StripeMaster 2 Touch Reference Manual

70289 Revision B

This manual describes the operation of the RoadVista StripeMaster 2 Touch pavement marking retroreflectometer.

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Introduction

The RoadVista StripeMaster 2 Touch (SM2T) measures the coefficient of retroreflected luminance (R_L) of pavement markings per ASTM E1710 and EN 1436. In addition, the StripeMaster 2 Touch allows the user to record detailed information about the stripe and its location on the road for complete inventory management systems

The light sensor meets ASTM E1710 and EN 1436 requirements with the CIE standard human eye response in conjunction with the CIE illuminant “A” lamp. The instrument accurately measures all line colors without the need to calculate correction factors.

The readings are taken locally, or remotely using a tablet or laptop. It maintains all readings in internal memory and can record individual readings or an average of multiple readings.

For each data point, the SM2T also records the following items with each sign:

- Global Positioning System (GPS) coordinates.
- Current date and time.
- Temperature and humidity
- Location on the road
- Line color
- Line width
- Pass/Fail values
- User comments

The internal memory has the capacity to store readings and accompanying data for 25,000 measurements (500 records per file, with 50 files total). The memory is non-volatile and remains intact when the unit is off.

The date and time clock is set for Coordinated Universal Time (UTC), but may be set for local time. An internal Bluetooth transceiver can be enabled to allow communications with other Bluetooth devices via the standard Serial Port Protocol (SSP). This allows wireless expansion of the instrument’s capabilities, such as sub-meter-accuracy GPS or full remote operation via an Android or Windows 8 tablet, and is limited to only what is available on the market.

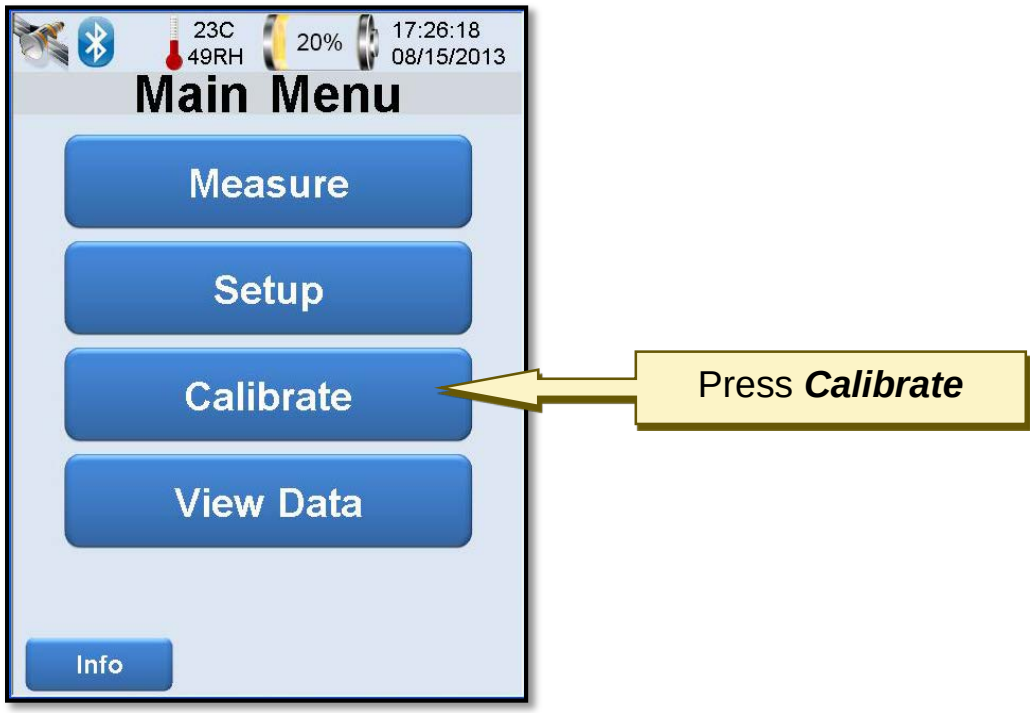
Data may be uploaded to a Windows-based computer using the Graphical User Interface (GUI) that comes with the SM2T. Uploading is accomplished through a USB interface, and stored in ASCII delimited format, keyhole markup language (KML), or shapefile format.

Definitions

- ***Record*** – A group of data that represents the retroreflection value and various attributes of an object at a single location. A ***Record*** may be composed of an average of 1 or more ***Measurements.*** A ***record*** is contained within a ***file,*** and inherits the attributes of the ***file.***
- ***File –*** A group of data that consists of 1 or more ***records***, along with attributes that are common to all the records within the file.
- ***Measurement –*** A single retroreflection reading used in a ***record.*** Depending on whether record averaging is selected, 1 or multiple ***measurements*** will be used to determine the retroreflection value of the ***record.***

Quick Start Guide

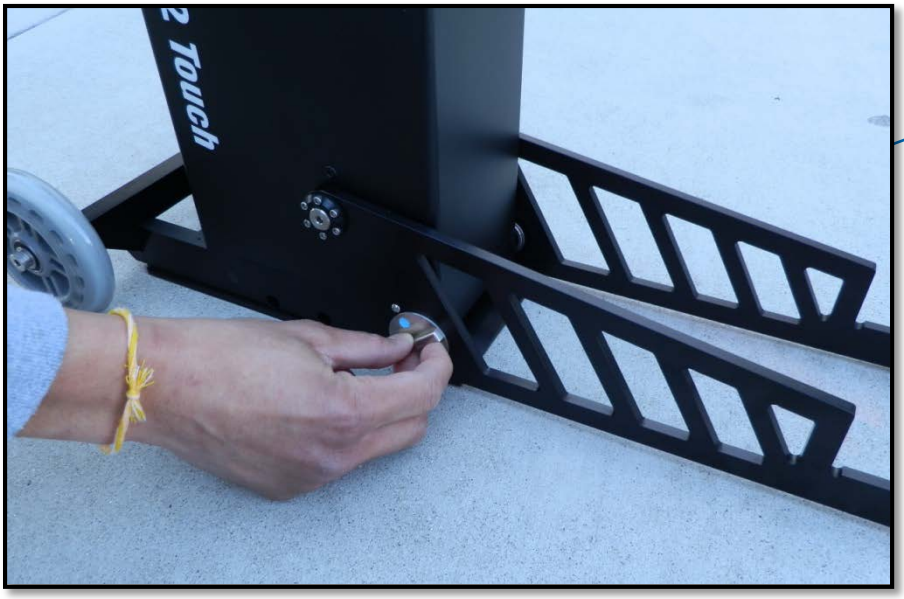
Turn on the Stripemaster 2 Touch, and wait until this screen is displayed.



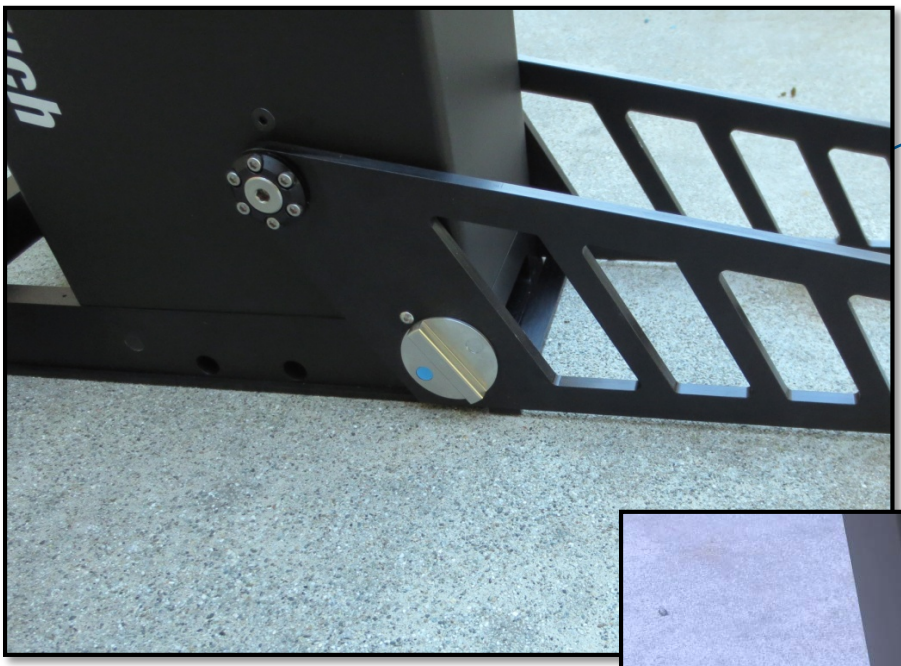
Orient the handle to desired position.

Push down firmly on the handle to unlock mechanism and twist.

Unfold and Lock Foot Assembly:



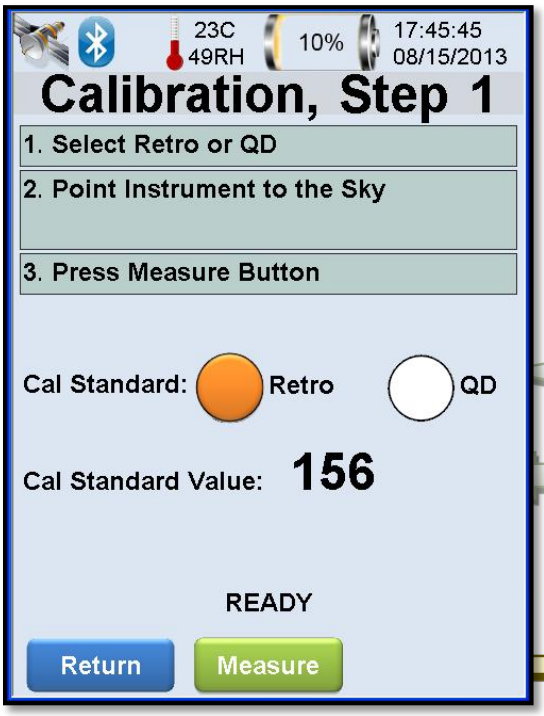
Align blue dots to screw as shown prior to folding down foot assembly.



Once foot assembly is correctly positioned, twist both dials to lock in place.
Rib on the Dial shall align with the screw.
Dial to rotate counter-clockwise (on the side shown to the left) and clockwise on the other side of foot assembly, see below).

Calibrate the Unit, Step 1:

Point instrument to the Sky. The calibration block should NOT be installed. This first step should be taking a measurement of nothing.



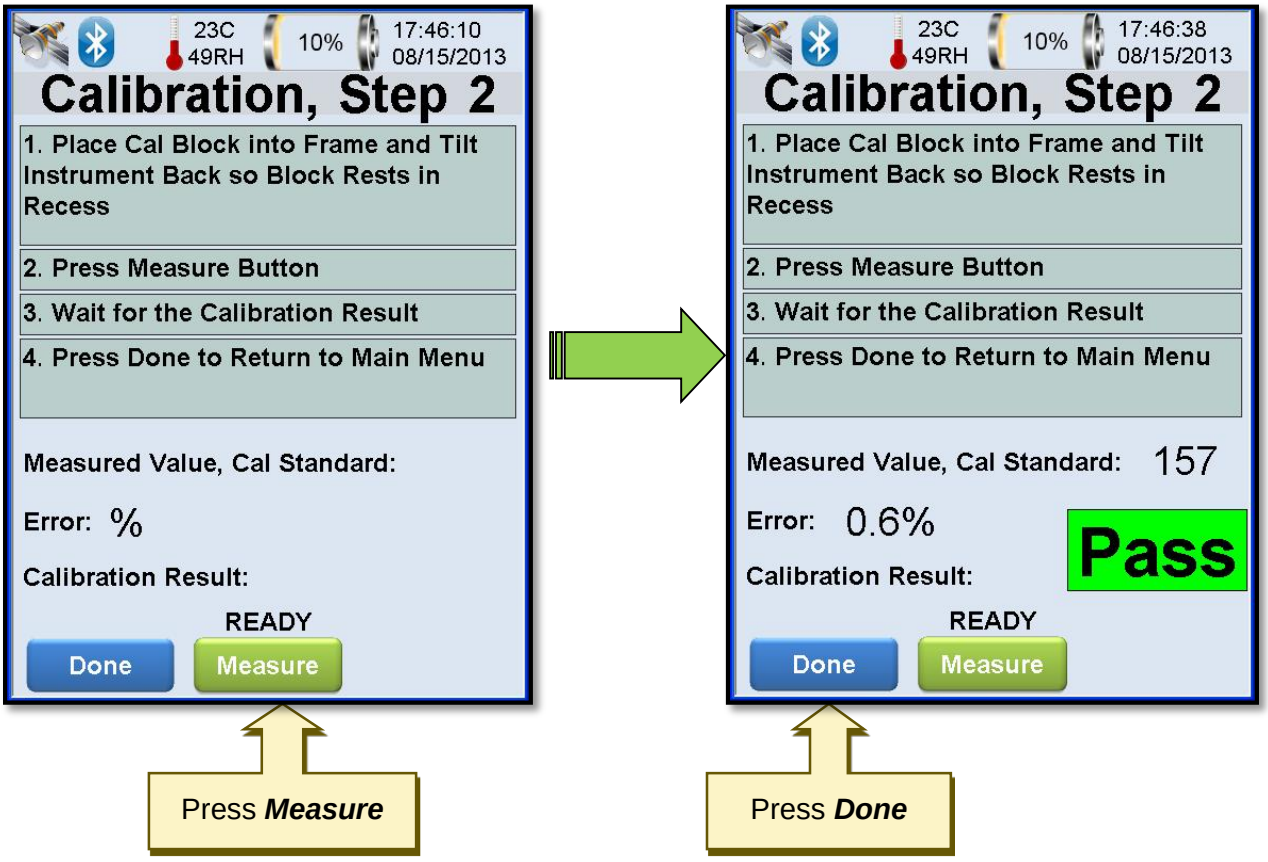
Make sure ***Retro*** is selected

This value should match the value of the included calibration

Press ***Measure***

Calibrate the Unit, Step 2:

Install the calibration block into the foot assembly, and make sure the foot assembly is locked in the down position.



Press ***Measure***

Press ***Done***

The lamp will flash twice. If the calibration was successful, the green "**Pass**" box will be displayed. If unsuccessful, a red **"Fail"** box will be displayed. The user can press the "Measure" button again until an acceptable result is obtained.

