SANDEL®

SG102 AHRS
Installation/Calibration Utility

User Guide

Rev G, 09/30/2014

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2 Revision History

Revision	Date	Comments
G	09/30/2014	A/R 1572 Software was 2.70 Added "Unknown SG102 Version" error message
F	08/25/2014	A/R 1560 Software was 2.60
E	03/06/2014	A/R 1472 addition of ARINC speed selection for Mod 2 and later hardware, software version 2.60
D	03/15/2010	A/R 1112 Software was 2_30
C	11/10/2009	A/R 1098 Software was 2_20
B	9/21/2009	A/R 1092 Software was 2_00
A	7/22/2009	A/R 1071; Initial Release Version 2.0

3   Introduction

The SG102 AHRS Installation/Calibration Utility version 2.80 and higher is a Windows application program which runs on a laptop or PC. When used in conjunction with the SG102 Maintenance Adapter it uses the computer's USB port to perform the mount position selection and compass alignment of the SG102/MT102 system after installation in the aircraft.

The software works with all versions of SG102. Where a specific step is version-specific, this will be noted in the instructions.

For SG102 software version 1.26 or later, this utility performs a 2-step coarse-fine calibration. This enhancement allows improved performance when operating in more difficult (i.e. highly magnetized) airframe environments.

For SG102 Mod 2 or later hardware with software version 1.50 or later, this utility presents the option for ARINC 429 High Speed.

The final system calibration values are stored in a configuration module physically located in the MT102. This calibration data is retrieved every time the SG102 system powers up. In the event of an SG102 replacement the calibration data stays with the aircraft and therefore realignment of the SG102 is not required.

> Note: The SG102 Maintenance Adapter Windows Drivers must be installed on the PC first. See the Maintenance Adapter User Guide.

3.1   Related Information

Description	SPN
SG102 Maintenance Adapter	82132
SG102 Maintenance Adapter Users Guide	82132-UG
USB Cable	88114
SG102 Installation CD	82011-INCD
SG102 Installation/Calibration Utility	82011-ICU
MT102 Maintenance Extension Cable Drawing	88128-10

# 4   Installing the Software on your PC

1) On your PC, create a directory in "C:\" called SG102Install.

2) Copy SG102Install_v2_XX.exe into that directory.

3) Navigate to C:\SG102Install in Windows Explorer.

4) Create a folder called "Reports" in the C:\SG102Install folder. To do this, right-click anywhere within the C:\SG102Install folder and select "New->Folder" from the drop-down menu. Rename the "New Folder" to "Reports".

5) Right click on the SG102Install_v2_XX.exe icon and select "Create Shortcut" from the dropdown menu.

6) Move the shortcut icon to the PC desktop.

5 Connecting the SG102 AHRS Maintenance Adapter

1) Follow the instructions in the SG102 Maintenance Adapter User Guide for installation of the USB serial port drivers if this has not been done.

2) Ensure that the switch is in the IN ("NORMAL") position before powering up the SG102 for Installation/Calibration. The green LED in the switch will be OFF when the USB connector is attached and the switch is in this position. The switch must be in the correct position BEFORE the SG102 is powered up.

3) When the SG102 power is applied all 4 SG102 LED's will illuminate momentarily – then the Error LED will flash until the unit goes valid..
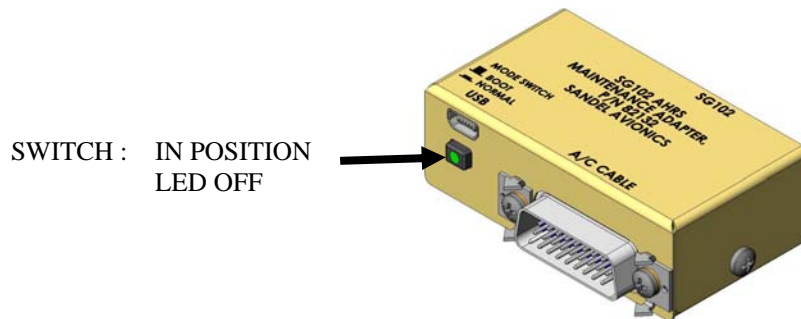
SWITCH :   IN POSITION
            LED OFF

LED's ALL ON MOMENTARILY.
If only POWER LED is on, recheck the
mode pushbutton switch.
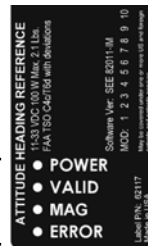
PROPER SG102 LED INDICATIONS

6   Startup Screen

6.1   Enter Shop Name and Aircraft ID

Note: This information needs to be entered only on the 1st pass through the program.

1) Double click the SG102 AHRS Installation/Calibration Utility shortcut icon on your desktop.

2) Enter the tail number of the aircraft and the shop name and installer name at the prompts. Click the "Next >" button to continue.


6.2   SG102 Communication

6.2.1   Establish Communication

Note: This information needs to be entered only on the 1st pass through the program.

