CHEMINSTRUMENTS

TENSILE TESTER

MODEL TT-1100

OPERATING INSTRUCTIONS

PRODUCT DESCRIPTION

Congratulations on the purchase of your new ChemInstruments TT-1100 Tensile Tester. This versatile, user-friendly, carefully designed instrument allows you to perform common tensile, compression, cycle, and loop tack test.

The unit has the following features:

- Selectable testing speeds from 1.0 to 25 inches per minute (2.5 to 63 cm/min).
- Pull force up to 200 lb. (90 Kg).
- Two line LCD display.
- Maximum separation distance is 32" (82 cm) minus the length of the grips.
- Throat distance from center of grip to mast is 3.5" (8.9 cm).
- Programmable data acquisition area.
- Measures in; kilograms, grams, Newtons, pounds, and ounces.
- Small 13" (33 cm) by 16" (41 cm) footprint.
- Supports load cells of 2 lb (1 Kg), 5 lb (2.3 Kg), 10 lb (4.5 Kg), 25 lb (911 Kg), 50 lb (22 Kg), 100 lb (45 Kg)& 200 lb (90 Kg).
- Automatic overload protection.
- Preset jog speed of 15 inches per minute.
- Compatible with EZ-Lab System software. (Optional)

UNPACKING

BEFORE USING THIS EQUIPMENT PLEASE READ THE ENTIRE MANUAL.

 Please use caution when unpacking the TT-1100. For safety, two people should be used to unpack and lift the 52 pound and 47 inch long tensile tester.

ChemInstruments has made every effort to ensure that the TT-1100 arrives at your location without damage. Carefully unpack the instrument and check for any damage that might have occurred during shipment. If any damage did occur during transit, notify the **carrier** immediately.

The ChemInstruments TT-1100 consists of the following parts:

- The test frame, which includes the internal data acquisition system.
- An envelope with this manual.
- The load cell assembly, including upper and lower grips (unattached).
- Power cord.

Make sure all of these components are present before discarding the packaging material.

ASSEMBLY

Carefully remove the TT-1100 tensile tester from the packaging and set it on a sturdy bench top. ***Due to its weight and size, two people should be used to move the TT - 1100.*** The space required for the unit is approximately 13" long x 16" deep x 47" high (including the mast). As with any precision piece of test equipment, it is preferable to locate the TT-1100 in an area where temperature and humidity are controlled to standard conditions ($72 \pm 2°F$, $50 \pm 5\%$ relative humidity).

Connect the power cord to its receptacle on the backside of the test frame at the far-left side when viewed from the rear. Complete the connection by inserting the male end of the power cord into an appropriate AC outlet. Notice that the on/off power switch is located directly above the power cord receptacle on the backside of the test frame. (See Photo 1 – TT-1100 Cabinet Back)

Using the Jog button, position the load cell assembly at a point midway from the top and bottom of the mast. You can now attach both the upper and lower grips. Carefully thread the upper grip onto the threaded rod of the load cell assembly. Make sure that the body of the grip does not come in contact with the body of the load cell assembly. The lower grip is secured with a locking pin allowing you to choose different mounting positions at every 90 degrees.

The ChemInstruments' TT-1100 Tensile Tester is now ready for calibration and use. Before proceeding with calibrating the TT-1100, it is advisable to become familiar with the Key Components of the TT-1100. A brief description of their function follows in the next section.
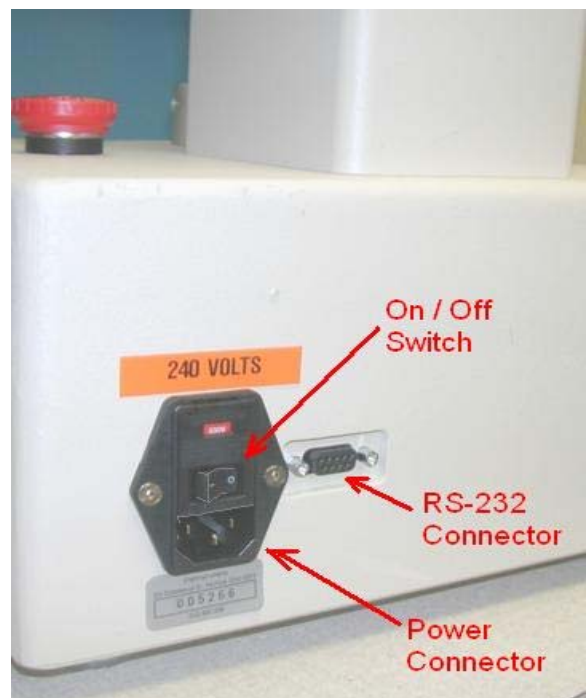