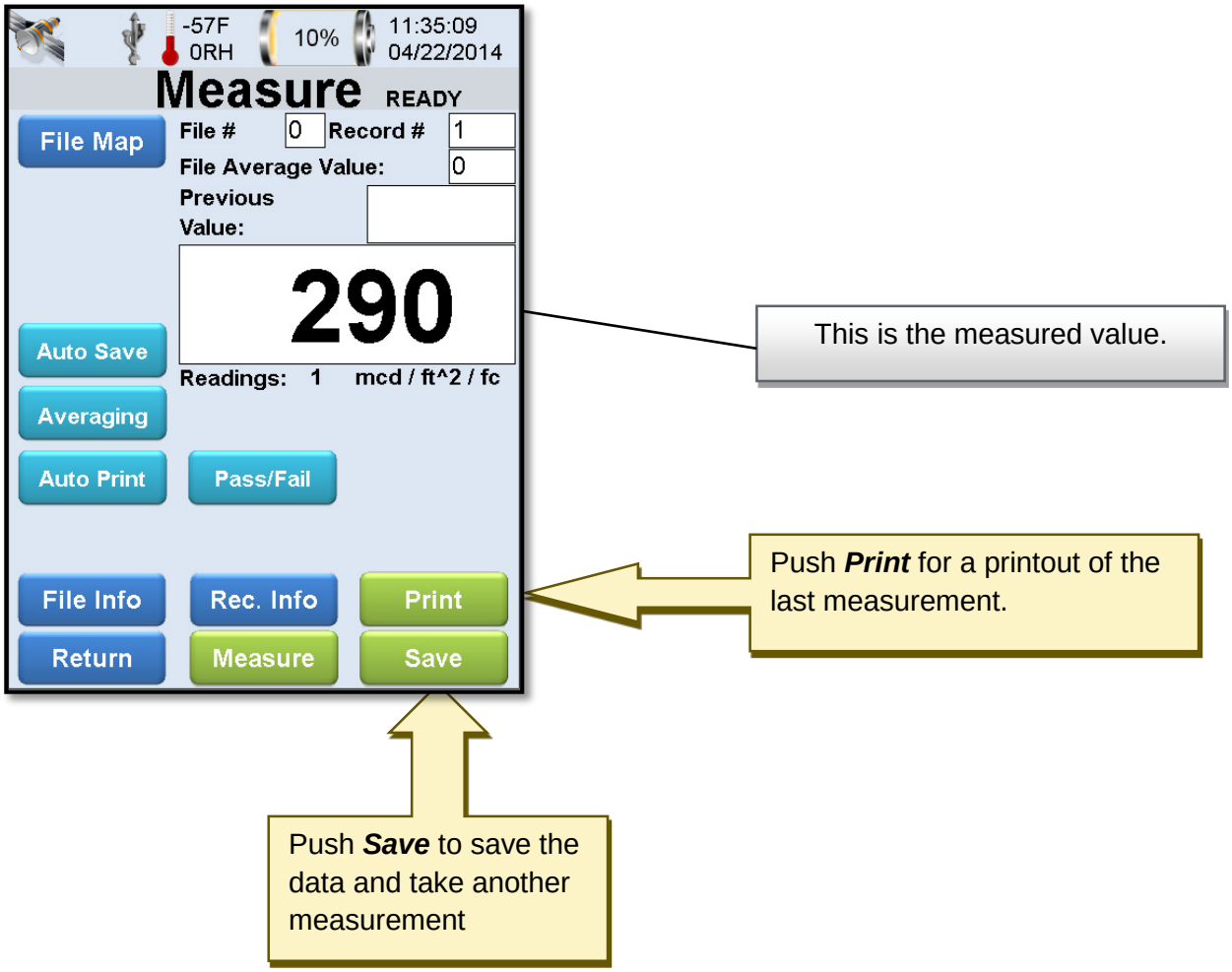
Take a Measurement:

Press ***Measure***

Position the StripeMaster over a road marking. The actual area of measurement will be approximately 2 feet in front of the glass window.

Press ***Measure***

The State of the Measure Screen after the measurement is taken:

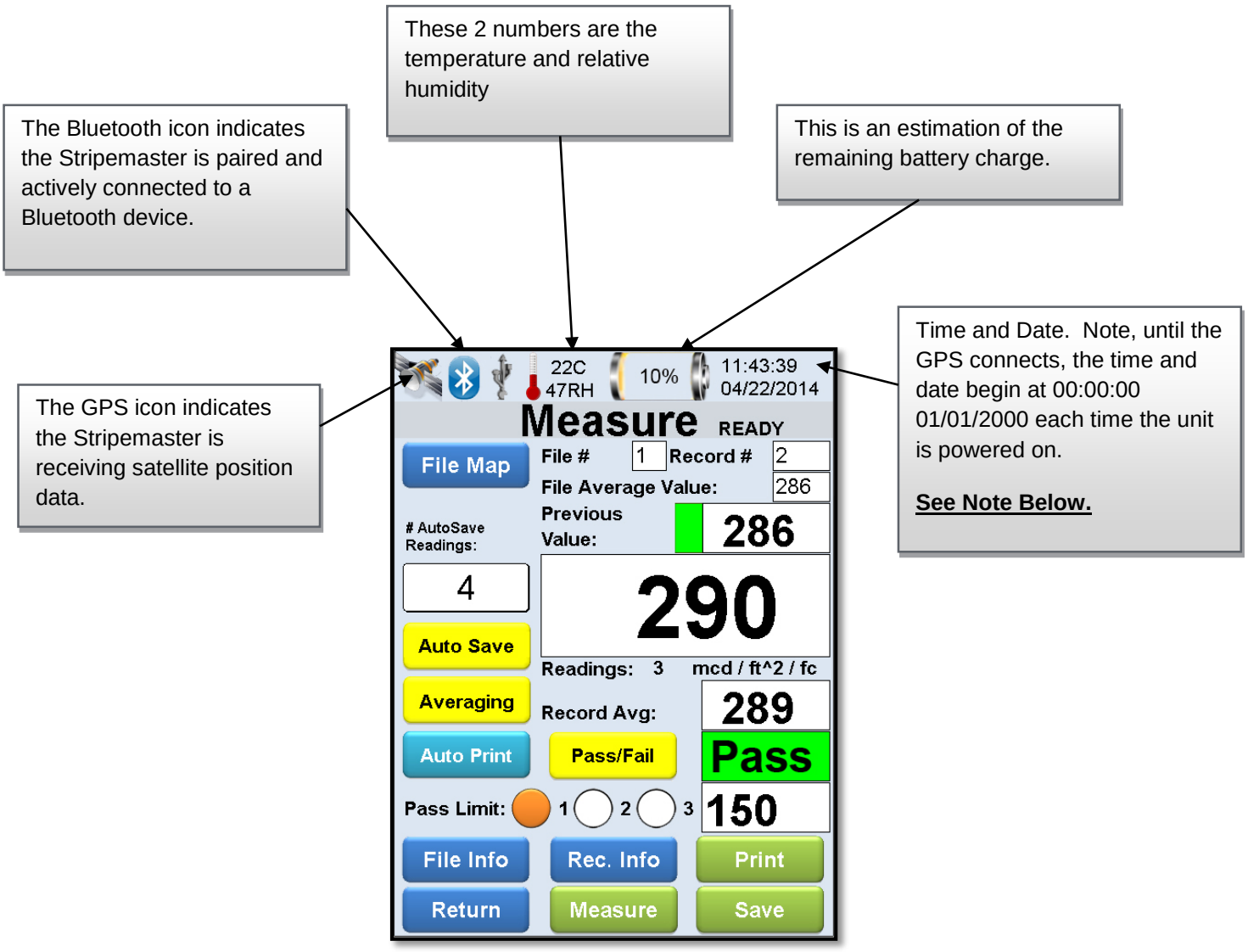


Installation of Wheels

If desired, wheels can be installed so the StripeMaster can be rolled around. Magnets hold the wheels in place and allow for easy removal.

Top Information Bar Details

The information shown on the very top of the screen persists throughout most of the various pages.



Note: All New StripeMaster 2 Touch Instruments manufactured after September 06, 2013 will be shipped with an improved GPS module (equipped with a back-up electrical battery), which will allow to store and keep track of current Time and Date internally in GPS module. Each time the instrument is powered on, a correct Time and Date should be displayed.

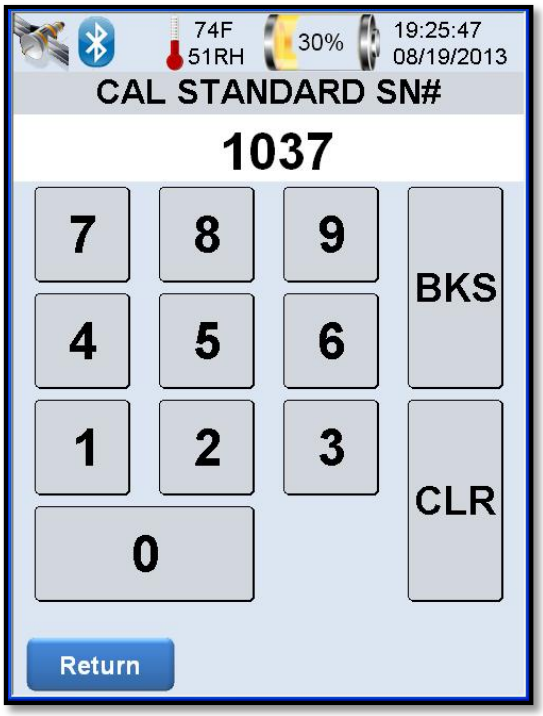
A back-up battery source for GPS Module has an estimated life time of 2 years and should be replaced during a regular Service / Maintenace at the factory on the annual basis.

Keypad: Numeric

Many User Interface screens on Touch Display allow user to enter information via the On-Screen Keypad. Figure below shows the example of the Numeric Keypad on the Stripemaster2 *Touch* which can be invoked by touching an Editable field on the Touch Screen. For example, two fields on the ***Setup: Calibration*** screen (Field *Cal Standard Serial#, and Field Cal Value*) are editable. Touch the screen in the area of the field to invoke the Numeric Keypad.

Besides ten numeric keys, there are **three** functional buttons on the screen:

Backspace (BKS)	-	Press to delete ONE (last) characters in the Field,
Clear (CLR)	-	Press to delete all input characters, and
Return	-	Press to save input text/Numeric values and Return to the previous screen.



Note: All Editable Fields have pre-set Maximum Length, which prevents user from entering more characters than allowed by the design of the User interface.

Keypad: Alpha-Numeric

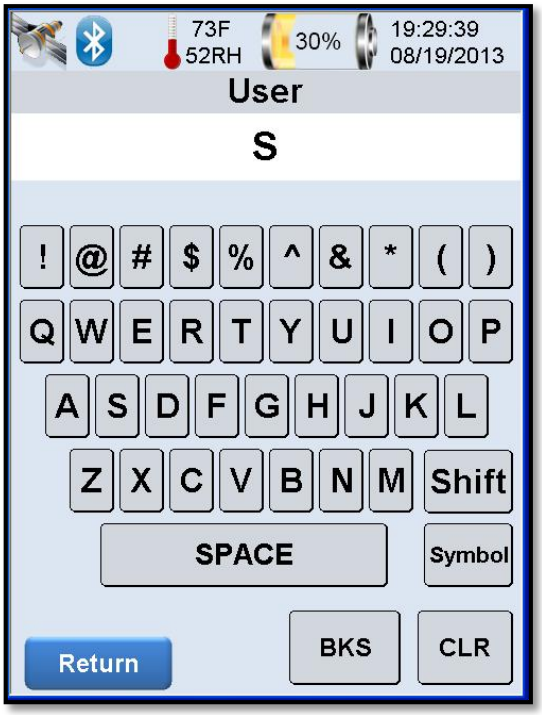
Some Fields in the User Interface do allow entering Letters, Digits, and Special characters all from the same Keypad.

This particular type of Keypad has **Five Control Keys**:

Shift	-	Allows to switch keypad between Capital and Small letters,
Symbol	-	Press to invoke page with Symbols,
ASCII	-	Press to return from Symbols to Alpha-Numeric Page
Backspace (BKS)	-	Deletes one (last) character in the Field /Text Box,
Clear (CLR)	-	Clears-out all input characters,
Return	-	Used to save input text/numeric values and Return to the previous screen.

Initial State of the Keypad

The Keypad is switched to Capital Letters and sub-set of symbols



Keypad: Alpha-Numeric (continued)

Press **Return** button to save the data and return to the previous page.

Calibration Standard/Block (shipped with the Instrument)

Every Stripe Master Instrument is supplied with the Calibration Block (Cal Block).

The Calibration Block shall be used on a daily basis (when Instrument is in use) to calibrate the instrument and verify performance.

It is very important for the Customer to handle the Cal Block with care and to store it accordingly. The Figures below describe the features of the Cal Block:

Calibration Factor / Value is printed on the top cover of the block:.

A Serial Number of the Block is printed on the decal.

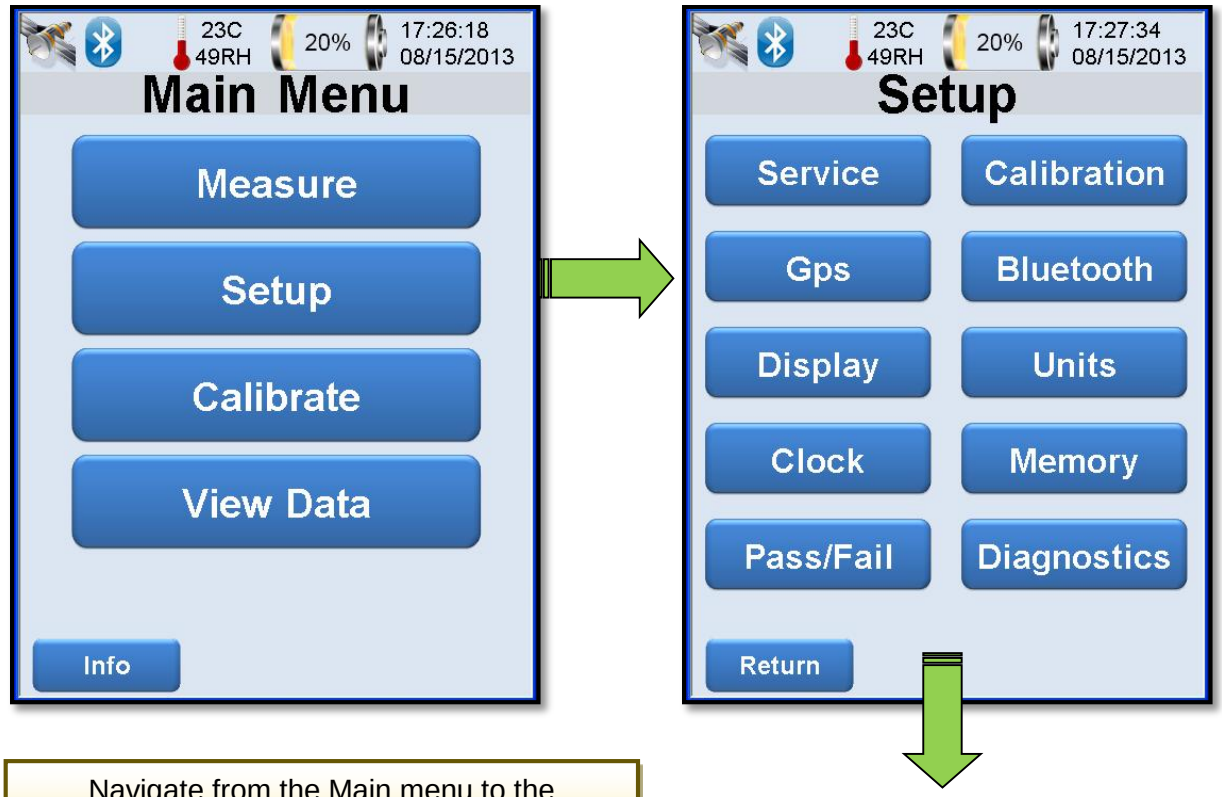
The White Reflective Material inside the Block is very sensitive to contamination.

Always orient it **toward the Instrument** while performing Calibration.

