

Seal Gap

Model 2300-RF

Version 6.2.5

System Manual

LMITM

LINEAR **M**EASUREMENT **I**NSTRUMENTS, Corp.

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Preliminary Information

1.1 Warranty

LMI *hardware* is warranted by LMI against defects in materials and workmanship for 12 months from date of original purchase. If you transfer ownership, the warranty is automatically transferred to the new owner and remains in effect for the original 12-month period. During the warranty period we will repair or, at our option, replace at no charge product that proves to be defective, provided it is returned, shipping prepaid, to LMI.

LMI *software and firmware* are warranted by LMI against defects in materials and workmanship for 60 days from date of original purchase, when the software and firmware is used in accordance with published or other written specifications prepared, approved, and issued by LMI and when used with specifically identified hardware. In any event, LMI makes no representation or warranty, express or implied, that the operation of the software or firmware will be uninterrupted or error free, or that the functions contained in the software or firmware will meet or satisfy the Distributor's intended use or license agreement or LMI extended support agreement. Software and firmware corrections are warranted for a period of thirty (30) days from the date shipped by LMI, or the remainder of the original warranty term, whichever is longer. If you transfer ownership, the warranty is automatically transferred to the new owner and remains in effect for the original 60-day period.

LMI *interface accessories*, such as cords and connectors are warranted by LMI against defects in materials and workmanship for 30 days from date of original purchase. Repaired or replacement cords or connectors are warranted for a period of 30 days from the date of shipment by LMI.

This warranty does not apply if the product has been damaged by accident or misuse or as a result of service or modification by other than LMI, or by hardware, software, interfacing or peripherals not provided by LMI.

This is your warranty.

Please retain this document for your records.





No other express warranty is given. The repair or replacement of a product is your exclusive remedy. Any implied warranty of merchantability or fitness is limited to the duration of this written warranty. Some States do not allow the exclusion or limitations of incidental or consequential damages, so the above exclusion or limitations may not apply to you.

1.2 Customer Service/Technical Support

LMI Customer Service and Technical Support can be reached at **810-714-5811** Monday through Friday between 8:00 a.m. and 5:00 p.m. Eastern Standard Time. Or fax anytime at **810-714-5711**. Send an e-mail message to techsupport@lmicorporation.com

1.2.1 Customer Service




Call LMI Customer Service to:

-  Request quotations
-  Inquire about the status of an order or repair
-  Return LMI equipment for service
-  Upgrade LMI equipment

1.2.2 LMI On-Site Training & Phone Support

LMI Technical Support can provide on-site training or phone support for LMI equipment and software. Contact LMI Customer Service for pricing and scheduling information.

Call LMI Technical Support to:

-  Assist in installing and configuring LMI equipment
-  Help setup and configure gages, multiplexers and accessories
-  Troubleshoot LMI equipment or LMI support software

1.2.3 Returns for Service

To expedite your service order:

- Contact Customer Service to obtain a Return Materials Authorization (RMA) number.
- Complete the RMA form provided and return the form, along with the unit, to LMI's repair department at the following address:

LMI Corporation
Attn: Repair Department
101 N. Alloy Dr.
Fenton, MI 48430

- Pack the equipment properly, using the original shipping container if possible. LMI cannot assume responsibility for damage caused by improper packaging.
- LMI will evaluate the unit and supply an evaluation and quotation for the necessary repairs.
- Upon receipt of a purchase order, LMI will repair and return the unit.

1.3 Cautions and Warnings

1.3.1 FCC Compliance

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. FCC ID: KNY-6231812519

1.3.2 RF Energy and Related Devices

This equipment generates, uses, and can radiate radio frequency energy and must be installed in accordance with the manufacturer's instructions. It is recommended that LMI cables be used whenever possible. If LMI cables are not used, all peripheral devices should be connected to this equipment via shielded cables with metalized connector hoods. If not properly installed, this equipment may cause interference with radio and television reception.

Systems used in the United States utilize a spread spectrum transmitter in the 900 MHz bandwidth. Systems in Europe utilize the 433 MHz or 2.4 GHz bandwidths.

1.3.3 Environmental Considerations

The PSG System operates at 50° - 95° Fahrenheit (10° - 35° Celsius), at up to 5,500 feet without degrading. The PSG System can be stored at 50° - 95° Fahrenheit (10° - 35° Celsius).

1.3.4 Cleaning Instructions

The PSG Controller case and the PSG accessories may be cleaned with mild detergent and soft damp cloth to remove any dust and dirt accumulation.

The PC may be cleaned using an anti-static spray.

Note: Unplug all power connections before cleaning and do not use excessive moisture that may run into openings in the case.

It is recommended that the cases be rubbed dry with a soft cloth to remove moisture. Do not operate the equipment if you suspect that any moisture has entered the Controller or accessories.

2

System Overview

The patented LMI 2300 Portable Seal Gap (PSG) System is a compact and portable inspection gage. Inconvenient feeler gages, clay, calipers and thumbscrews are no longer necessary to check gaps between the door and door opening flange or deck lid and deck lid opening flange.

The system consists of the Seal Gap software running on a PC, the 2351-RF Hub and the 237 or 238 Seal gap gages. The 2351-RF Hub can communicate the gage readings to the PC using a standard communication cable or through the wireless transceivers. Each gage is connected to the 2351-RF Hub with a cord retractor. This allows you to pull the gage out to the spot being checked and then return it easily without tangling after the check is complete.¹ To operate it simply pull the gage slightly past the check location to allow a small amount of slack so the gage is not being pulled on during the checking process. Remove the gage after data collection and give a slight tug to release the position hold. The cord should then retract back in as you return the gage to the rail position.²

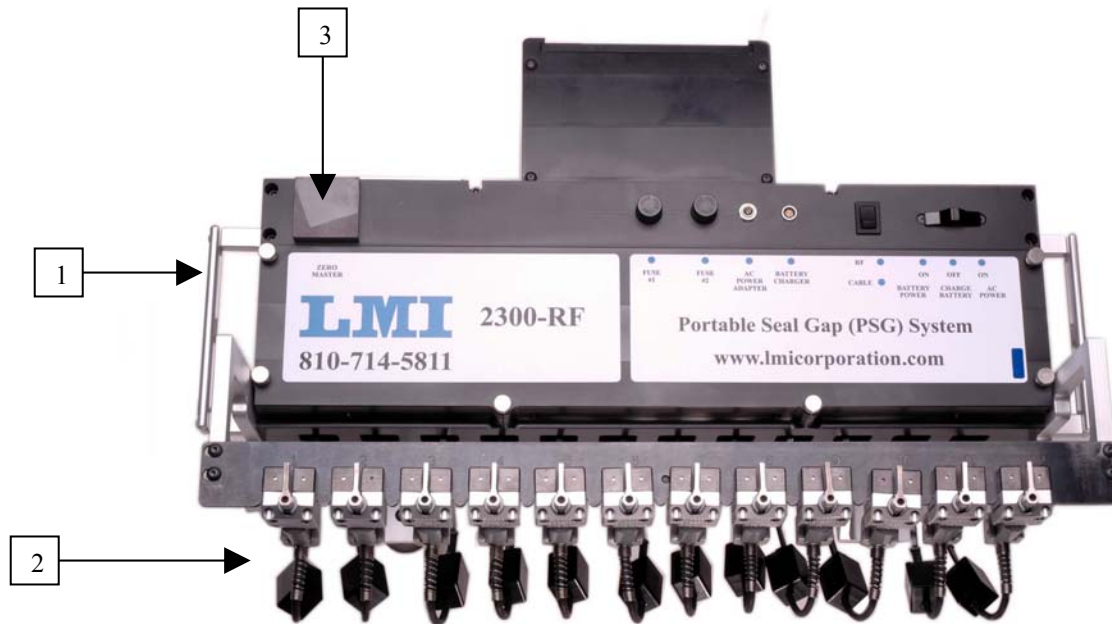
To inspect a vehicle, simply place the Hub inside the car, quick clamp the 237 or 238 Seal Gap Gage(s) to the flange. Then apply the door magnets to “flush” the door or deck lid and sample the readings. Data is stored in a convenient file format for use in your SPC program. Comprehensive screen displays show the characteristic readings and colorfully identify whether each reading is within specification limits (green), within control limits (yellow), or out of specification limits (red).

The hardware and complete software setup is explained in the following chapters.

¹ The cord retractor has a ratchet mechanism.

² Make sure the cord retractor cord does not get twisted.

2.1 Hardware, 2351-RF Hub and Accessories



1. 2351-RF Hub

The 2351-RF Hub is the central piece of hardware for the 2300 Seal Gap System. All of the communications for each gage runs through the hub.

2. 237 or 238 Seal Gap Gage

These are the actual measuring tools to inspect the seal gap of the vehicle. Each gage connects to one of the twelve ports located on the front of the hub. The gage is clamped onto the seal flange but stays connected to the hub with a ratcheting cable retractor.

3. Zero Master

The zero master is attached to the 2351-RF Hub to make it convenient to calibrate the 237 and 238 gages. The block is used to set the gages upside down on the steel plate in order to zero the gages.



4. Wireless Receiver Unit

The hub can communicate wirelessly to the computer using this wireless receiver. This unit simply plugs into the COM port on your PC and replaces the serial cable that would normally have to attach to the hub. Use the AC Power for this unit for normal operation since the Battery power is only for brief operation.

5. Magnet Handles

Used to flush the doors or deck lid after the gauges have been attached and you are ready to measure a vehicle.

6. Remote Sample

Used to sample the readings once you are ready to collect data.



7. AC Wall Adapter

Used to power the hub without the use of batteries.

8. Battery Charger

Used to charge the batteries in hub.

2.2 2351-RF Hub Specifics



1. AC Power Jack

The 2351-RF Hub can operate on AC power if the AC wall adapter is plugged into an outlet and plugged into the AC Power Jack. The Power Selector switch must also be moved to the AC Power ON position.

2. Battery Charger Jack

The Ultra Life battery charger plugs into this jack in order to charge the battery inside the hub. The Power Selector switch must be in the Charge/OFF position to charge.

3. RF Transmit Switch

In the OFF position, the communication to the software will only work using a serial cable to the PC. The main Power Selector switch to the hub still has to be ON to operate.

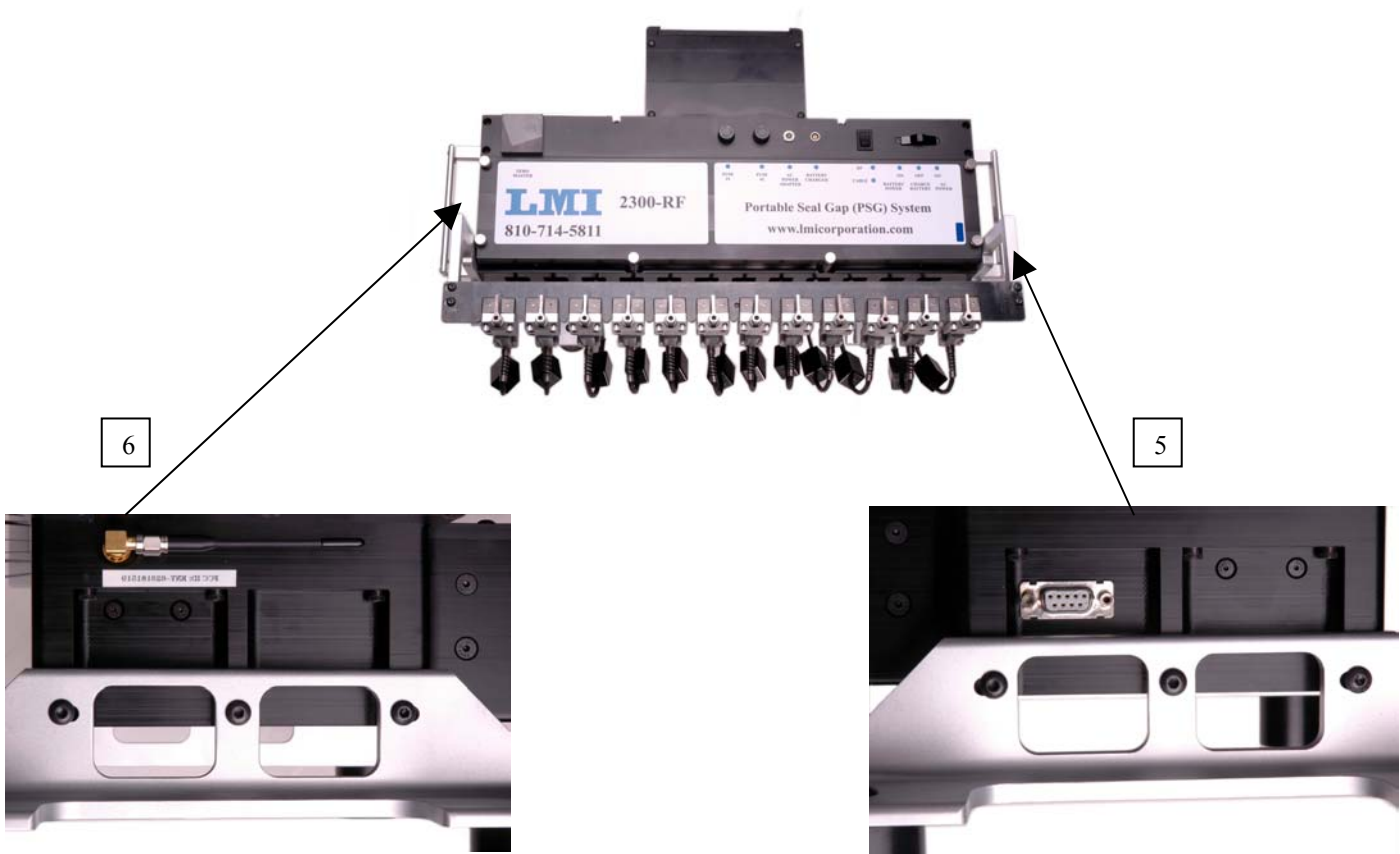
In the ON position the hub can communicate to the software wirelessly using the wireless receiver. The main Power Selector switch to the hub still has to be ON and the wireless receiver must be plugged in to the PC COM port and powered on as well to operate.

4. Power Selector Switch

Battery/On Position – Main power is on using the battery

Charge/Off Position – Main power is off and is ready to charge the battery

AC Power/On Position – Main power is on when the AC wall adapter is plugged in.



5. Communication Port for a serial cable

Port is used to connect the hub to the PC COM port using a serial cable.

6. Hub RF Transmitter Antenna

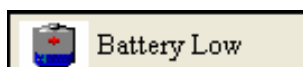
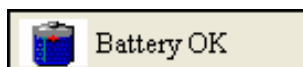
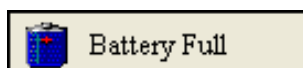
RF Antenna is the main RF communications between the Hub and the Wireless Receiver unit.

2.3 Batteries

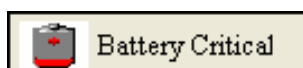
2.3.1 Battery Charging

The system is supplied with (1) battery to power the LMI 2351-RF Hub unit. The battery is a Ultra Life rechargeable lithium ion battery that on a full charge will last approximately 30 hours of continuous use. It will take less than 4 hours to fully recharge a battery, depending on the initial battery level.

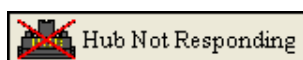
When a battery is in a 2351-RF Hub and connected to the seal gap software you can view the status of the battery level from the runtime side. When collecting data in the software, an icon in the bottom left hand corner of the screen will be visible. The figures below show the different battery levels.



Battery starting to get low, consider recharging.



Recharge battery



This icon is displayed when no battery signal is recognized. This icon will also be present if you have an older hub that is not compatible with this feature.

IMPORTANT NOTE: Lithium Ion batteries DO NOT have a memory like NiCad battery technology that prefers to fully discharge a battery before recharging. In fact more frequent charging prolongs the life of the lithium ion batteries and fully draining the battery will reduce the batteries' life. LMI recommends recharging the battery after every use.

There are two ways to charge the battery. You can charge the battery while it is still in the 2351 Hub or by itself, external to the hub. It is important to follow the instructions below.

Charging just the battery:

1. Make sure the DC power jack is plugged into the Ultra Life charger and then plug the AC plug into an outlet.
2. Connect the 5-pin charger connector to the battery by aligning the red dots.
3. The LED on the charger will illuminate to indicate the status of the battery.

Charging the battery while it is still in the 2351-RF Hub:

1. Move the Power selector switch to the OFF or CHARGE position on the 2351 Hub. The 2351 Hub will not be functional while the unit is charging.

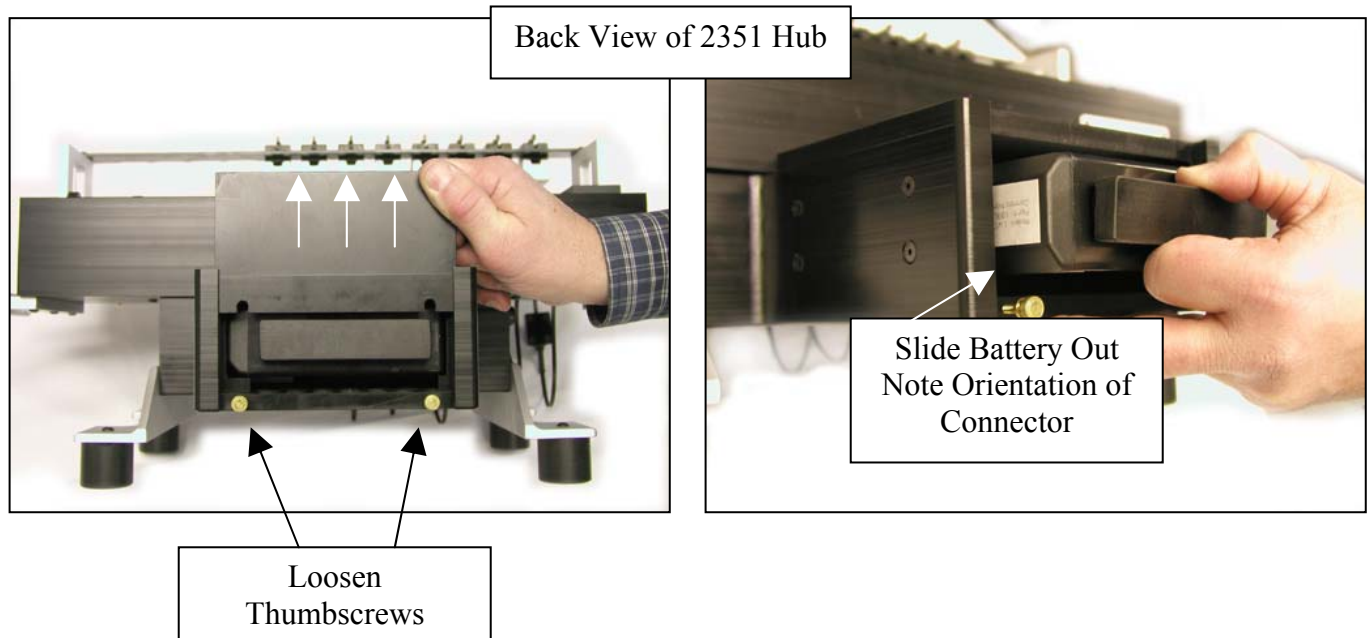
2. Make sure the DC power jack is plugged into the Ultra Life charger and then plug the AC plug into an outlet.
3. Connect the 5-pin charger connector to the 5-pin connector on top of the 2351-RF Hub labeled BATTERY CHARGER by aligning the red dots.
4. The LED on the charger will illuminate to indicate the status of the battery.

The LED on the charger will illuminate once a battery is plugged in. The LED will indicate the status of the battery as follows:

Light Condition	Battery Status
Green Flash	Fast Charging
Green Solid	Fully Charged
Yellow Solid	Standby
Red Flash	Error

2.3.2 Switching Batteries

The 2351-RF Hub was designed so the internal battery could be replaced with a fresh battery without the use of tools. To remove the battery, loosen the two thumbscrews that secure the battery panel on the back of the unit. The battery panel will slide up revealing the battery. Pull the battery straight out and replace with a new battery. Note the orientation of the connector on the battery that was removed and insert the new battery the same way. Push the battery all the way in and replace the battery panel and tighten the thumbscrews.



2.3.3 Remote Pendant Switch Battery

The remote pendant switch uses a 3 volt battery. To replace the battery, use a flat head screwdriver to open the pendant casing. Remove the old battery, verify the correct polarity of the new battery and place it in the casing. Close the casing and replace the screw.

2.3.4 Battery Warnings

Use only the battery and charger provided with the LMI 2300 System. Use of batteries other than the battery supplied or specified by LMI can result in System damage.

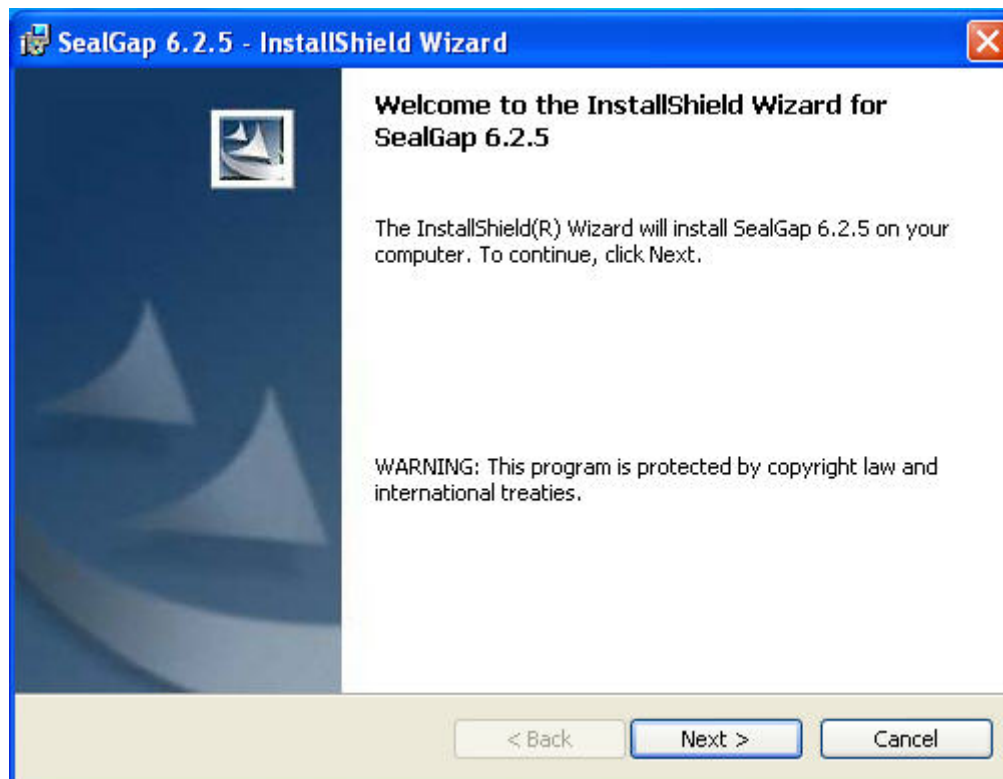
The PSG System uses rechargeable batteries. In some municipalities it is illegal to dispose of this battery into the municipal waste stream. At the end of its useful life, the battery is recyclable. Check with your local solid waste officials for details about recycling options or proper disposal in your area.

3

Software Installation & Operating Notes

3.1 Installation

Insert the 2300 Seal Gap software CD and the installation should automatically start and display the following screen. If the Install Wizard does not begin as shown below, run the setup.exe from the CD drive. Click NEXT to begin installation.



Follow the installation instructions. You will be prompted to enter in the software serial number. The serial number is located on your CD case that the CD came in. Type this number as it is shown on the CD case and press NEXT to continue. When the installation is complete simply press Finish.

3.2 General Notes

- The Seal Gap System can be operated using a mouse or keyboard.
- The program has been subdivided into two parts:
 1. Seal Gap - Configuration
Used to configure files for data collection.
 2. Seal Gap - Runtime
Used to collect data.

Minimum Seal Gap System Requirements

- Pentium 900 MHz or faster processor
- SVGA monitor running in 1024x768 resolution
- The operating system must be one of the following...
 - Windows ME
 - Windows 2000 (ideal platform)
 - Windows XP
- At least one available 9-pin Serial COM Port (suggested (2) 9-pin serial COM port) for dual Seal Gap Systems.

3.3 Key Functions

TAB is generally used to cycle through controls within a screen. The movement is generally from top to bottom and from left to right. SHIFT+TAB moves to the previous control.

Each screen contains words that are individualized by an underlined letter. To execute a function associated to the word, press ALT + [underlined letter].

An option is designated by []. Generally an option is grouped with other options. Use the arrow keys or ALT+[underlined letter], or click with the mouse to select an option.

A check box is designated by []. To enable or disable press the space bar, or ALT+[underlined letter], or click with the mouse.

The spreadsheets within the Seal Gap - Configuration software support the basic spreadsheet functions of copy (CTRL+C), paste (CTRL+V), insert (with the row or cell highlighted, press the insert key), and delete (with the row or cell highlighted, press the delete key).

4

Setting Up an LMI 2300 Seal Gap System

There are four basic steps to setup a 2300 Seal Gap System:

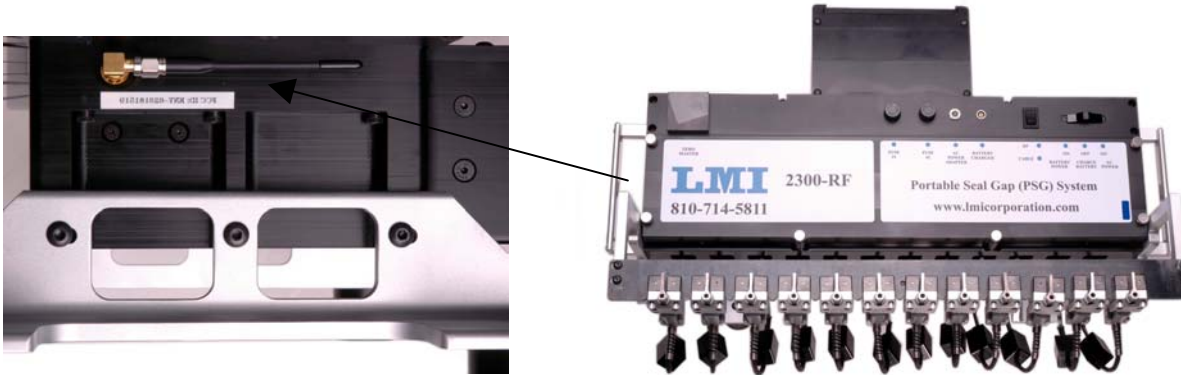
1. Making Necessary Connections to the hardware.
2. Setting up a Part File - A part file must be setup to define the component(s) being gauged.
3. Calibrating the Gages.
4. Gauging Parts - Data is taken and stored for further analysis.

These steps are outlined in Sections 4 through 7.

4.1 Making Necessary Connections

To start communication to the software the gages need to simply plug into the individual ports in the front of the hub and the hub powered ON. The 2351-RF Hub has two methods of communication, either with a cable or wirelessly.

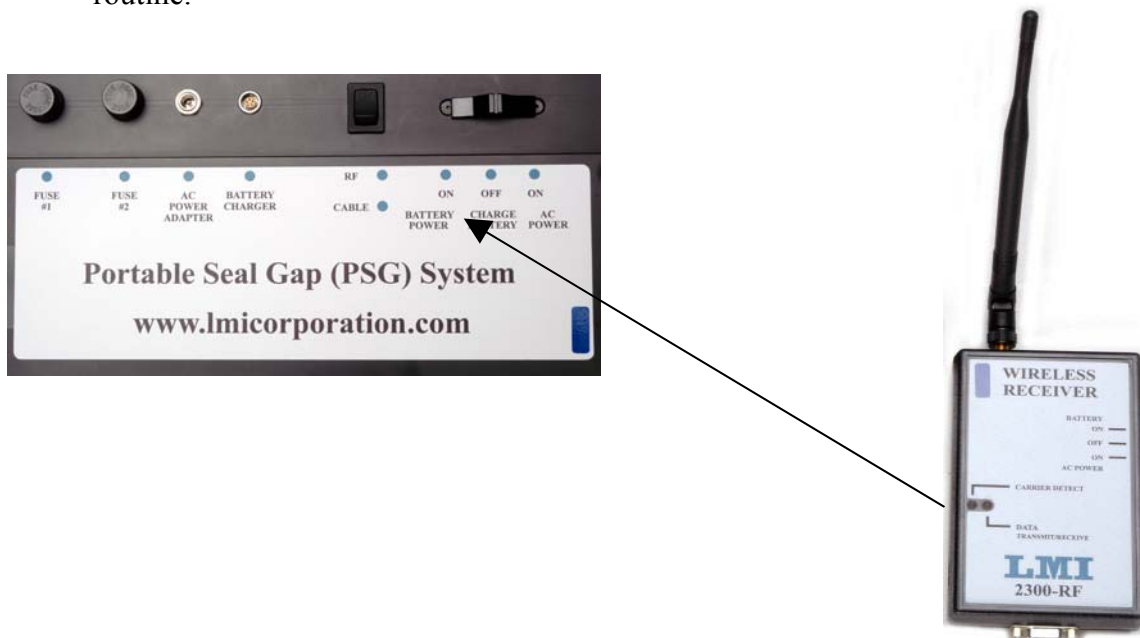
4.1.1 Communicating with the 2351-RF Hub using a cable



Plug one end of the serial cable into the communication port on the left side of the 2351-RF Hub. The other end connects to the proper COM port specified on the computer. The hub power must be turned ON and the RF Transmit switch turned off.