1) This screen allows selecting the PC COM port for communicating with the SG102/MT102. If the SG102 AHRS Installation/Configuration Utility has been run before, it will automatically select the last COM port used.
2) If communication automatically establishes, proceed to section 6.2.2.
3) If communications does not automatically establish, then manually select the correct COM port for communicating with the SG102. If the correct port is unknown there is no harm in trying the different options until you find the right one.
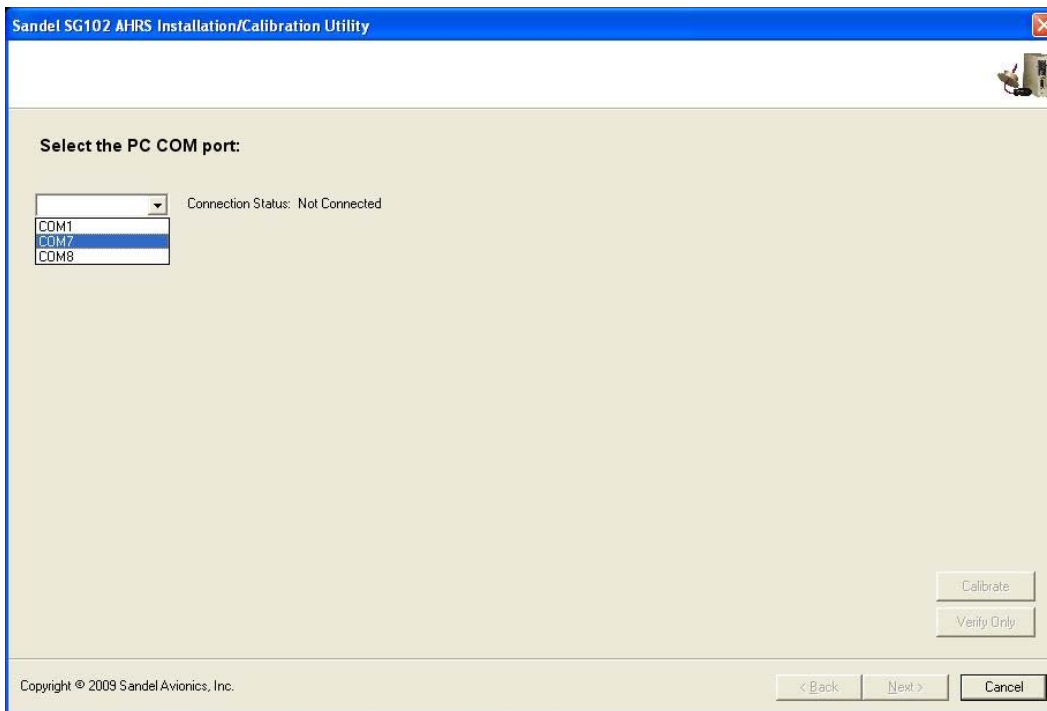
When the correct COM port is selected, the Connection Status changes to Connected.

If an error message "Unknown SG102 Version. Program will CANCEL..." appears, press the OK button to close the program and contact Sandel for assistance.

After establishing the connection, software version information appears for the SG102 and the MT102. Once connected, the following information appears:

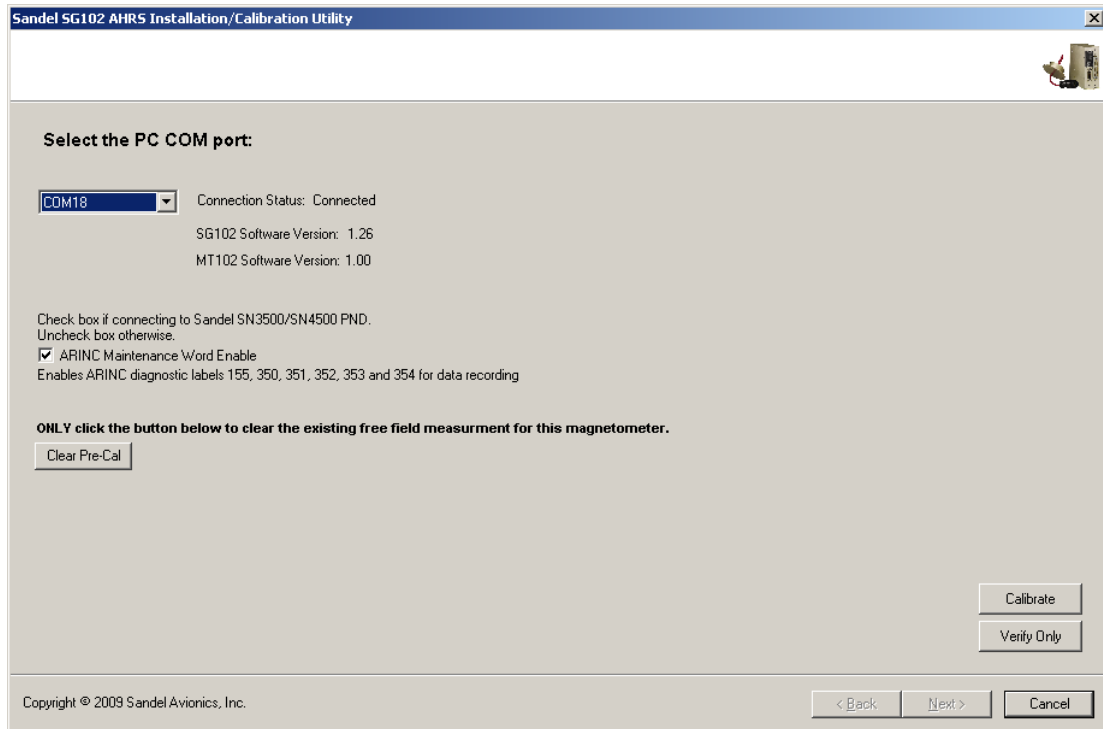### 6.2.2 Select ARINC 429 Speed (Hardware Mod 2 and Later):
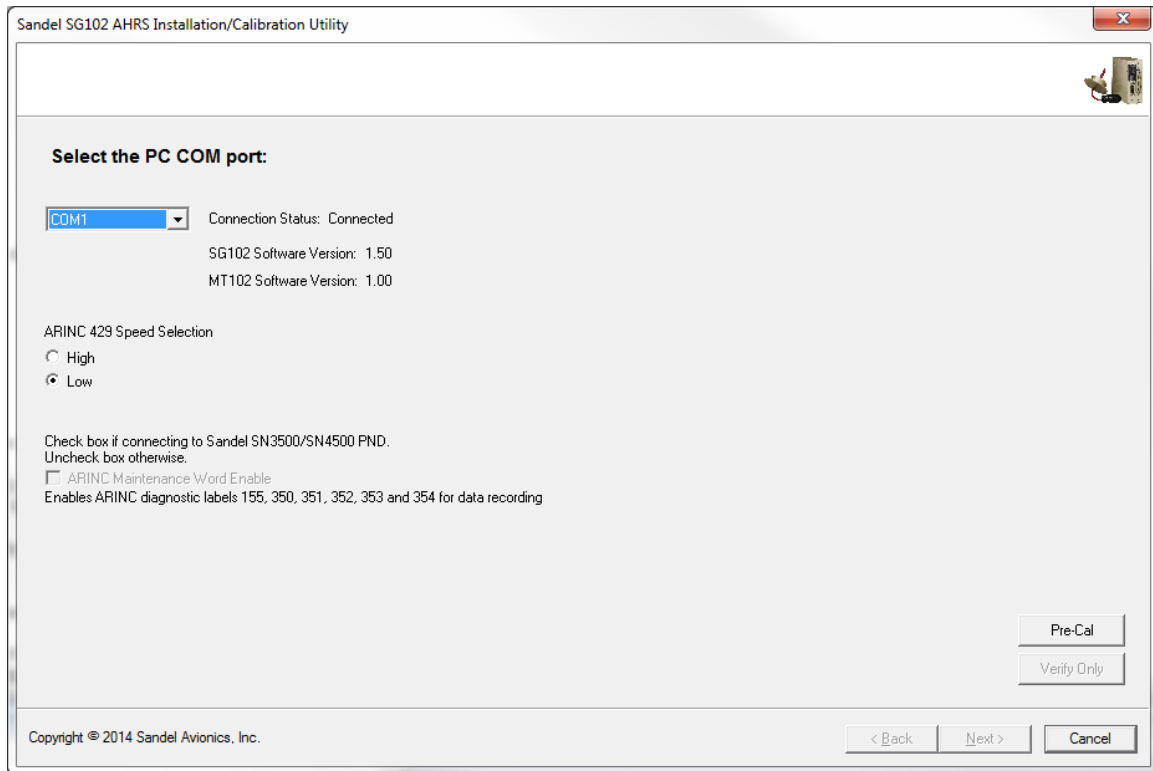
For Mod 2 hardware and later, the High speed 429 option is available and may be selected.