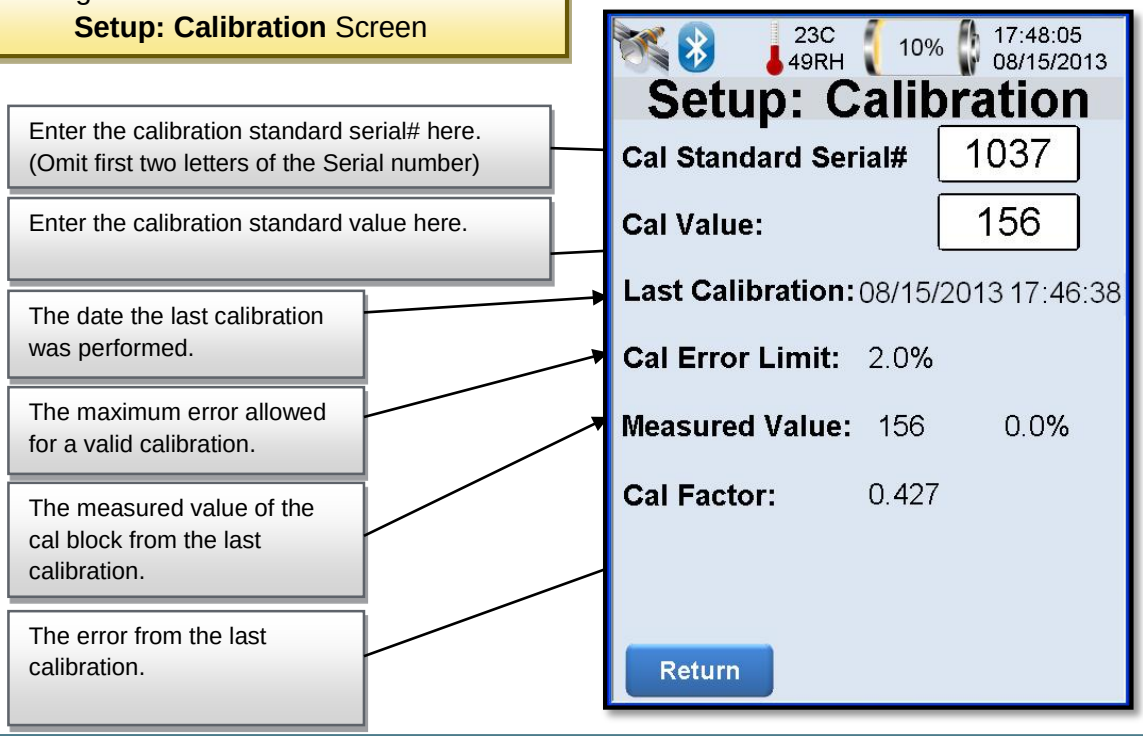
Calibration procedure:

The Instrument should be calibrated at the beginning of the day before use. A standard calibration block is included with the Instrument for this procedure.

Preparatory Step: Enter the standard calibration information into the StripeMaster.

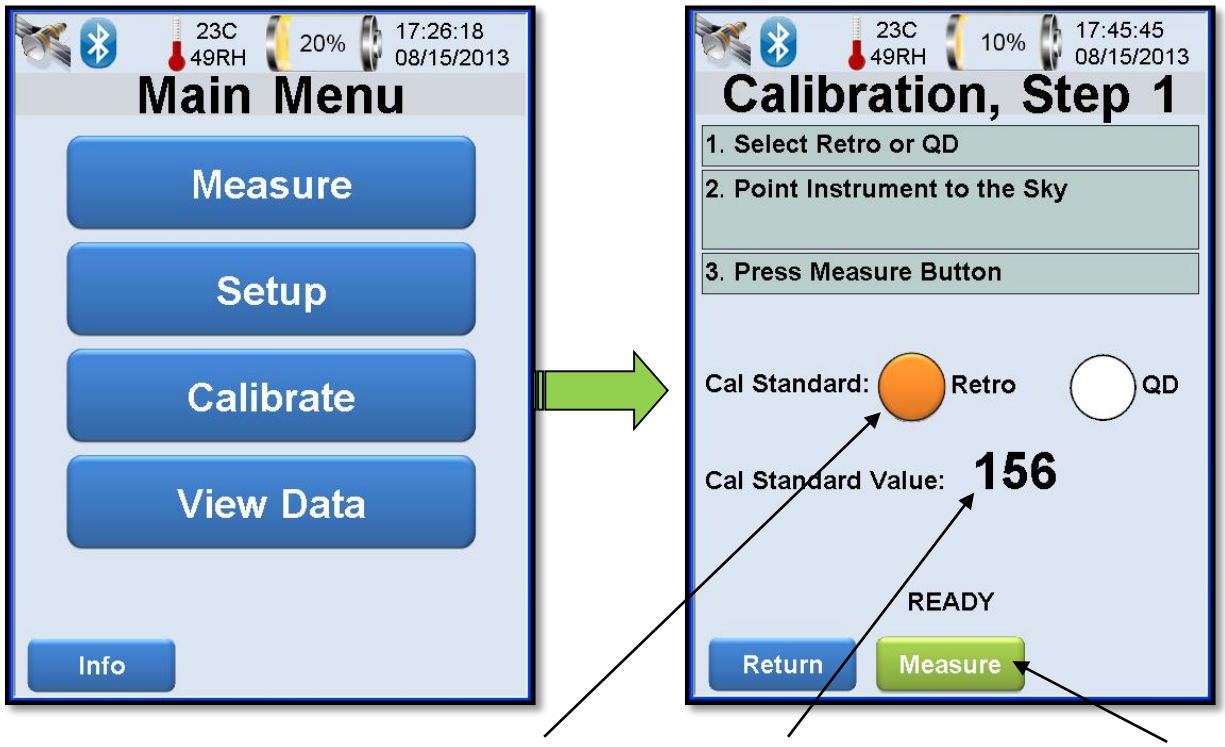


Navigate from the Main menu to the **Setup: Calibration** Screen



Calibration Step 1: Do a "Dark" Reading

Orient the Stripemaster such that the flash output is pointing to the sky.



Navigate from the main menu to the Calibration Screen

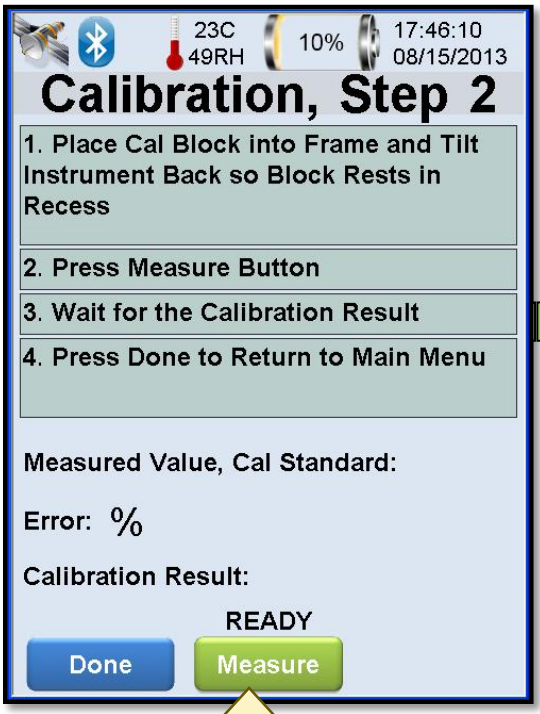
For standard Retroreflection measurements, select ***Retro***

The value entered in Setup will be displayed here:

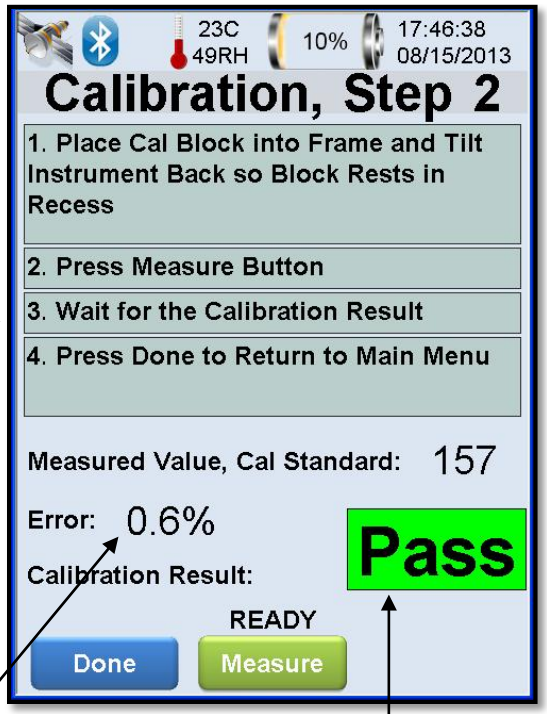
Pull the trigger or press ***Measure.***

Calibration Step 2: Use the Calibration Block to Calibrate

Place the calibration block into the frame with the White Reflective strip of Material oriented toward the Instrument



Pull the trigger or press ***Measure***.

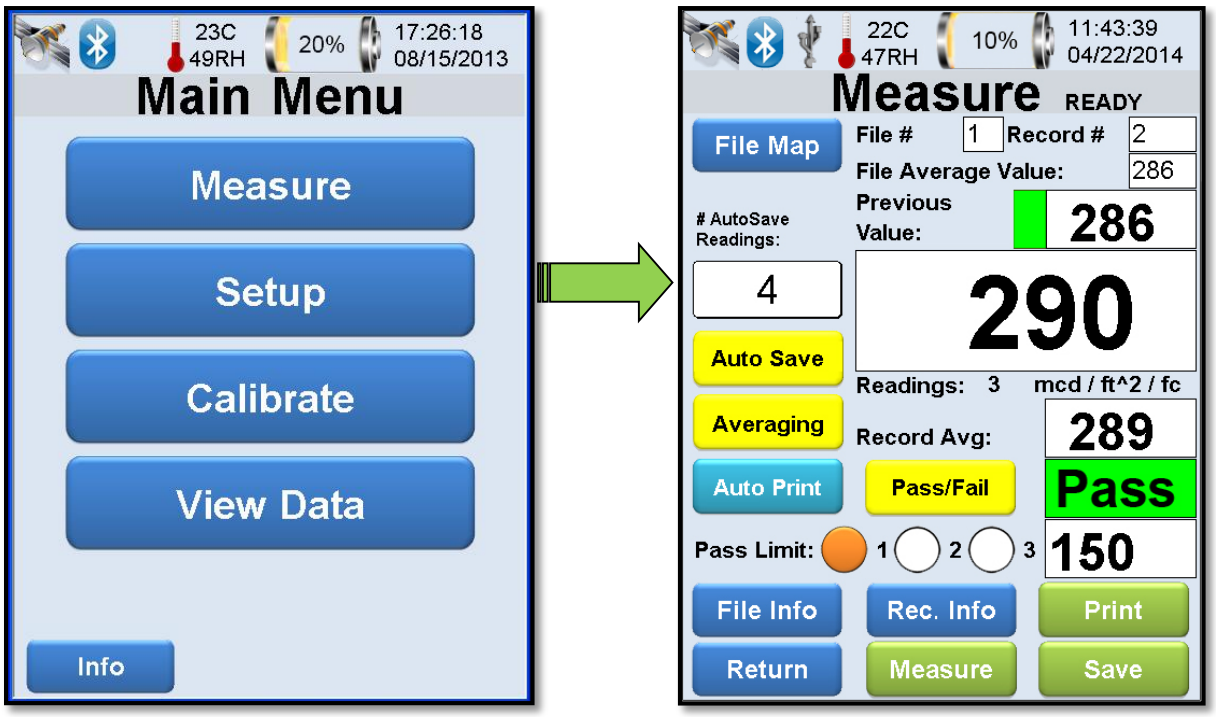


The Calibration Error is shown here.

The lamp will flash twice. If the calibration error is less than 2%, the green "**Pass**" box will be displayed. If unsuccessful, a red "**Fail**" box will be displayed.
The user can press the "Measure" button again until an acceptable result is obtained.

Measure

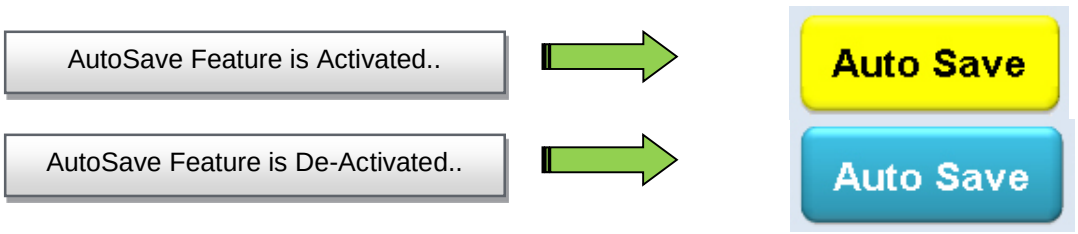
Push the ***Measure*** button from the main menu to access the measure page.



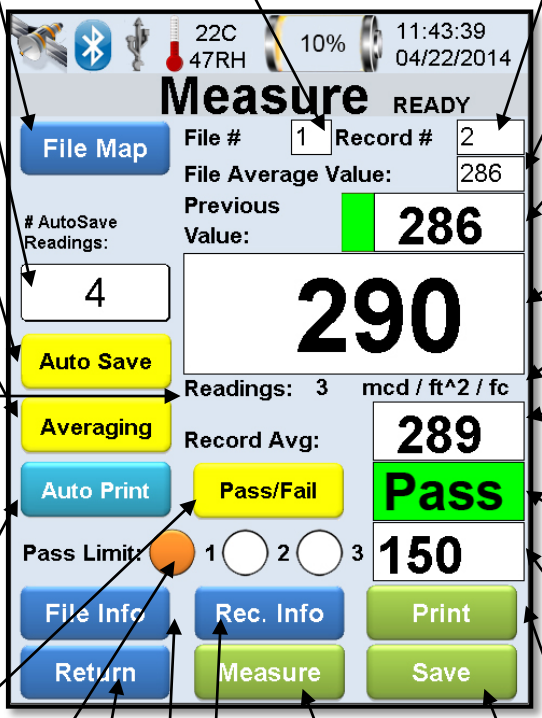
Measure: Active /In-Active State of Buttons and Related Features.

Functionality of the Measure screen is controlled in part by Four Functional Buttons: *Auto Save, Auto Print, Averaging, and Pass/Fail.*

Each of these buttons has two States: Active and In-active. When button (and related feature) is activated, the button turns yellow. See Examples of both Active and in-active states below:



Measure: Page Detail



File Map leads to the file selection page.

This box shows which file is currently in use.

This box shows which record is active.

Enter the number of readings for an average before data is auto-saved.

This box displays the average of all records in the current file.

Selecting ***Auto Save*** causes the Stripemaster to automatically save each record immediately after a measurement.

This box displays the value of the previous record in the file.

Averaging allows multiple measurements to be taken per record, with the average used as the recorded value.

This box displays the value of the last reading in the current record.

The system units are displayed here.

If ***Averaging*** is active, this indicates the number of measurements make up the average.

If ***Averaging*** is active, this is the average value of the record.

Auto Print causes the Stripemaster to print each record when the record is saved.

If ***Pass/Fail*** is active, this box indicates whether the record passes.

Pass/Fail turns on the pass/fail limit selection and pass/fail indicator.

If ***Pass/Fail*** is active, this box shows what value is being used to determine pass/fail.

When ***Pass/Fail*** is on, use these buttons to select which of the 3 limits are used to determine whether a record passes or fails.

Print causes the Stripemaster to print the current record.

Measure causes the Stripemaster to flash the lamp and take a measurement. This button does the same thing as the handle trigger.

Save causes the Stripemaster to save the current record and advance to the next record.