4.1.2 Communicating Wirelessly to the 2351 Hub

The hub can communicate wirelessly to the computer using this wireless receiver. First the RF Transmit switch must be ON and the hub power also turned ON. Second the Wireless Receiver unit must be plugged in to the COM Port of the PC and powered on. The Carrier Detect light will turn green when the hub unit is connected and you are ready to communicate. The Trans/Receive Data light will flash when you are sending readings during the measurement routine.



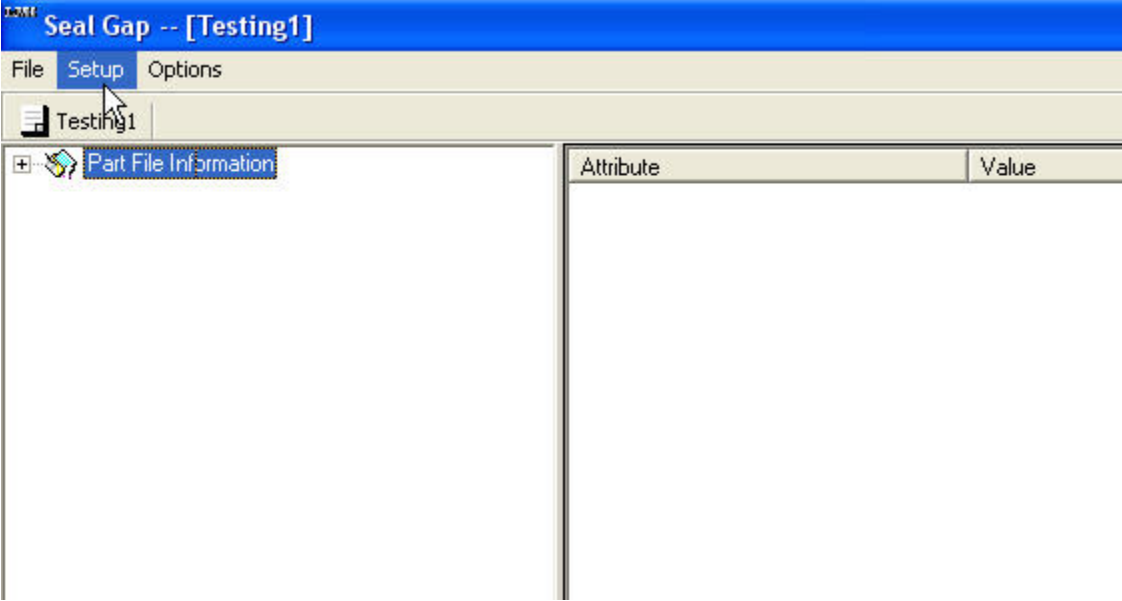
4.2 Part File Setup

A part file must be created before readings can be taken with the PSG System. A part file is created to define the points on the part that will be gauged. This task is performed using the Seal Gap - Configuration program. Double-click the 'Seal Gap - Configuration' icon from the Windows Desktop.



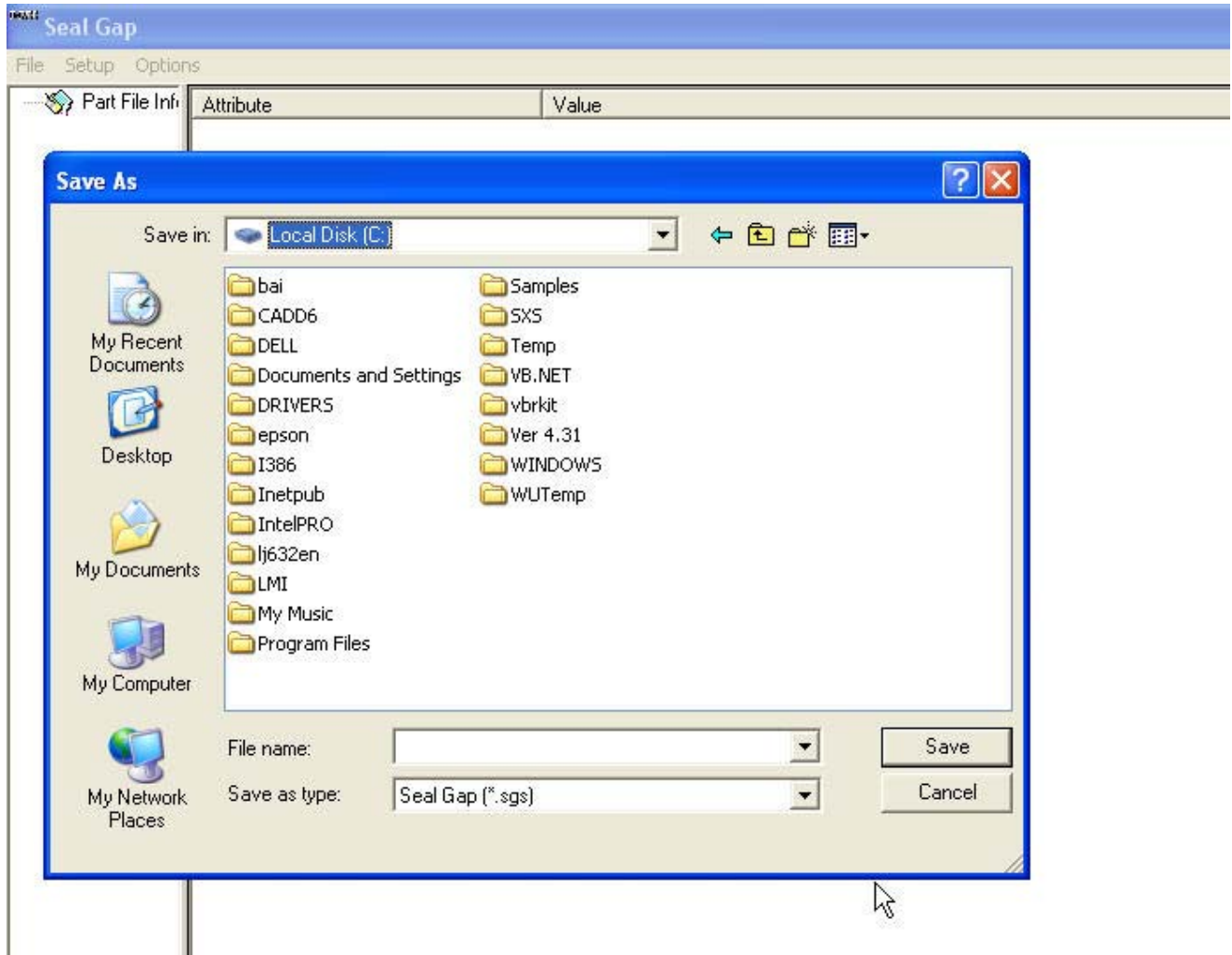
Picture 4.2a

If no part files have been created previously, you will be shown a blank tree view screen with menu options at the top of the screen. Once here, you must Select File and then New...



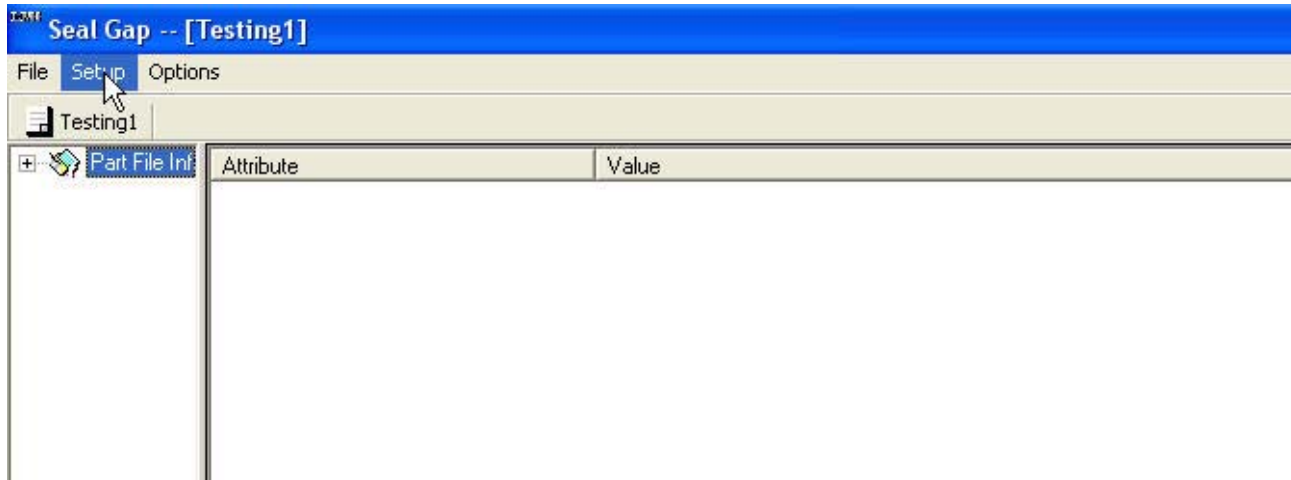
Picture 4.2b

You will then be prompted to save the part file. Select the file location you wish to save the part file to by selecting the “Save in” drop down box. Once this has been done, enter the name of the part file in the “File name” text box. Press the Save button. If this is not what you wanted to do, then hit Cancel.



Picture 4.2c

At this point, the tree view will be once again in focus. Notice the part file name is at the top of the screen and also under the menu options. The part file name at the top of the screen lets you know what part file you are currently using. The part file name under the menu options lets you know the last four Part files that have been opened. Since no other part files have been created, only one part file is shown at this time.

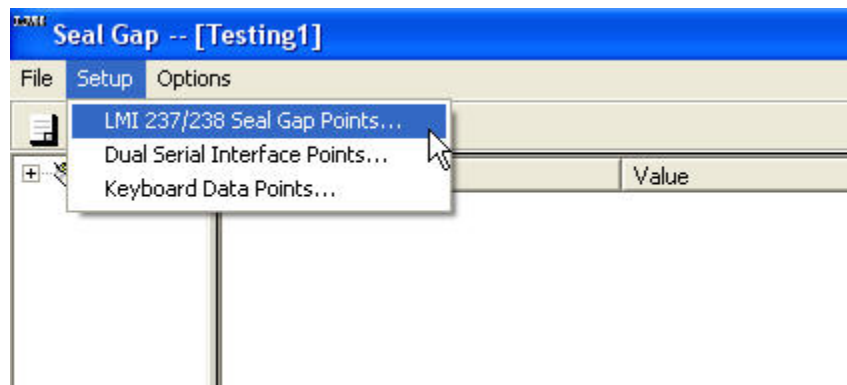


Picture 4.2d

At this point, all the menu options are now enabled. Also, a plus has appeared next to the “Part File Information” icon in the tree view. This will expand to show you important information about the part file in use. Section 7 goes more into this.

4.2.1 LMI 237/238 Seal Gap Points...

The LMI 237/238 Seal Gap option is used to define characteristic check point parameters. These check points will be gauged using the LMI 237 Quick Attach Door Seal Gage or LMI 238 Quick Attach Decklid Seal Gap Gage. First, select Setup from the menu and then select LMI 237/238 Seal Gap Points...



Picture 4.2.1a

At this point, an Excel™ type screen will appear to the user. At the present time, no rows are seen because no check points have been assigned.

The screenshot shows a software window titled "LMI 237/238 Seal Gap Points Setup". The window has a menu bar with "Defaults", "Graphics", "Save", and "Exit". Below the menu bar, there are two checked checkboxes: "Active" and "Display Gage ID Labels". To the left of these checkboxes is a text box labeled "# of Check Points" containing the number "0".

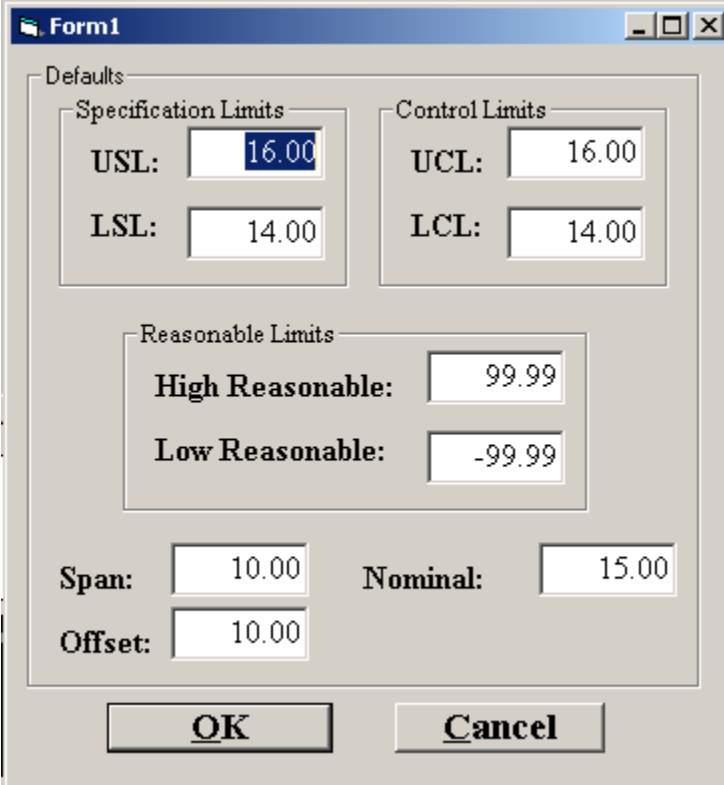
	Characteristic	Component	Gage ID	COM Port	Gage Port	Span	Offset	Nominal	USL	LSL	UCL
--	----------------	-----------	---------	----------	-----------	------	--------	---------	-----	-----	-----

Below the table is a large grey rectangular area, likely a scrollable list of data rows. At the bottom of the window, there is a "Notes:" label followed by a large empty text area. Below the text area, there is a black bar with white text that reads: "Characteristic -- The name of the selected characteristic point can be entered here. The maximum is 15 characters."

Picture 4.2.1b

Default Settings

Select Defaults. The following screen will be displayed. The defaults are preset values that will apply to all gage points within each gage file. Click on the desired box to make any necessary changes. Note that any changes will affect all check points. Individual point settings can be changed during part setup.



The screenshot shows a dialog box titled "Form1" with a "Defaults" section. It contains several input fields for setting limits and parameters. The "Specification Limits" section has "USL:" set to 16.00 and "LSL:" set to 14.00. The "Control Limits" section has "UCL:" set to 16.00 and "LCL:" set to 14.00. The "Reasonable Limits" section has "High Reasonable:" set to 99.99 and "Low Reasonable:" set to -99.99. Below these are "Span:" set to 10.00, "Nominal:" set to 15.00, and "Offset:" set to 10.00. At the bottom are "OK" and "Cancel" buttons.

Picture 4.2.1c

Definition of fields:

- **USL: (Upper Specification Limit)**

Defines the upper specification limit of the reading. During data collection, a reading that exceeds this limit will trigger an out-of-specification warning (red color). The default setting is 16.00 mm.

- **LSL: (Lower Specification Limit)**

Defines the lower specification limit of the reading. During data collection, a reading that falls below this limit will trigger an out-of-specification warning (red color). The default value is 14.00 mm.

- **UCL: (Upper Control Limit)**

Defines the upper control limit of the reading. During data collection, a reading that exceeds this limit, but falls below the upper specification limit (USL) will trigger a warning (yellow color)

indicating the value is near the specification limit. The default value is 16.00 mm and is equal to the USL default value. If the USL value is changed, the UCL value will automatically change to match the USL value. To override this default, enter the desired UCL value after entering the USL value.

- **LCL: (Lower Control Limit)**

Defines the lower control limit of the reading. During data collection, a reading that falls below this limit, but exceeds the lower specification limit (LSL), will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is 14.00 mm and is equal to the LSL. If the LSL value is changed, the LCL value will automatically change to match the LSL value. To override this default, enter the desired LCL value after entering the LSL value.

- **High Reasonable:**

Defines the high reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceeded the highest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction. If the High Reasonable limit is changed to a value less than the USL or UCL, a message box will appear letting the user know that the value must be greater than these other two. This happens once the OK button is pressed. The default setting is 99.99 mm.

- **Low Reasonable:**

Defines the low reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceeded the lowest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction. If the Low Reasonable limit is changed to a value greater than the LSL or LCL, a message box will appear letting the user know that the value must be less than these other two. This happens once the OK button is pressed. The default setting is -99.99 mm.

- **Nominal:**

This is the value that defines the “perfect reading”. The default value is 15.00 mm.

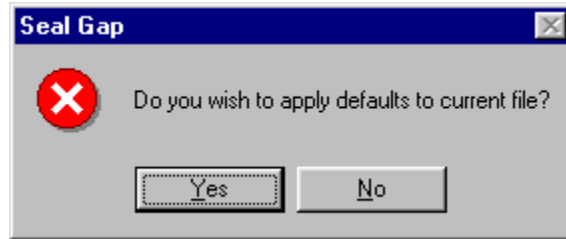
- **Span:**

The maximum displacement of the specific Gage. In most cases this will be 10.00 mm, which is the default value.

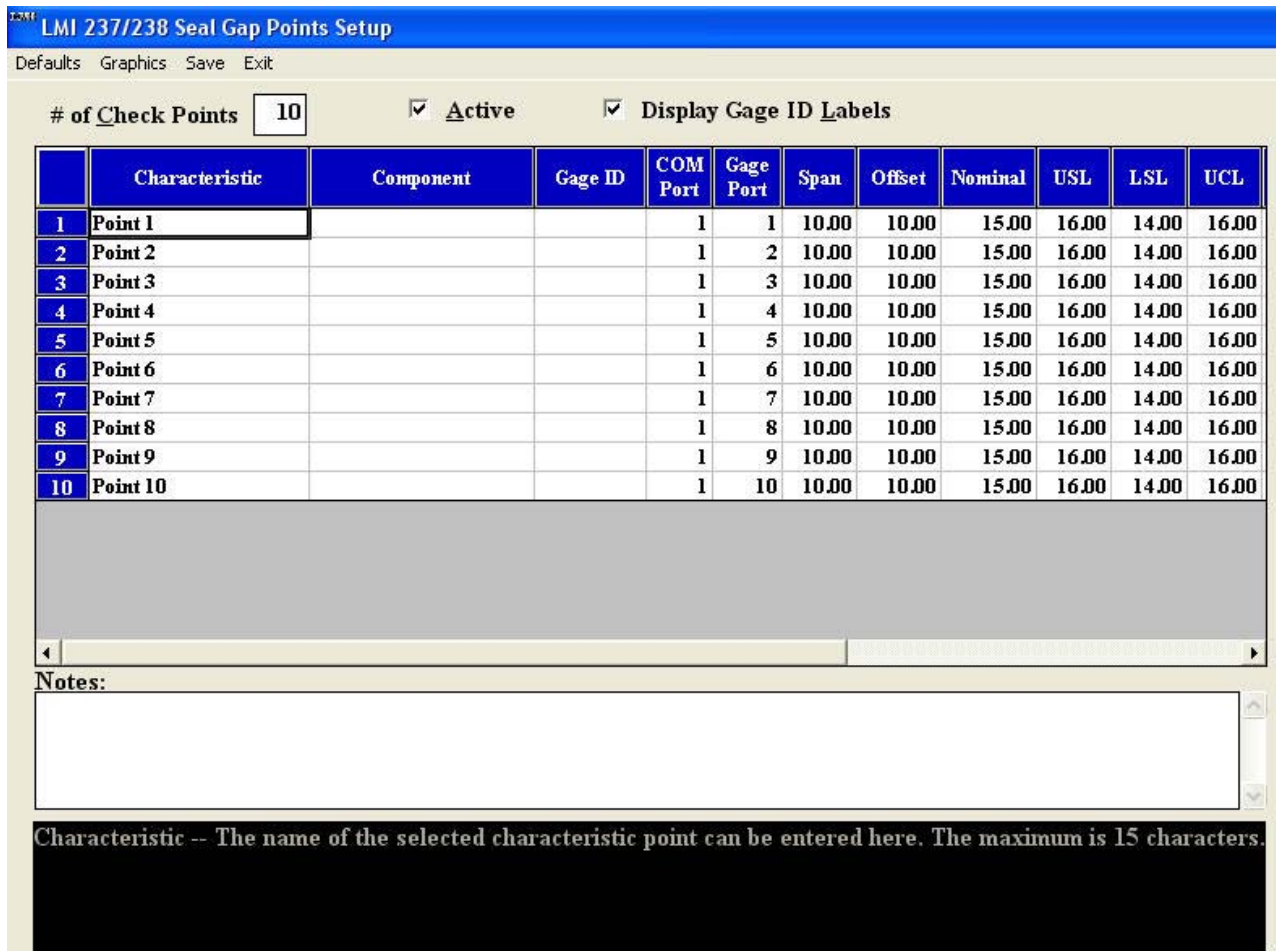
- **Offset:**

A constant that is added to the measured reading. $\text{Displayed Measurement} = \text{Measurement} + \text{Offset}$. The offset should be set at the minimum checking distance for a particular gage. For example, a gage that has a checking range of 10mm to 20mm should have an offset of 10. The default value is 10.00 mm.

If the values are correct, click OK. The following message will be displayed:



Click Yes or No as desired to return to the LMI 237/238 Seal Gap Points Setup screen.



Picture 4.2.1d

Definition of fields:

• **# of Check Points:**

The number of check points to be inspected in the part file using LMI 237 or LMI 238 gages. Enter the number of characteristic check points in the “# of Check Points” box and press the ↵Enter key. The spreadsheet will expand to accommodate the defined number of check points. The above picture is an example of 10 check points.

• **Active:**

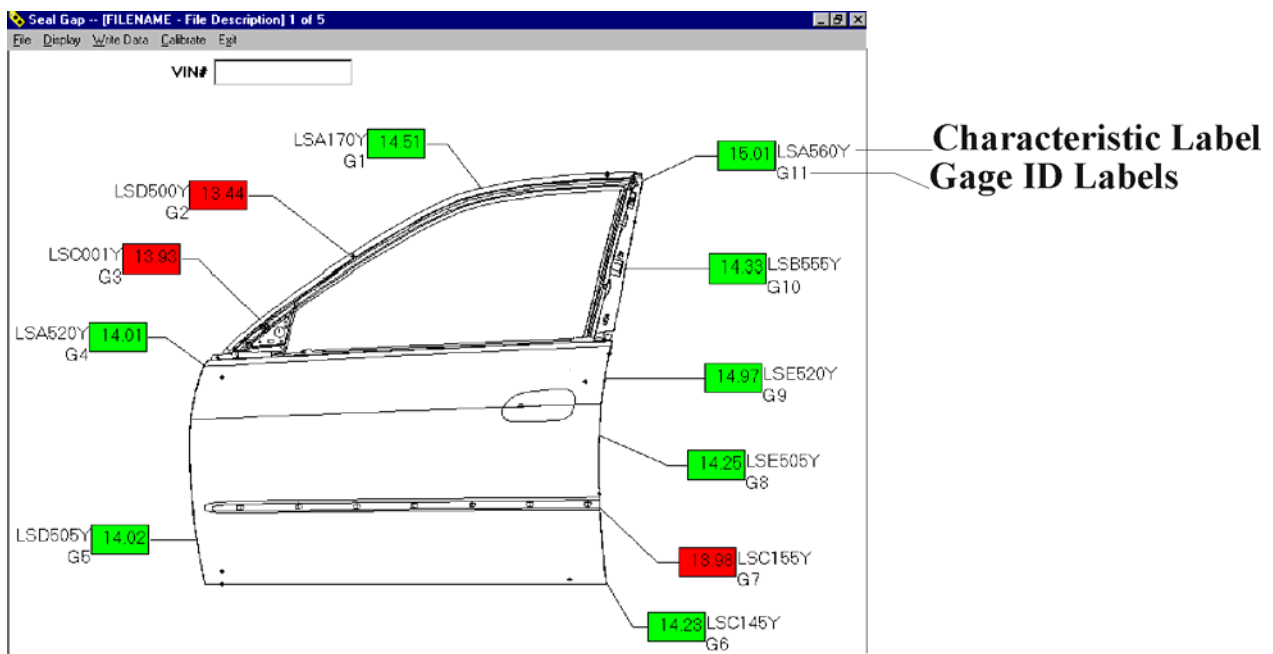
Enables or disables LMI 237/238 Seal Gap Points while collecting data. During data collection, the screens will automatically scroll through all gage checking types, i.e. LMI 237/238 Seal Gap Points, Dual Serial Interface Points, or Keyboard Data Points. The “Active” box will be enabled by default. Click off the “Active” box if you do not wish to take readings from LMI 237/238 Seal Gap Points. The data collection screens will only display the Active gage checking types.

- **Display Gage ID Labels:**

The Gage ID (identification) labels will appear on the Graphic screen in data collection mode if the box is enabled (see Picture 4.2.1e). The Gage ID labels will assist the operator in selecting the correct gage for each gage point in the part file during data collection. This option will be enabled by default. Use the mouse to click off the Display Gage ID Labels as desired.

- **Characteristic:**

The characteristic is a label assigned to each gage point. The characteristic label will appear on the Graphic screen, Value screen and Bar Graph screen during data collection (see Picture 4.2.1e). The characteristic label will default to Point 1, Point 2, etc. To change the label, click on the characteristic field, use the backspace key to erase the existing label and enter an alphanumeric label of up to 15 characters. Press the \downarrow Enter key.



Picture 4.2.1e

- **Component:**

Defines what part is being checked, i.e. the front right door, back right door or deck lid. Click on the first component box and enter an alphanumeric label of up to 30 characters. Press the \downarrow Enter key and the label will appear in each of the component boxes. It is necessary to group all characteristic check points by component, as shown in Picture 4.2.1e. If multiple components are necessary, select the component box for the appropriate characteristic, use the backspace key to erase the existing component and enter the next component label. Continue until all component labels are entered. Each component will appear on a separate screen in the data collection mode.

- **Gage ID:**

The identification of the specific physical gage, which will be used to inspect the individual check points. This alphanumeric label can be up to 15 characters long. For example, the gage that is connected to Gage Port number one could be labeled as “G1”. **Note:** The same physical gage can be used on different points on different components, but can not be used more than once on a single component.

- **Gage Port:**

Indicates the gage port that the specified gage is connected to. Each individual gage receptacle on the 2351 Hub is labeled with a unique number, which identifies the port number.

- **Span:**

The maximum displacement of the specific Gage. In most cases this will be 10.00 mm, which is the default value.

- **Offset:**

A constant that is added to the measured reading. $\text{Displayed Measurement} = \text{Measurement} + \text{Offset}$. The default value is 10.00 mm.

- **Nominal:**

This is the value that defines the “perfect point”. The default value is 15.00 mm.

- **USL: (Upper Specification Limit)**

Defines the upper specification limit of the reading. During data collection, a reading that exceeds this limit will trigger an out-of-specification warning (red color). The default setting is 16.00 mm.

Defines the lower specification limit of the reading. During data collection, a reading that falls below this limit will trigger an out-of-specification warning (red color). The default value is 14.00 mm.

- **UCL: (Upper Control Limit)**

Defines the upper control limit of the reading. During data collection, a reading that exceeds this limit, but falls below the upper specification limit (USL) will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is 16.00 mm and is equal to the USL default value. If the USL value is changed, the UCL value will automatically change to match the USL value. To override this default, enter the desired UCL value after entering the USL value.

- **LCL: (Lower Control Limit)**

Defines the lower control limit of the reading. During data collection, a reading that falls below this limit, but exceeds the lower specification limit (LSL), will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is 14.00 mm and is equal to the LSL. If the LSL value is changed, the LCL value will automatically change to match the LSL value. To override this default, enter the desired LCL value after entering the LSL value.

Note: It may be necessary to move the horizontal scroll bar to the right to view the following fields:

- **High Reasonable:**

Defines the high reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceeded the highest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction.

- **Low Reasonable:**

Defines the low reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceeded the lowest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction.

- **High Cal: (High Calibration)**

An integer value from 0 to 4095 that indicates the maximum value in bit count units at one end of the Gage span. The value must be at least 1000 counts different than Low Calibration. This value is set during calibration and cannot be changed here. A value of “***” indicates that this value has not been set.

- **Low Cal: (Low Calibration)**

An integer value from 0 to 4095 that indicates the minimum value in bit count units at one end of the Gage span. The value must be at least 1000 counts different than High Calibration. This value is set during calibration and cannot be changed here. A value of “***” indicates that this value has not been set.

- **Master Cal:**

An integer value from 0 to 4095 that indicates the value in bit count units of the master point. It is the A/D conversion value that represents a perfect reading. This value is set during calibration and cannot be changed here. A value of “***” indicates that this value has not been set.

- **Notes:**

A memo field for each characteristic. Press the Tab key or click on the “Notes” box to access the field. Use the mouse to click on the next desired field.

- **Graphics:**

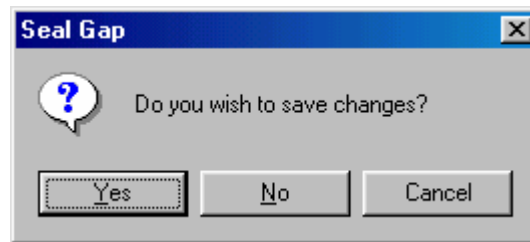
Displays Graphics Setup screen. See Section 4.2.5 for instructions.

- **Save:**

Saves part file or changes made to the part file. **Note:** The part file must be saved prior to entering Graphics Setup or exiting LMI 237/238 Seal Gap Points Setup.

- **Exit**

Returns user to the main menu. If the part file or changes to the part file have not been saved, the following message will be displayed:



Click Yes, No, or Cancel as desired.

The example part file below shows a part file that has 14 checkpoints. 10 checks are for a Front Door, 4 check points for Lift Gate.