Factory setting is Low speed.

Units prior to Mod 2 only support Low speed.

6.2.3   Check ARINC Maintenance Word Enable (1.25 and later):

> **Note:** For SG102 Software before 1.25 the ARINC checkbox does not appear.

Check this box if connected to a Sandel SN3500/SN4500 PND. This adds debugging labels to the SN3500/4500 data recording systems.

Uncheck this box if not connected to a Sandel SN3500/SN4500 to suppress these labels.

6.2.4   'Clear Pre-Cal' button (1.26 and later)

This button is normally not used. It appears on the 2nd pass through the program after the Pre-Cal procedure has been completed. Clicking this button will clear the previous Free Field measurement file if it is desired to repeat the free field measurement for any reason.

6.2.5   "Pre-Cal"

This button appears if the Pre-Cal has not yet been done. Proceeds to the Pre-Cal procedures.

6.2.6   "Calibrate"

This button appears after Pre-Cal has been done. Proceeds to the Calibrate procedures.

6.2.7   "Verify Only"

This button is normally not used. It allows you to verify an existing calibration without changing anything.

7 Pre-Cal Procedure (MT102 Unmounted)

7.1 Make the MT102 Free Field Measurement

This step is performed after the SG102 is installed but prior to final mounting of MT102. It is an off-aircraft measurement of the local magnetic field that is made using the Maintenance Extension Cable.

> **Note:** The MT102 may be connected/disconnected with the SG102 power on.

1) Attached the MT102 extension cable.
2) Place the MT102 on a level surface away from the aircraft, stray magnetic fields, concrete rebar, etc. For instance, the MT102 may be placed on a board laid across the top of a large plastic bin, cardboard box, or any suitable non magnetic surface. The MT102 must be level at a height of approximately 3' off the ground or higher.
3) Click the "Execute" button.
4) After the measurement has been made, the data will be displayed.
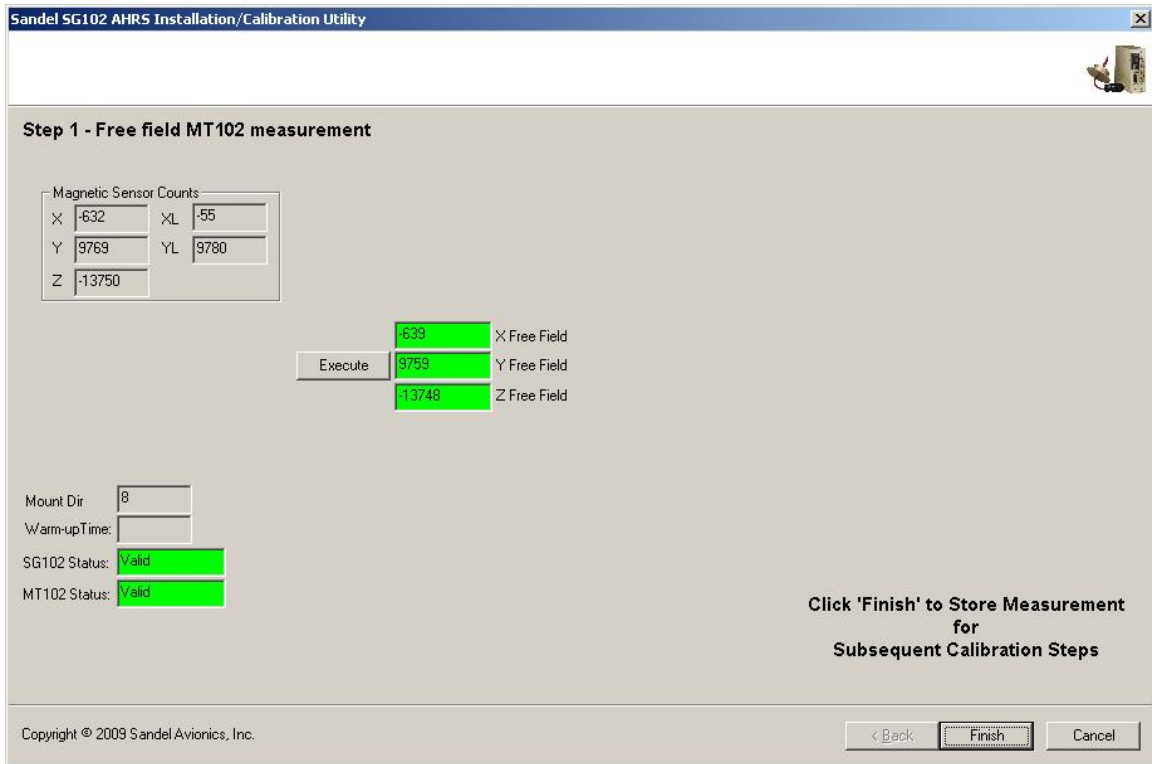
5) Click "Finish" to store the measurement to the PC.
6) The program will now exit.
7) The PC and SG102 may now be shut down.