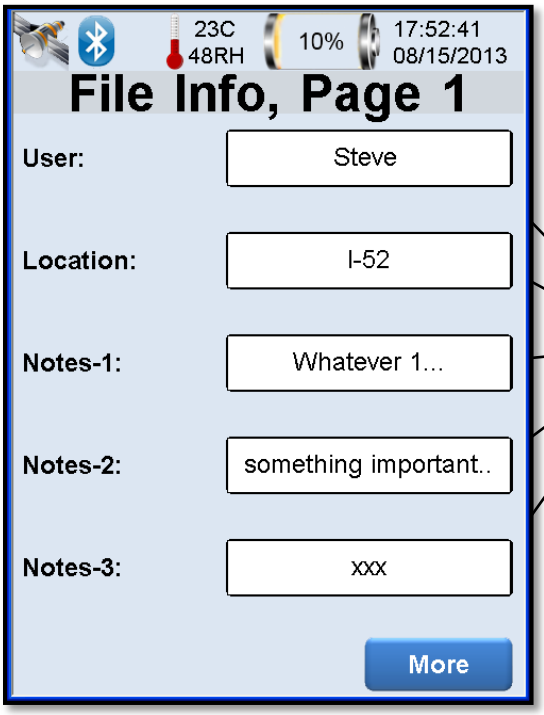
Return leads to the Main Menu page.

File Info leads to the file information section.

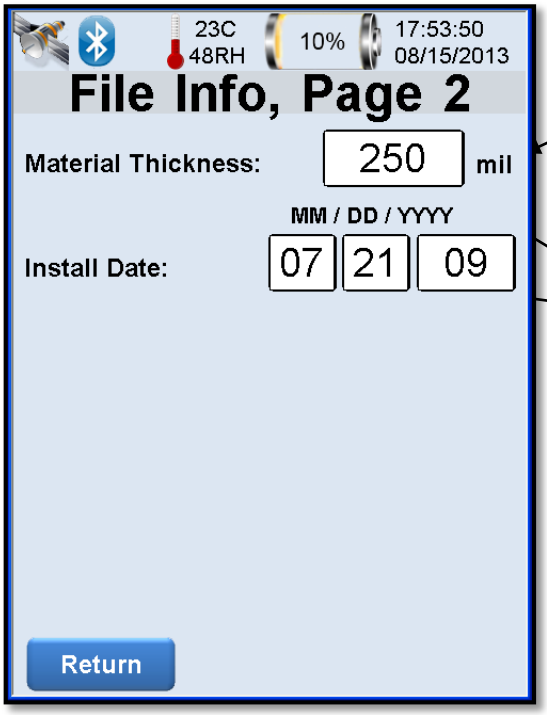
Rec Info leads to the record information section.

Measure: File Info

Enter information on these pages that will be common to the entire file.



Touch inside the white field to bring up an Alpha-Numeric keypad to enter data. Fields can be up to 22 characters each.

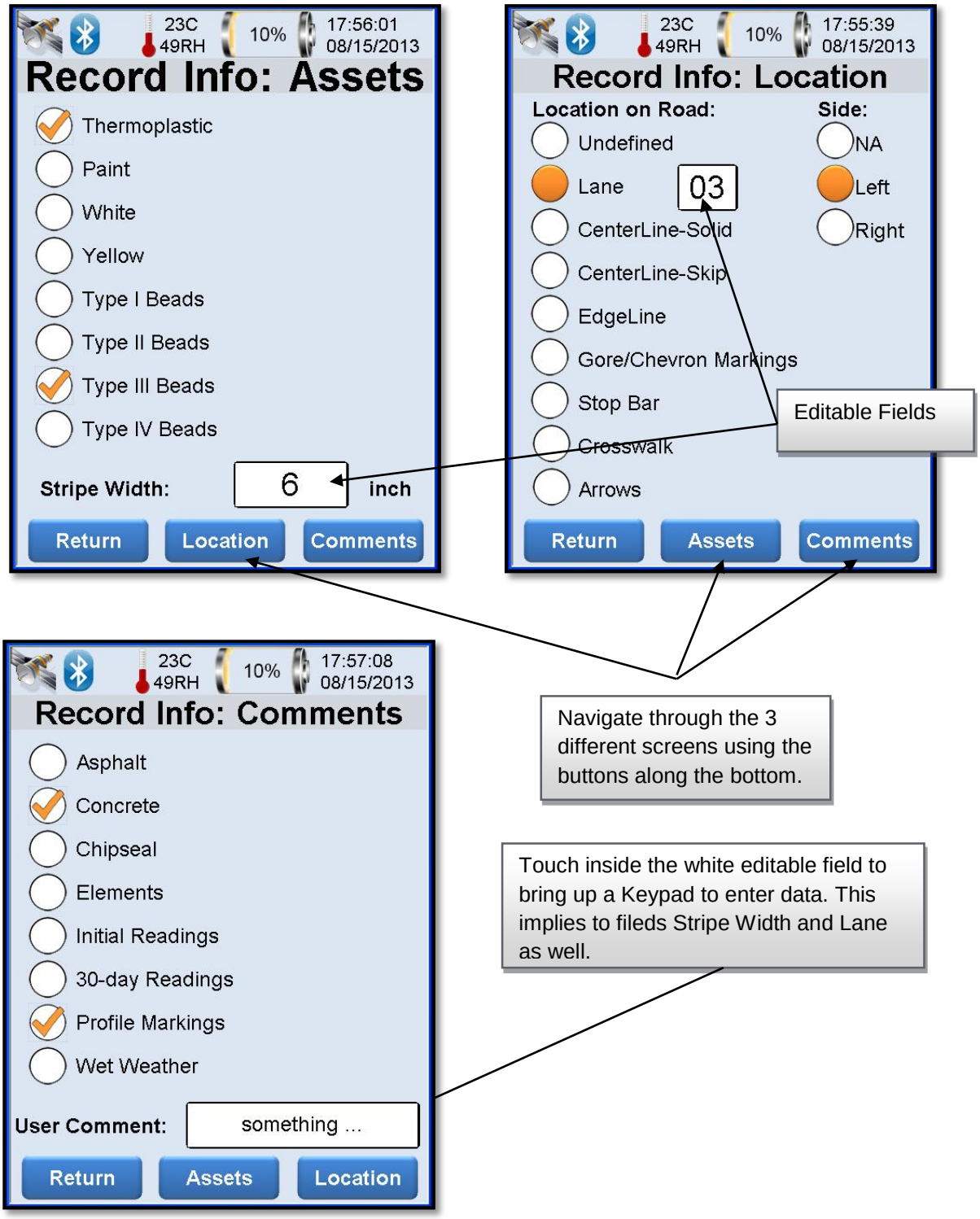


The material thickness units can be either **mil** or **mm**, and are selectable from the Setup page.

Touch inside the white field to bring up a Numeric keypad to enter data.

Measure: Record Info

Information on these pages is specific to each record. The information entered persists from record to record within the same file, so the user does not need to re-enter all of the information for each new record within the same file.



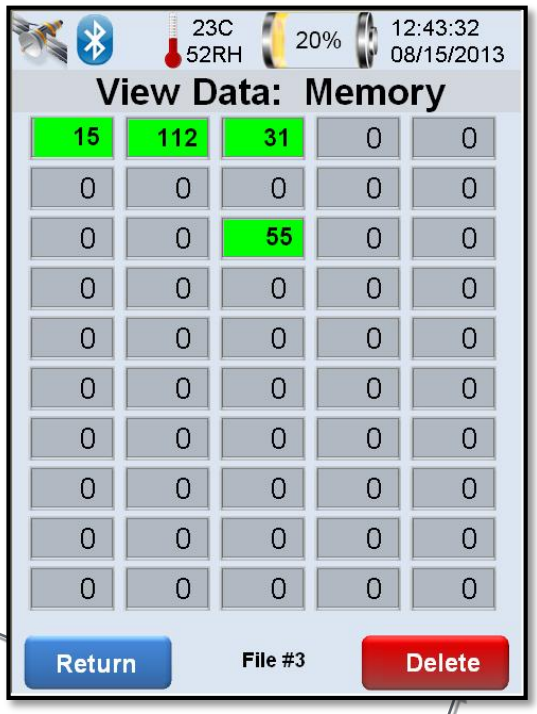
Memory Organization

The StripeMaster's memory is organized into 50 files, with each file able to hold up to 500 records.

Each record consists of multiple data fields, which are described in Appendix A. These data fields allow the operator to uniquely describe the record. Some of the fields will be automatically populated by the StripeMaster, such as the GPS position data, the time, and the temperature. Some of the fields represent options that the user can select, such as Lane # and Comments. Of course, the retroreflection value is a field within each record.

Each file is a collection of records. The file also contains attributes, which are assumed to apply to all of the records within. The file attributes contain some fields that represent the state of the instrument when the records were recorded, such as units, calibration error, gps format, etc. Some of the file attributes are selectable by the operator, such as user and location.

The file map page shows the current memory situation. Files that contain at least 1 record are highlighted in green. Select a file by pushing the respective button. In the example shown, File #3 contains 31 record, and is currently selected.
File #1 contains 15 records,
File #2 – 112 records and so on..

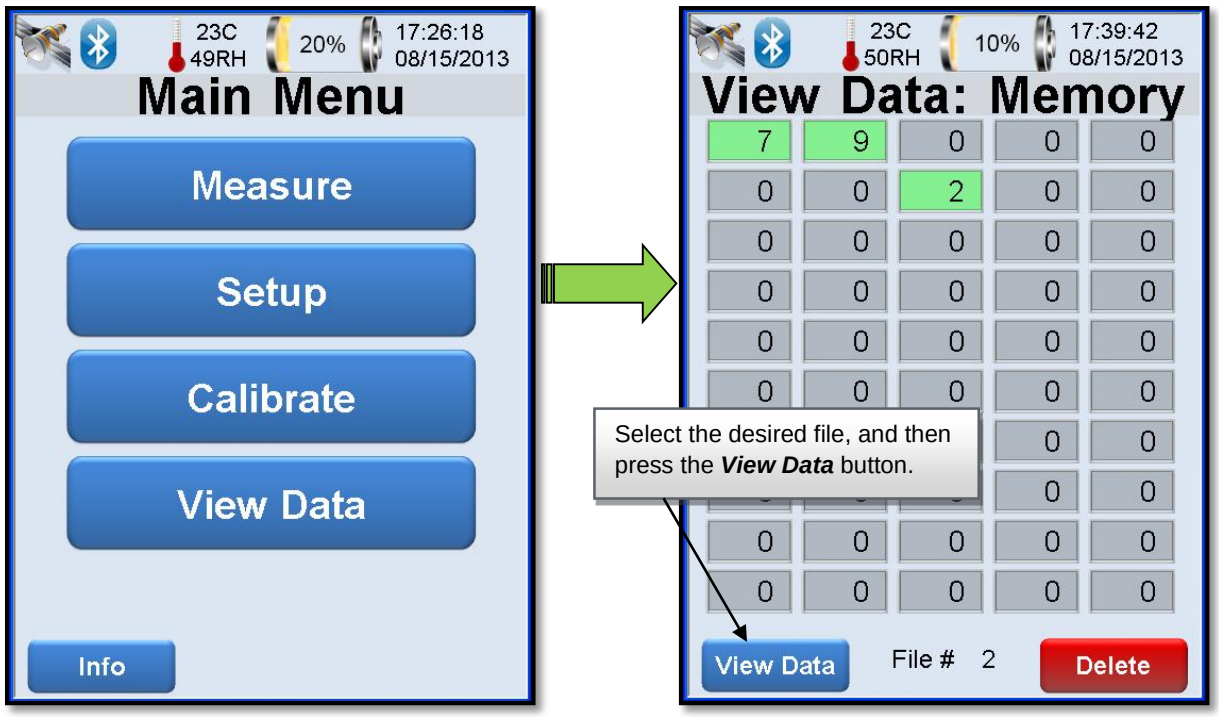


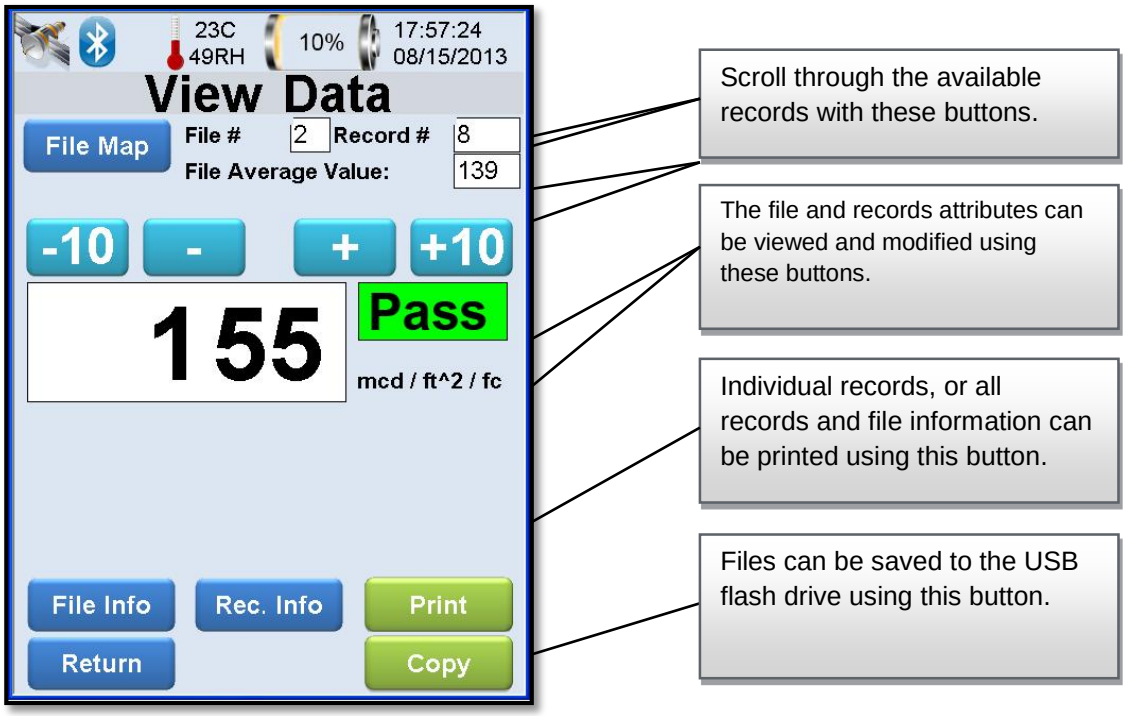
Return (or ***View Data***) leads to either the Measure Page or the View Data page, depending on how the file map was accessed.

Delete erases all the records and file attributes for the currently selected file. This button is only available if the file map is accessed though the *View Data* page. If the file map is accessed from the *Setup* menu, this button will delete **ALL** files.