Photo 1 – TT-1100 Cabinet Back

KEY COMPONENTS (See Photos , 1, 2, & 3)

- **POWER SWITCH** is located on the back panel of the control cabinet next to the power cord connection**.** (Photo 1 – TT-1100 Cabinet Back)

- **LIMIT SWITCH** limits the travel of the load cell and grip assembly. (Photo 2 – TT-1100 Components)

- **LOAD CELL ASSEMBLY** consists of the mounting bracket for the load cell and the upper grip. (Photo 2 – TT-1100 Components)
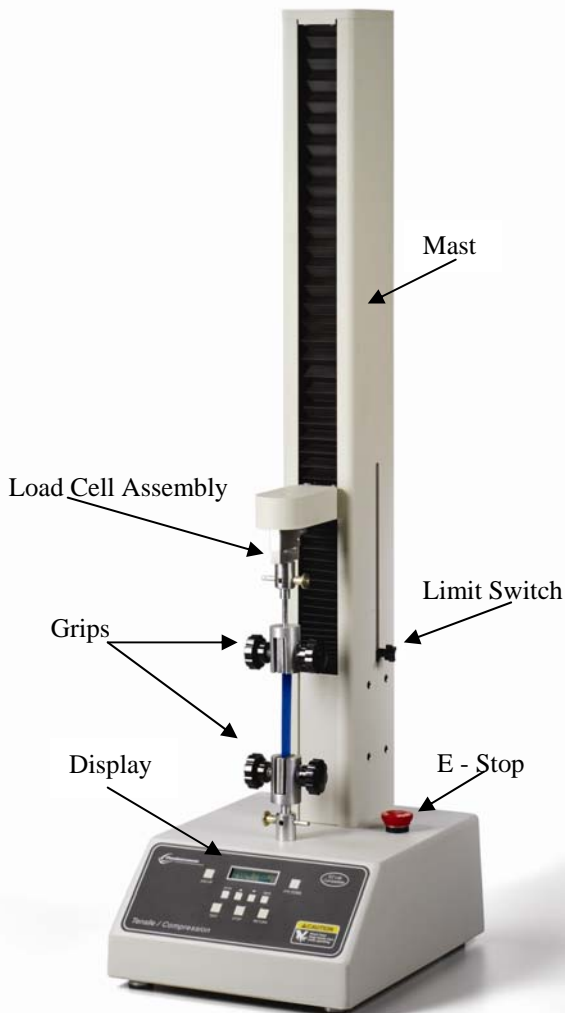
- **GRIPS** secure the upper and lower ends of the test material. (Photo 2 – TT-1100 Components)

- **MAST** vertical component housing the drive screw with the upper grip and load cell assembly. (Photo 2 – TT-1100 Components)

- **DISPLAY** provides status and test data. (Photo 3 – TT-1100 Display - page 8)

- **CONTROL KEYS** control the motion of the load cell assembly and upper grip crosshead. (Photo 3 – TT-1100 Display – page 8)

- **PROGRAM KEYS** provide control of test parameters. (Photo 3 – TT-1100 Display – page8)

- **RS-232 CONNECTION** cable connection for downloading test data. (Photo 1 – TT-1100 Cabinet Back)

- **E-STOP** emergency stop button. (Photo 2 – TT-1100 Components)

Photo 2 TT-1100 Components

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OPERATION

THEORY OF OPERATION

Test material is placed in the two opposing grips. The operator programs the test speed, the distance of the test and the area of data to be recorded. The upper grip, which is fastened to a load cell, travels up and down the Mast causing forces on the test sample. A load cell, measures these forces. The data collection system records the measurements and displays the high, low, elongation and average in numerical values. This test data is saved in memory as a file available for review or is transferred to your PC when using the optional EZ-Lab software.

POWER UP

Turn on the Power Switch, which is located on the back panel of the test frame directly above the power line receptacle. (See Photo 1 – TT-1100 Cabinet Back) When you turn on the power, the TT-1100 System will show the version number of the internal program before displaying the instant force reading being registered by the load cell.

Warning! Operating temperature for this equipment is 0 to 70 Celsius. The equipment needs to be completely free of condensation inside and out, before applying power."

SAFETY FEATURES

The TT-1100 tensile tester has numerous safety features incorporated into its design and operation. Three of these features need to be understood for proper operation of the TT-1100.