7.2 Mount the MT102 in the aircraft

Disconnect the Maintenance Extension Cable and install the MT102 in its final position in accordance with the Installation Manual.

8 Calibration

8.1 Notes on Aircraft Configuration

All calibration steps are performed in the aircraft with the engine power and electrical loads as indicated below to ensure the magnetic environment during compass rose calibration matches as closely as possible the magnetic environment during flight.

1) Ensure that the SG102 AHRS Maintenance Adaptor (PN 82132) is securely attached to the SG102.

2) Battery Master switch should be ON.

3) Engine(s) should be running (see step 8).

4) For Helicopters, rotor must be engaged and spinning (for those with a rotor clutch).

5) Avionics master switch ON.

6) All available avionics equipment ON. In addition, rotating beacon and strobe lights should be ON.

7) Typical engine operation. The purpose is to ensure that test conditions are similar to flight conditions.

   - Jet Engines at idle.
   - Turbine aircraft at 60%.
   - Piston aircraft at 1800 RPM.
   - Rotor Speed no less than 30%-40%

8.2 Taxi to the Compass Rose

Proceed to a calibrated Compass Rose or compass calibration location at least 100 feet from large metal objects such as: fuel trucks, aircraft tugs, metal buildings, high power lines and transformers and underground fuel tanks. A calibrated, handheld sight compass is strongly recommended for this procedure. It is essential to align the aircraft precisely at each calibration point.

8.3 Perform Calibration

8.3.1 Re-establish PC Communications

Start up the PC and the Installation Utility. Communications with the SG102 should re-establish. When this occurs the MT102 Free Field measurement previously recorded will be retrieved and the Calibrate button will proceed to the Mount Direction screen.

8.3.2   Select SG102 Mount Direction
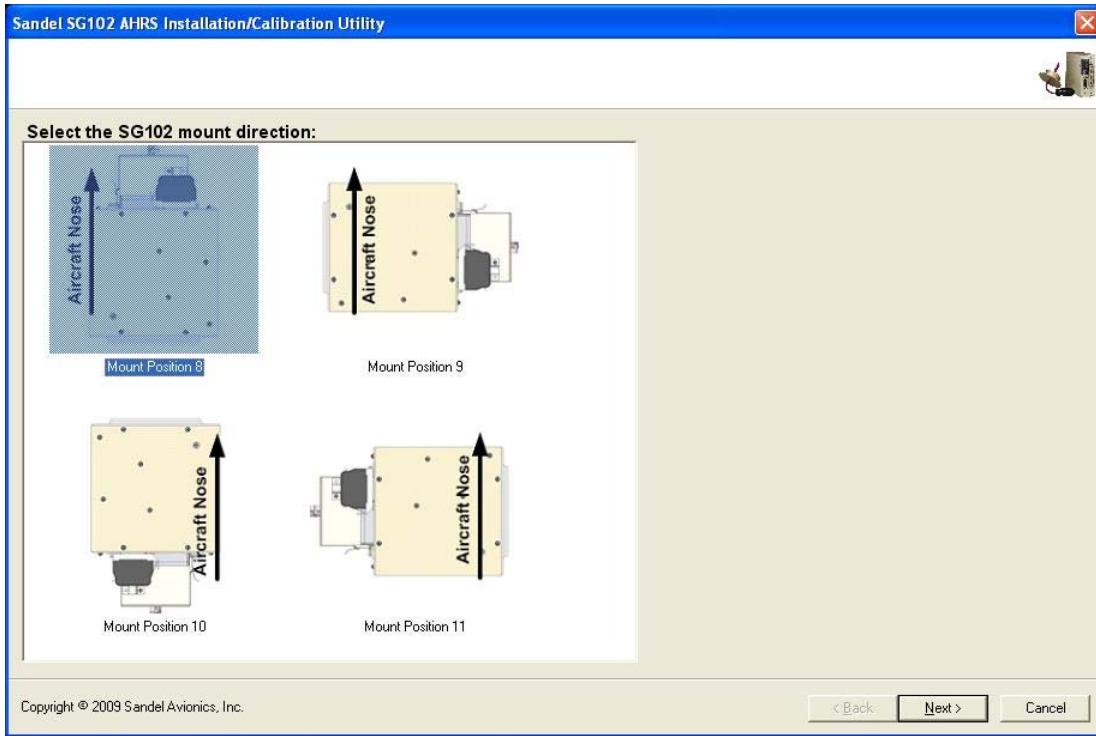
1) Select the mount orientation by clicking on the appropriate picture.
2) Click "Next >" to continue if mount position was not changed.
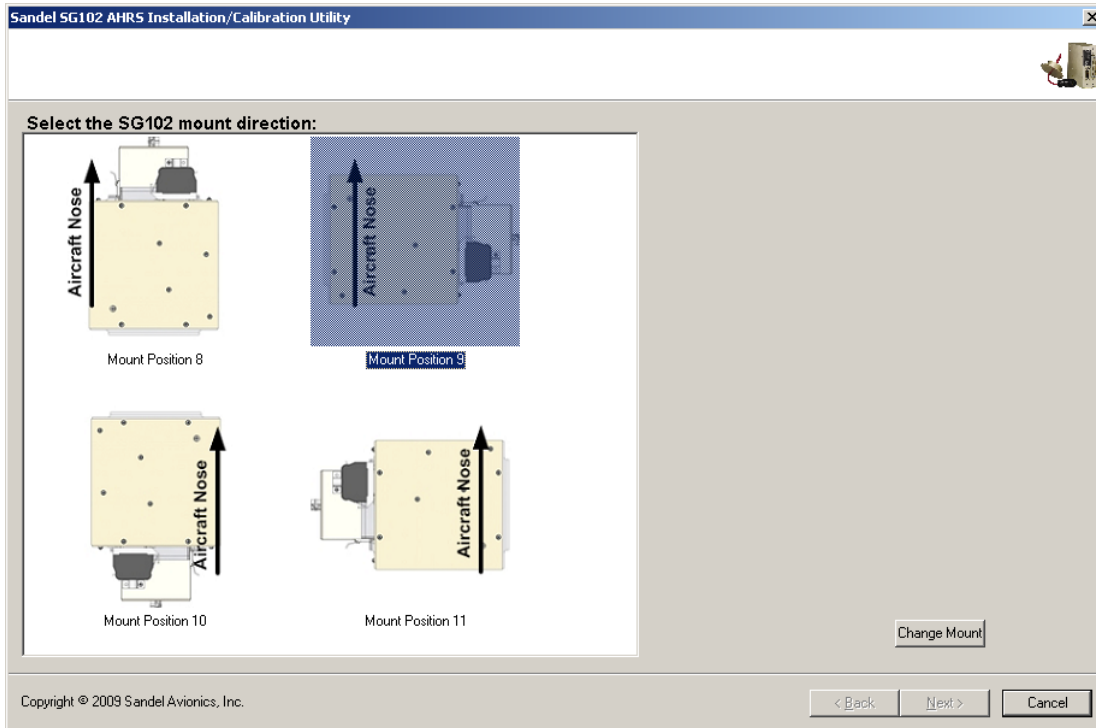
3) If the mount position selected has changed, click "CHANGE MOUNT".
4) Follow the on-screen instructions.
5) The program will ask for the SG102 power to be turned off.
6) After turning the power off, wait for the screen prompt before turning power back on.