View Data

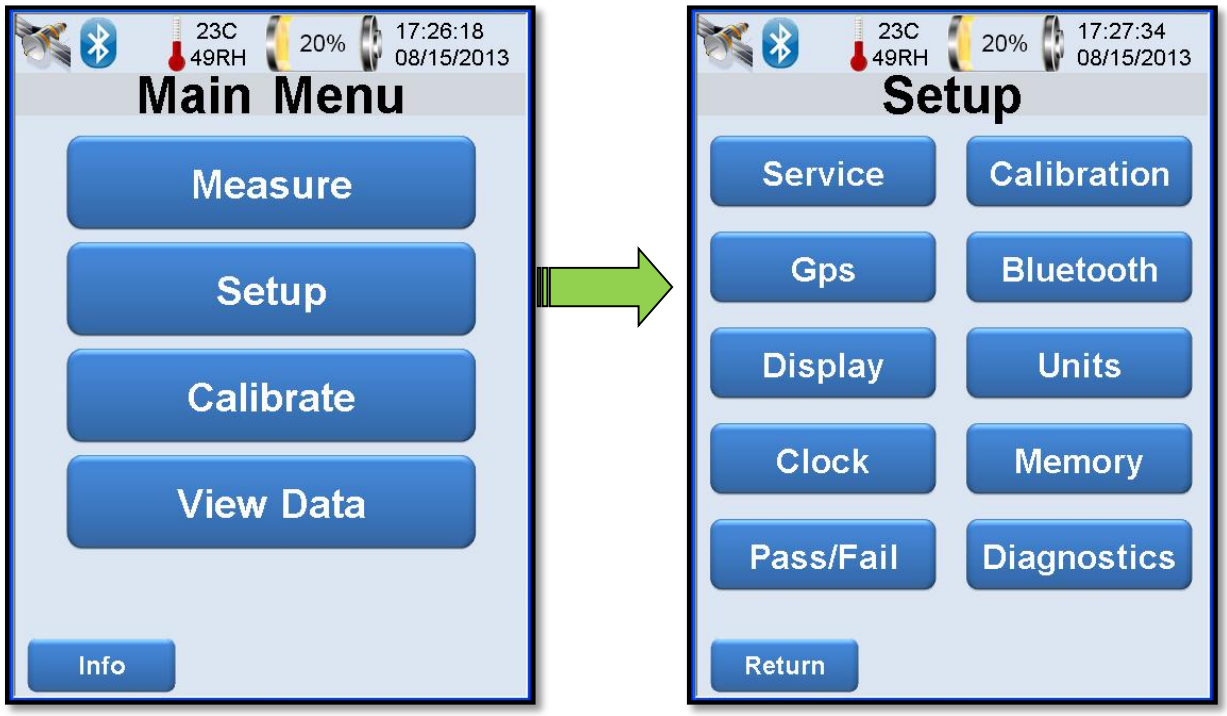
Previously measured and saved data can be viewed using the **View Data** screen.





Setup

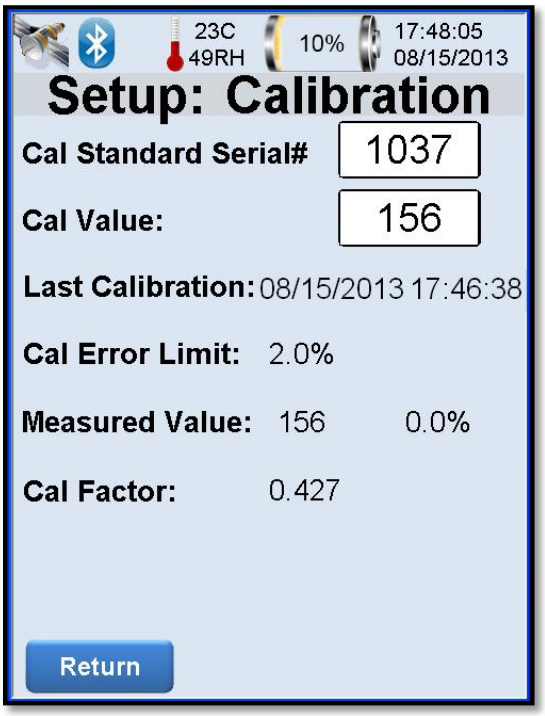
The Setup Menu provides access to various parameters.



Setup: Service

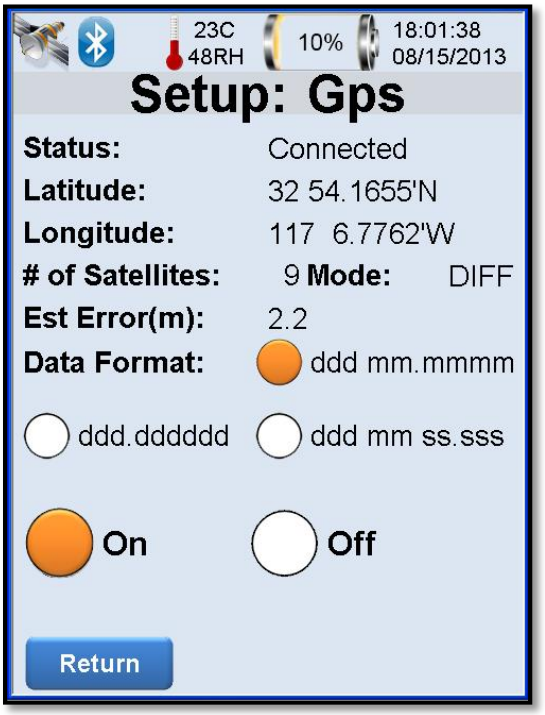
The ***Service*** page displays information that may be useful for troubleshooting, scheduled service, etc.

Setup: Calibration



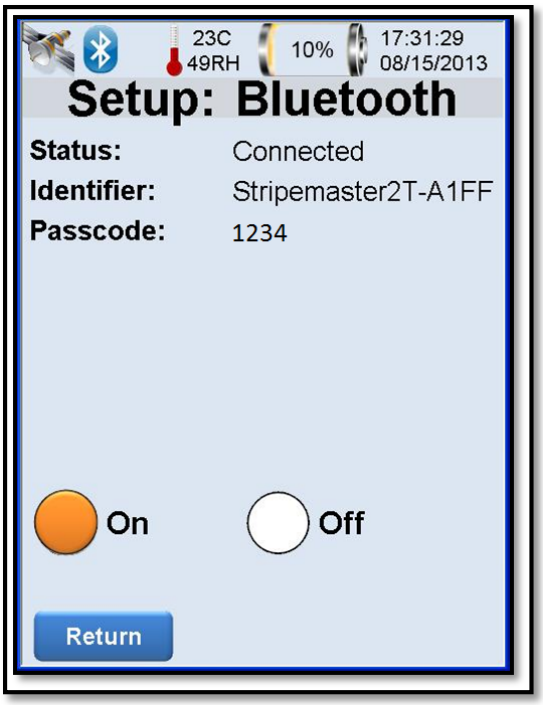
The **Calibration** page is where the serial number value of the calibration plaque is entered.

Setup: Gps



GPS:
Various GPS data is shown here. The gps format can be selected, and the gps can be turned off if not needed.

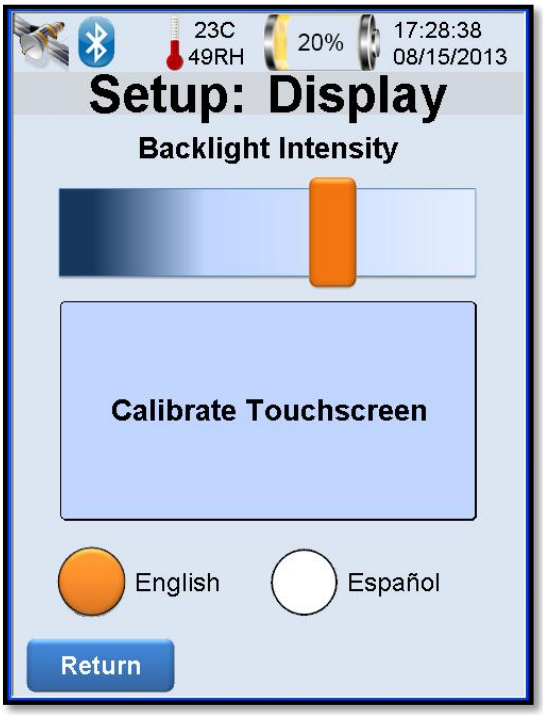
Setup: Bluetooth



The **Bluetooth** Link information is shown here.

it is recommended to turn the Bluetooth feature off (if not in use) to reduce power consumption and improve battery life.

Setup: Display

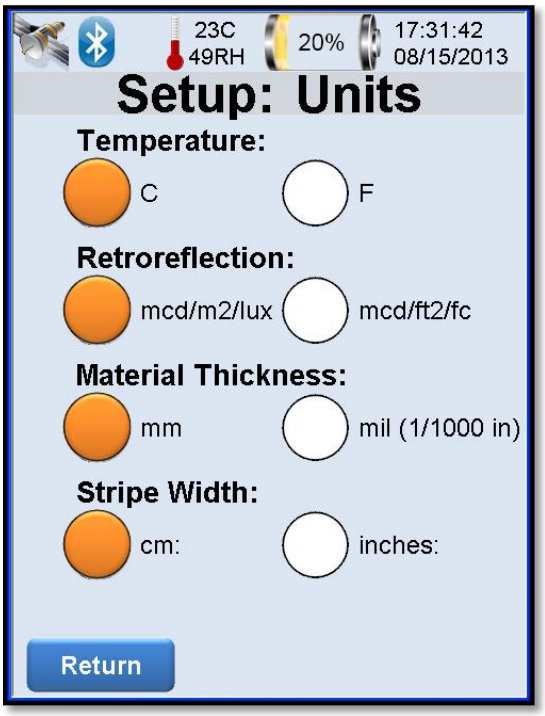


Display:

Several features related to display functionality can be adjusted from this page:

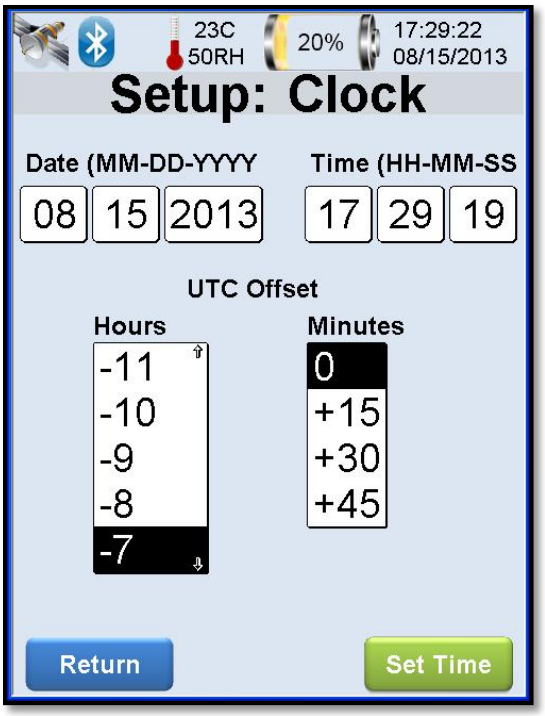
1) The display brightness; **a brighter display uses more battery power**.
2) The touch screen calibration.
3) Switch Language of User Interface between English and Spanish.

Setup: Units



Units
Set the various system units to metric or imperial as desired.

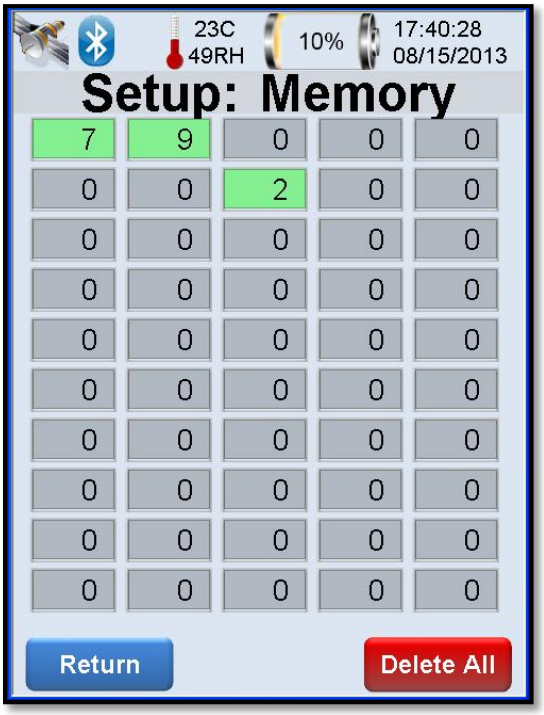
Setup: Clock



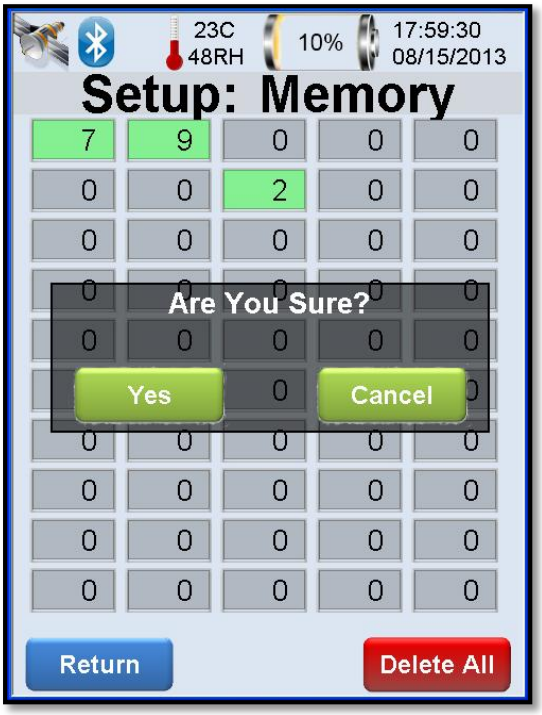
Clock:
Each time the GPS module in the Instrument receives a valid synchronization data, the Stripemaster updates itself to be in sync with the GPS information. An offset can be used to adjust for the local time-zone.

In cases where the GPS is off or no GPS signal is available, the time can be manually entered by filling in the 6 date and time fields, and pressing ***Set Time.***

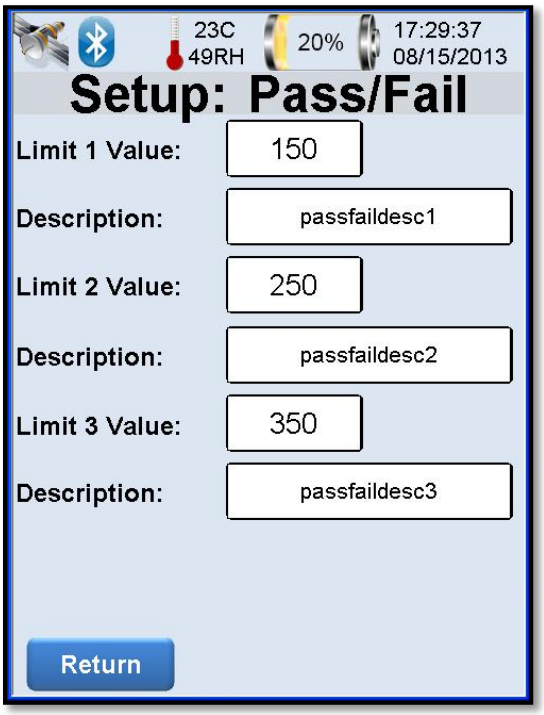
Setup: Memory



Memory:
The current state of the **50** data files on the Stripemaster is shown on this page.
Each file can hold up to 500 records.
Press ***Delete All*** to completely clear the memory; a Confirmation request will be displayed on the screen (See Figure below).