LMI 237/238 Seal Gap Points Setup
 Defaults Graphics Save Exit

of Check Points Active Display Gage ID Labels

	Characteristic	Component	Gage ID	COM Port	Gage Port	Span	Offset	Nominal	USL	LSL	UCL
1	Point 1	Front Door	1	1	1	10.00	10.00	15.00	16.00	14.00	16.00
2	Point 2	Front Door	2	1	2	10.00	10.00	15.00	16.00	14.00	16.00
3	Point 3	Front Door	3	1	3	10.00	10.00	15.00	16.00	14.00	16.00
4	Point 4	Front Door	4	1	4	10.00	10.00	15.00	16.00	14.00	16.00
5	Point 5	Front Door	5	1	5	10.00	10.00	15.00	16.00	14.00	16.00
6	Point 6	Front Door	6	1	6	10.00	10.00	15.00	16.00	14.00	16.00
7	Point 7	Front Door	7	1	7	10.00	10.00	15.00	16.00	14.00	16.00
8	Point 8	Front Door	8	1	8	10.00	10.00	15.00	16.00	14.00	16.00
9	Point 9	Front Door	9	1	9	10.00	10.00	15.00	16.00	14.00	16.00
10	Point 10	Front Door	10	1	10	10.00	10.00	15.00	16.00	14.00	16.00
11	Point 11	LiftGate	11	2	11	10.00	10.00	15.00	16.00	14.00	16.00
12	Point 12	LiftGate	12	2	12	10.00	10.00	15.00	16.00	14.00	16.00
13	Point 13	LiftGate	13	2	13	10.00	10.00	15.00	16.00	14.00	16.00
14	Point 14	LiftGate	14	2	14	10.00	10.00	15.00	16.00	14.00	16.00

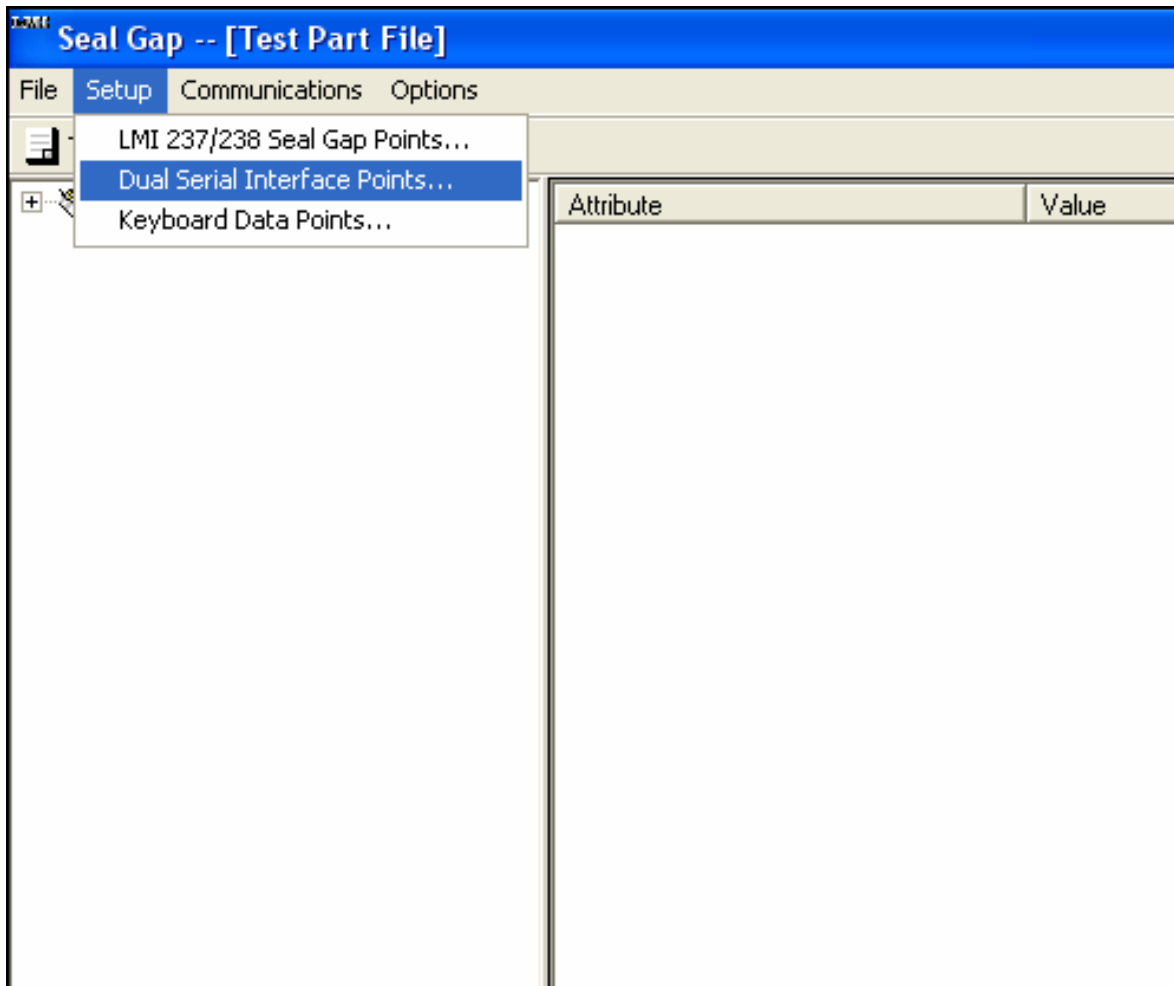
Notes:

of Check Points -- Indicates the number of check points that will be performed with Seal Gap Gages.

Picture 4.2.1e

4.2.2 Dual Serial Interface Points...

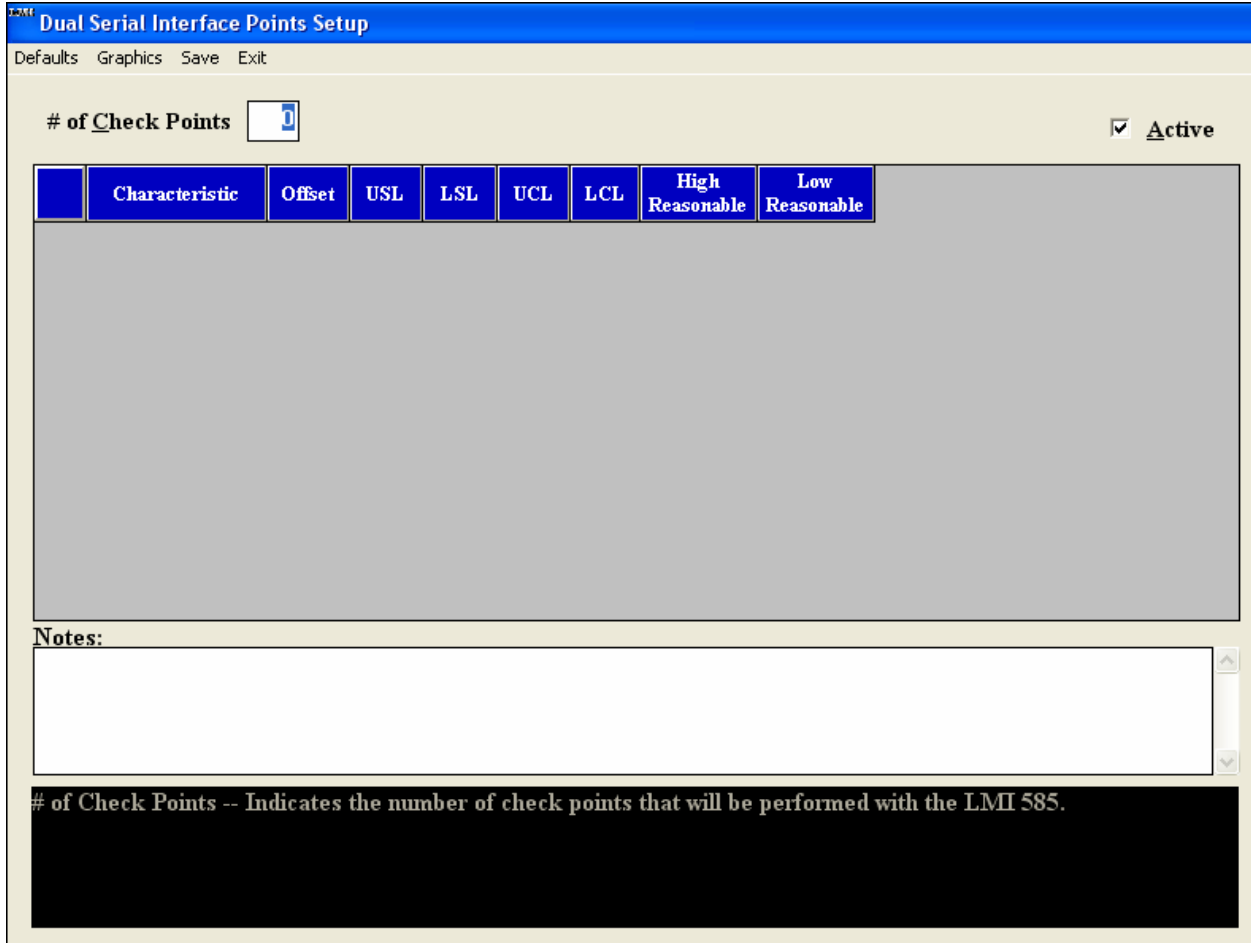
The Dual Serial Interface Points option is used to define check points that will be taken using an LMI 585 Digital Transmitter connected to an LMI 200 Series Probe. This is used to take individual seal gap readings manually using the 235 or 236 friction lever blocks. First, select Setup from the menu and then select Dual Serial Interface Points...



Picture 4.2.2a

Note: The 585 Must be properly setup and connected to interface properly. If you have a 585 Plus the Baud rate must be set to 4800 and Export #1 must be selected. You must also be connected to the unused COM port 1 or 2 on your PC that is not being used by the 2351 Hub. For instance, if you configured COM1 for the hub then COM 2 must be connected to the 585. When the DSI checks are ready to be taken on the runtime side the readings will fill the boxes when the 585 SEND button is pressed.

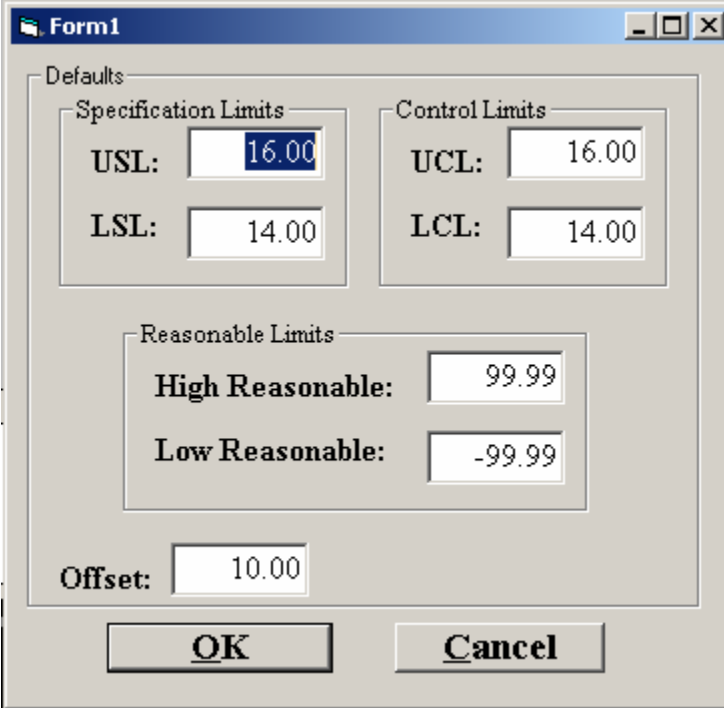
The following screen is displayed:



Picture 4.2.2b

Default Settings

Select Defaults. The following screen will be displayed. The defaults are preset values that will apply to all gage points within each gage file. Click on the desired box to make any necessary changes. Note that any changes will affect all gage points within Dual Serial Interface and Keyboard Data Point part files. Individual gage point settings can be changed during part Setup.



The screenshot shows a dialog box titled 'Form1' with a 'Defaults' section. It contains four input fields for Specification Limits (USL: 16.00, LSL: 14.00), two for Control Limits (UCL: 16.00, LCL: 14.00), two for Reasonable Limits (High Reasonable: 99.99, Low Reasonable: -99.99), and one for Offset (10.00). 'OK' and 'Cancel' buttons are at the bottom.

Picture 4.2.2c

Definition of fields:

•USL: (Upper Specification Limit)

Defines the upper specification limit of the reading. During data collection, a reading that exceeds this limit will trigger an out-of-specification warning (red color). The default setting is 3.00 mm.

•LSL: (Lower Specification Limit)

Defines the lower specification limit of the reading. During data collection, a reading that falls below this limit will trigger an out-of-specification warning (red color). The default value is -3.00 mm.

• UCL: (Upper Control Limit)

Defines the upper control limit of the reading. During data collection, a reading that exceeds this limit, but falls below the upper specification limit (USL) will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is 3.00 mm and is equal to the USL default value. If the USL value is changed, the UCL value will automatically change to

match the USL value. To override this default, enter the desired UCL value after entering the USL value.

- **LCL: (Lower Control Limit)**

Defines the lower control limit of the reading. During data collection, a reading that falls below this limit, but exceeds the lower specification limit (LSL), will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is -3.00 mm and is equal to the LSL. If the LSL value is changed, the LCL value will automatically change to match the LSL value. To override this default, enter the desired LCL value after entering the LSL value.

- **High Reasonable:**

Defines the high reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceed the highest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction. If the High Reasonable limit is changed to a value less then the USL or UCL, a message box will appear letting the user know that the value must be greater then these other two. This happens once the OK button is pressed. The default setting is 99.99 mm.

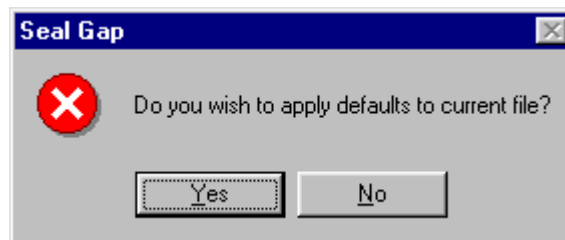
- **Low Reasonable:**

Defines the low reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceed the lowest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction. If the Low Reasonable limit is changed to a value greater then the LSL or LCL, a message box will appear letting the user know that the value must be less then these other two. This happens once the OK button is pressed. The default setting is -99.99 mm.

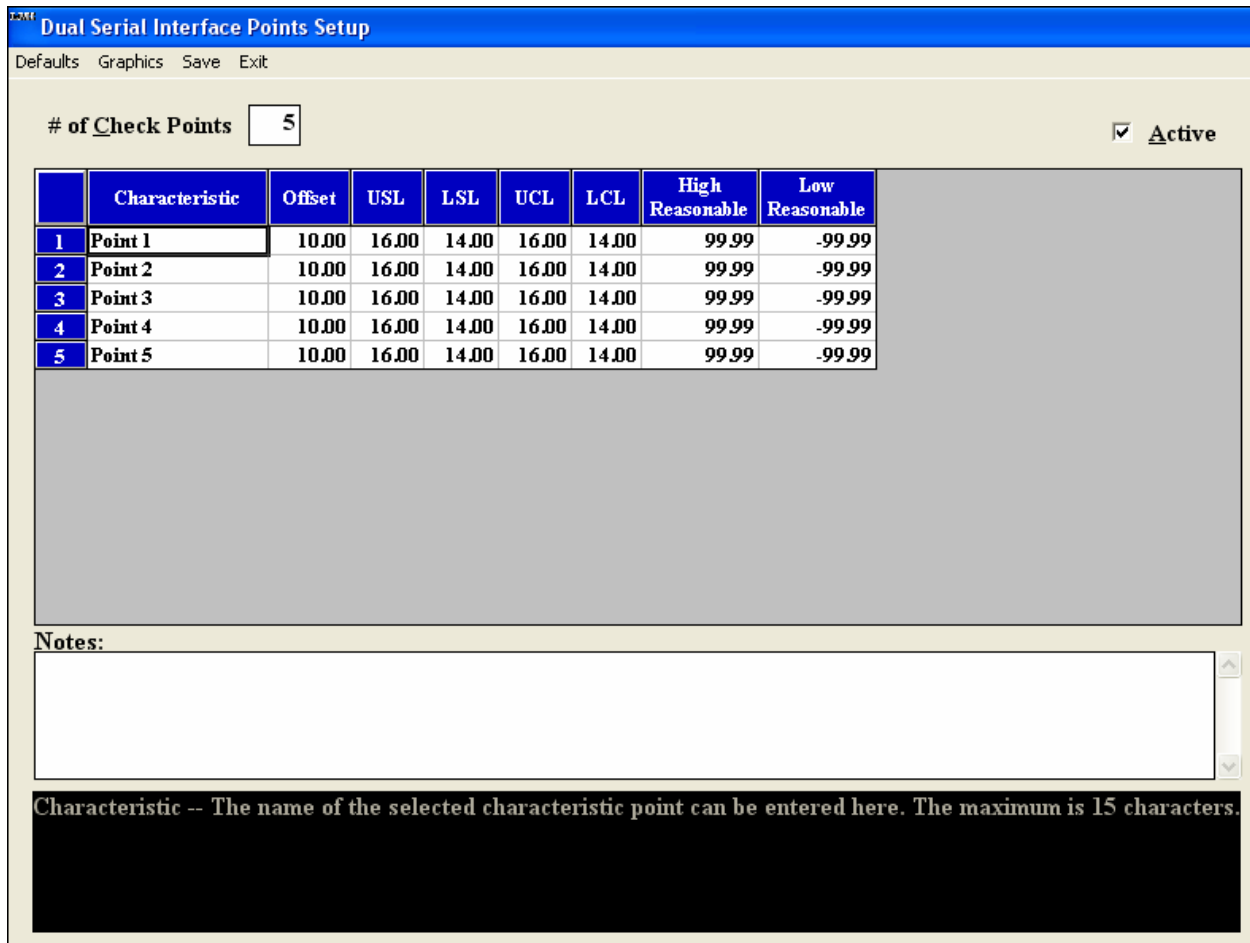
- **Offset:**

A constant that is added to the measured reading. $\text{Displayed Measurement} = \text{Measurement} + \text{Offset}$.

If the values are correct, click OK. The following message will be displayed:



Click Yes or No as desired to return to the Dual Serial Points screen.



Picture 4.2.2d

Definition of fields:

- **# of Check Points:**

Signifies the number of check points to be inspected in the part file. Enter the number of characteristic check points in the “# of Check Points” box and press the ↵Enter key. The spreadsheet will expand to accommodate the defined number of check points.

- **Active:**

Enables or disables Dual Serial Interface check points while collecting data. By default, the “Active” box will be enabled. Click off the “Active” box if you do not wish to take readings using the DSI. The data collection screens will only display the Active gage checking types.

- **Characteristic:**

The characteristic is a label assigned to each gage point. The characteristic label will default to Point 1, Point 2, etc. To change the label, click on the characteristic field, use the backspace key to erase the existing label and enter an alphanumeric label of up to 15 characters. Press the ↵Enter key.

- **Offset:**

A constant that is added to the measured reading. $\text{Displayed Measurement} = \text{Measurement} + \text{Offset}$.

- **USL: (Upper Specification Limit)**

Defines the upper specification limit of the reading. During data collection, a reading that exceeds this limit will trigger an out-of-specification warning (red color). The default setting is 3.00 mm.

- **LSL: (Lower Specification Limit)**

Defines the lower specification limit of the reading. During data collection, a reading that falls below this limit will trigger an out-of-specification warning (red color). The default value is -3.00 mm.

- **UCL: (Upper Control Limit)**

Defines the upper control limit of the reading. During data collection, a reading that exceeds this limit, but falls below the upper specification limit (USL) will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is 3.00 mm and is equal to the USL default value. If the USL value is changed, the UCL value will automatically change to match the USL value. To override this default, enter the desired UCL value after entering the USL value.

- **LCL: (Lower Control Limit)**

Defines the lower control limit of the reading. During data collection, a reading that falls below this limit, but exceeds the lower specification limit (LSL), will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is -3.00 mm and is equal to the LSL. If the LSL value is changed, the LCL value will automatically change to match the LSL value. To override this default, enter the desired LCL value after entering the LSL value.

- **High Reasonable:**

Defines the high reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceeded the highest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction.

- **Low Reasonable:**

Defines the low reasonable limit of the reading. During data collection, a reading that exceeds this limit will trigger a warning (red color) indicating that the value has exceeded the lowest limit that a gage should ever reach. This usually happens when a gage is not connected correctly or has a malfunction.

- **Notes:**

A memo field for each characteristic. Press the Tab key or click on the “Notes” box to access the field. Use the mouse to click on the next desired field.

- **Graphics:**

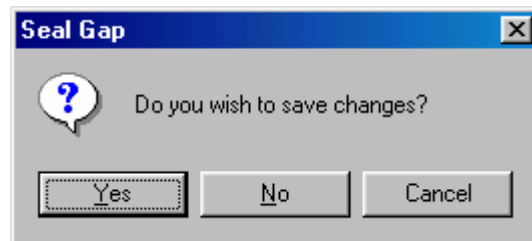
Displays Graphics Setup screen. See Section 4.2.6 for instructions.

- **Save:**

Saves changes made for Dual Serial Interface check points. **Note:** The part file must be saved prior to entering Graphics Setup or exiting Dual Serial Interface Points Setup.

- **Exit:**

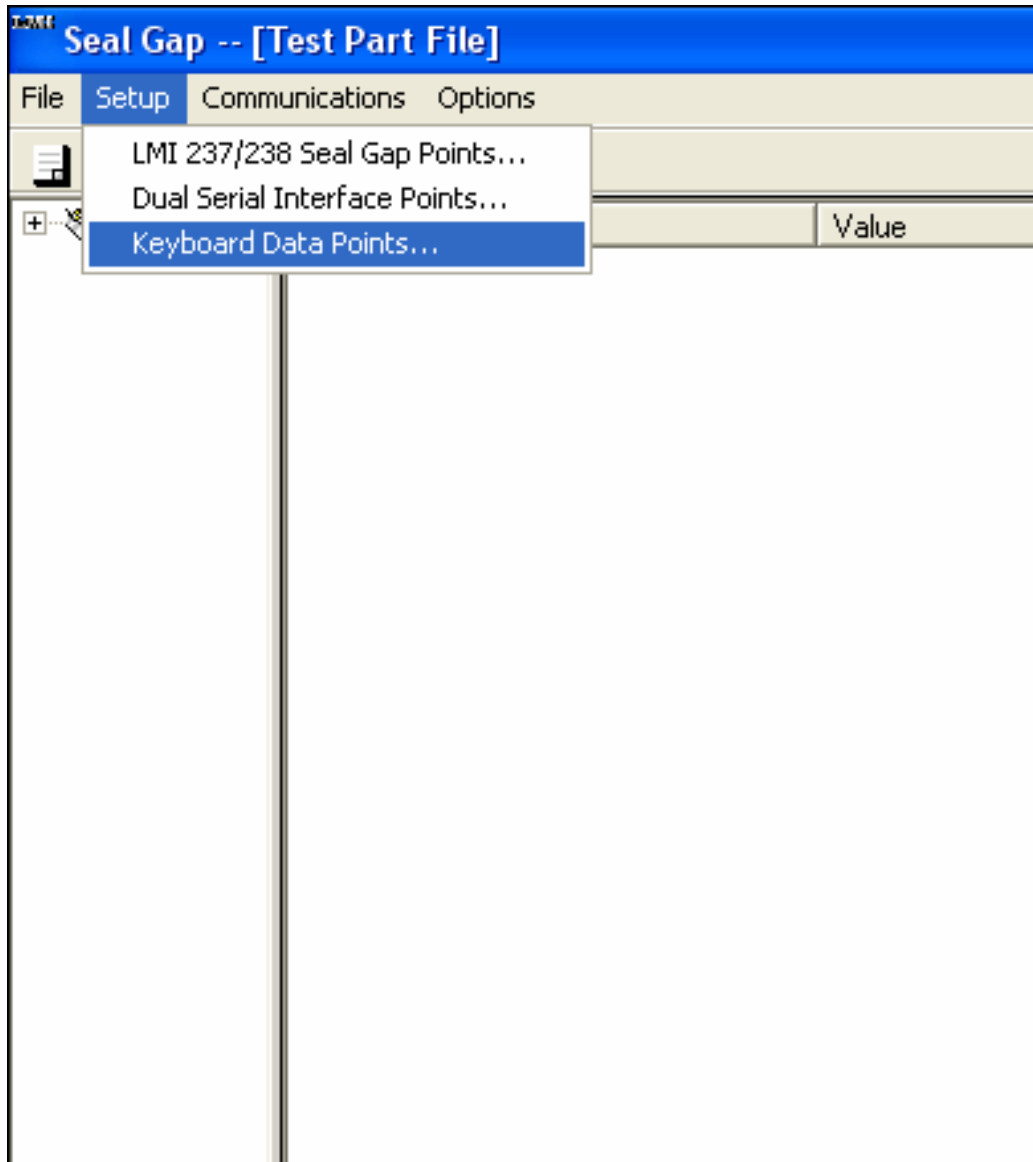
Returns user to the main menu. If the part file or changes to the part file have not been saved, the following message will be displayed:



Click Yes, No, or Cancel as desired.

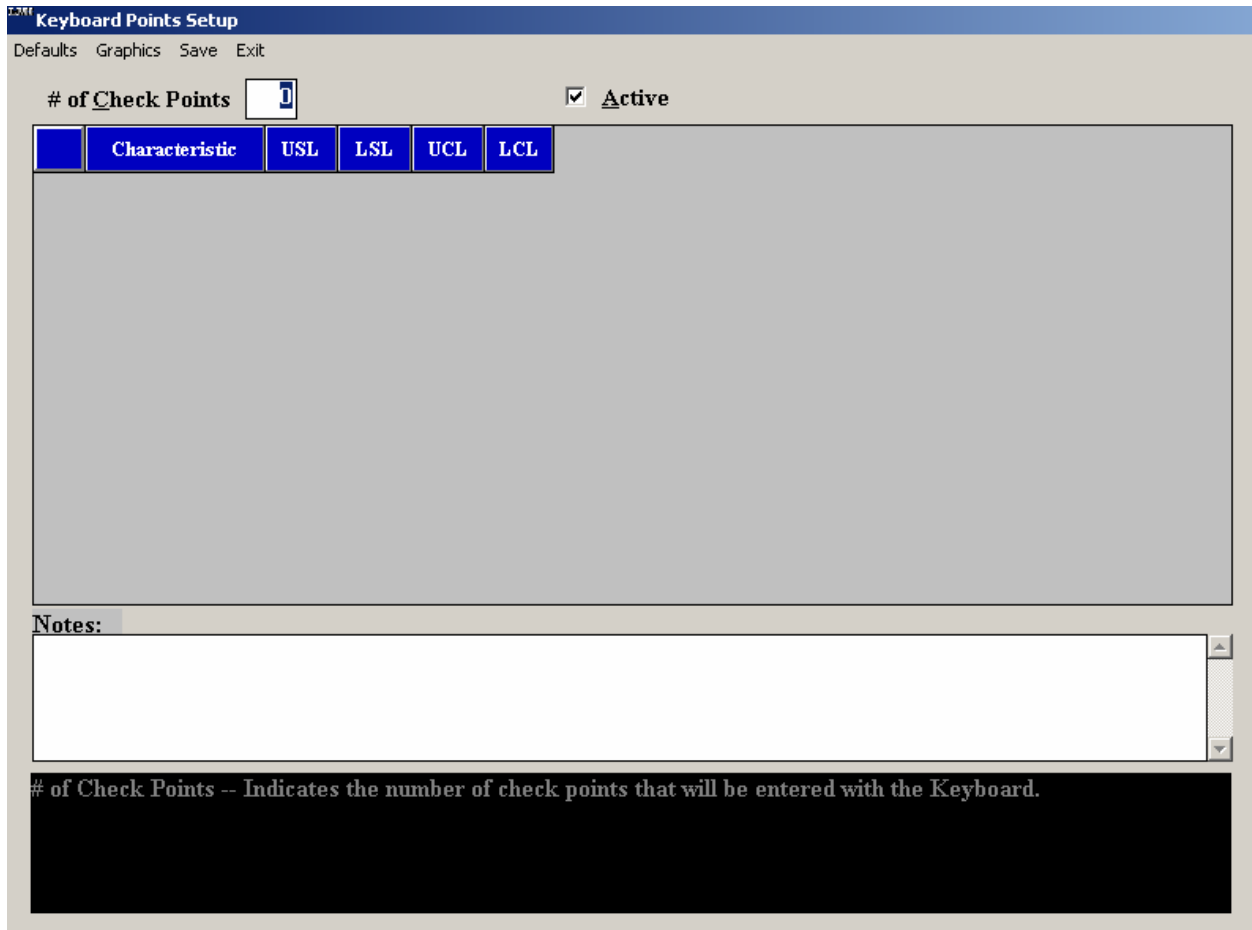
4.2.3 Keyboard Data Points...

Defines keyboard point parameters. Keyboard Data Points are readings that are typed in using the keyboard. Select Setup and then select Keyboard Data Points...