The first is the "E-Stop". This red button when pushed shuts all power to the TT-1100 off. After releasing this button you will have to wait until the TT-1100 goes through its normal startup sequence before you can use the tensile tester.

The second feature is automatic and senses the opposed force measured by the load cell when in the tensile mode. Should 50 grams of opposite force be detected the crosshead and load cell stop movement and an error message is displayed.

The third feature is overload protection for the load cell. If the load cell senses a force 10% greater than its maximum rating, the crosshead will stop and an error message is displayed.

CONTROL KEYS

The five Control Keys control the movement of the Load Cell Assembly. Each of the five keys and their function are listed below. (See Photo 3 – TT-1100 Display) It is recommended that you familiarize yourself with their function before attempting to run any test.

Photo 3 TT – 1100 Display

- Up – This key causes the Load Cell Assembly to move upward at the preset jog speed of 15 inches per minute.
- Down – This key cause the Load Cell Assembly to move downward at jog speed.
- Stop – This key will stop the movement of the Load Cell Assembly and test sequence.
- Test – This key initiates the test sequence.
- Return – This key will return the Load Cell Assembly to the start point of the most recent test.

PROGRAM KEYS

The four Program Keys allow the operator to set the units of measure, speed, test distance parameters, and calibrate the load cell. (See Photo 3 – TT-1100 Display) It is recommended that you familiarize yourself with their function before attempting to run any test.

- Units – This key causes the displayed unit of measure to cycle from grams, kilograms, ounces, pounds, & Newtons. When in the Setup mode and programming speed, this key allows the units of distance measurement to be changed from inches to centimeters.
- Enter – This key is used for recording settings when in the Setup mode.
- Up Arrow – This key allows you to cycle through the display from, Instant Force, Average Force, Maximum Force, Minimum Force, & Elongation of the last test.
- Down Arrow – This key allows the same cycling of the display as the Up Arrow. When used simultaneously .with the Up Arrow key you access the Setup Mode for programming, test speed, test parameters, & calibration of the load cell.

POSITIONING LOAD CELL ASSEMBLY

Before running a test it is necessary to position the Load Cell Assembly at the appropriate start point. The length of the material being tested and any fixtures being used in the test will determine the start point. To move the Load Cell Assembly, follow this procedure. Use caution when moving the Load Cell Assembly downward to avoid damaging the load cell. The Load Cell Assembly will be traveling at the preset speed of 15 inches per minute and should not come in contact with the fixtures or the bottom grip.

CAUTION, THE HEAD WILL CONTINUE TO TRAVEL FOR UP TO A 1/4 INCH AFTER PUSHING THE STOP CONTROL KEY.

1. To move the Load Cell Assembly upward, push the "Up" Control Key.
2. If needed push the "Stop" Control Key to halt the Load Cell Assembly's movement.
3. To move the Load cell assembly downward, push the "Down" Control key.

LIMIT SWITCH

To prevent damage to the TT-1100 and its load cell, a travel Limit Switch has been provided on the right side of the Mast. (See Photo 2 – TT-1100 Components) It is important that this be set correctly. The Limit Switch location is adjustable, allowing you to set its position for preventing the top and bottom Grips from coming in contact with each other. There is an internal top limit switch set at the maximum upper limit. The following is the step-by-step procedure for locating the lower Limit Switch.

1. Determine the test method to be followed and the position of the Load Cell Assembly at the start point.
2. Place the lower Limit Switch so that it is in position to "trip" when the Load Cell and Grip Assembly travels below the start position. Use caution in moving the Load Cell Assembly downward so as to avoid contact with the lower Grip**. Sever damage can result from the upper and lower Grips coming in contact with each other.**
3. With the lower Limit Switch properly positioned, the TT-1100 is ready to run a test.

GRIP OPERATION

The Standard Vice Grips open and close by turning the two opposing handles. (See Photo 2 – TT-1100 Components) With the Grip opened, insert the free end of the sample and close the

Grip by turning the handles in a clockwise direction. For proper measurement during a test, it is important that the test material be located in the center of the Grips and properly secured. This position will provide the most accurate results.

NOTE: The upper Grip is attached directly to the load cell. Do not move this Grip sideways or up and down.