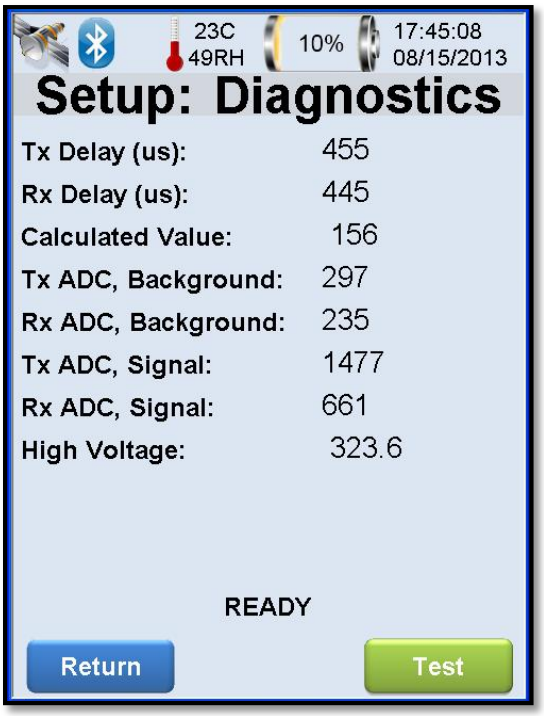


Setup: Pass / Fail



Pass / Fail Limits:
The Stripemaster can hold 3 different pass/fail limits and their descriptions. Enter or Modify them on this page.

Setup: Diagnostics



The **Diagnostics** page:
The diagnostics screen provides information about the operation of the internal electronics. This information can be useful for troubleshooting.

User can measure Reflectivity of Road Stripe or Calibration Block while on Diagnostics page by pressing ***Test*** button or handle trigger, however the measured data will not be stored.

A Normal Operational range of values for each parameter is described in the text below.

Tx Delay (micro-sec): 440 – 470.
Rx Delay (micro-sec): 420 – 470.
Calculated Value: Variable, measured Value of Calibration Block or Stripe
Actual value depends on the reflectivity of the object that being measured.
Tx ADC, Background: 200 – 400, usually around 300.
Rx ADC, Background: 200 – 400, usually around 300.
Tx ADC, Signal: 1200 – 1800, usually around 1500.
Value of this parameter will slowly go down with the aging of internal flash lamp.
Rx ADC, Signal: Value depends on reflectivity of object.
When Cal Block is measured, this value will normally range within 500 – 600.
High Voltage (Volts): 319 – 326.
Voltage of Power storage for internal Flash Lamp.

Software

Software is provided with the StripeMaster 2 Touch that allows the user to upload data, configure the Instrument, and export the data in various formats. The software runs on Windows XP, Vista, 7, and 8, and connects to the StripeMaster via a standard USB connection.

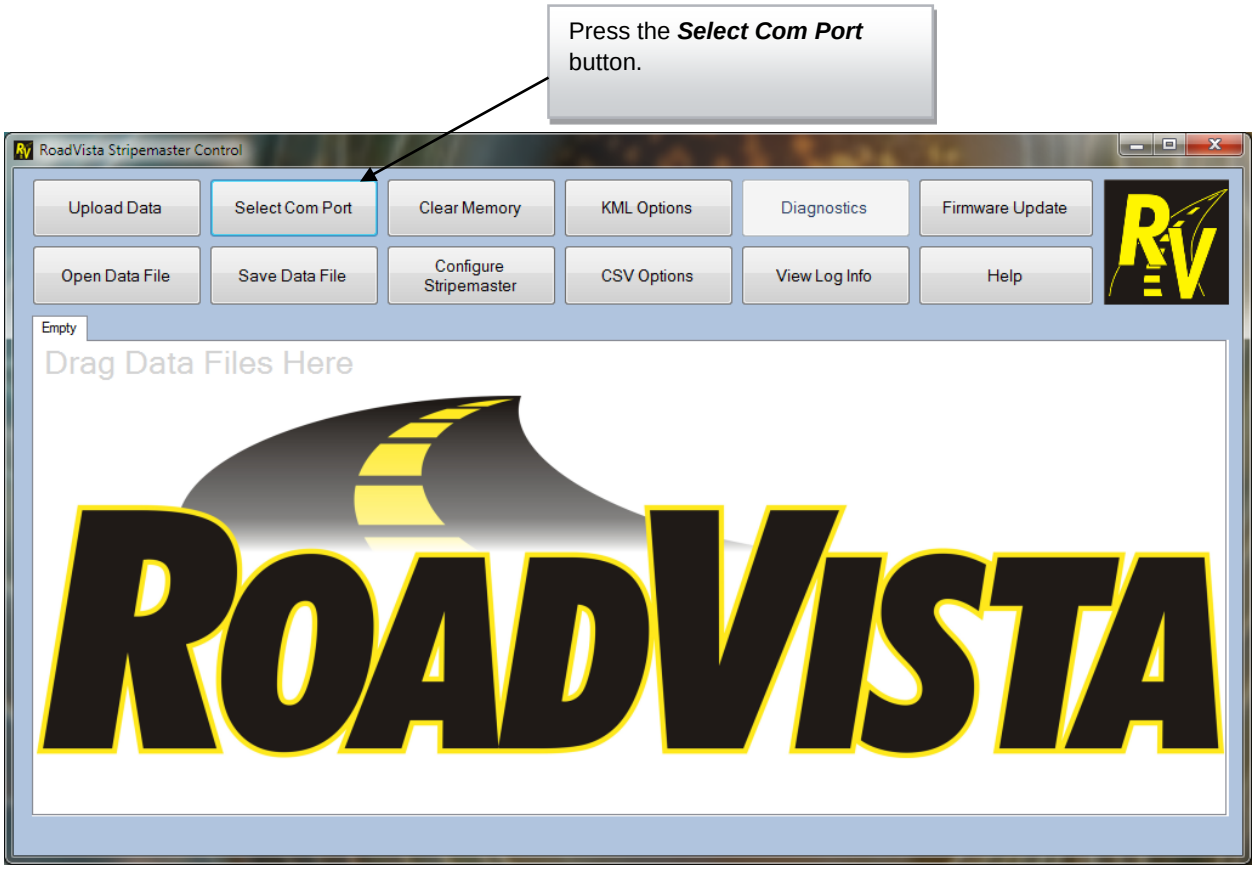
Software: Installation

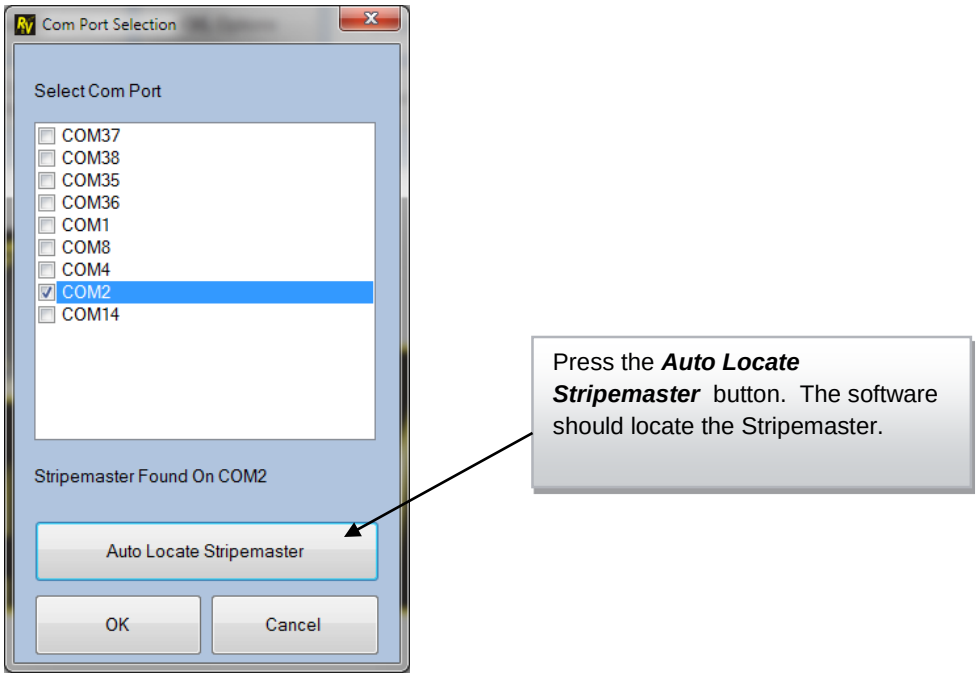
The software can be installed from either a CD or downloaded from the RoadVista Website. In either case, run setup.exe.

USB drivers will also need to be installed. In most cases, Windows will automatically install the necessary drivers when the StripeMaster is powered on and connected via the USB cable. In the case that drivers do not install automatically, run the file “CDM20802_Setup.exe”, found in the USB folder on the CD, or in the USB drivers section on the website.

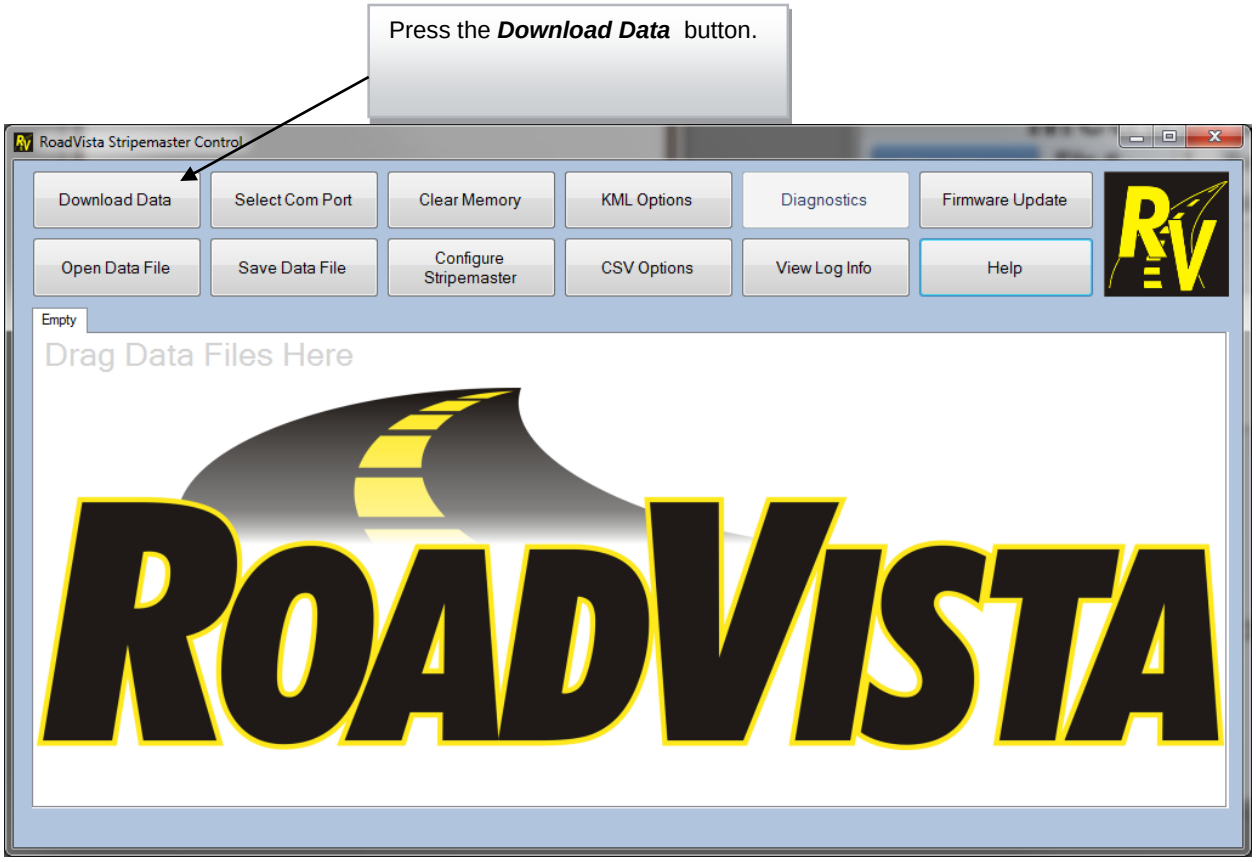
Software: Com Port Selection

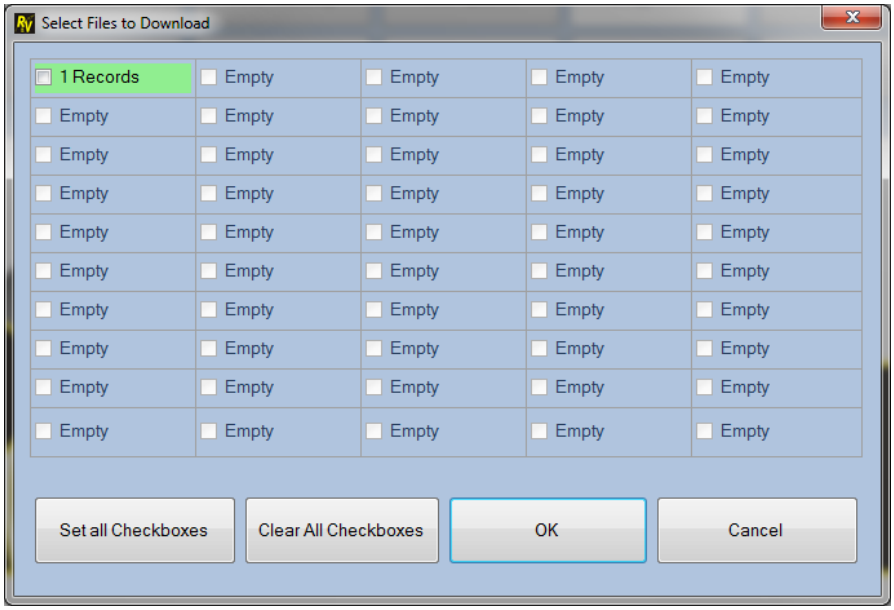
Launch the RoadVista StripeMaster Control Application. Make sure the StripeMaster is on and connected to the computer via USB.