Picture 4.2.3a

The following screen is displayed:



Keyboard Points Setup
Defaults Graphics Save Exit

of Check Points Active

Characteristic	USL	LSL	UCL	LCL
----------------	-----	-----	-----	-----

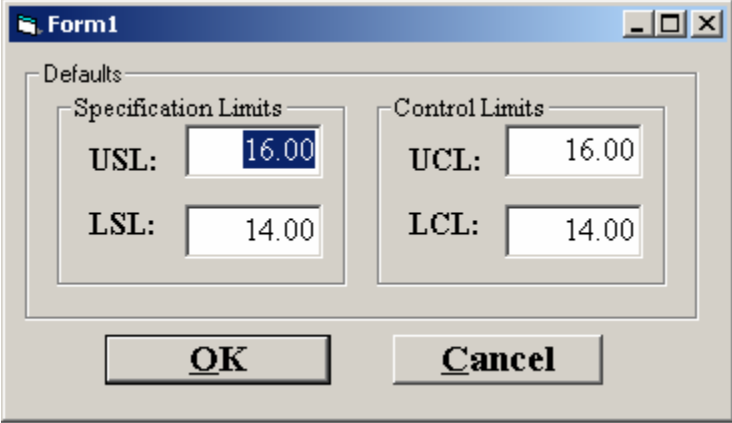
Notes:

of Check Points -- Indicates the number of check points that will be entered with the Keyboard.

Picture 4.2.3b

Default Settings

Select Defaults. The following screen will be displayed. The defaults are preset values that will apply to all gage points within each gage file. Click on the desired box to make any necessary changes. Note that any changes will affect all gage points within Dual Serial Interface and Keyboard Data Point part files. Individual gage point settings can be changed during part Setup.



The screenshot shows a dialog box titled 'Form1' with a 'Defaults' section. It is divided into two columns: 'Specification Limits' and 'Control Limits'. Under 'Specification Limits', there are two input fields: 'USL:' with a value of 16.00 and 'LSL:' with a value of 14.00. Under 'Control Limits', there are two input fields: 'UCL:' with a value of 16.00 and 'LCL:' with a value of 14.00. At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Picture 4.2.3c

Definition of fields:

•USL: (Upper Specification Limit)

Defines the upper specification limit of the reading. During data collection, a reading that exceeds this limit will trigger an out-of-specification warning (red color). The default setting is 3.00 mm.

•LSL: (Lower Specification Limit)

Defines the lower specification limit of the reading. During data collection, a reading that falls below this limit will trigger an out-of-specification warning (red color). The default value is -3.00 mm.

• UCL: (Upper Control Limit)

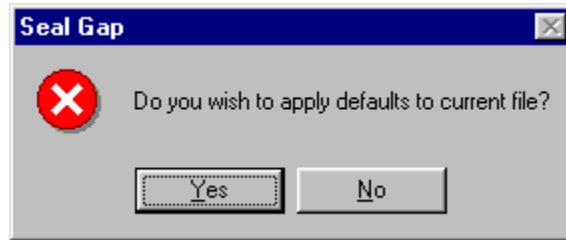
Defines the upper control limit of the reading. During data collection, a reading that exceeds this limit, but falls below the upper specification limit (USL) will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is 3.00 mm and is equal to the USL default value. If the USL value is changed, the UCL value will automatically change to match the USL value. To override this default, enter the desired UCL value after entering the USL value.

•LCL: (Lower Control Limit)

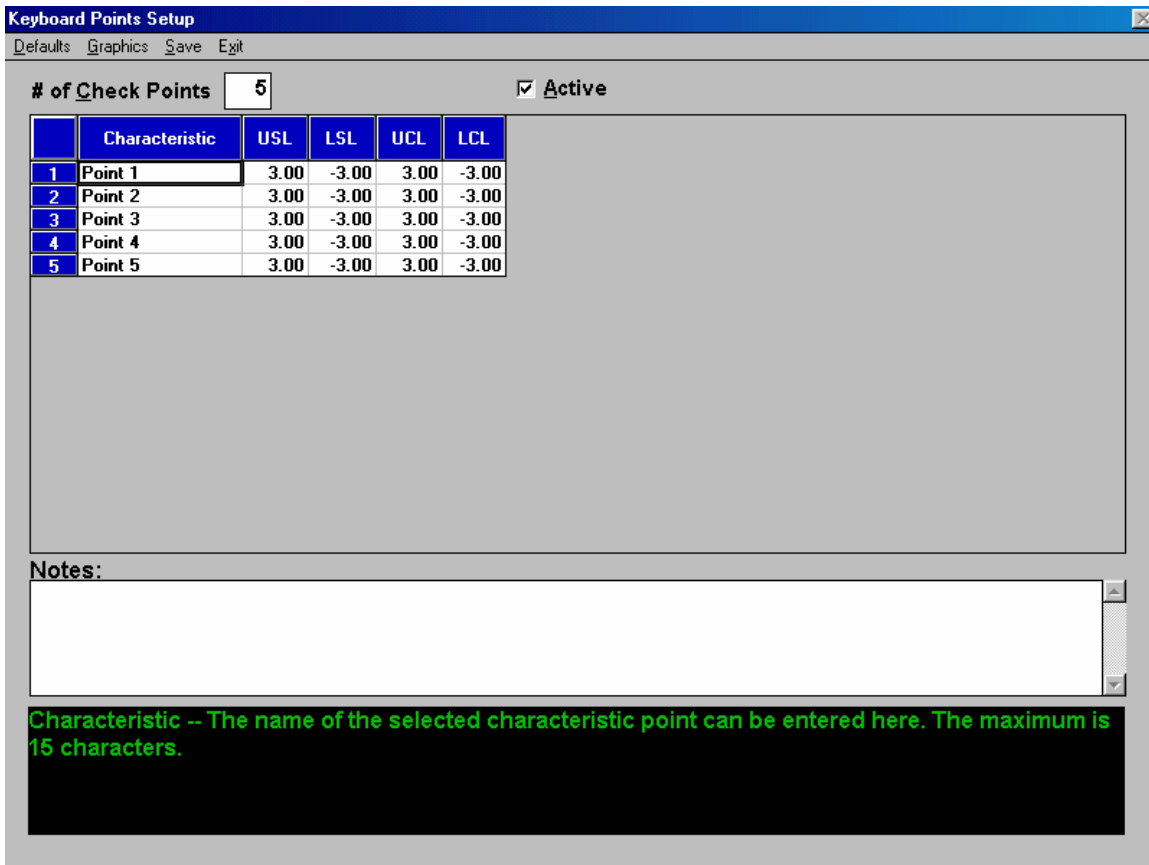
Defines the lower control limit of the reading. During data collection, a reading that falls below this limit, but exceeds the lower specification limit (LSL), will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is -3.00 mm and is equal to

the LSL. If the LSL value is changed, the LCL value will automatically change to match the LSL value. To override this default, enter the desired LCL value after entering the LSL value.

If the values are correct, click OK. The following message will be displayed:



Click Yes or No as desired to return to the Keyboard Data Points screen.



Picture 4.2.3d

• **# of Check Points:**

The number of check points to be inspected and manually typed in using the keyboard.

Enter the number of characteristic check points in the “# of Check Points” box and press the ↵Enter key. The spreadsheet will expand to accommodate the defined number of check points. The above picture is an example of 5 check points.

- **Active:**

Enables or disables Keyboard Data Points check points while collecting data. During data collection, the screens will automatically scroll through all gage checking types, i.e. LMI 237/238 Seal Gap Points, Dual Serial Interface Points, or Keyboard Data Points. By default, the “Active” box will be enabled. Click off the “Active” box if you do not wish to take readings from Keyboard Data Points. The data collection screens will only display the Active gage checking types.

- **Characteristic:**

The characteristic is a label assigned to each gage point. The characteristic label will default to Point 1, Point 2, etc. To change the label, click on the characteristic field, use the backspace key to erase the existing label and enter an alphanumeric label of up to 15 characters. Press the ↵Enter key.

- **USL: (Upper Specification Limit)**

Defines the upper specification limit of the reading. During data collection, a reading that exceeds this limit will trigger an out-of-specification warning (red color). The default value is 3.00 mm.

- **LSL: (Lower Specification Limit)**

Defines the lower specification limit of the reading. During data collection, a reading that falls below this limit will trigger an out-of-specification warning (red color). The default value is -3.00 mm.

- **UCL: (Upper Control Limit)**

Defines the upper control limit of the reading. During data collection, a reading that exceeds this limit, but falls below the upper specification limit (USL) will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is 3.00 mm and is equal to the USL default value. If the USL value is changed, the UCL value will automatically change to match the USL value. To override this default, enter the desired UCL value after entering the USL value.

- **LCL: (Lower Control Limit)**

Defines the lower control limit of the reading. During data collection, a reading that falls below this limit, but exceeds the lower specification limit (LSL), will trigger a warning (yellow color) indicating the value is near the specification limit. The default value is -3.00 mm and is equal to the LSL. If the LSL value is changed, the LCL value will automatically change to match the LSL value. To override this default, enter the desired LCL value after entering the LSL value.

- **Notes:**

A memo field for each characteristic. Press the Tab key or click on the “Notes” box to access the field. Use the mouse to click on the next desired field.

•**G**raphics:

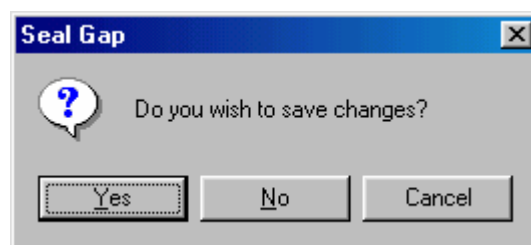
Displays Graphics Setup screen. See Section 4.2.6 for instructions.

•**S**ave:

Saves part file or changes made to the part file. **Note:** The part file must be saved prior to entering Graphics Setup or exiting Keyboard Data Points Setup.

•**E**xit:

Returns user to the main menu. If the part file or changes to the part file have not been saved, the following message will be displayed:



Click Yes, No, or Cancel as desired.

4.2.4 Quick Part File Setup Steps

The following steps will guide you through the basic part file setup using just LMI 237/238 Seal Gap Points. A Dual Serial Interface Points and Keyboard Data Points part file would follow many of the same steps.

1. Double-click on the Seal Gap Configuration icon on the Windows desktop.
2. If there are no existing files or you would like to create a new part file, select File – New and the New Filename dialog will appear. Enter the file name and press Save. If a file already exists, you can select if from the recently used files toolbar below the menu options or go to File – Open.
3. Click on Setup from the menu.
4. Click on the desired part file type, i.e. LMI 237/238 Seal Gap Points
5. Enter the desired number of check points in the # of Check Points box. Press ↵Enter.
6. The Characteristics label for each gage point will default to Point 1, Point 2, etc. Click on the Characteristics field for the first check point to change the label, if desired. Use the backspace key to erase the existing label and enter the desired label. Press ↵Enter.
7. Click on the Components field for the first check point. Enter the desired component label and press ↵Enter. (Note that all subsequent component labels will default to the same component label. To override the default, click on the desired component label field and enter the next label.)
8. Click on the Gage ID field for the first check point. Enter the desired gage label for the physical gage to be used for the particular check point. (Example: 1, 2, etc) Press ↵Enter.
9. Click on the Gage Port field for the first check point. Enter the gage port number the physical gage is connected to (see the gage port labels on the 2351 Hub to identify the correct port). Note that if a Gage ID is used more than once in a file, the Gage Port will default to the first Gage Port entered under that Gage ID.
10. The Span, Offset, Nominal, USL, LSL, UCL, LCL fields have a default value as defined in the Default screen. Click on each individual field to make any necessary changes. Press ↵Enter after each entry.
11. Press Tab or click on the Notes field to enter notes for the check point, if desired.
12. Repeat steps 6 through 11 for each individual check point. Click on Save and Exit when file is complete.

4.2.5 Graphics...

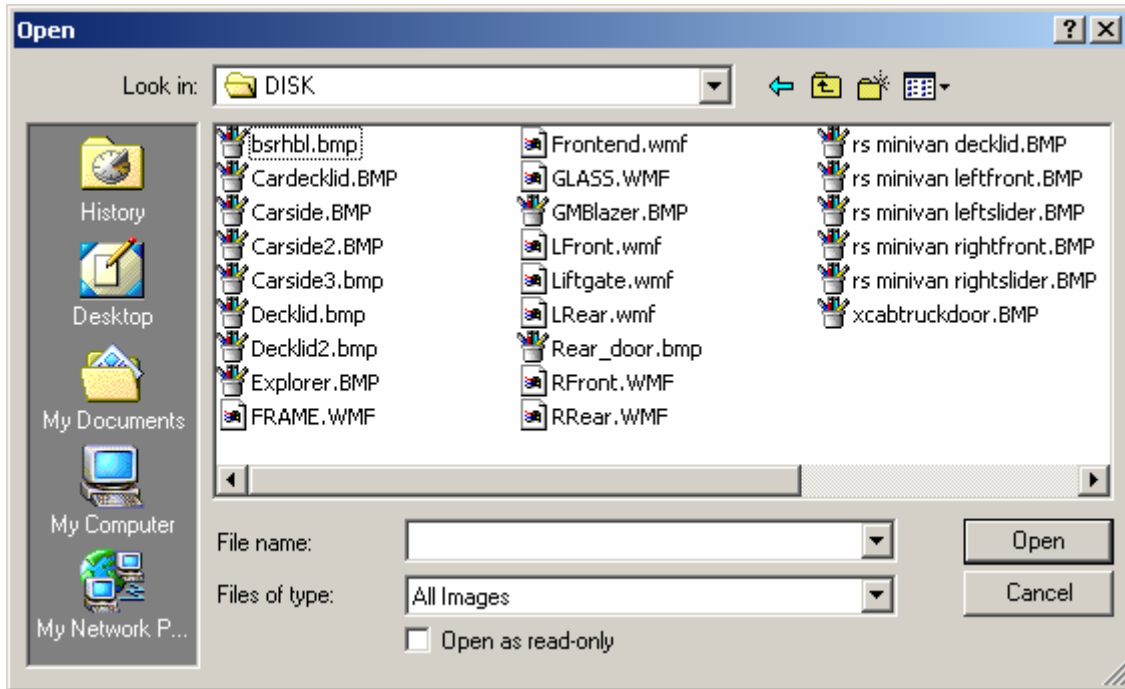
To configure a graphic, select the Graphic menu item from the LMI 237/238 Seal Gap Points, Dual Serial Interface Points, or Keyboard Data Points Setup screen. The component labels will be displayed in a drop down box. Select the component for which you want to import a graphic.

The following screen will be displayed:



Picture 4.2.5a

Each point defined in the file will be represented by a blank box along with the Characteristic label and a Gage ID label (if the Gage ID Label is enabled in the part file Setup screen). The live readings will be shown in the boxes during data collection mode. A graphic can be added by choosing Add Graphic... from the menu. The following dialog box will be shown:

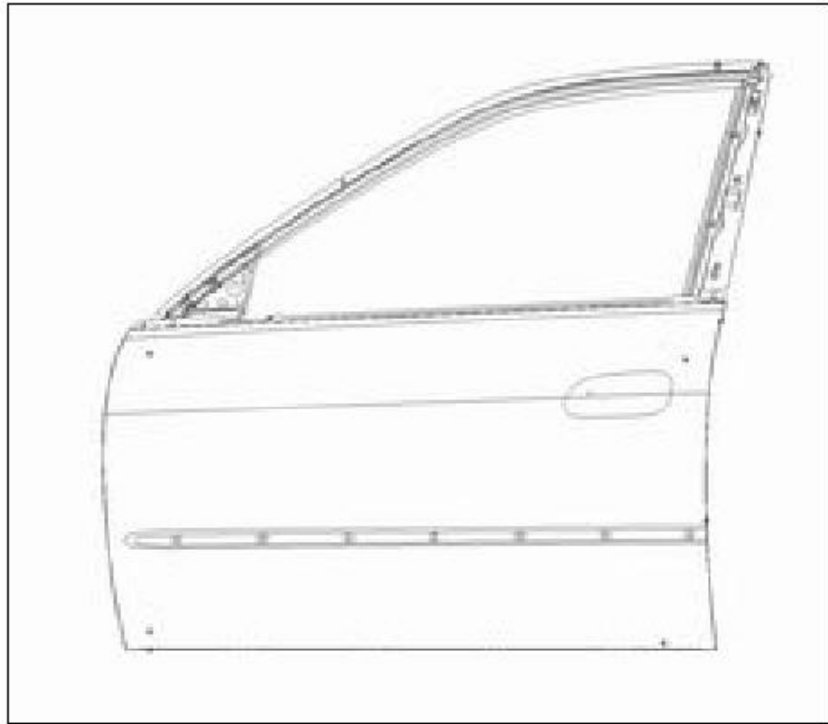


Picture 4.2.5b

Select the graphic you wish to import by selecting the appropriate drive and directory, and the file name. Click OK and the graphic will appear on the screen (see Picture 4.2.5c). All of the available file types that can be imported are listed in the “Files of Type” drop down box.

Supported graphics include:

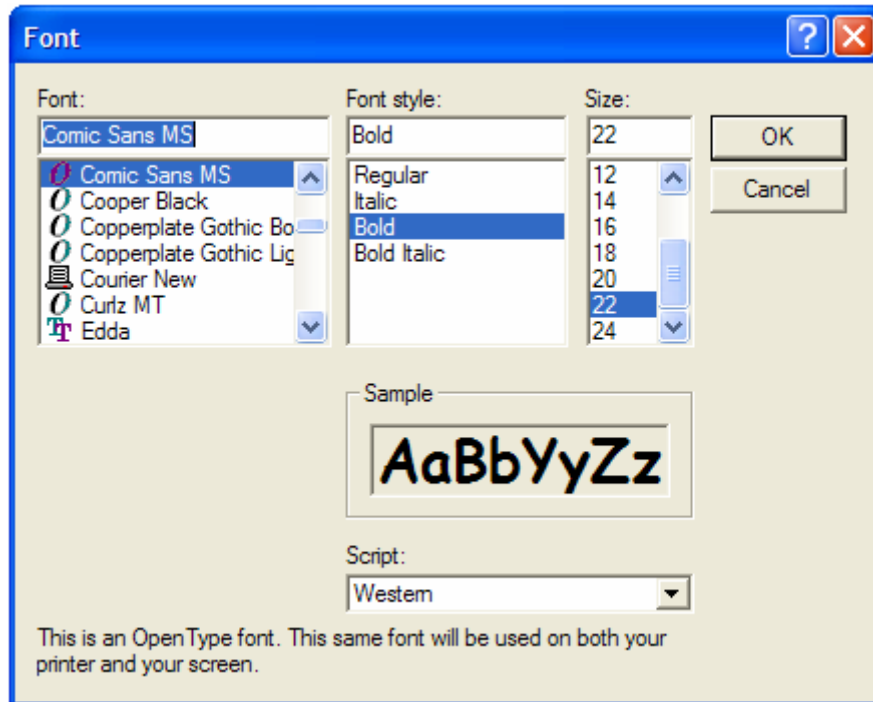
AI, BMP – Windows Bitmap, CDR, CGM, CTM, CH3, DIB, DRW, DXF - AutoCAD, EPS, GEM, GIF, HGL, JPG, MET, NAP, PCD, PCX, PDI, PIC, PCT, RND, SYM, SYS3, TGA, TIF, WMF – Windows Metafile, and WPG.



Picture 4.2.5c

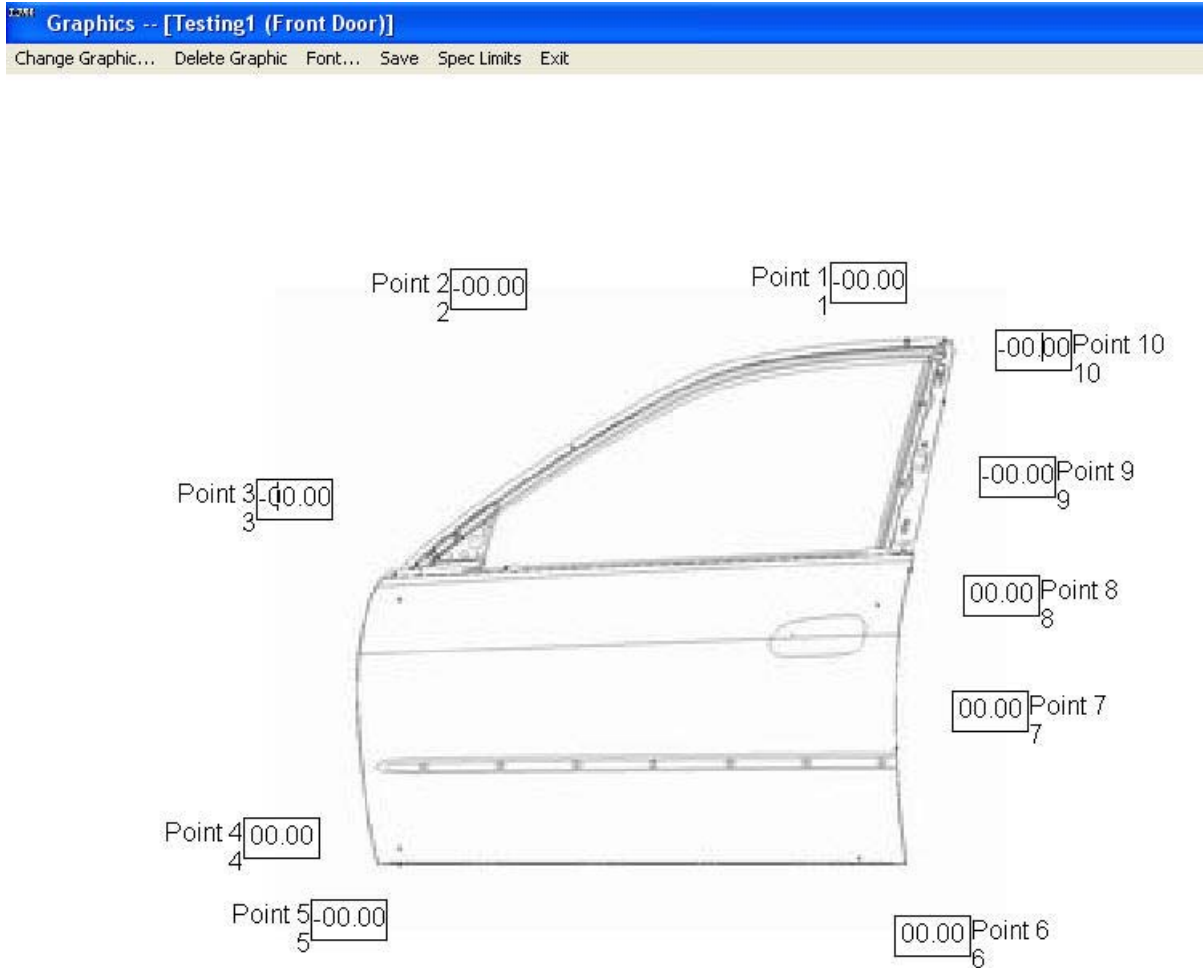
The graphic will be shown with a black border around it. Move the image using the mouse to click and drag the image. Size the image by moving the mouse pointer to the edge of the graphic and clicking and dragging the border. When the graphic has been moved and sized correctly, double click on the graphic to freeze graphic in place. The black border around the graphic will disappear and the graphic can not be changed. Double click on the graphic and it can be resized and moved once again.

The check points with each gage reading box will be stacked on top of one another when you first start. Use the mouse to click and drag each box to an area near the desired checking point on the graphic. Double click on a box and the characteristic label and/or gage ID will switch to the left or right of the reading. The size of the text and boxes can be made larger or smaller by selecting Font from the menu. Also, you can change the font type and font style from this menu.



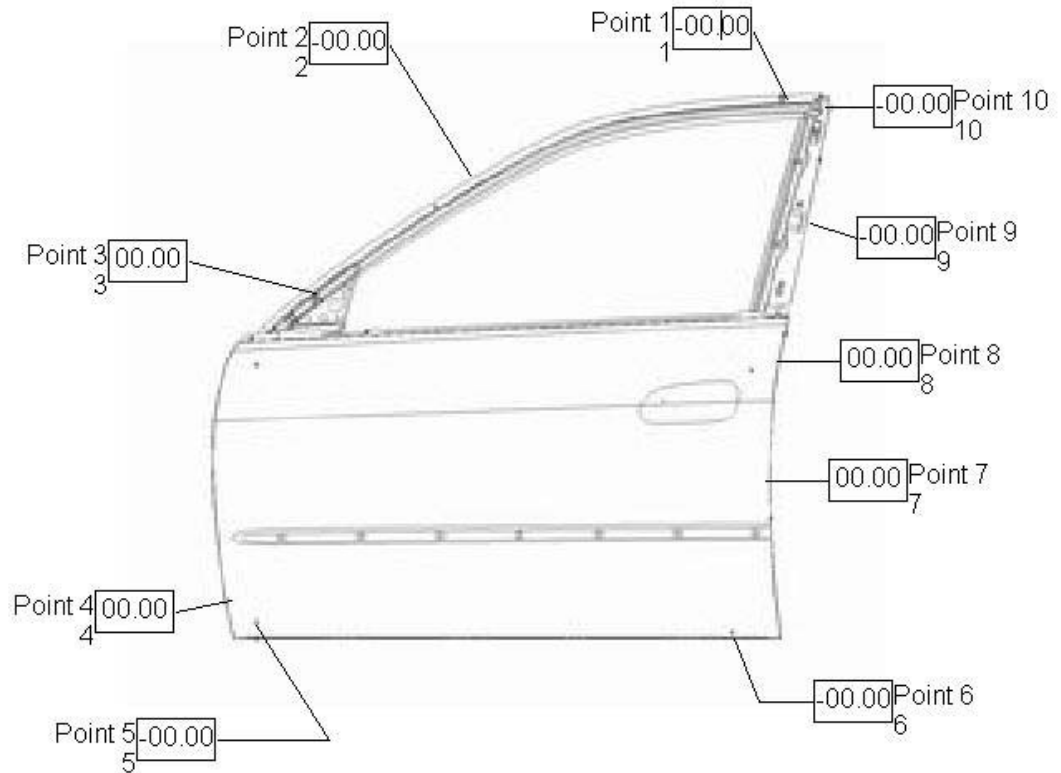
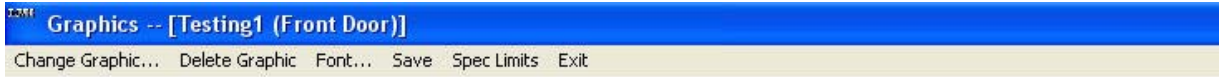
Picture 4.2.5d

To add optional leader lines from the graphic to each characteristic box, hold the SHIFT key down and click on the desired position on the graphic. Release the SHIFT key and a line will follow the path of the mouse pointer.



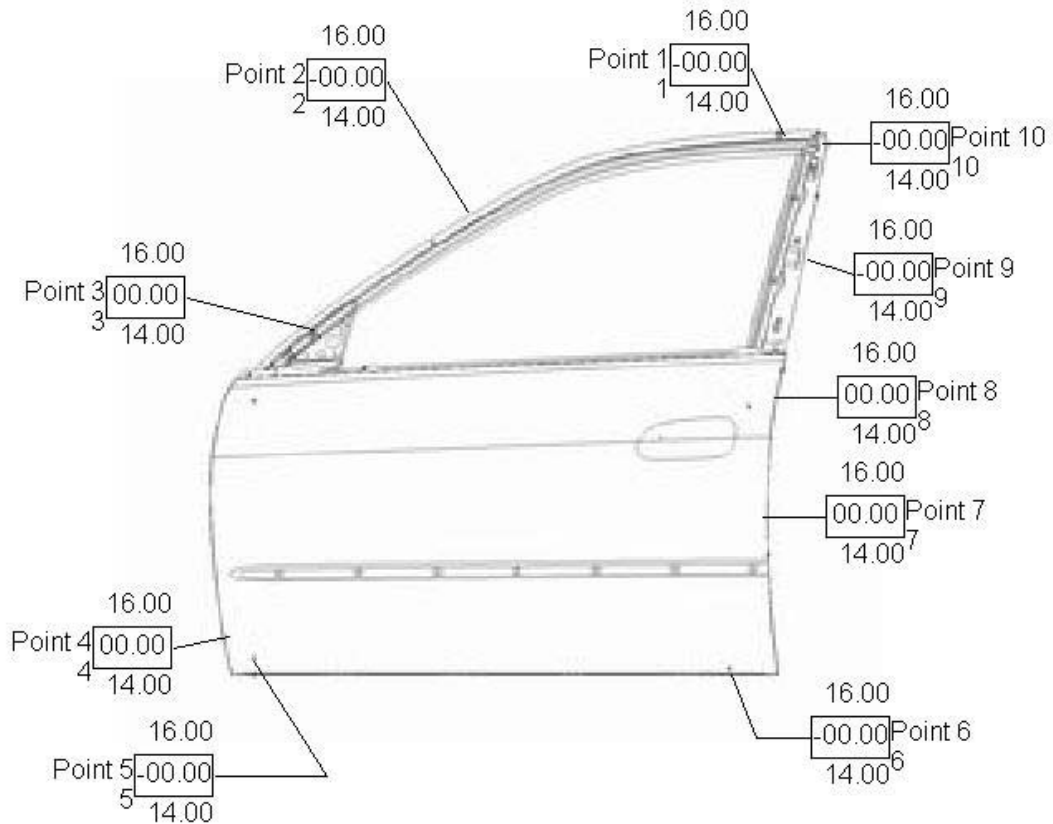
Picture 4.2.5e

Complete the line by clicking on the desired characteristic box. You will notice that the characteristic box becomes italicized when a line is moved near it. This is to let you know that the line will be attached to that characteristic box. Now complete all lines for the graphic.