**Note:** After recycling the power the SG102 Status window will turn red (invalid) for approximately 2 minutes. The approximate time to valid will show in the "warmup time" window on the following screen. Do not move the aircraft.
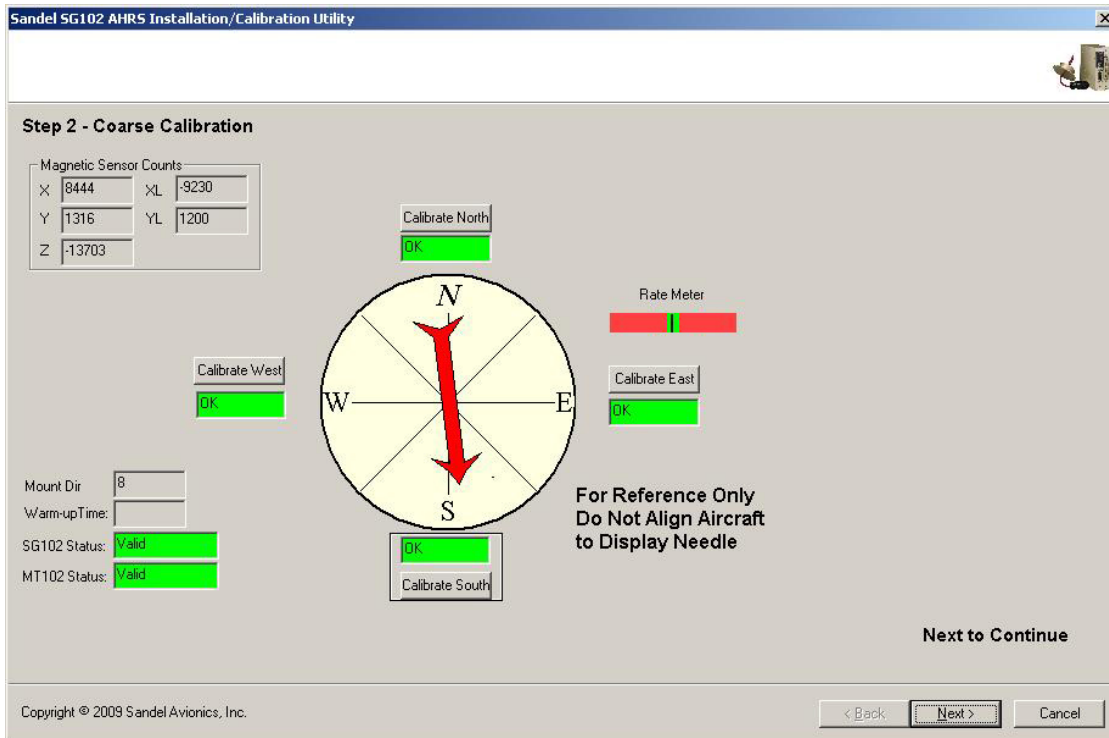
8.3.3   Coarse Calibration (1.26 or later)
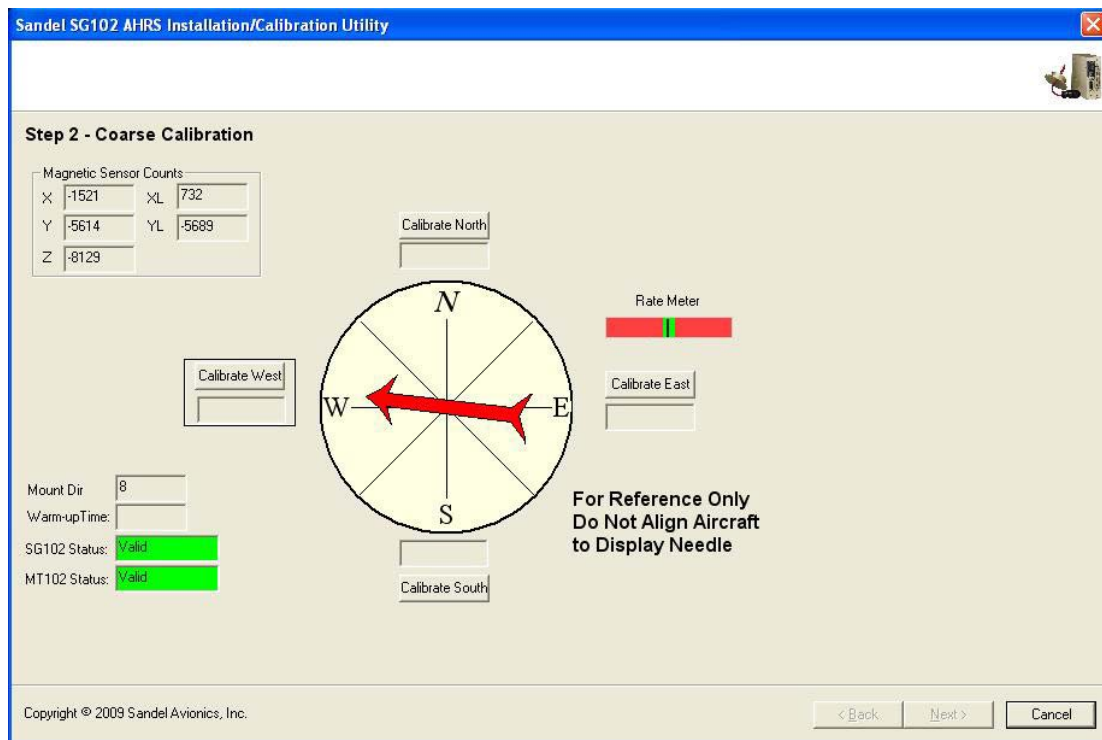
1) Establish the aircraft configuration and power settings previously specified.