Software: Download Data





Files that contain data will be highlighted in green and display the number of records available for upload. Select the files you wish to upload, and press ***OK.***

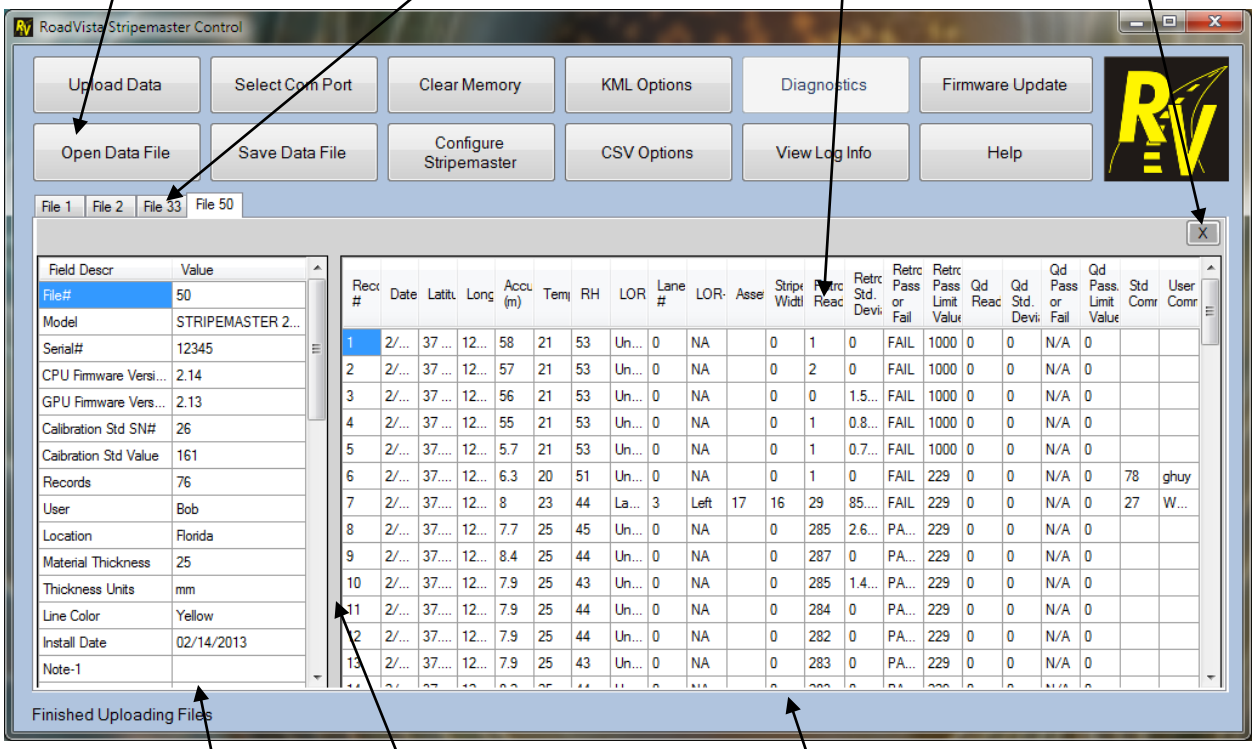
Software: Layout

Data files (either from the USB flash drive or from previously saved data) can be dragged and dropped into the main window, or accessed by selecting the ***Open Data File*** button.

Multiple files can be open simultaneously, and are selected via these tabs.

Clicking on a column header will sort data according to that column

Close a file by pressing the ***X*** button.



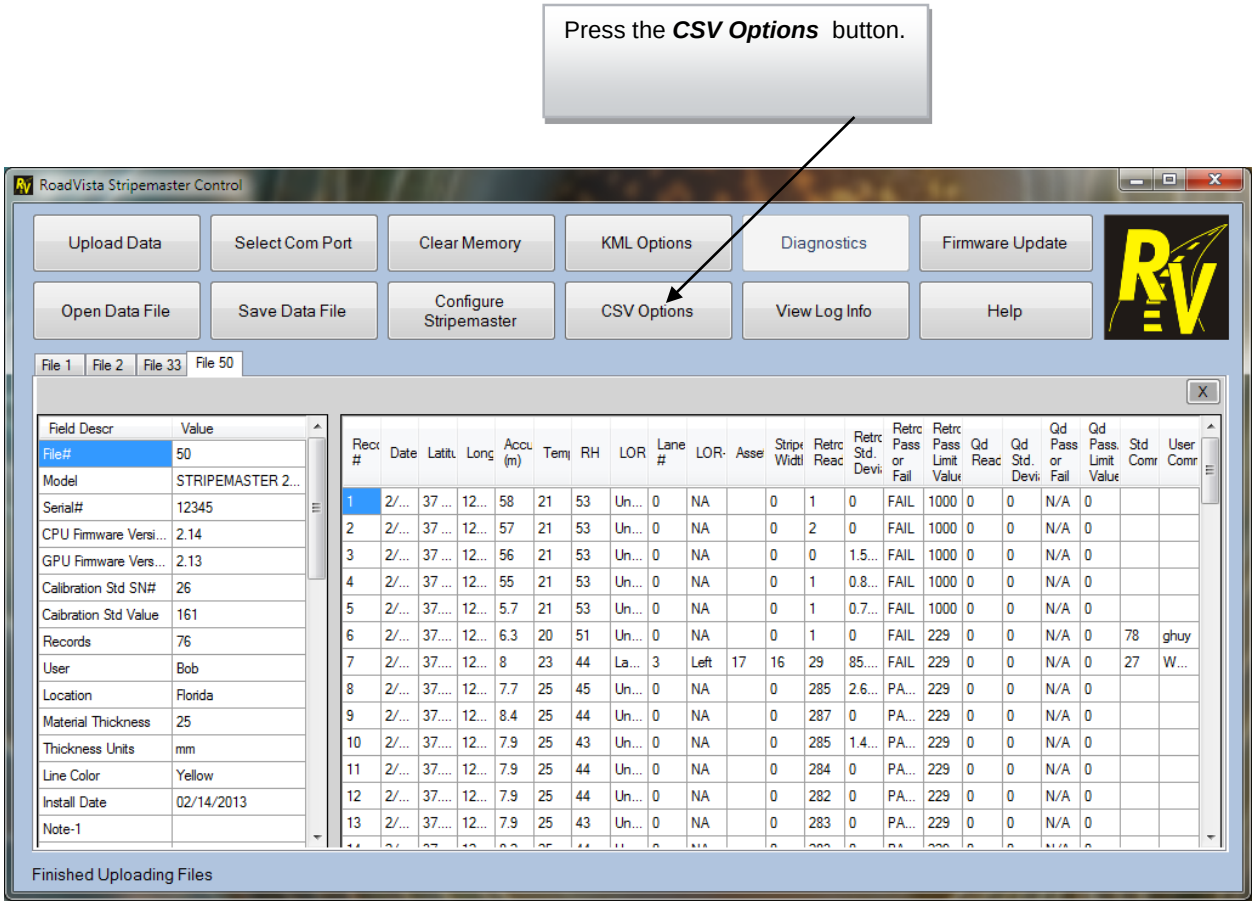
The file information is displayed in this section.

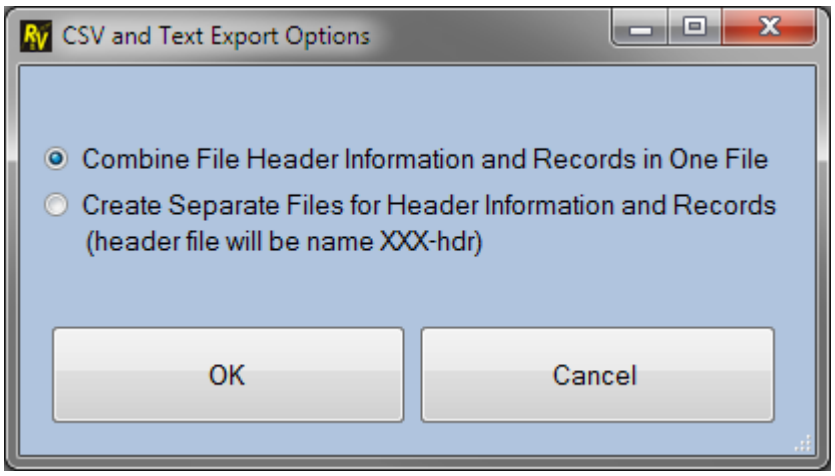
The separator bar can be dragged to adjust the viewable areas for the file and records.

Record information is displayed in this section.

Software: CSV Options

CSV options control how the data is saved when saving in .csv format.



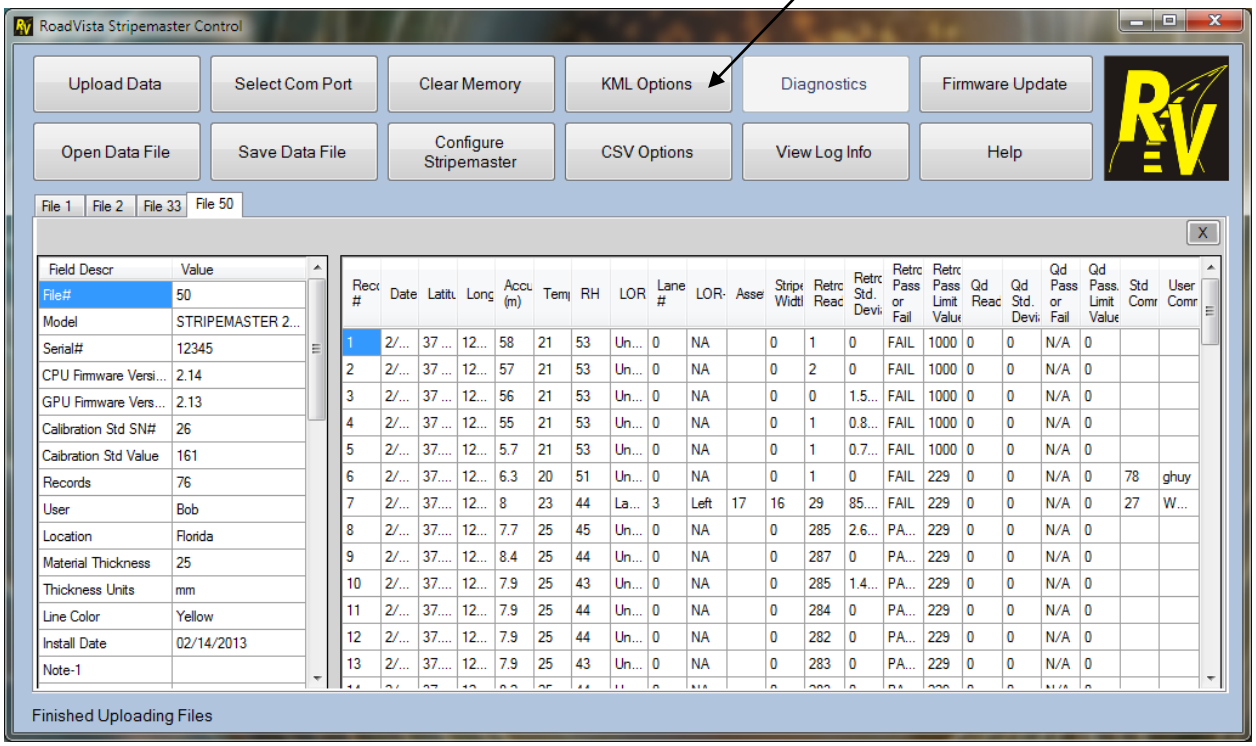


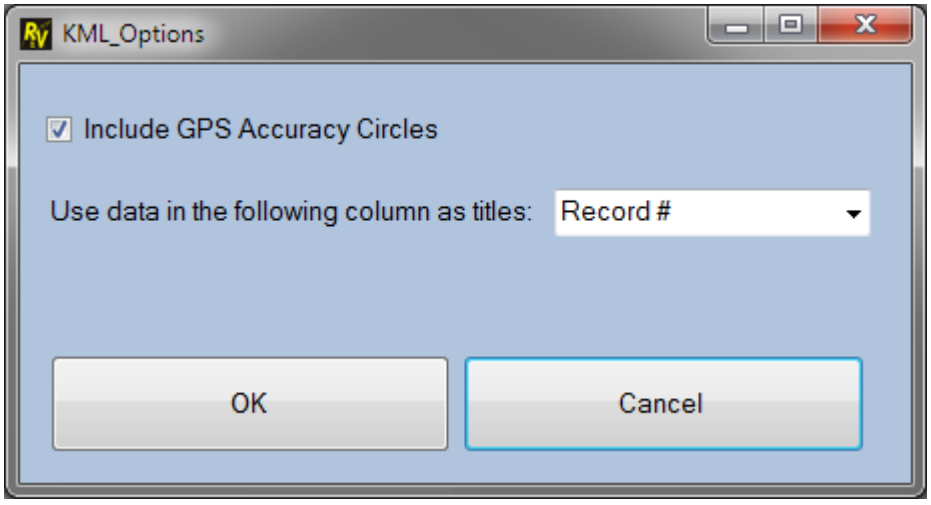
When exporting to a .csv or .txt file the file and record information and be combined into a single file, or separated into separate files. Separate files may be useful for some database applications which require a single header row.

Software: KML Options

KML options control how the data is saved when saving in .kml (Google Earth) format.

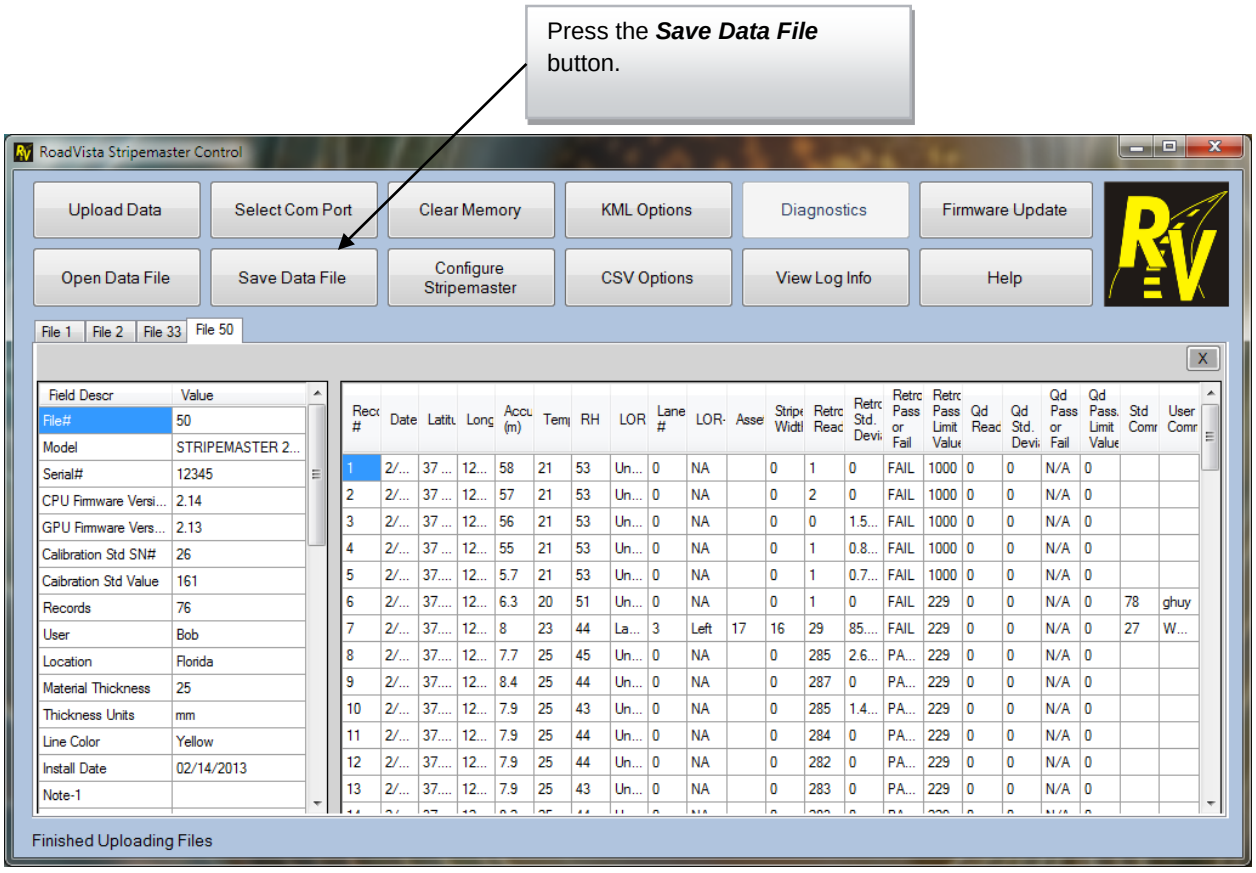
Press the ***KML Options*** button.