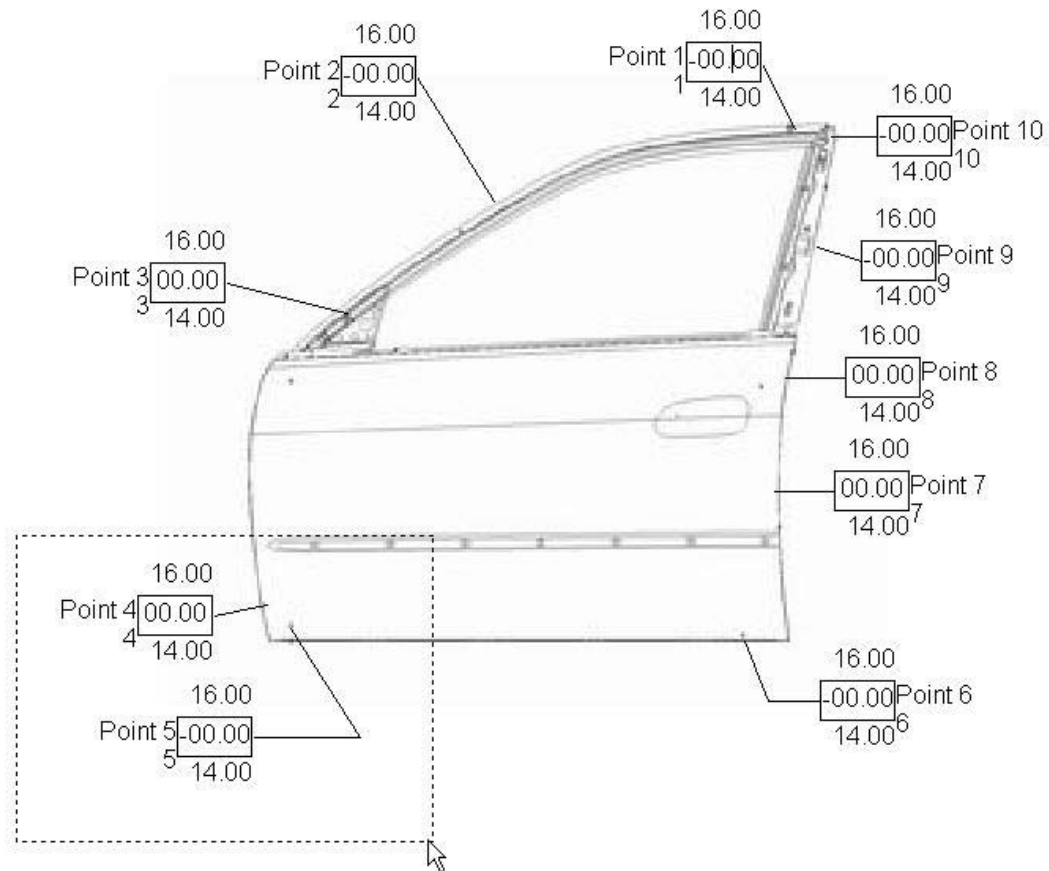
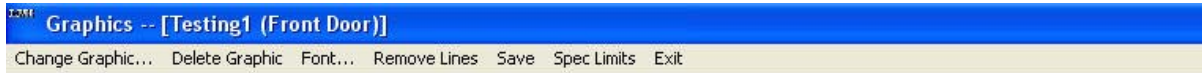


Picture 4.2.5g

Specification Limits were an added function were the user has the ability to hide or show individual characteristic spec limits. To show spec limits simply select the spec limits in the menu bar and check off show. To hide the spec limits simply check hide spec limits.



To remove a line or multiple lines, click and drag the mouse to create a box around both ends of the desired line(s). Release the mouse button. The Remove Lines option will appear on the menu bar. Click on Remove Lines or press the Delete key. Only the lines will be removed; the blank check point boxes will not be affected.



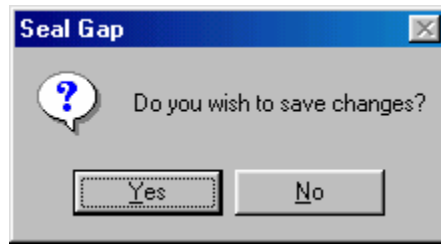
Picture 4.2.5g

To delete the graphic, click the Delete Graphic menu item.

To change to graphic, select the Change Graphic menu item. You will be prompted with the graphic dialog box.

Click the Save menu item to save a completed graphic or any changes made to a graphic.

Click on Exit to return to the Setup screen. The following message will be displayed if the graphic has not been saved.



Click Yes or No as desired.

4.3 Communications

4.3.1 COM Port Selection

A new COM Port selection column has been added for multiple COM Ports interface on the Configuration side.

LMI 237/238 Seal Gap Points Setup
 Defaults Graphics Save Exit

of Check Points Active Display Gage ID Labels

	Characteristic	Component	Gage ID	COM Port	Gage Port	Span	Offset	Nominal	USL	LSL	UCL
1	Point 1	Front Door	1	1	1	10.00	10.00	15.00	16.00	14.00	16.00
2	Point 2	Front Door	2	1	2	10.00	10.00	15.00	16.00	14.00	16.00
3	Point 3	Front Door	3	1	3	10.00	10.00	15.00	16.00	14.00	16.00
4	Point 4	Front Door	4	1	4	10.00	10.00	15.00	16.00	14.00	16.00
5	Point 5	Front Door	5	1	5	10.00	10.00	15.00	16.00	14.00	16.00
6	Point 6	Front Door	6	1	6	10.00	10.00	15.00	16.00	14.00	16.00
7	Point 7	Front Door	7	1	7	10.00	10.00	15.00	16.00	14.00	16.00
8	Point 8	Front Door	8	1	8	10.00	10.00	15.00	16.00	14.00	16.00
9	Point 9	Front Door	9	1	9	10.00	10.00	15.00	16.00	14.00	16.00
10	Point 10	Front Door	10	1	10	10.00	10.00	15.00	16.00	14.00	16.00
11	Point 11	LiftGate	11	2	11	10.00	10.00	15.00	16.00	14.00	16.00
12	Point 12	LiftGate	12	2	12	10.00	10.00	15.00	16.00	14.00	16.00
13	Point 13	LiftGate	13	2	13	10.00	10.00	15.00	16.00	14.00	16.00
14	Point 14	LiftGate	14	2	14	10.00	10.00	15.00	16.00	14.00	16.00

Notes:

Characteristic -- The name of the selected characteristic point can be entered here. The maximum is 15 characters.

Picture 4.3

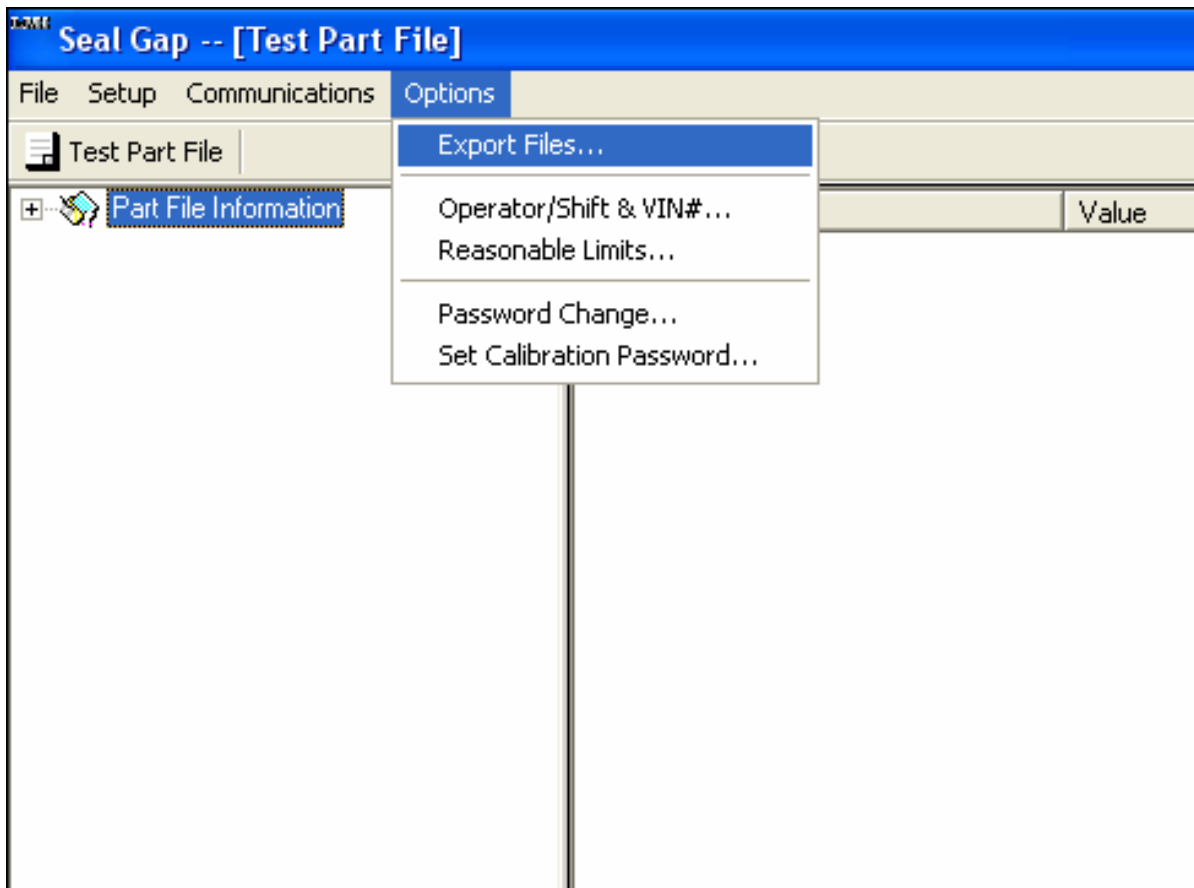
The Selection of the COM Ports is dependent on the number of ports available and also the number of ports active on the local machine.

4.4 Options...

This section of the configuration allows you to choose various options you want associated with your part file. These options include the types of Export Files you want to have written, the insertion of an Operator, Shift, or VIN/MOD ID, the setup of Reasonable Limits, and the ability to put a password on your part file.

4.4.1 Export Files

To determine the export file formats, click Options from the main menu. Select Export Files.



Picture 4.4a

Check the desired export file options to enable those files during data collection. Multiple file formats can be selected. At least one export format and the location of the file must be configured in order to run a part file.



Picture 4.4b

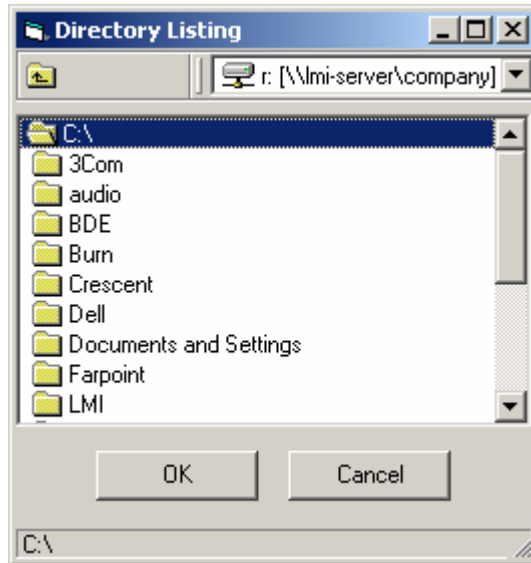
Seal Gap has several export options available. Although each was designed for a specific application, most spreadsheet programs can import all. After a sampling has occurred, an export file can be created with the name of the part file and an extension of one of the formats defined below. The file(s) can be found in the c:\Seal Gap directory. Refer to your specific SPC software to import the collected data for further analysis.

Subgroup Size:

Defines the sample size of data that will be taken for a given part file.

Location of Exports:

This is the location that the selected export files will be stored. When the Browse button is clicked, the following dialog box comes up:



Picture 4.4c

The status bar at the bottom of the screen will show you the location of the directory. When you have chosen the right location, select the OK button and you will be taken back to the Export File form.

TXT

When the TXT format is selected data is written to a file with the extension .TXT.

Format: Date Time, Vin #, Operator, Shift, Reading 1, Reading 2, ...
06/30/1998 09:31:48,1234ABCD,Op1,Sh1,-0.01,1.73,-2.99,0.02
06/30/1998 09:32:33,1234ABCE,Op1,Sh1,-0.02,1.73,-3.01,0.01

DAT

When the DAT format is selected data is written to a file with the extension .DAT. This format includes a Pass/Fail flag, “Pass” for a part with all of its readings within the USL / LSL specification range, or “Fail” for a bad part (quotes are omitted), and readings.

Format: Date Time, Vin #, Operator, Shift, Pass/Fail flag, Reading 1, Reading 2, ...
06/30/1998 09:31:48,1234ABCD,Op1,Sh1,Pass,-0.01,1.73,-2.99,0.02
06/30/1998 09:32:33,1234ABCE,Op1,Sh1,Fail,-0.02,1.73,-3.01,0.01

PRN

When the PRN format is selected data is written to a file with the extension .PRN.

Format:

{ 9 characters}	{ 9 characters}
Characteristic 1	Reading 1
Characteristic 2	Reading 2
...	...
1	-0.01
2	1.73
3	-2.99
4	0.02

DDM

When the DDM format is selected data is written to a file with the extension .DDM.

Format:

Date, Time, Vin #, Operator, Shift, Characteristic 1, Name 1, Reading 1, Characteristic 2, Name 2, Reading 2, ...
06/30/1998,09:31:48,1234ABCD,Op1,Sh1,1,Probe1,-0.01,2,Probe2,1.73,3,Probe3,-2.99,4,Probe4,0.02
06/30/1998,09:32:33,1234ABCE,Op1,Sh1,1,Probe1,-0.02,2,Probe2,1.73,3,Probe3,-3.01,4,Probe4,0.01

Quantum

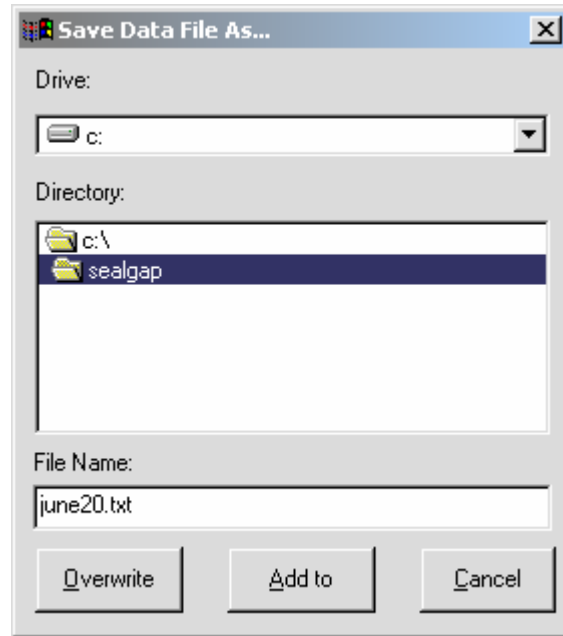
When the Quantum format is selected data is written to a file named Quantum.txt. This file was specifically designed to be imported into DataMyte Quantum SPC Software.

Format: Part file name, Date Time, Vin #, Operator, Shift, Reading 1, Reading 2, ...
FILENAME,06/30/1998 09:31:48,1234ABCE,Op1,Sh1,1,-0.01,1.73,-2.99,0.02
FILENAME,06/30/1998 09:32:33,1234ABCE,Op1,Sh1,1,-0.02,1.73,-3.01,0.01

The contents of this file will be deleted when a new set of readings is written to prevent the import of existing data.

BSA

When the BSA format is selected data is written to a file with a user entered file name. The following dialog box will be displayed when the write data button is press in the run time.



Picture 4.4d

Format:

File Description, Characteristic 1, Date ,Time , Vin#, Reading 1, Shift

File Description, Characteristic 2, Date ,Time , Vin#, Reading 2, Shift

File Description, Characteristic 3, Date ,Time , Vin#, Reading 3, Shift

...

, L822LA701Z,06/30/1998,09:31:48,1,-0.01,1

, L822LA702Z,06/30/1998,09:31:48,1,-0.31,1

, L822LA703Z,06/30/1998,09:31:48,1,0.01,1

Selecting a file and clicking Overwrite will overwrite an existing file.

Selecting a file and clicking Add to will append to an existing file.

Cancel will cancel the write data process.

The Seal Gap software also writes all sampled data to a tmp file named c:\Sealgap\Filename.tmp, where filename is the name of the part file.

AAI

When the AAI format is selected data is written to a file with the extension .AAI. After every component, the header information is written out to the file.

Format: Date, Time, VIN#, Operator, Component, Shift, Reading 1, Reading 2...

Date, Time, VIN#, Operator, Component, Shift, Reading 1, Reading 2, Reading 3, Reading 4
06/30/1998, 09:31:48, 1234ABCD, Op1, Component1, Sh1, -0.01, 1.73, -2.99, 0.02

Date, Time, VIN#, Operator, Component, Shift, Reading 1, Reading 2, Reading 3, Reading 4
06/30/1998, 09:3:48, 1234ABCD, Op1, Component2, Sh1, -0.01, 1.73, -2.99, 0.02

RS1

When the RS1 format is selected data is written to a file with a user entered file name.

The following dialog box will be displayed when the write data button is pressed in the run time.



Picture 4.4e

Format:

Date ,Time , VEH# / MOD#, Operator, Shift, Gage ID 1, Characteristic 1, Reading 1, Gage ID 2,
Characteristic 2, Reading 2, ...

06/30/1998,09:31:48,1 1,1,3,G1,L822LA701Z,-0.01,2,G2,L822HA701Z,1.73,G3, L822JA701Z,-
2.99,G4, L822KA701Z,0.02

06/30/1998,09:32:48,1 1,1,3,G1,L822LA701Z,-0.01,2,G2,L822HA701Z,1.73,G3, L822JA701Z,-
2.99,G4, L822KA701Z,0.02

XLS

When the XLS format is selected data is written to a file with the extension .XLS so the data is easily opened in Excel™ without importing.

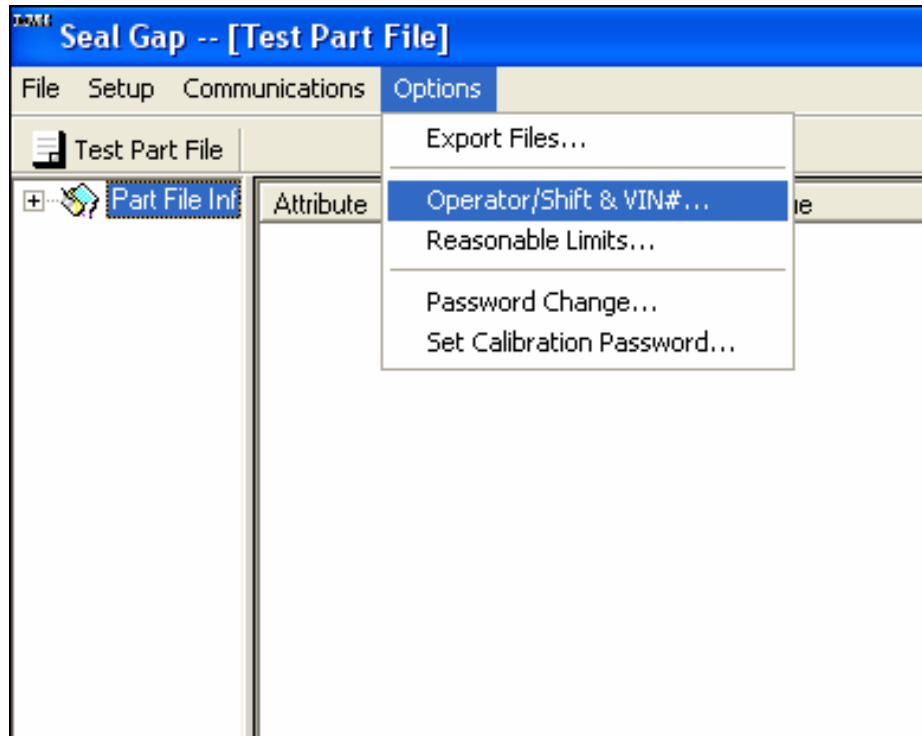
Format: Date, Time, VIN#, Model, Operator, Shift, Char label 1, Reading 1.....

Sample for Excel™:

	A	B	C	D	E	F	G	H	I	J
1	12/16/2003	15:32:22	11111	Sedan	Steve	2	Point 1	-0.18	Point 2	4.73
2	12/16/2003	15:35:47	22222	Sedan	Steve	2	Point 1	-0.15	Point 2	4.74
3	12/16/2003	15:37:47	33333	Coupe	Steve	2	Point 1	-0.16	Point 2	4.73
4	12/16/2003	16:34:41	44444	Coupe	Steve	2	Point 1	11.02	Point 2	5.08
5										

4.4.2 Operator/Shift & VIN#...

During data collection, the Operator, Shift, Vehicle, and Model Number can be written to the data file. To enable each of these labels, click Options from the main menu. Select Operator/Shift & VIN#...



Picture 4.4.2a

The following box will be displayed:

The screenshot shows a dialog box titled "Input Parameters" with a blue header and a close button (X) in the top right corner. The dialog contains the following elements:

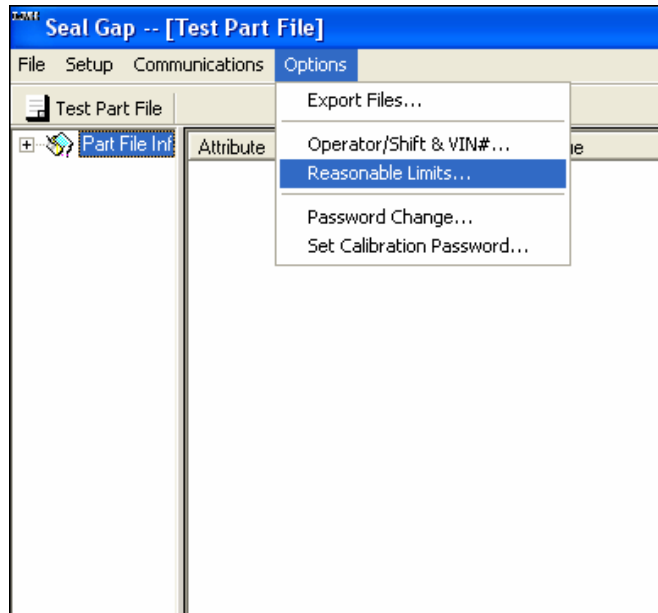
- Checkboxes for "Use Operator / Shift", "Use CID#", "Use VIN#", "Use SKID#", "Use MOD#", and "Use BUILD#".
- A section labeled "Routine Code 1" with an empty text input field.
- A section labeled "Routine Code 2" with an empty text input field.
- "OK" and "Cancel" buttons at the bottom.

Picture 4.4.2b

The first two options will be enabled by default. Click the check boxes on or off as desired. Click OK to return to the main menu. The data for these options will be entered during data collection.

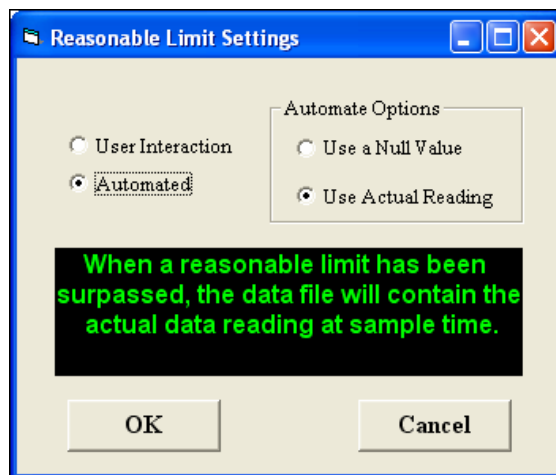
4.4.3 Reasonable Limits ...

Select Options and then Reasonable Limits from the menu to choose the desired Reasonable Limits options.



Picture 4.4.3a

This will bring up the following screen:

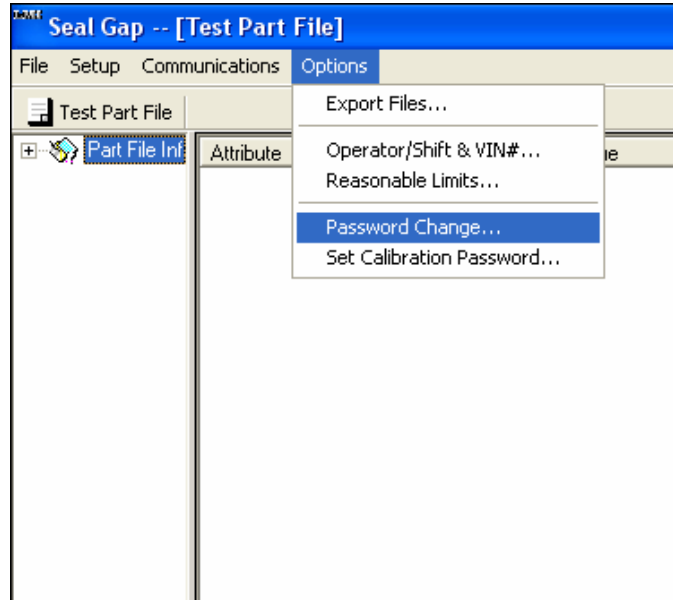


Picture 4.4.3b

On this screen, the option to make reasonable limits automated or manual is available. If you want to be prompted with a message box letting you know what you should do, select User Interaction. If you would like the computer to handle the case that a reasonable limit has been reached, select Automated and then select what you want the computer to do when an unreasonable limit has been reached, either use a null value or the actual value. Press OK when finished.

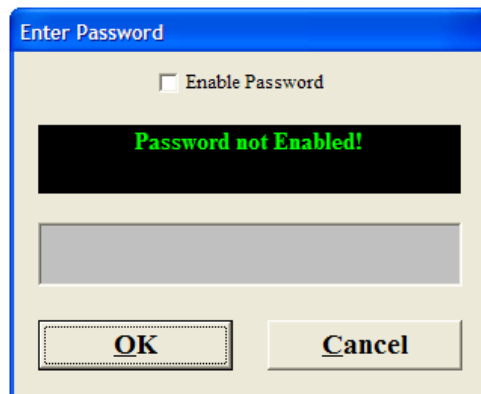
4.4.4 Password Change...

To set a password to protect the part file configuration, select Options and then Password Change



Picture 4.4.4a

The following screen is displayed:



Picture 4.4.4b

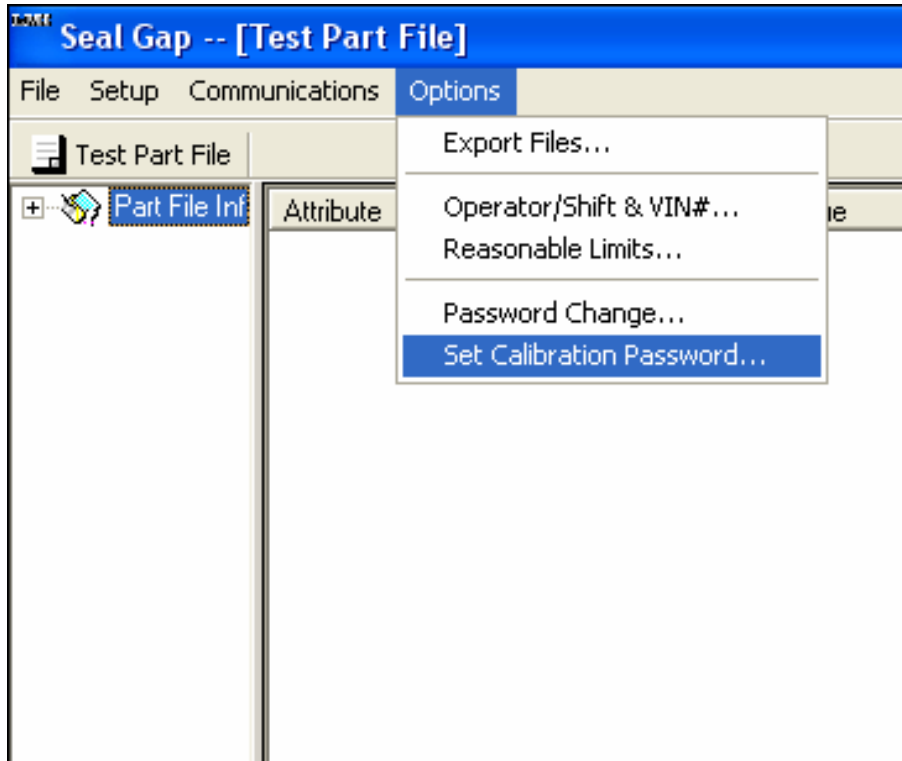
If a password is required for this part file, check the Enable Password box. This will now allow you to enter in a new password.

Type the new password and press the ↵Enter key. You will be prompted to verify the password by typing the password again. Press the ↵Enter key again. The new password will be in effect the next time the particular part file is opened.

If the password is no longer needed, simply go back to this screen and uncheck the Enable Password button.

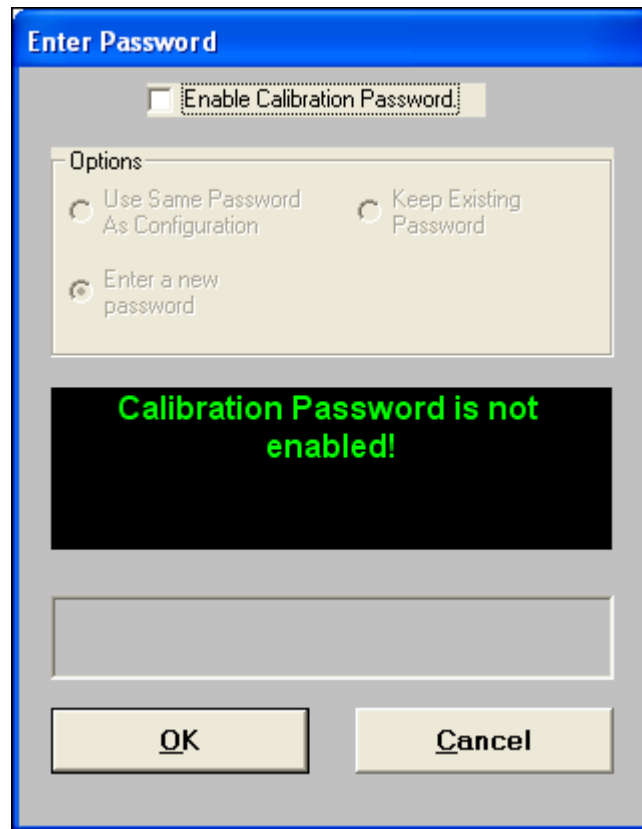
4.4.5 Set Calibration Password...