2) Physically point the aircraft precisely to one of the cardinal headings.

3) The PC will show the MT102 reading. This is reference information only – it will show any magnetic errors.

4) Use the compass rose or sight compass to align the aircraft.

   Note: The calibration at the cardinal headings can be done in any order.
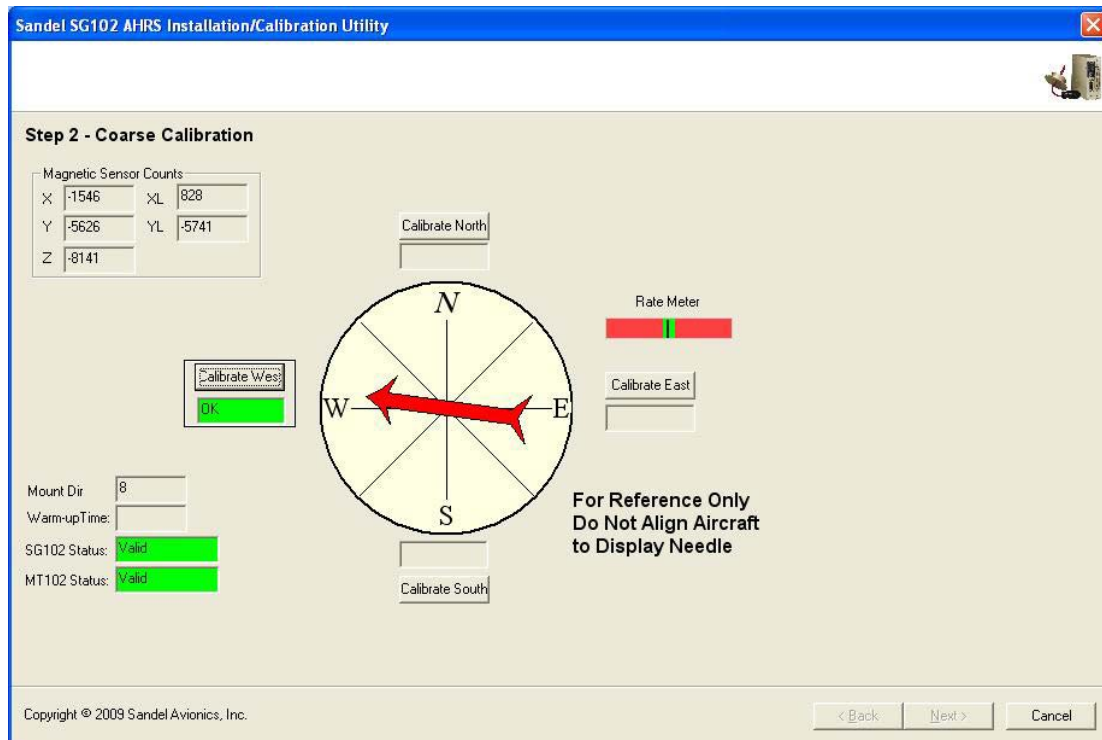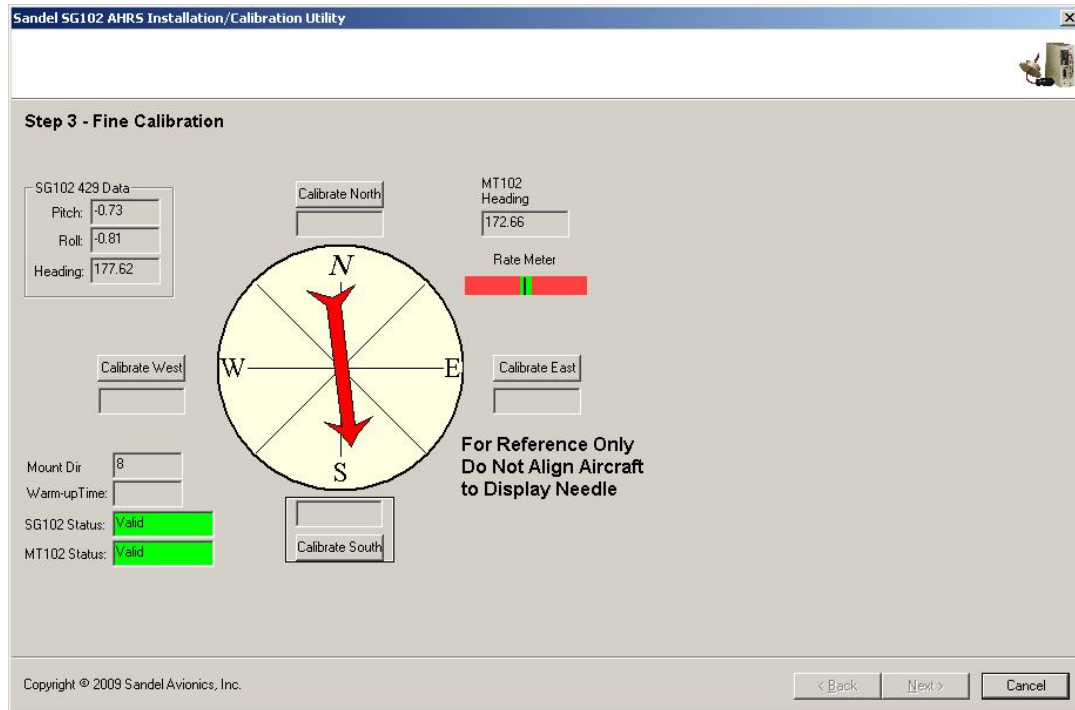
5) Wait until the Rate Meter is in the green and then click the appropriate "Calibrate" button .