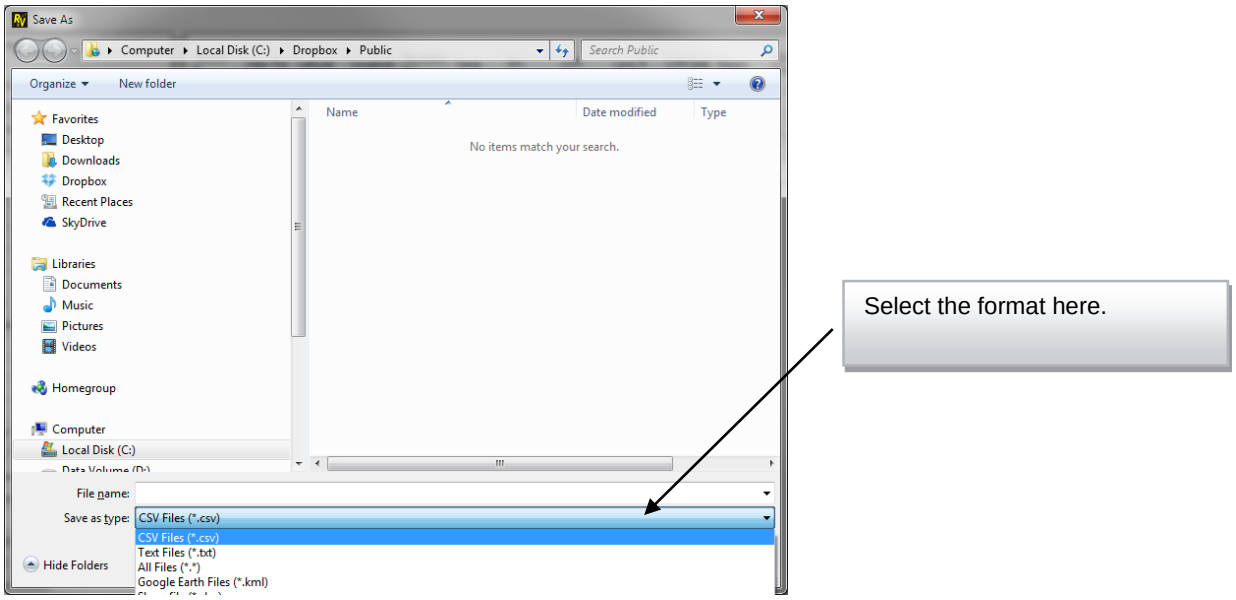


Any of the Record fields can be used as the titles for the KML file. Additionally, the user can opt to include GPS accuracy circles, which will lightly draw a circle that represents and estimation of the GPS error.

Software: Save Data

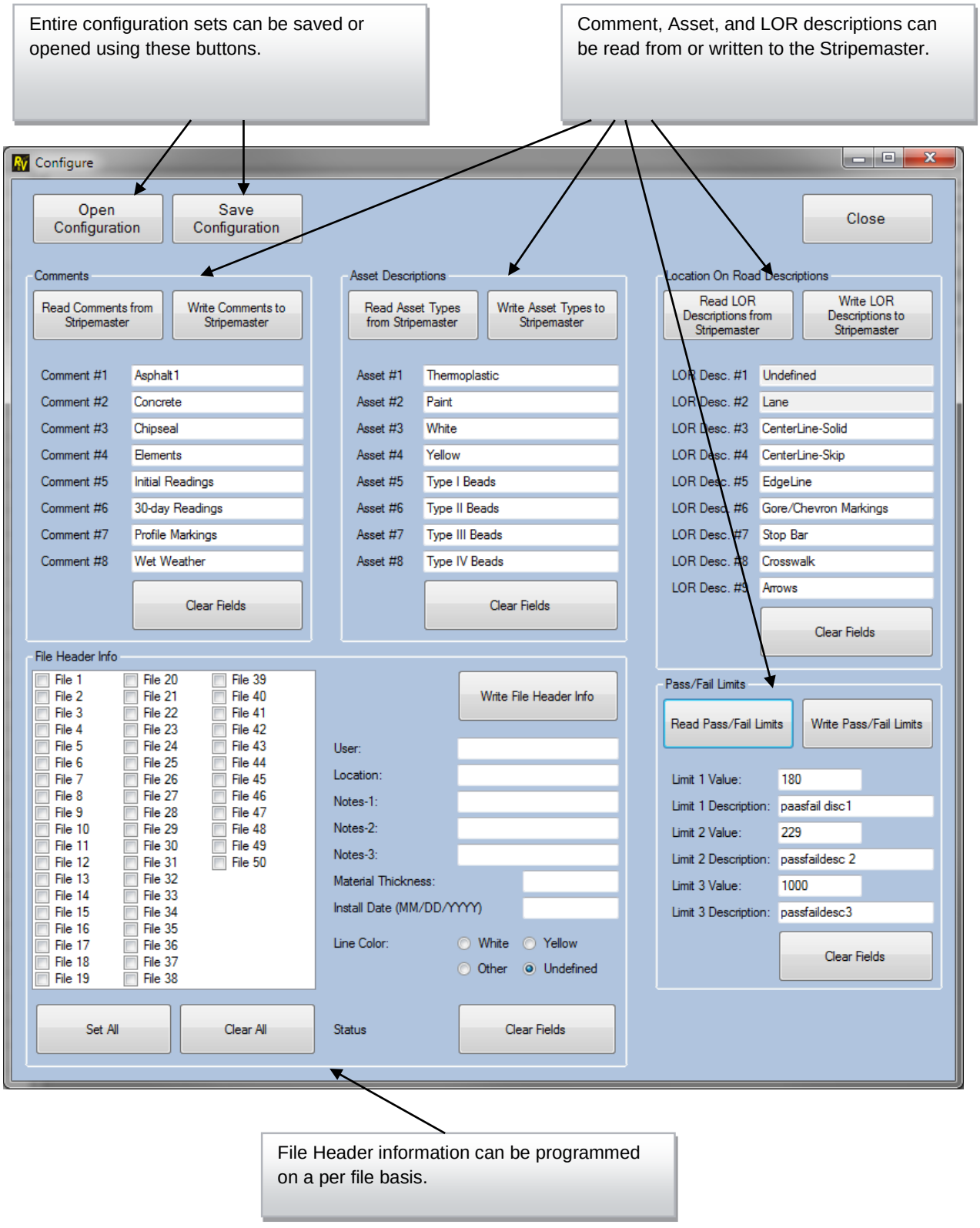


Once data has been uploaded into the program, it can be saved as in either as .csv (comma separated values, for excel and databases), .kml (keyhole markup language, for Google Earth), or .shp (shapefile, for Esri shapefile) formats.



Software: Configure StripeMaster

The StripeMaster can be configured using this page.



Data Transfer

There are three methods of transferring data off of the StripeMaster:

1. Utilizing the RoadVista StripeMaster Control software (Windows only)
2. Utilizing a USB flash drive
3. Communicating directly with the StripeMaster via USB and ASCII commands.

RoadVista StripeMaster Control Software

See previous section regarding use of the Control Software.

USB Flash Drive

Insert a USB-flash drive into the StripeMaster. In the *View Data* screen, press the ***Copy*** button. Select either ***File*** (to save just the currently selected File) or ***All Files*** (to save all files containing at least one record). The StripeMaster will then proceed to write .csv files according to the naming convention "FILE_XX.csv", where XX represents the file number and can span the range from 1 to 50. The .csv file will have both the file and record data within. Please refer to Appendix-A for a detailed description of this format.

USB and ASCII Commands

Connect the powered-up StripeMaster to a computer via USB. The computer should automatically install the correct drivers to establish virtual COM port. If it doesn't, you may need to manually install the VCP drivers www.ftdichip.com that are suitable for your computer. FTDI provides VCOM drivers for Windows, Linux, Mac OS X, and Windows CE.
Connect to the appropriate port using 115200baud, 8 data bits, 1 stop bit, no parity. Type "?" to get a list of commands and to verify communication with the StripeMaster.
In general, when issuing a command, the StripeMaster will respond by repeating the same command, followed by a space, followed by the appropriate data. In cases where no data is expected, the StripeMaster will respond with the command and "OK".
To upload data from the StripeMaster, do the following:

1. Type **FMAP.**
   - StripeMaster responds with a comma delimited list of how the number of records in each of the 50 files.
2. Type **FSCF,n** where n is the file number you wish to upload.
3. Type **OFHS** to upload the file information.
   - StripeMaster responds with the file information
4. Type **OFRS** (optional)
   - StripeMaster responds with the comma delimited records header.
5. Type **OFAS,n** where n is the record number you wish to upload.
   - StripeMaster responds with the comma delimited record information
6. Repeat step 4 for as many records as you wish to upload.

Refer to Appendix A for a description of the File and Record data formats.

Appendix A

Appendix A: Data Format

The following is an example of a .csv file (with 2 records) that holds both the file and record information. Lines are terminated by both a 0x0D and a 0x0A (shown as <cr> in this document). Using the RoadVista software, this data can optionally be split into 2 files that separate the File information from the Record information.

File#,4<cr>
Model,STRIPEMASTER 2 TOUCH<cr>
Serial#,1003<cr>
CPU Firmware Version,2.09<cr>
GPU Firmware Version,2.09<cr>
Calibration Std SN#,23<cr>
Calibration Std Value,1000<cr>
Records,2<cr>
User,Bob<cr>
Location,Florida<cr>
Material Thickness,4<cr>
Thickness Units,mm<cr>
Line Color,Yellow<cr>
Install Date,03/14/2003<cr>
Note-1, <cr>
Note-2, <cr>
Note-3, <cr>
Cal. Time,01/15/2013 15:29<cr>
Calibration Error,0.02<cr>
Stripe Width Units,cm<cr>
Rd Units,mcd/m^2/lux<cr>
Temperature Units, F<cr>
File Retro Average,1199<cr>
File Qd Average,65535<cr>
GPS Format,ddd.dddddd<cr>
Asset 1 Desc., <cr>
Asset 2 Desc.,Bituminous<cr>
Asset 3 Desc.,Cement<cr>
Asset 4 Desc.,<cr>
Asset 5 Desc.,<cr>
Asset 6 Desc.,<cr>
Asset 7 Desc.,<cr>
Asset 8 Desc.,<cr>
Com1 Desc.,Missing<cr>
Com2 Desc.,Potholes<cr>
Com3 Desc.,Bad Line<cr>
Com4 Desc.,Missing RPV's<cr>
Com5 Desc.,Skid Marks<cr>
Com6 Desc.,Oil<cr>
Com7 Desc.,Gravel<cr>
Com8 Desc., Bad Measurement<cr>
Record #,Date-Time,Latitude,Longitude,Accuracy (m),Temp,RH,LOR,Lane #,LOR-Side,Pav Type,Stripe Width,Retro Reading,Retro Std. Deviation,Retro Pass or Fail,Retro Pass/Fail Limit Value,Qd Reading,Qd Std. Deviation,Qd Pass or Fail,Qd Pass/Fail Limit Value,Std Comments,User Comment<cr>
1,1/17/2013 10:27:01 AM,37.887540N,121.293982W,5.7,69,45,Undefined,0,NA,Undefined,0,1193,0,PASS,800,0,0,N/A,0,, <cr>
2,1/17/2013 10:40:12 AM,37.887544N,121.293942W,7.8,69,45,Symbol,0,Right,Concrete,23,1206,0,PASS,800,0,0,N/A,0,3, <cr>

Appendix A: File Field Descriptions:

1. File# - The file number, from 1 to 50.
2. Model – The name of the instrument.
3. Serial# - The serial number of the instrument.
4. CPU Firmware Version – The firmware version of the central processor
5. GPU Firmware Version – The firmware version in the GUI interface processor
6. Calibration Std SN# - The serial number of the calibration standard used.
7. Calibration Std Value – The value of the calibration standard.
8. Records – The number of records in the file.
9. User – The user who produced the data.
10. Location – The general location of the data.
11. Material Thickness – The material thickness
12. Thickness Units – either mm or mil.
13. Line Color – Indentifies the Line Color as White, Yellow, Other, or Undefined.
14. Install Date – When the stripe being measured was originally installed.
15. Note-1 – Any relevant information.
16. Note-2 – Any relevant information.
17. Note-3 – Any relevant information.
18. Cal Time – The last time the instrument was calibrated.
19. Calibration Error – The % error from the last calibration.
20. Stripe Width Units – Either cm or inches.
21. Rd Units – Either mcd /m^2/lux or mcd /ft^2/fc
22. Temperature Units – Either C or F
23. File Retro Average – the average value of all of the retroreflection measurements.
24. File Qd Average – the average value of all of the Qd measurements (requires option Qd attachment)
25. GPS format – either ddd.dddddd (decimal degrees), ddd mm.mmmm (degrees decimal minutes), or ddd mm ss.sss (degrees minutes seconds)
26. Asset 1 Desc – Asset 1 description
27. Asset 2 Desc – Asset 2 description
28. Asset 3 Desc – Asset 3 description
29. Asset 4 Desc – Asset 4 description
30. Asset 5 Desc – Asset 5 description
31. Asset 6 Desc – Asset 6 description
32. Asset 7 Desc – Asset 7 description
33. Asset 8 Desc – Asset 8 description
34. Com 1 Desc - Standard Comment 1 description
35. Com 2 Desc - Standard Comment 2 description
36. Com 3 Desc - Standard Comment 3 description
37. Com 4 Desc - Standard Comment 4 description
38. Com 5 Desc - Standard Comment 5 description
39. Com 6 Desc - Standard Comment 6 description
40. Com 7 Desc - Standard Comment 7 description
41. Com 8 Desc - Standard Comment 8 description

Appendix A: Record Field Descriptions:

1. Record # - The record number, from 1 to 500
2. Date – The date, in month/day/year hour:minute:second format
3. Latitude – Latitude, formatted according to file field #25.
4. Longitude – Longitude, formatted according to file field #25.
5. Accuracy (m) – An estimate of the maximum GPS positional error in meters.
6. Temp – the temperature at the time the record was taken, in units defined by file field #22.
7. RH – the relative humidity at the time the record was taken.
8. LOR – the Location on Road selected.
9. Lane # - Lane number if Lane is selected for LOR.
10. LOR-Side – NA, Left, or Right
11. Assets – the assets (described in file fields 26-33) that were selected for the particular record.
12. Stripe Width – Stripe Width, in units defined in file field #20.
13. Retro Reading – The retroreflection value of the record.
14. Retro Std. Deviation – The standard deviation of the reading if averaging was used. 0 if no averaging was used.
15. Retro Pass or Fail – Whether the measurement passed or failed according the pass/fail limit currently selected at the time.
16. Retro Pass/Fail Limit Value – The value used to determine whether the measurement passed or failed.
17. Qd Reading – The Qd value of the record. (requires optional Qd attachment)
18. Qd Std. Deviation – The standard deviation of the Qd reading if averaging was used. 0 if no averaging was used. (requires optional Qd attachment)
19. Qd Pass or Fail – Whether the Qd measurement passed or failed according the pass/fail limit currently selected at the time. (requires optional Qd attachment)
20. Qd Limit Value – The value used to determine whether the Qd measurement passed or failed. (requires optional Qd attachment)
21. Standard Comments – the standard comments (described in file fields 34-41) that were selected for the particular record.
22. Comment – A field for any other pertinent information.

Revision History

Rev	Description	ECN	Date
A	INITIAL RELEASE	6615	6/26/14
B	CHANGE BLUETOOTH PASSKEY	6775	03/24/16