You can set a password to protect the gage calibration when collecting data in the run time side. To set the password, select Options and then Password Change from the menu.



Picture 4.4.5

The following screen is displayed:



Picture 4.4.5b

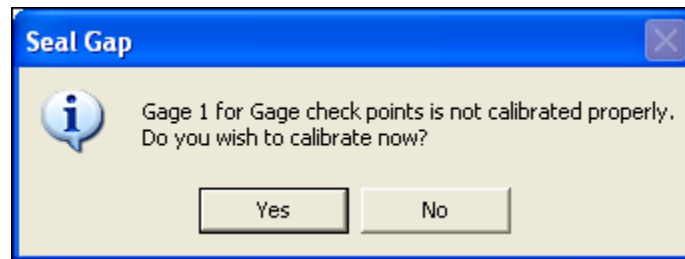
To enable, click the box at the top named Enable Calibration Password.

Type the new password and press the ↵Enter key. You will be prompted to verify the password by typing the password again. Press the ↵Enter key again. The new password will be effective for the next calibration procedure. If you are currently using a password for the part file configuration you can simply hit OK without typing a password and by default it will use the same password for both the configuration and the calibration.

5

Calibrating the Seal Gap System

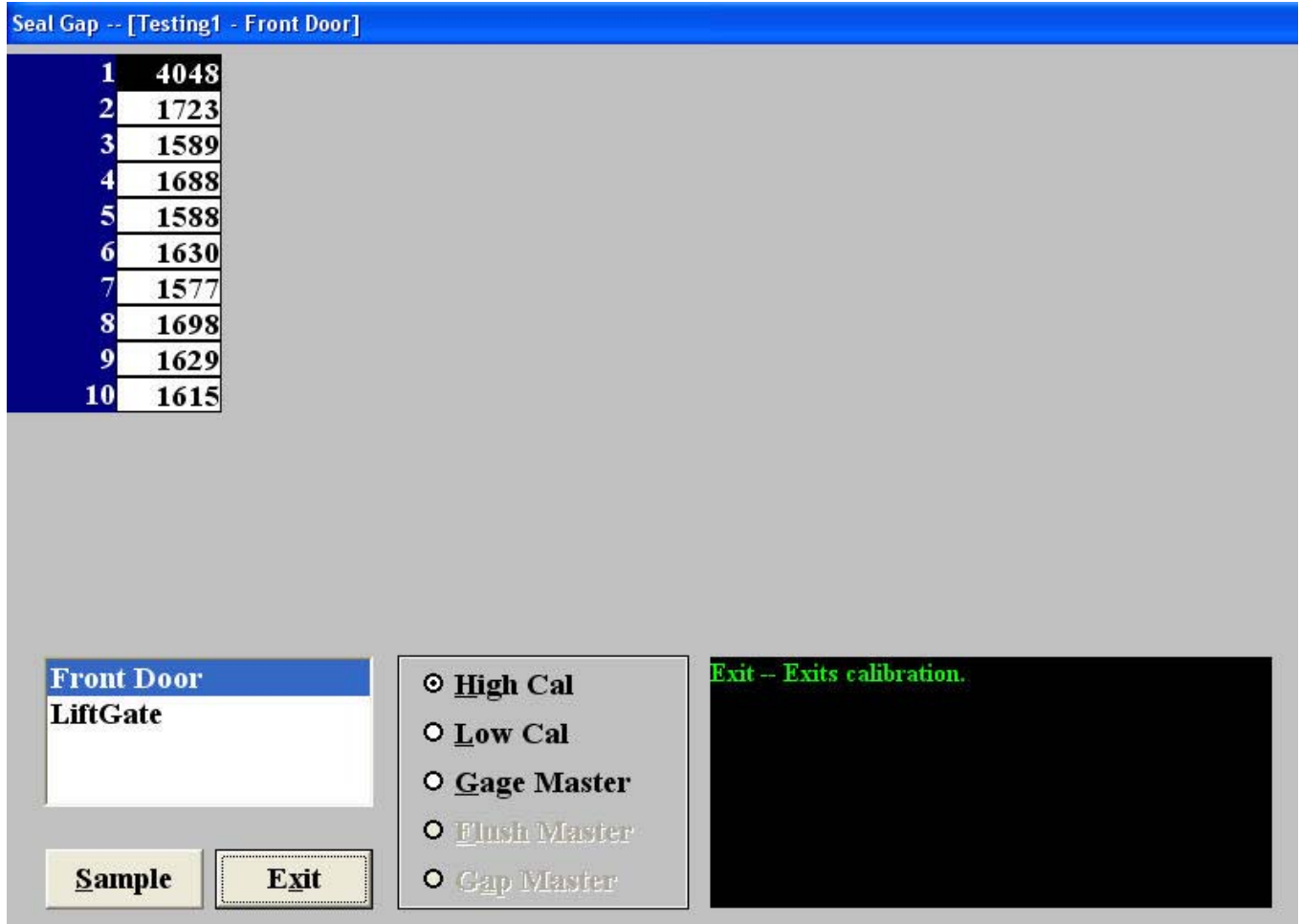
In order for the gages to transmit meaningful data they must first be calibrated. The first time you run a part file from the Seal Gap runtime you will be required to calibrate the gages. Double click the Seal Gap runtime icon to start. The File Open dialog box will automatically open. Select the newly created part file. You may be required to enter in Operator or Shift depending on the options you selected for the part file. Enter this information if required and press Enter. The Dialog box in figure 5a below will appear. Make sure the 2351 Hub is powered ON and select YES to enter the calibration mode.



Picture 5a

After the initial calibration you can always re-calibrate any time by simply selecting the menu item Calibrate.

The following screen is displayed:



Picture 5b

Definitions of fields:

- **Components**

Select a component from the list box. All of the corresponding gage ID's used for this component will then be displayed in the upper left-hand corner. Note that if a particular gage is common to more than one component, it is only necessary to calibrate the gage once.

- **High Cal**

Select when taking the high reading for calibration. (See Section 5.1 for calibration instructions.)

- **Low Cal**

Select when taking the low reading for calibration.

- **Gage Master**

Select when taking the master reading for calibration

- **Sample**

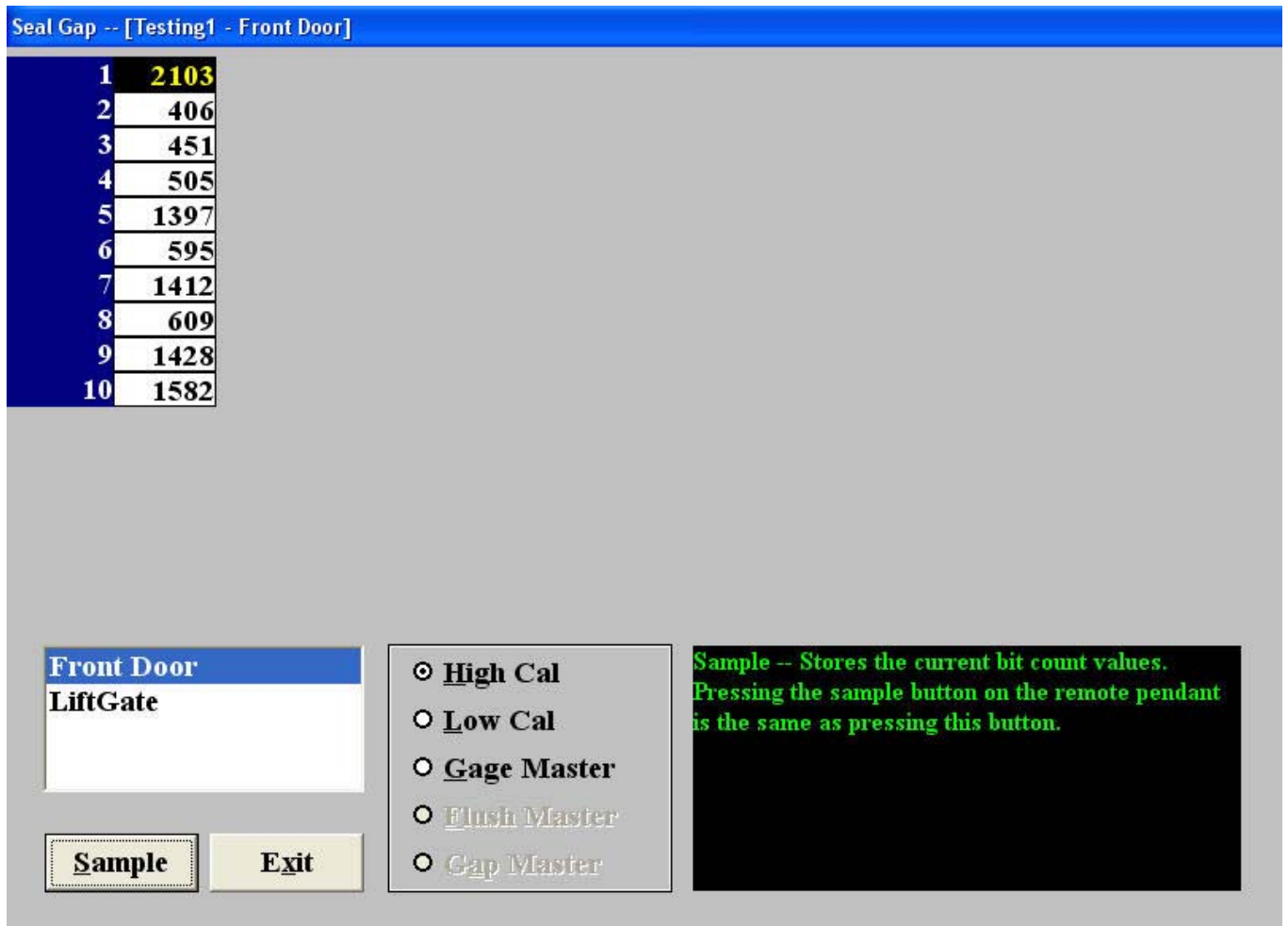
Select to store the high, low or master bit count values during calibration. Pressing the sample button on the remote pendant switch will perform the same function.

- **Exit**

Exits calibration.

5.1 Calibration Steps for LMI 237 & LMI 238 Seal Gap Gages

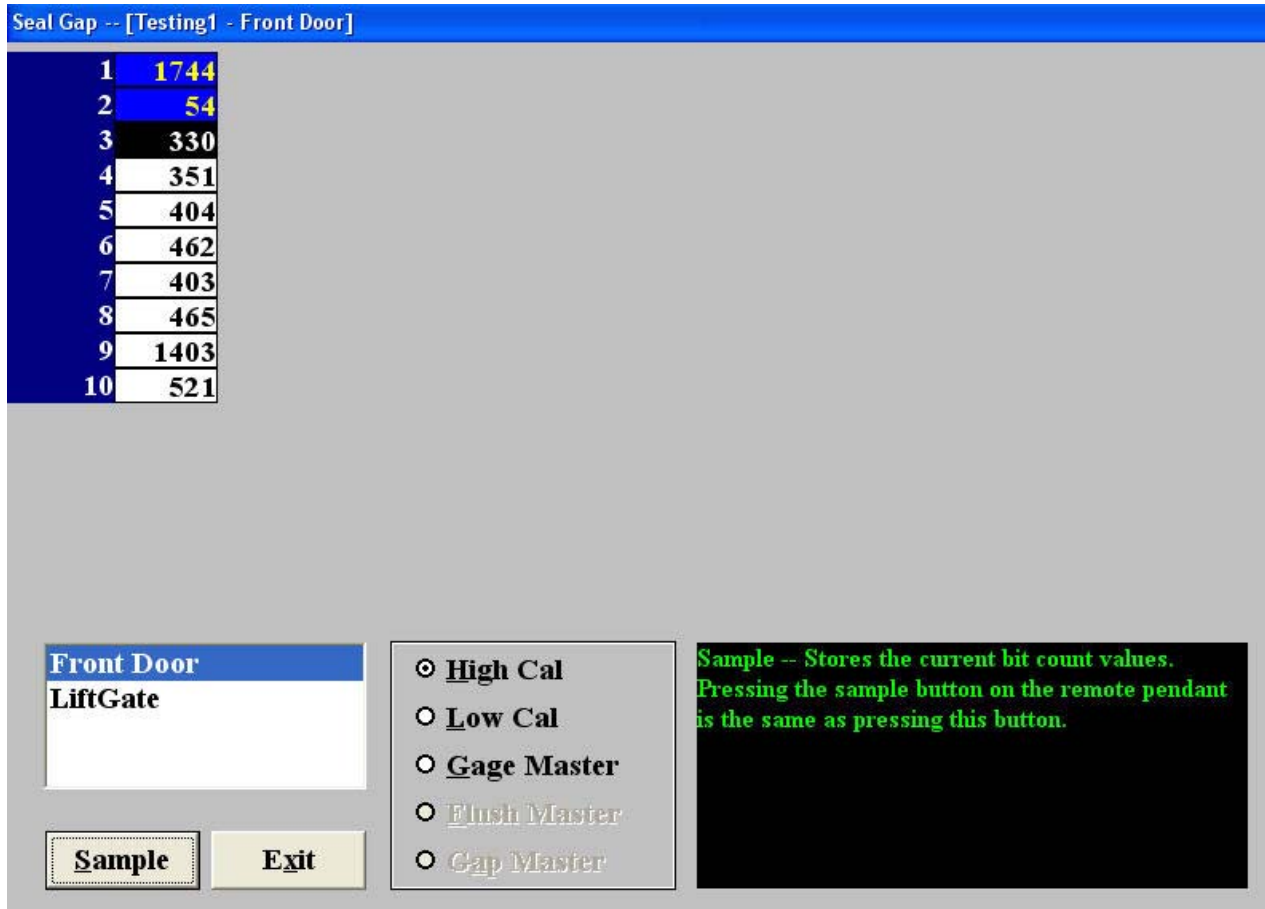
1. Select the component from the display box you wish to calibrate. All gage points for the component will appear in the upper left-hand corner.
2. Select the first gage, e.g. 1. Note that the selected gage reading appears on a black background with white numerals.



Picture 5.1a

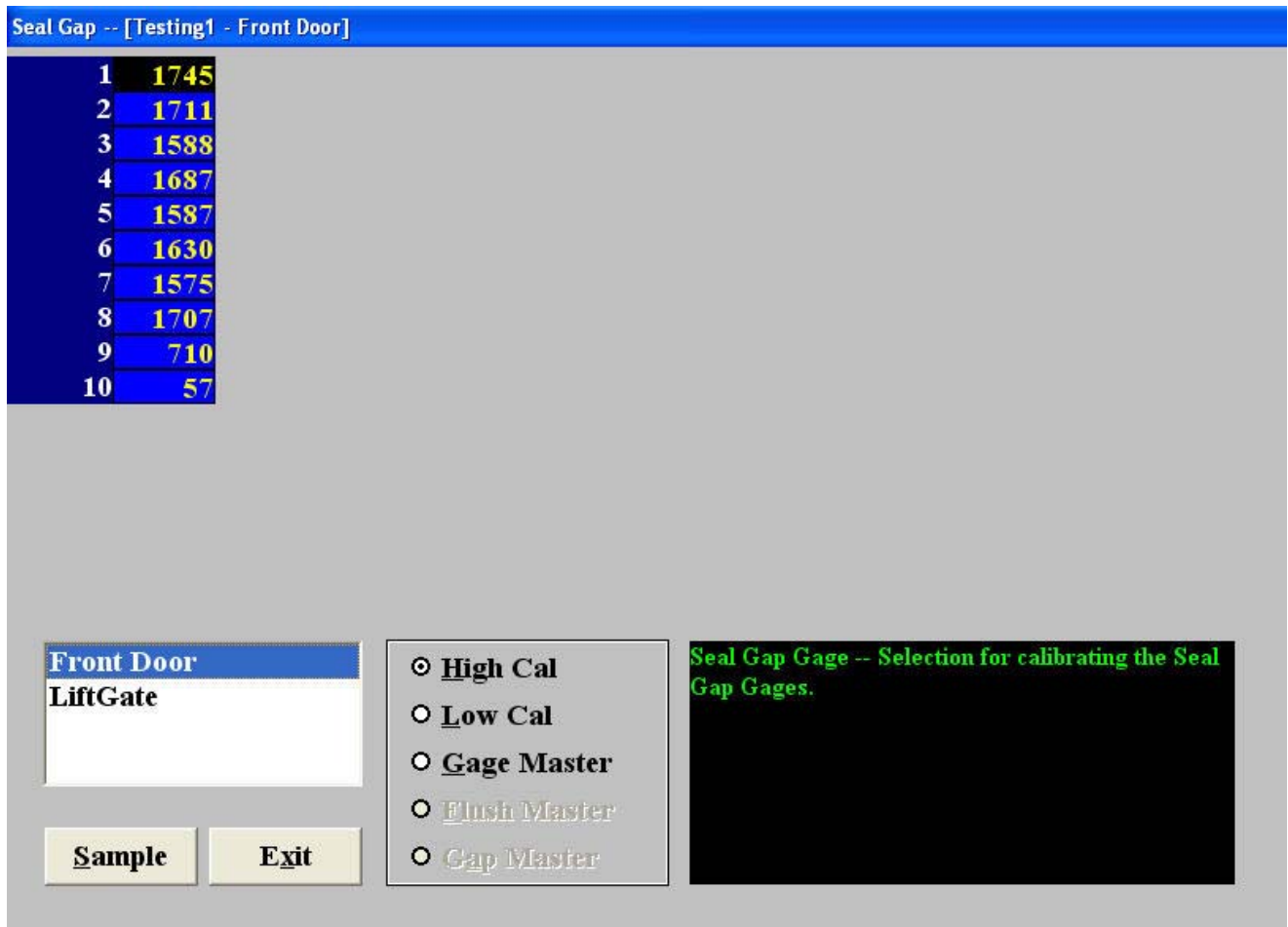
3. With the gage fully extended (at rest), select High Cal and sample by using the remote pendant (press both buttons simultaneously), click the Sample button or press ALT+S. The software will automatically scroll to Low Cal.
4. Fully retract the gage and sample Low Cal using the remote pendant switch, Sample button or ALT+S. The software will automatically scroll to Master.
5. Set the gage in the master position by placing the tip of the gage on the master block that is locating on the 2351 Hub so that the tip is flush with the gage body. Use the remote pendant

switch, Sample button or ALT+S to sample for Master. The software will automatically scroll to the next gage for calibration. Note that after a gage has been calibrated, the reading appears on a blue background with yellow numerals.



Picture 5.1b

6. Repeat steps two through five until all gages are calibrated.
7. The screen will automatically scroll to the next component that includes gages that have not been calibrated. Note that if a gage is common to two or more components and has already been calibrated, the gage reading will appear on a blue background with yellow numerals under all components. It is not necessary to recalibrate the gage under each component.



Picture 5.1c

8. After all gages for all components have been calibrated, click Exit to return to the main menu.
9. Verify calibration in data collection mode by comparing the gage reading on the screen when the gage is in its master position, which should be the offset value (+/- .02mm). The span of the gage should equal the difference between the values of the gages fully extended and retracted (+/- .02mm).

6

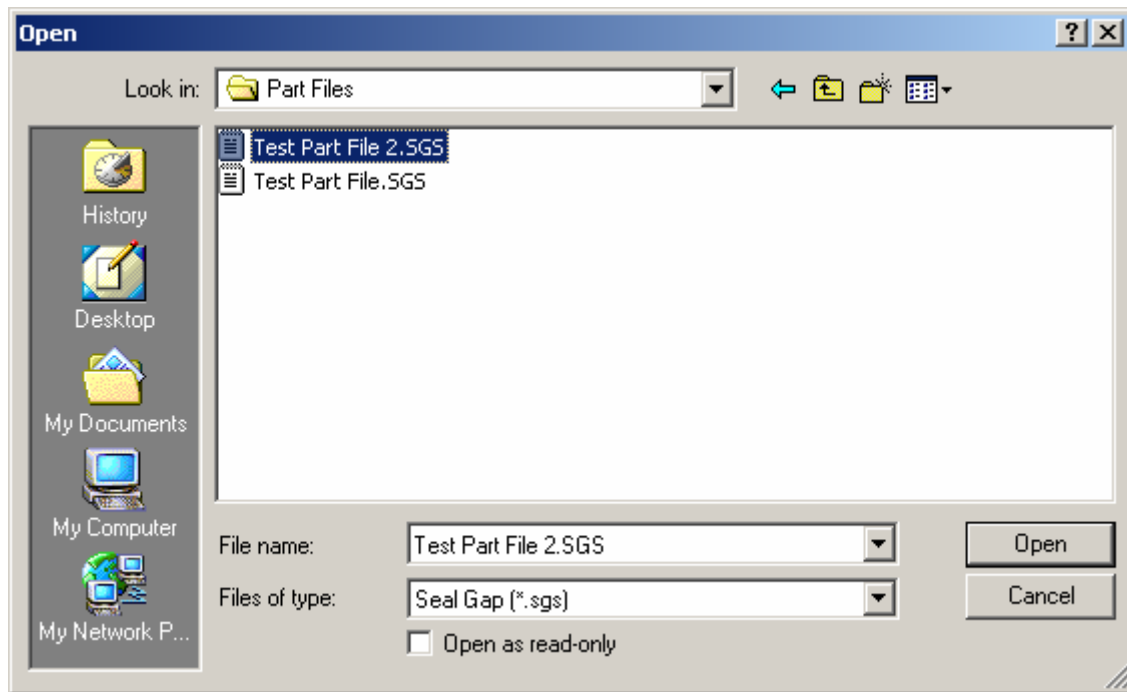
Collecting Data

All gages must be properly calibrated before collecting data. Double-click the 'Seal Gap' icon from the Windows Desktop to begin data collection.



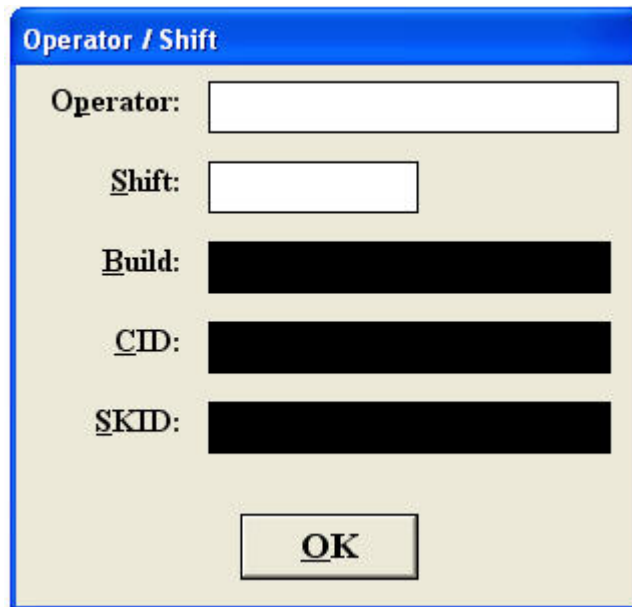
Picture 6a

Select the desired file from the Open File dialog box. Click OK.



Picture 6b

If the Operator/Shift option has been activated in Seal Gap – Configuration, the following box will then be displayed:



The image shows a dialog box titled "Operator / Shift" with a blue header bar. The dialog box has a light beige background and contains five input fields stacked vertically. The first field is labeled "Operator:" and is empty. The second field is labeled "Shift:" and is empty. The third field is labeled "Build:" and is filled with black. The fourth field is labeled "CID:" and is filled with black. The fifth field is labeled "SKID:" and is filled with black. At the bottom center of the dialog box is an "OK" button.

Picture 6c

The operator can enter values for “Operator” and “Shift”. Select OK when complete or Cancel if no operator or shift labels are required.

6.1 Menu Definitions for the Runtime

File Display Components Write Data Calibrate

- **File**

Select File and Open to enter another part file. Select File and Print to print the current screen. Select File and Operator/Shift to assign a new operator or shift to the part file.

- **Display**

Select and move to another display mode.

- **Component**

Click on to select the desired component for sampling. This option will only appear if there is more than one component within a part file. (Use shortcut keys: F1, F2, F3, etc. to select component)

- **Write Data**

Once all subgroups of data are full, the data can be saved to the export file(s) by clicking the Write Data button. The data will be exported to all of the export files that were previously selected in Seal Gap – Configuration.

- **Calibrate**

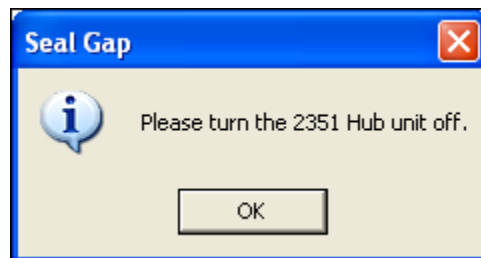
Select to calibrate or re-calibrate gages, if necessary. See Section 5.1 for calibration instructions.

- **VIN#**

The operator can enter the vehicle identification number. This field will only appear if the VIN# option was activated in Seal Gap – Configuration.

- **Exit**

Select Exit to leave the Seal-Gap program. Select Yes to exit and the reminder to power off the Hub will be displayed

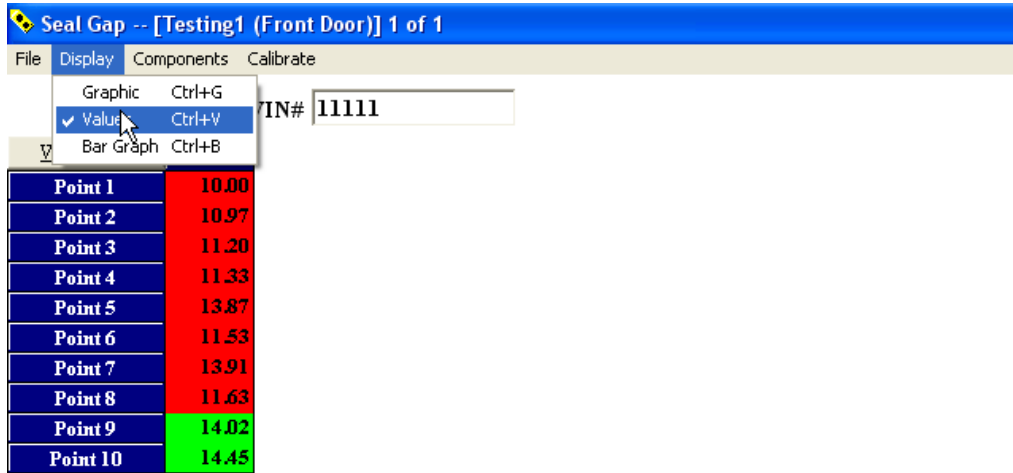


Turn the 2351 Hub on/off switch to OFF and click OK to exit Seal Gap.

6.2 Selecting a Display Screen

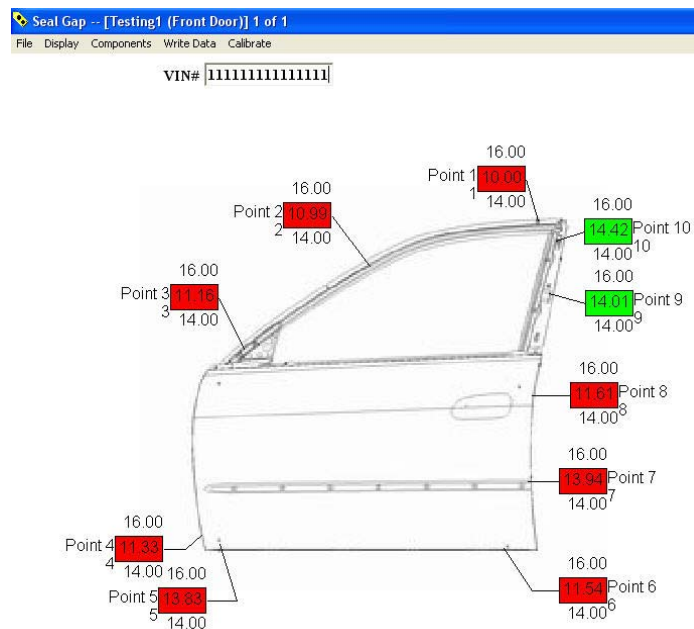
Parts can be gauged while viewing the Graphic, Bar Graph, or Values screen. Select Display and then the desired display mode from the menu. (Or use shortcut keys: CTRL+G = Graphics Display, CTRL+V = Values Display, CTRL+B = Bar Graph Display,) The values screen will be the default display.