6) The button will turn green and 'OK' appears in the text box.

Note: The compass pointer will <u>not</u> change position.

Step 2 - Coarse Calibration

Magnetic Sensor Counts
X 8444   XL -9230
Y 1316   YL 1200
Z -13703

Calibrate North
OK

Rate Meter

Calibrate West
OK

W   E

Calibrate East
OK

Mount Dir   8
Warm-upTime:
SG102 Status: Valid
MT102 Status: Valid

S

OK

Calibrate South

For Reference Only
Do Not Align Aircraft
to Display Needle

Next to Continue

Copyright © 2009 Sandel Avionics, Inc.   < Back   Next >   Cancel

7) Repeat the steps for the other 3 cardinal headings.

8) After successfully collecting data at the four cardinal headings, all will be green. Click "Next >" button to proceed to Step 3 – Fine Calibration.
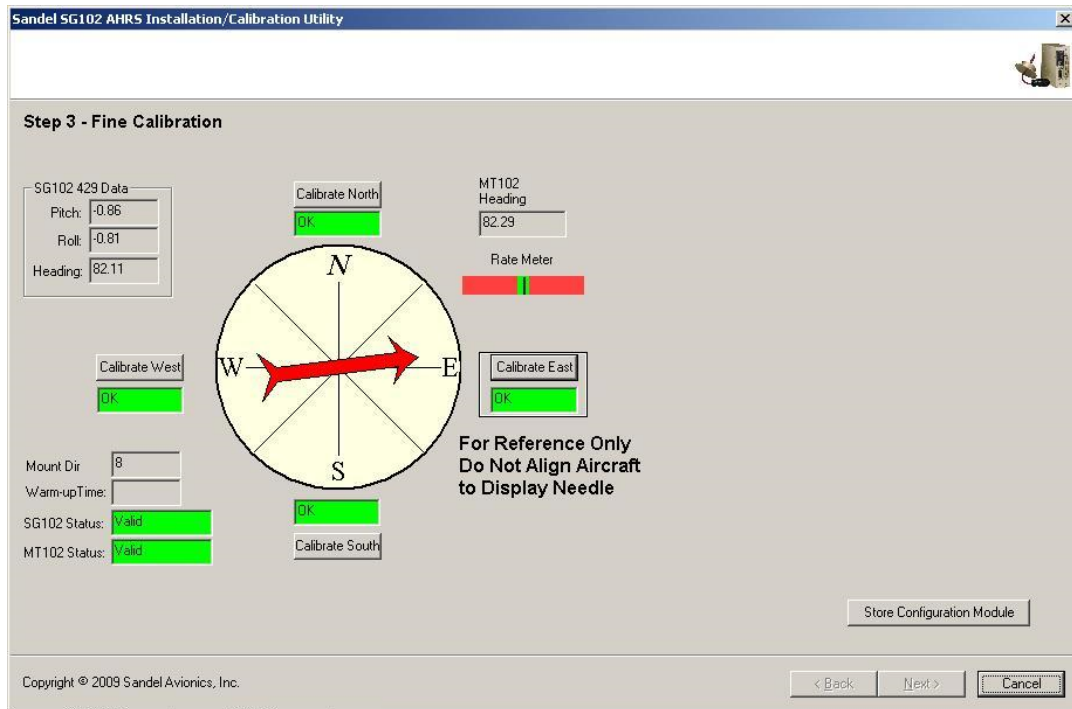
8.3.4 Fine Calibration

1) Physically point the aircraft precisely to one of the cardinal headings.

2) The compass pointer on the PC will now show the MT102 readings *with the coarse calibration applied*. This is reference information only – it still shows magnetic error left after the coarse calibration.

> **Note:** The fine calibration at the cardinal headings can be done in any order.

3) Use the compass rose or sight compass to align the aircraft.

4) Wait until the Rate Meter indicator is in the green and click the appropriate "Calibrate" button.

5) The button will turn green and 'OK' appears in the text box.

> **Note:** The compass pointer will <u>not</u> change position.

6) Repeat the steps for the other 3 cardinal headings.

7) Click "Store Configuration Module" to store the calibration data to the MT102.

Note: "Cancel" is normally not used. It provides a way to abandon all calibration data and exit the program.
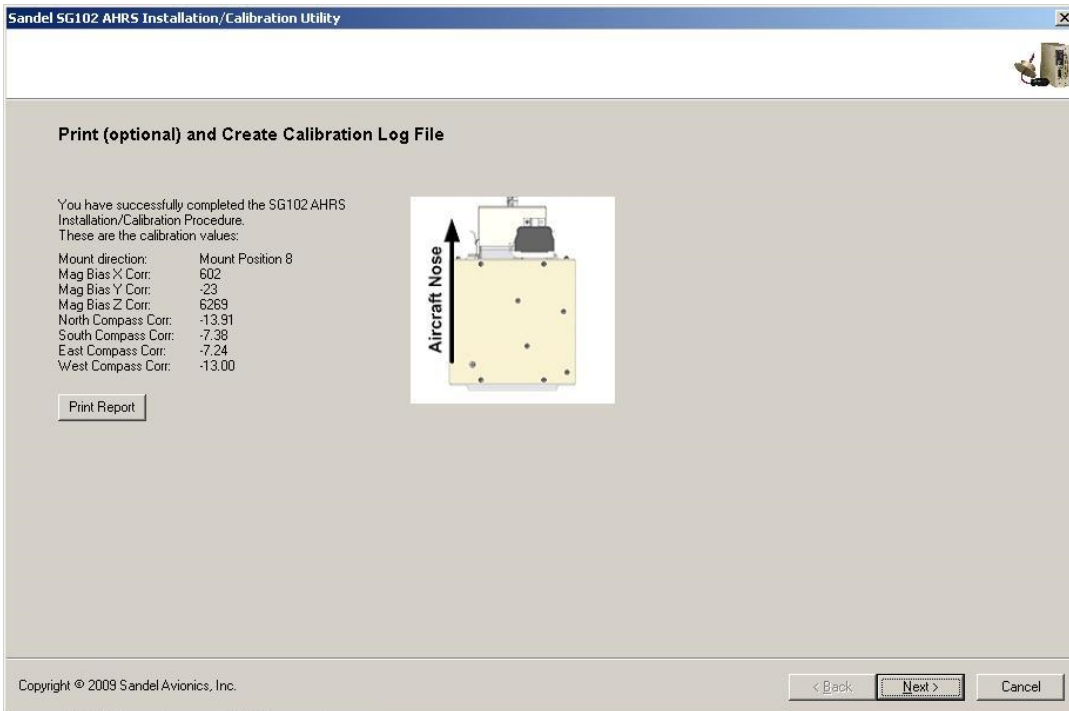
8.3.5 Lattitude and Magvar (1.10 and earlier only)