Value Screen:



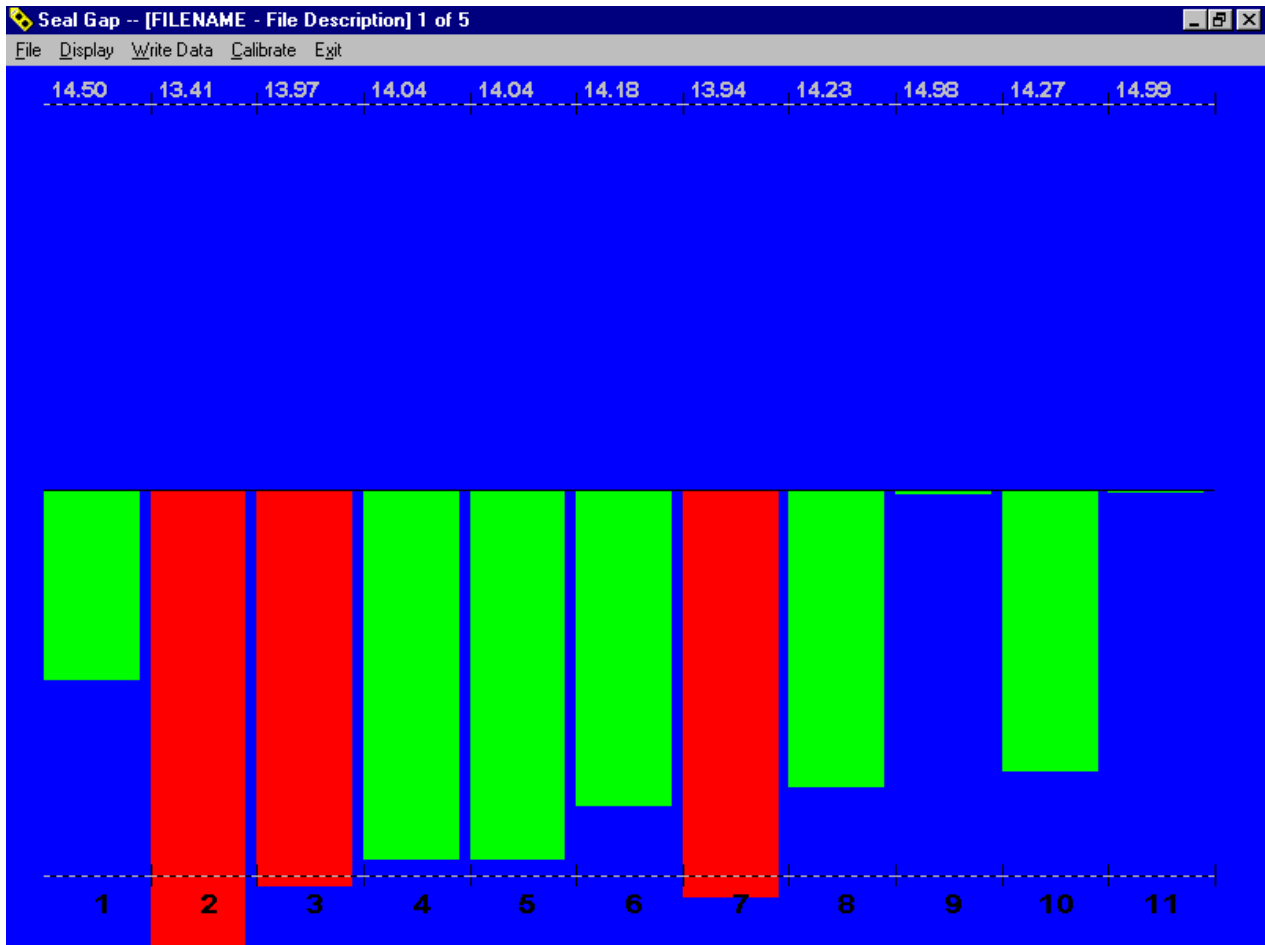
Picture 6.2a

Graphic Screen:



Picture 6.2b

Bar Graph Screen:



Picture 6.1d

The solid lines at the top and bottom of the Bar Graph screen indicate the USL and the LSL for each of the individual characteristics. The dashed lines indicate the UCL and the LCL for each of the individual characteristics. The live readings are displayed at the top of each bar column. The solid and dotted lines will overlap if the specification limits and control limits have the same value.

6.3 Sampling Data

6.3.1 Sampling LMI 237/238 Seal Gap Points

Attach the LMI 237(s) or LMI 238(s) to the door or deck lid flange at the desired check point(s). See the Appendix for proper gage application instructions.

Samples can be taken while viewing the Values, Bar Graph or Graphic display screens. Use the remote pendant switch to sample data. (Samples can also be taken by pressing ALT+S on the PC keyboard.) The message below will flash briefly to indicate that a sampling has occurred.



Picture 6.3.1a

Data will be taken for each point on the displayed component. The data will be colorfully displayed to indicate whether the reading is within specification limits (green), within control limits (yellow) or out of specification limits (red).

The screen will automatically scroll to the next component in the selected part file. If other gage types, i.e. Dual Serial Interface Points, or Keyboard Data Points, are active, the screen will automatically scroll through each for sampling. Continue to sample until all subgroups in the part file have been sampled.

The sampled readings are now written to a temp file (.tmp) and is located under the default directory.

When all subgroups have been sampled, the data will appear on a black background. See Section 6.4 for editing and re-sampling instructions.

6.3.2 Sampling Data with the Dual Serial Interface

The Dual Serial Interface is designed to be used with the LMI 585 Digital Transmitter and an LMI 200 Probe. Samples can be taken while viewing the Values or Graphic display screens.

The 585 Must be properly setup and connected to interface properly. If you have a 585 Plus the Baud rate must be set to 4800 and Export #1 must be selected. You must also be connected to the unused COM port 1 or 2 on your PC that is not being used by the 2351 Hub. For instance, if you configured COM1 for the hub then COM 2 must be connected to the 585. When the DSI

checks are ready to be taken on the runtime side the readings will fill the boxes when the 585 SEND button is pressed

Click **F**inished when all of the boxes have been filled with readings. The screen will automatically scroll to the next Active checking type, i.e., Keyboard Data Points.

Note: Please refer to the LMI 585 Digital Transmitter manual for further information on the LMI 585.

6.3.3 Sampling Data Using Keyboard Data Points

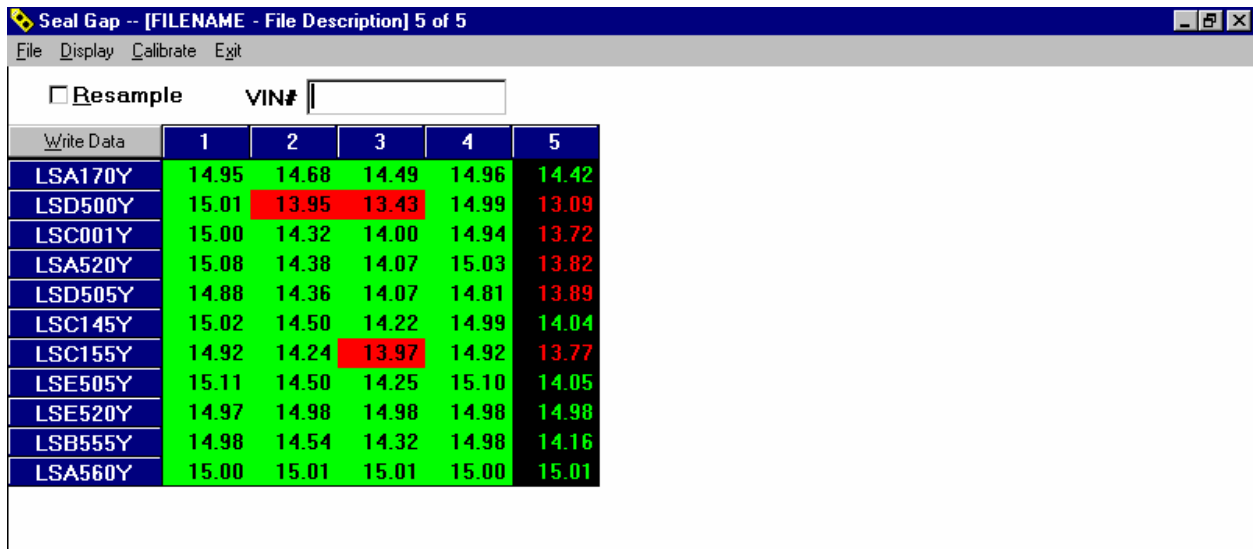
Take the first check point reading using a handheld gage, such as a feeler gage or caliper. Enter the value in the first check point field using the keyboard. Press ↵Enter. Continue to take readings and enter values until all check points have been sampled. Click **F**inished. The display screen will automatically scroll to the next subgroup or to the resample screen.

6.4 Editing & Re-Sampling Data

The collected data can be edited prior to selecting Write Data in the Values or Graphic screen.

6.4.1 Value Screen

To edit the data in the Values screen, click on a column that has data in it.



Seal Gap -- [FILENAME - File Description] 5 of 5
File Display Calibrate Exit

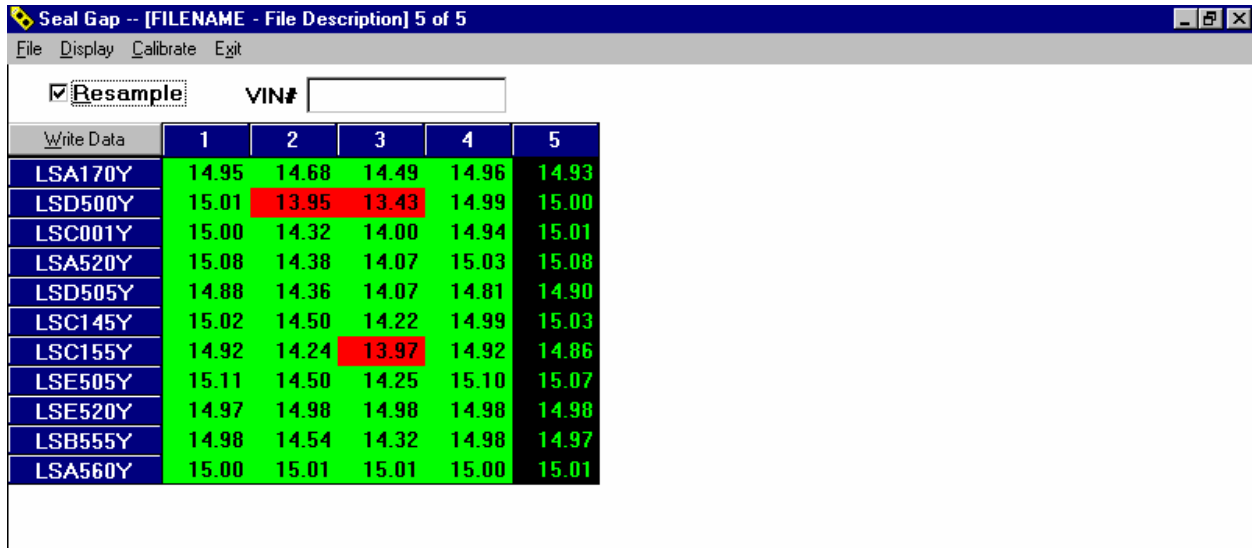
Resample VIN#

Write Data	1	2	3	4	5
LSA170Y	14.95	14.68	14.49	14.96	14.42
LSD500Y	15.01	13.95	13.43	14.99	13.09
LSC001Y	15.00	14.32	14.00	14.94	13.72
LSA520Y	15.08	14.38	14.07	15.03	13.82
LSD505Y	14.88	14.36	14.07	14.81	13.89
LSC145Y	15.02	14.50	14.22	14.99	14.04
LSC155Y	14.92	14.24	13.97	14.92	13.77
LSE505Y	15.11	14.50	14.25	15.10	14.05
LSE520Y	14.97	14.98	14.98	14.98	14.98
LSB555Y	14.98	14.54	14.32	14.98	14.16
LSA560Y	15.00	15.01	15.01	15.00	15.01

Picture 6.4a

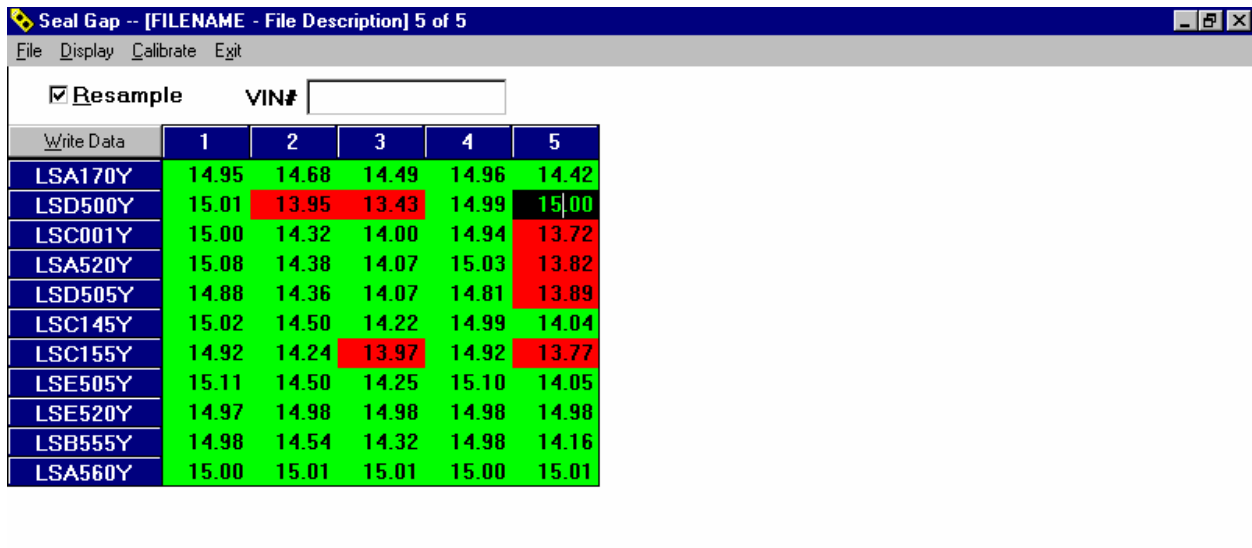
The “Resample” checkbox will be displayed. The “Resample” checkbox must be unchecked when editing specific cells using the keyboard. To edit the data with the keyboard, click on the desired cell and type the new value in the selected cell in the spreadsheet. Press ↵Enter.

To resample all check points within a selected column with the gage(s), click on the Resample checkbox.



Picture 6.4b

The live values will be displayed in the selected column. Use the remote pendant switch to take a new sample.

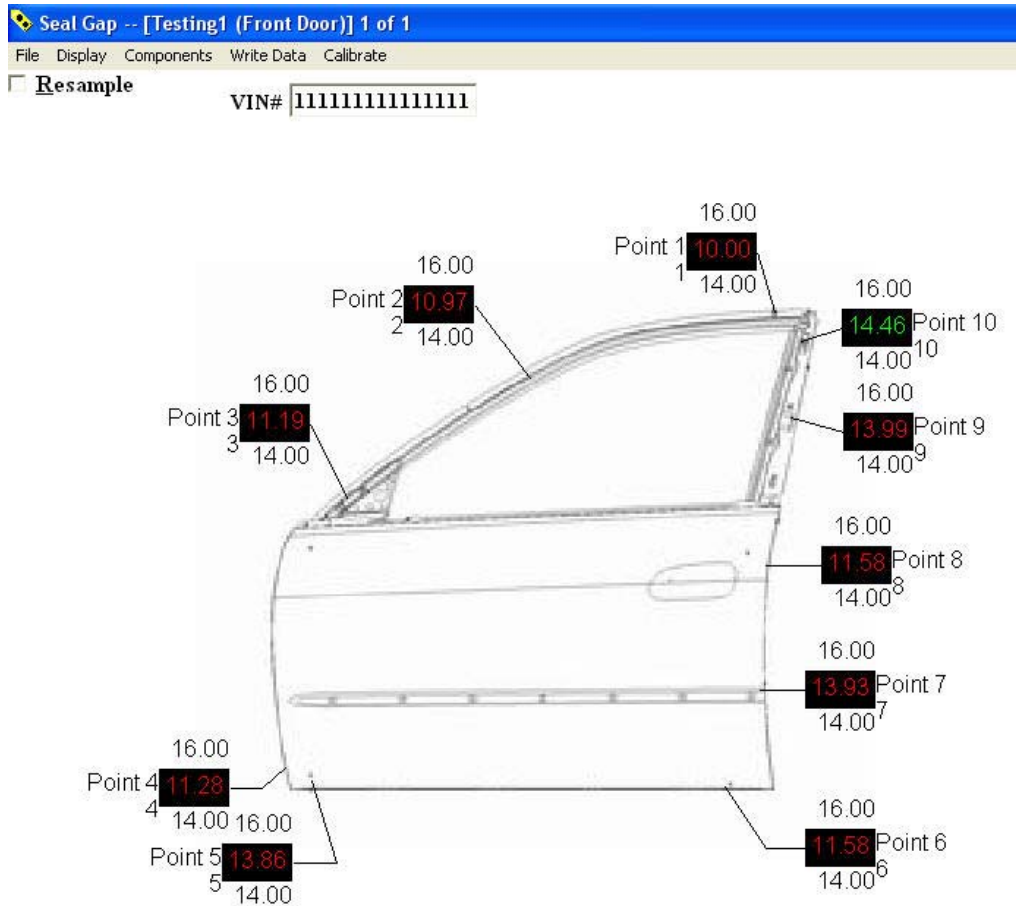


Picture 6.4c

To take an individual reading with a gage, click on the column for the desired reading. The readings in the column will become live and the background will be black. Check the resample box. Click on the cell for the desired reading. Only the selected check point will display a live reading. Resample the data.

6.4.2 Graphics Screen

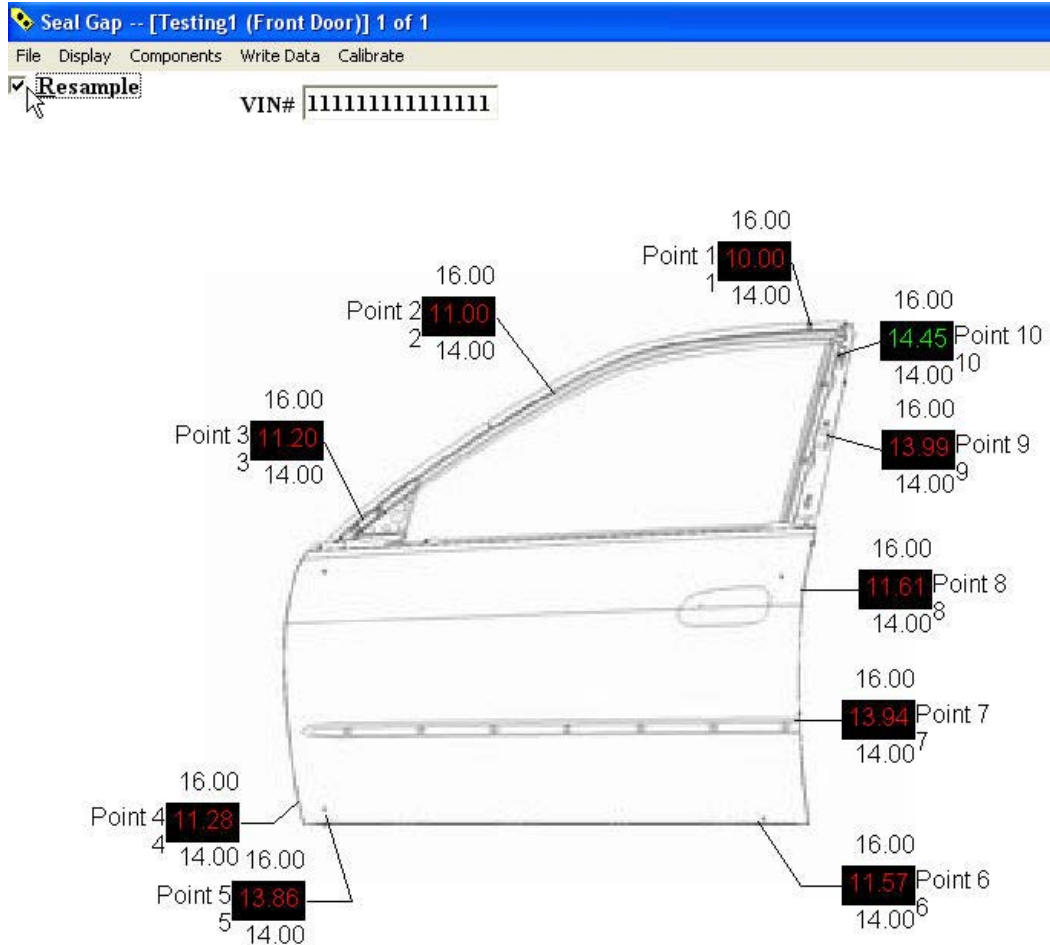
To edit data in the Graphics Screen, click on the box for the desired check point.



Picture 6.4d

The “Resample” checkbox will be displayed. The “Resample” checkbox must be unchecked when editing individual readings. Use the keyboard to enter the correct data. Press **↵**Enter. The cursor will scroll to the next check point box. Continue to edit until complete.

To resample the data for all check points, click on the Resample box.



Picture 6.4e

The live values will be displayed. Resample the data.

To resample the data for an individual check point, click on the Resample box. The live values will be displayed. Click on the desired check point. Only the live value for the selected check point will be displayed. Resample the data.

6.5 Creating an Export File

An export file can be created from any data collect display screen. After all desired check points have been sampled, click Write Data. The data will be exported to all of the export files that were previously selected in Seal Gap – Configuration. The file(s) can be found in the directory that was given on the configuration side. Refer to your specific SPC software to import the collected data for further analysis.

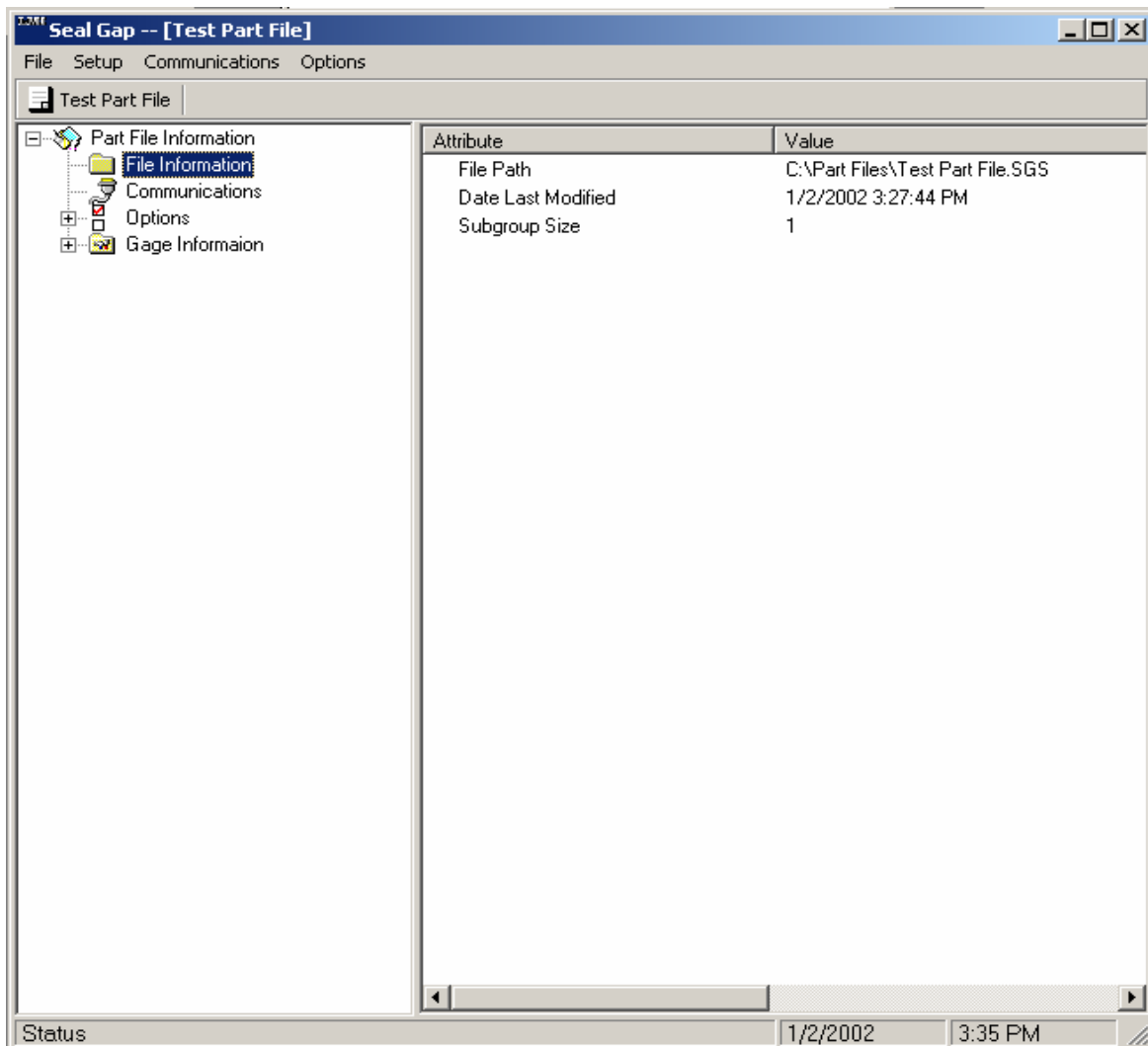
The sampled readings are now written to a temp file (.tmp) and is located under the default directory.

7

Navigating the Configuration Tree View

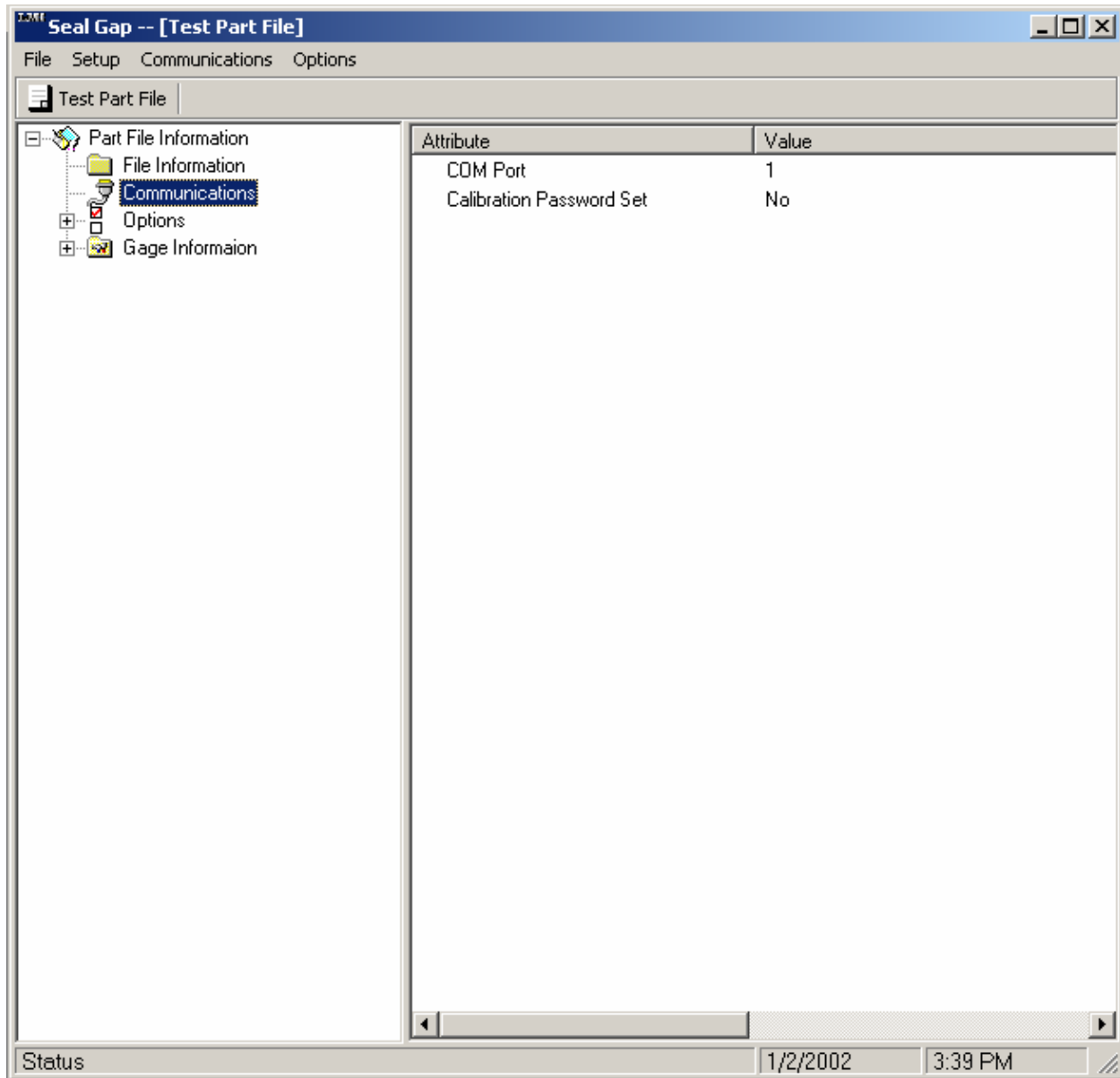
The tree view of the Configuration side of Seal Gap contains information pertinent to the project opened. There are a possible six sections in the tree view. The next few pages will give you a small overview of these sections.

The first section is File Information. Here the file path, date the file was last modified, and the subgroup size can be found.



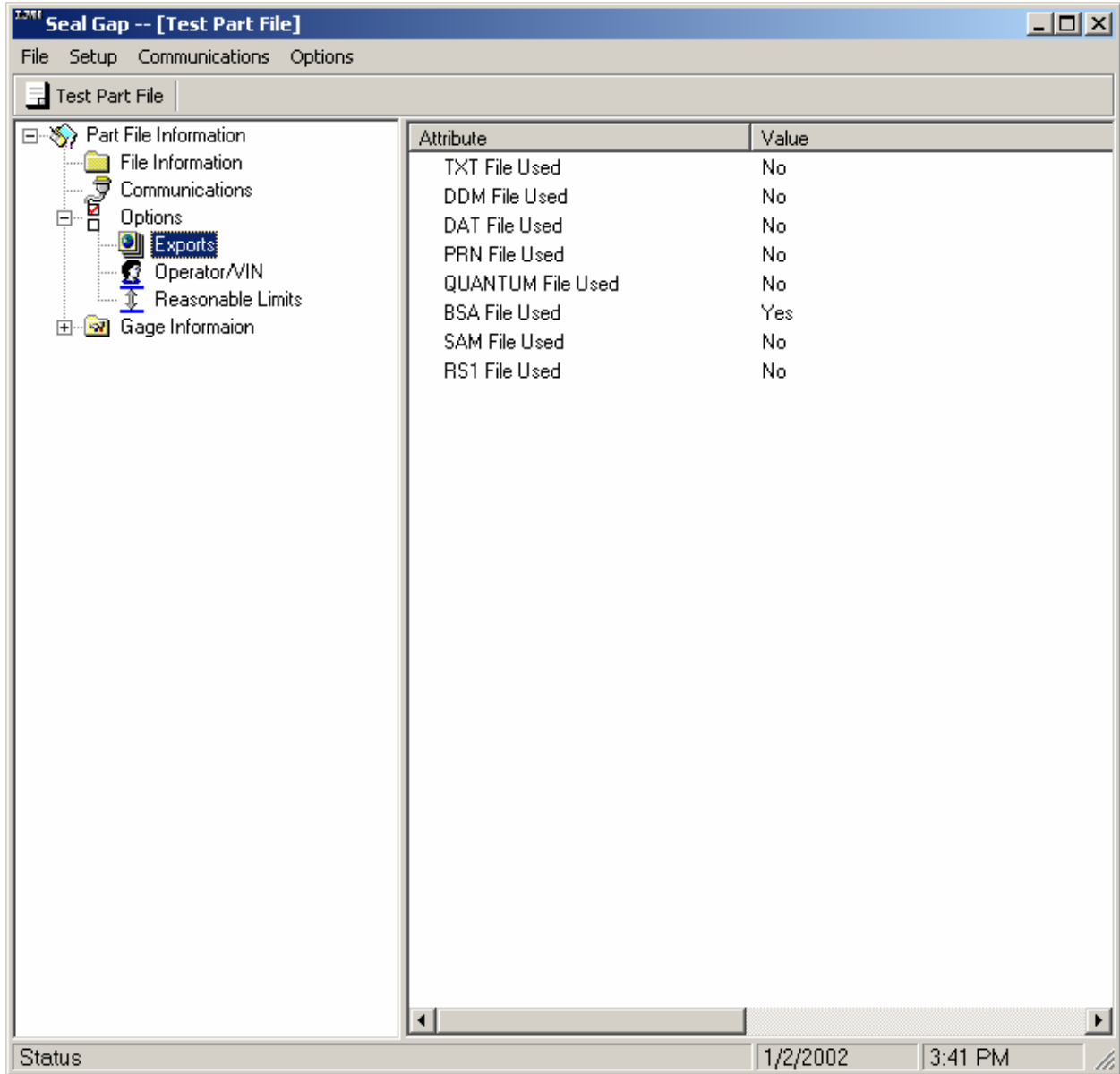
Picture 8a

The second section is Communications. Here the COM Port and Calibration Password can be found.



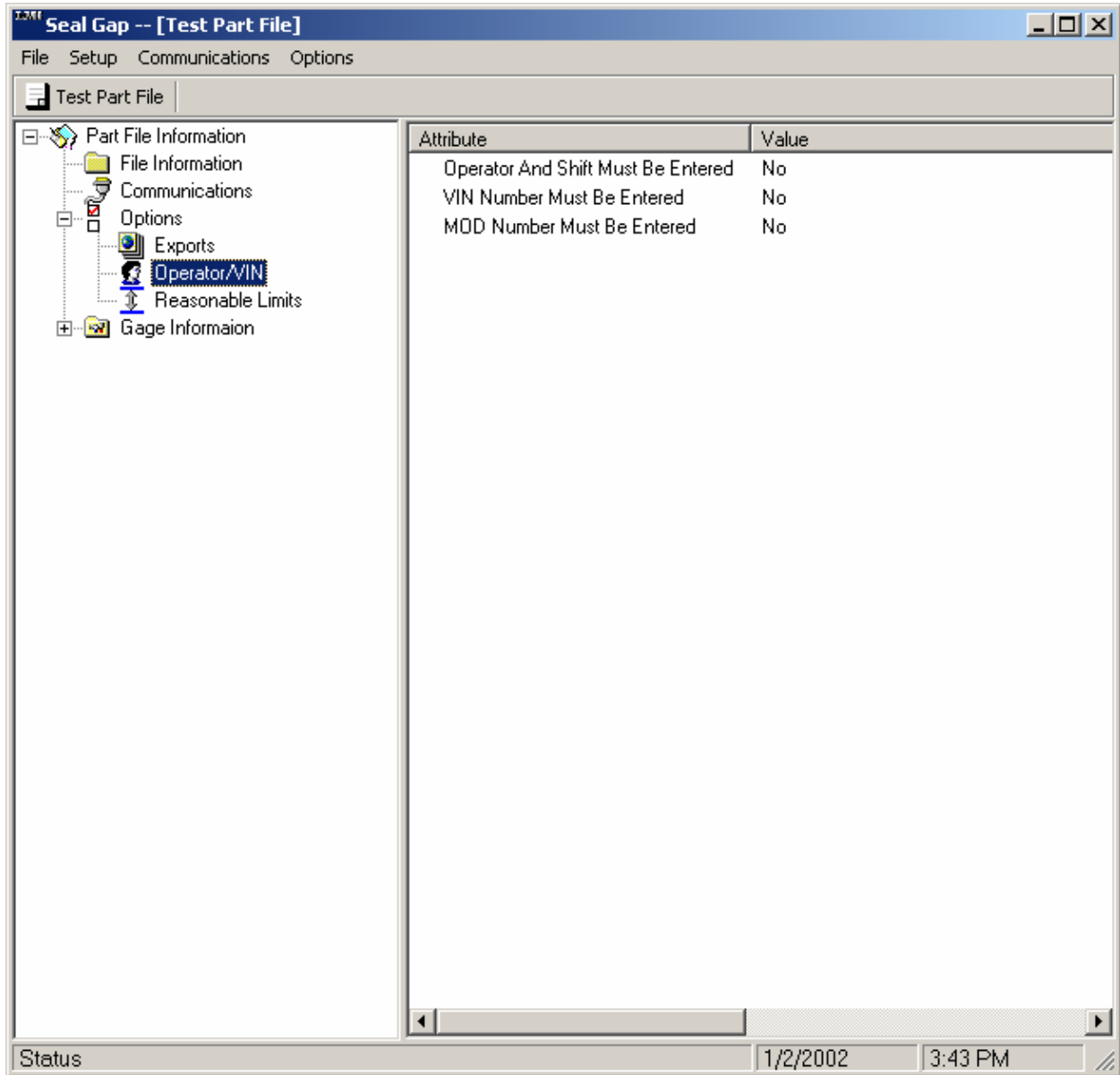
Picture 8b

The third section is options. Here you will have a choice of three different options. The first option of the three is Exports. This will show you which export files have been selected to be used on the Runtime side.



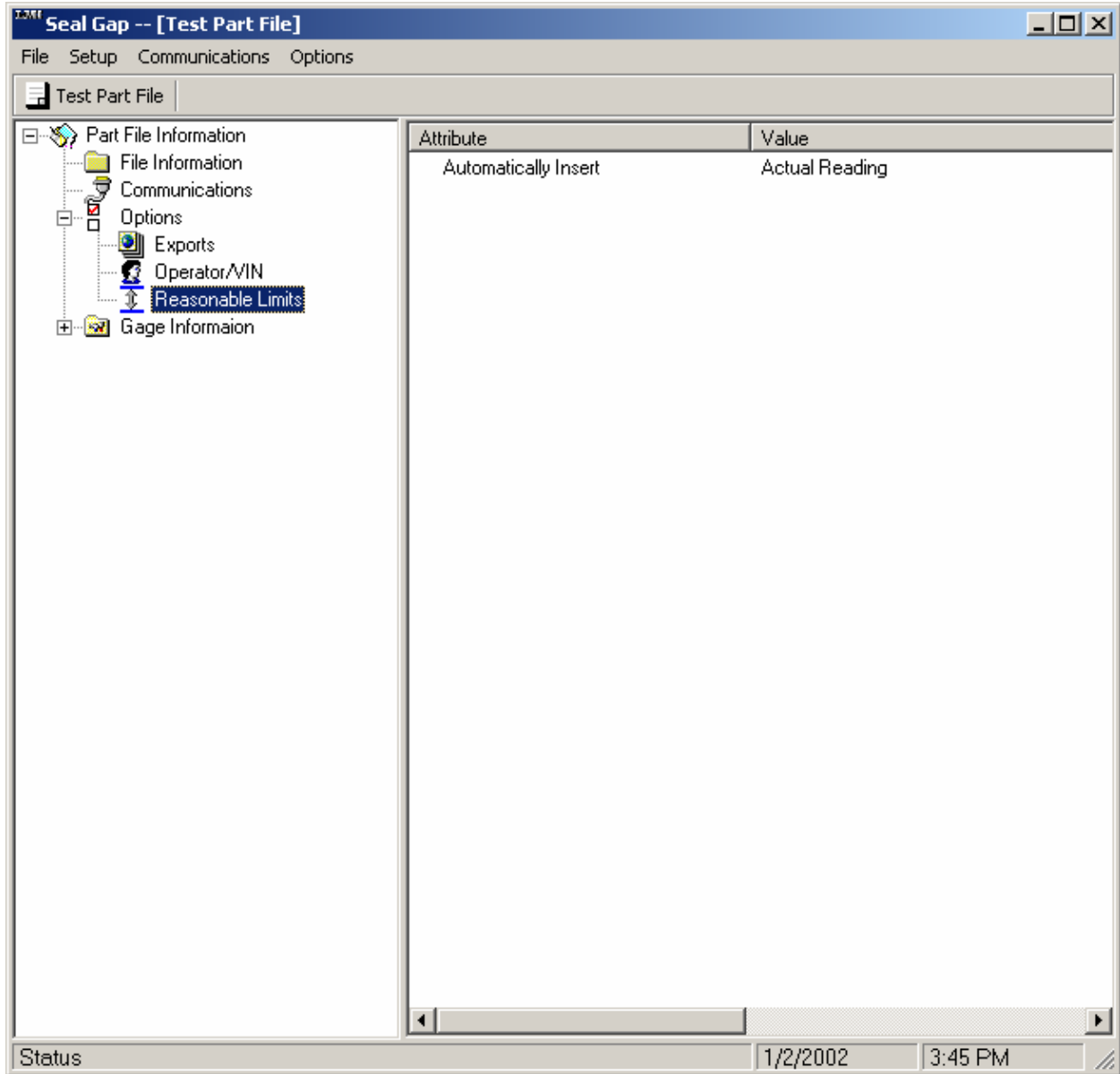
Picture 8c

The second option in the Options view is Operator/VIN. This section will show you if an Operator, VIN number, or MOD number must be entered on the Runtime side.



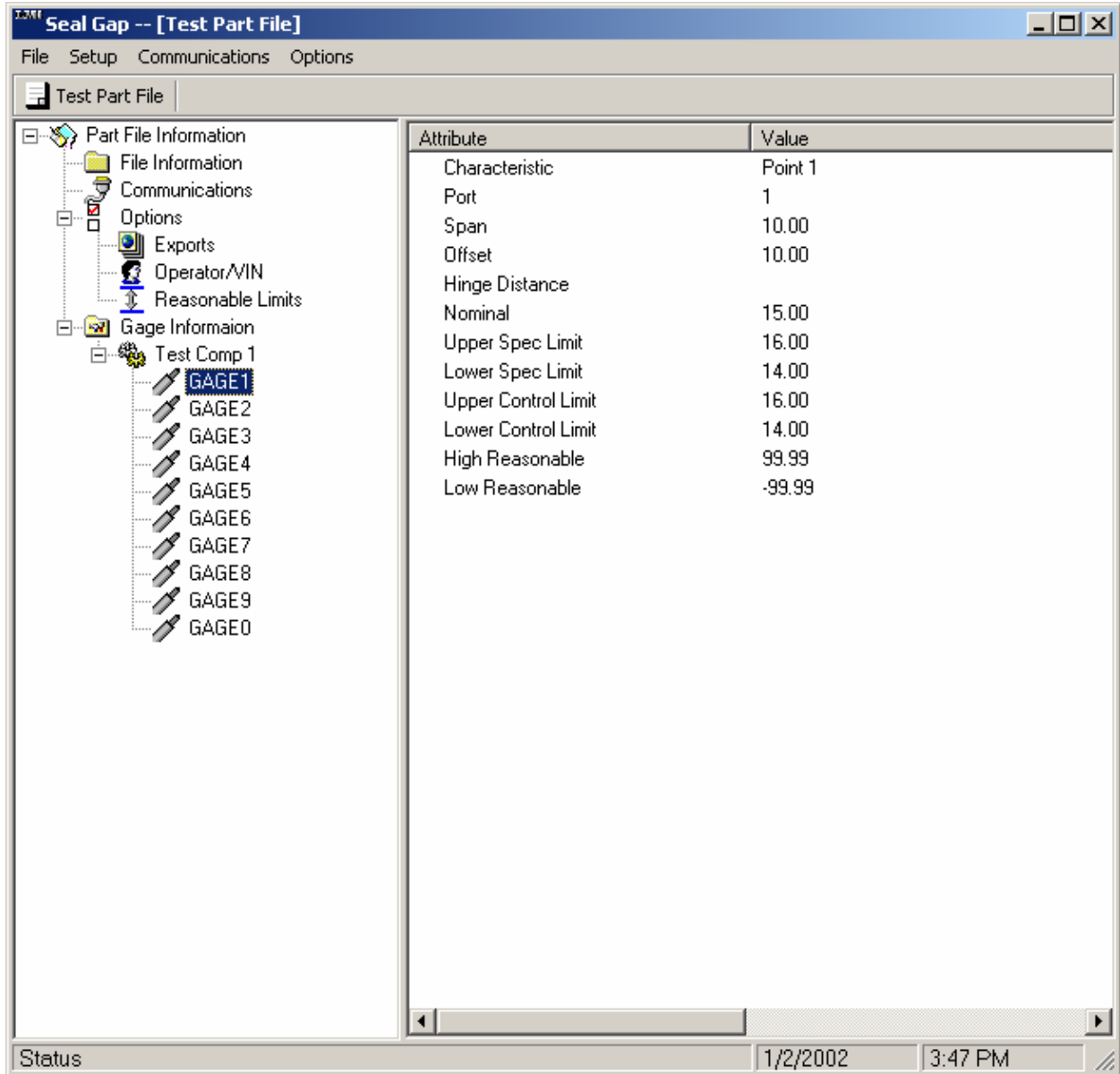
Picture 8d

The third option in the Options view is Reasonable Limits. This section will let you know if the Runtime will automatically handle an occurrence of an unreasonable limit or if there will have to be some user interaction.



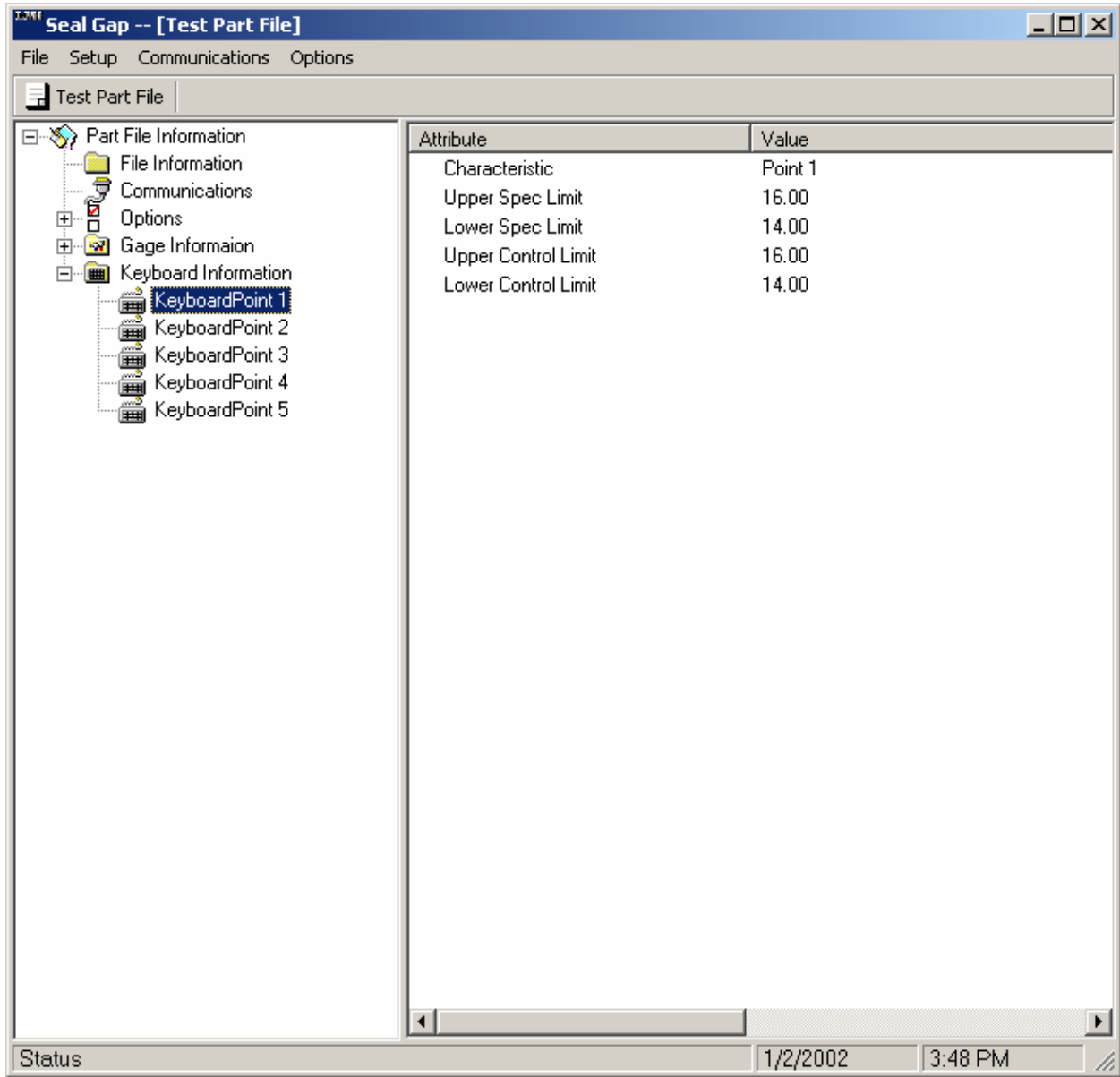
Picture 8e

The next section under Options is Gage Information. This part of the tree will give you a summary of all the Gages that have been setup. It will tell you the number of different components, the number of different gages per a given component, and any pertinent information regarding any of the individual gages created.



Picture 8f


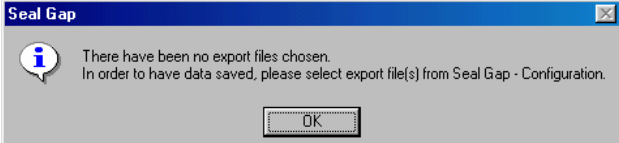
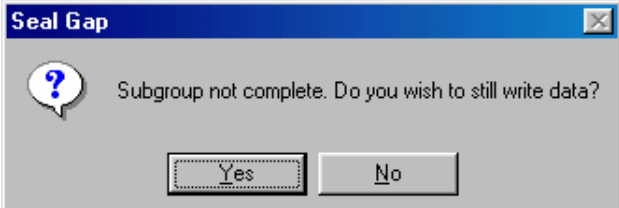
The next section under Gage Information is Keyboard Information. This part of the tree is similar to Gage Information, but there is no mention of components.

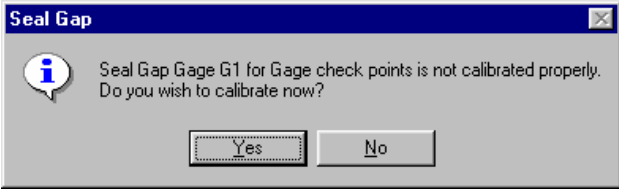
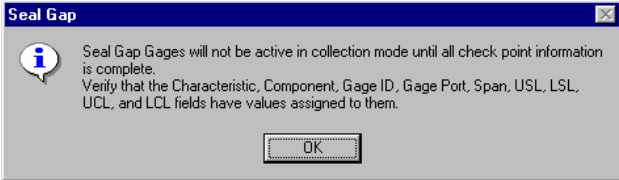
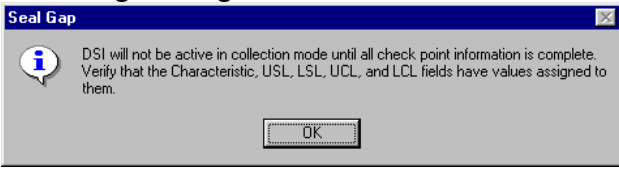
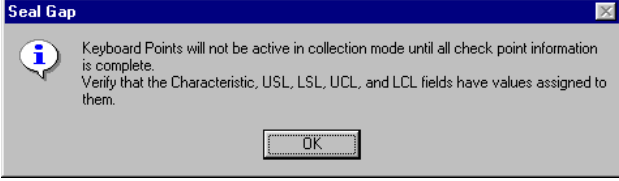


Picture 8g

8

System Trouble Shooting

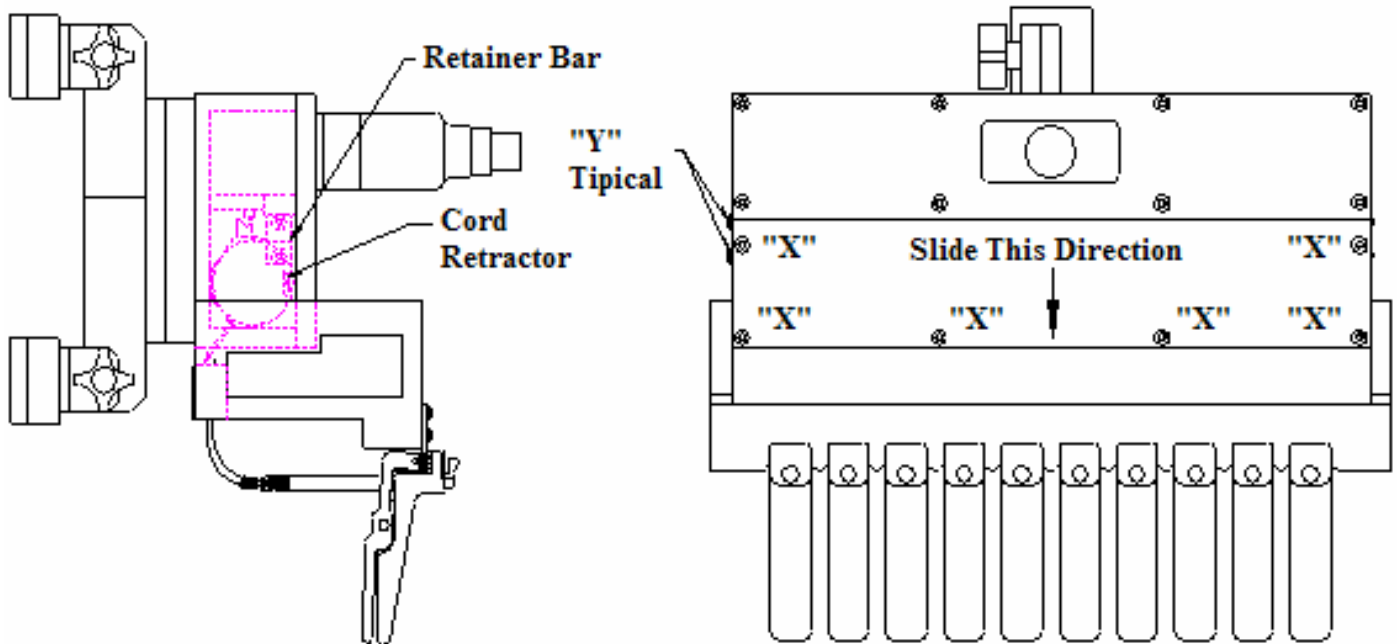
Problem	Possible Solutions
<p>Receiving message:</p> 	<p>...Check communication cable connection, refer to 4.1 Making necessary connections</p> <p>...2351 Hub unit is powered OFF</p> <p>...2351 Hub Power switch is pushed to the Battery ON position but the battery may need recharging. Switch to a fully charged battery, refer to section 2.2</p> <p>...2351 Hub Power switch is pushed to the AC Power ON position but the wall adapter may not be plugged into the jack on the hub or at the outlet.</p> <p>...Turn RF Transmit On, Turn main hub power switch ON, Connect Wireless Receiver to the proper COM port on the PC and the Carrier Detect LED should be green.</p>
<p>Receiving message:</p> 	<p>...An export file type has not been selected; run Seal Gap-Configuration and select a export file type; see instructions in Section 4.3.1</p>
<p>Receiving message:</p> 	<p>...Data has not been taken for all subgroups within the file before creating the export file; select Yes to write sampled data, select No to return to Seal Gap to complete sampling for the remaining data</p>

Problem	Possible Solutions
<p>Receiving message:</p> 	<p>...The wrong gage port was selected for the gage being calibrated; retry using the correct gage port; see instructions in Section 4.2 to select the correct gage port</p> <p>...Incorrect settings in part file Setup screen</p> <p>...User not following the correct calibration steps; see instructions in Section 5.1 for calibration instructions</p>
<p>Receiving message:</p> 	<p>...All information not complete in Seal Gap – Configuration; run Seal Gap-Configuration and verify that all checkpoint information is complete; see instructions in Section 4.2.1 LMI237/238 Seal Gap Points</p>
<p>Receiving message:</p> 	<p>...All information not complete in Seal Gap – Configuration; run Seal Gap-Configuration and verify that all checkpoint information is complete; see instructions in Section 4.2.2 Dual Serial Interface Points</p>
<p>Receiving message:</p> 	<p>...All information not complete in Seal Gap – Configuration; run Seal Gap-Configuration and verify that all checkpoint information is complete; see instructions in Section 4.2.3 Keyboard Data Points</p>

APPENDIX

Cord Retractor Replacement

To replace a cord retractor in the retractor hub, remove gages from rail & move off to one side. Remove (6) screws attaching the front half of the lid (6 screws marked "X" on fig. 1) & slide the lid section out through the front of the unit. (see **Picture 1**) Also remove handle screws & handles. After removal you will see an aluminum retainer bar used to hold the retractors in place. Remove (2) screws at each end of the body (marked "Y") on the outside and lift the retainer bar out. Each retractor is now held in location by velcro. Gently pull the desired retractor up from its location, now disconnect the plug and simply pull the retractor out of the hub and put a new one into position reversing the disassembly process. Note: **Do Not Over-Tighten the lid screws.**

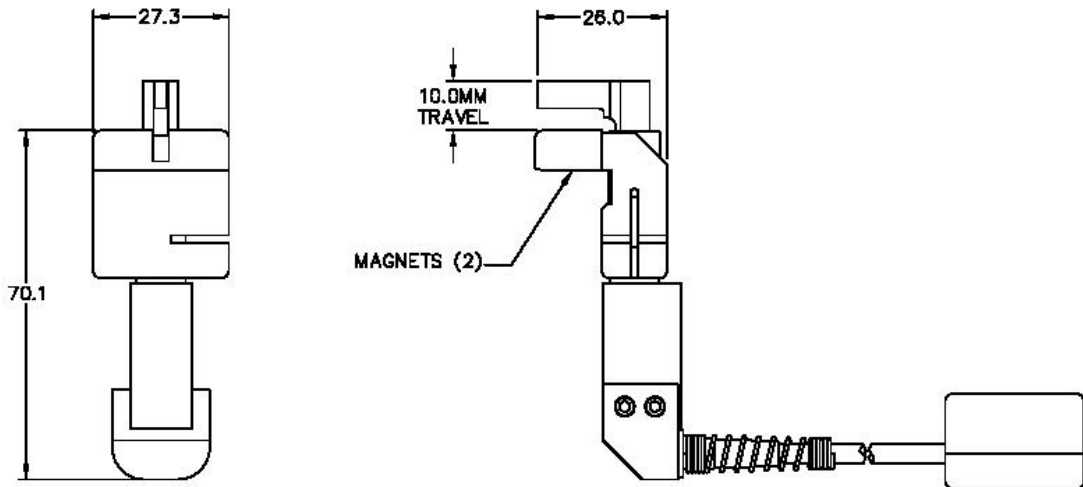


LMI 237-MAG Door Seal Gap Gage Instructions

The LMI 237 Door Seal Gap Gage creates a new level of simplicity and efficiency when checking the gap between the door and door opening flange. The following instructions explain how to apply the gage in order to make your measurements. Refer to figure below throughout instructions.

1. Attach the LMI 237-MAG to the “Door Opening Flange” by placing the gage on the Flange.
2. Once the LMI 237 is in place, the door is closed to the “Flush Position”. Door flushness is critical
3. The spring loaded tip will then make contact with the door and a reading can be taken.

Ensure accurate and repeatable readings. Contact LMI if your application does not allow true flush condition.



NOTE: In order to take readings with the LMI 237-MAG, the gage needs to be connected to an LMI Portable Seal Gap (PSG) System or a Mobile Seal Gap (MSG) System, and calibrated. For specific calibration instructions and setup refer to the System manual. (A three-point calibration process is required. The 10mm span of the transducer is internally preset and represents the two outer points of calibration. The master position of the LMI 237-MAG is always set to where the tip is flush with the “Minimum Reference Surface”.) In addition when the gage is properly setup the max. seal gap measurement will be slightly less than 20.0 millimeters.