Enter the home airport Latitude and Magnetic Variation.

8.3.6 Create Log File

This step allows you to view the calibration results, and store to a log file. In the unlikely event a printer is available it will also allow a printout to be made.

Note: The log file is a simple text file which may be printed at any time.

1) Click "Print Report" if a printer is available.
2) Click "Next >" to store the calibration log file and proceed to the Verification step.
3) When the "Next >" button is clicked, a file browser appears
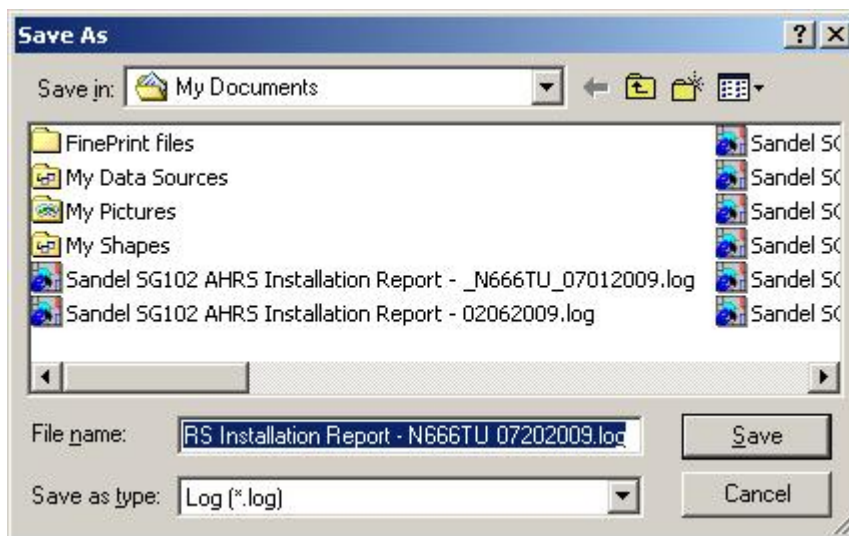
4) Navigate to the location where you would like to store the calibration log file, and click the "Save" button to store the calibration log.
5) Clicking "Cancel" will abandon the log file. This is not advised as a permanent record will not be kept.

8.4   Verification – Calibration Complete

The purpose of the final step is to verify the ultimate calibration. The compass system may be checked at any heading. The pointer now shows the MT102 *with both coarse and fine calibration values applied*.
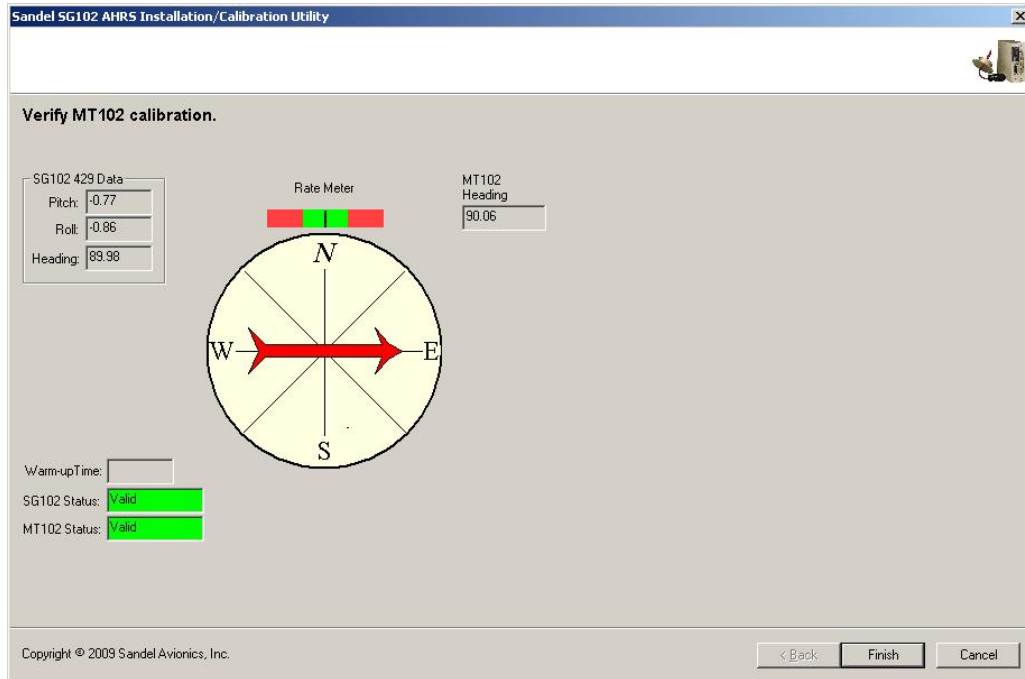
9 For Further Assistance

For further assistance with this procedure, please contact Sandel Product Support:

Phone: 877-726-3357 or 760-727-4900 ext. 2
Email: support@sandel.com