SETTING SPEED

To perform a test correctly, it is necessary to set the Load Cell Assembly speed of the TT-1100 Tensile Tester in accordance with the selected test method. The following is a step-by-step procedure for setting speed

1. Access the Setup menu by simultaneously pressing the Up↑ and Down↓ Arrow Keys for 3 seconds.
2. At the Setup menu the first mode displayed will be "SPEED SETUP". Press the Enter Key to access the settings for speed.
3. Select the units of measure (inches or centimeters). You can toggle between the two units with the Units key. To record the choice, press the Enter key.
4. The current set speed of the upper grip is then displayed. To change the speed, press the appropriate Up↑ or Down ↓ Program Keys.
5. To record the selected speed setting, press the Enter Key.
6. This action will return the unit to the Run mode and control the Load Cell Assembly at the new set speed for testing.

LOAD CELL CALIBRATION

It is important to calibrate the load cell to ensure that reliable data will be gathered. A calibration procedure is built into the operating software of the TT-1100. This procedure should be followed upon first use of the TT-1100 and whenever necessary thereafter. The following is the step-by-step procedure for calibrating the load cell.

MAKE SURE THE TT-1100 HAS BEEN POWERED ON FOR 30 MINUTES BEFORE PROCEEDING WITH CALIBRATION. TO AVOID THIS WARM UP PERIOD, LEAVE THE TT-1100 ON.

CALIBRATION PROCEDURE

1. Move the Load Cell Assembly with upper Grip to a midpoint of the Mast.
2. Simultaneously press the Up ↑ and Down ↓ keys for 3 seconds to access the Setup menu.
3. From the Setup menu, press the Up↑ key to select "LOAD CELL SETUP" for the calibration mode.
4. Press the Enter Key to access the calibration sequence. At the "Lo Cal" display, determine the Low Offset Value desired (Typically 0.00). Make sure that you **<u>do not</u>** have a weight hanging from the upper grip and press the Enter Key to record the value. The Display will change to, "Hi Cal" for High Offset Value.

NOTE: the calibration sequence defaults to grams as the unit of measure. Make sure your calibration weights and entries are in grams.

5. At the "Hi Cal" display, select a calibration weight close to the maximum expected test value or at least 10% of the full scale of the load cell. Then hang the weight on the upper Grip.
6. Set the High Offset Value on the Display to correspond with the selected calibration weight. You can change the displayed value by pressing the Up↑ and Down ↓ keys.
7. Make sure the **calibration weight is completely at rest**, and then press the Enter Key. The display will change to the "Instant Force" mode showing the current force.
8. Verify the calibration by hanging a **<u>different weight</u>** on the upper Grip.
9. Use the Up↑ key to access the Instantaneous mode for a current reading. Confirm that the displayed Instant Force equals the weight hanging from the upper Grip.
10. Repeat the calibration procedure if necessary.

AUTO RETURN

Your TT-1100 is equipped with an automatic return feature. This feature, when turned on, causes the upper Grip, at the completion of a test, to travel to the original start position. In order to activate this feature it is necessary to perform the procedure below.

1. Access the Setup menu by simultaneously pressing the Up ↑ and Down ↓ keys for 3 seconds.

2. Press the Up↑ key to select the AUTORETURN mode.

3. Press the Enter Key to access the setting for AUTORETURN. The display will show the current status for this feature, either "On" or "Off".

4. Use the Up↑ key to toggle between the two settings.

5. Press the Enter Key to record the setting and return to the Run menu.

BREAK FEATURE

The Break feature can be set for use with each of the four available test modes. When activated in the Setup menu, the Break feature will stop test data from being collected when the value of the data collected sees a force measurement decrease equal to the percentage chosen in the Setup procedure. The procedure for activating the Break feature is as follows.

1. Enter the Setup menu by pressing the Up ↑ and Down ↓ keys together for 3 seconds.

2. Use the up or down arrow keys to access the "BREAK SETUP" mode.

3. Press the Enter key to display the current Break % settings.

4. Use the up or down arrow keys to cycle between the five available settings. (Off, 25%, 50%, 75%, and 100%).

5. After selecting the appropriate setting, press the Enter key to record the setting and return to the Run mode.

SETTING OFFSET PARAMETERS

Each test will require a set of instructions identifying how far the Upper Grip should travel before data is collected, how long data should be collected, and how far the Upper Grip should travel after collecting the test data. These three distances are identified as; Data Start, Data Test, and Test Stop. To set these parameters, follow the procedure below.

1. Enter the Setup menu by pressing the Up ↑ and Down ↓ keys together for 3 seconds.

2. Use the up or down arrow keys to access the "OFFSET SETUP" mode and press the Enter key.

NOTE: At this point the Unit's Key is active and a selection between (cm) centimeters and (in) inches can be made by pushing the Units Key. Press the Enter key to continue

TEST PROCEDURE

1. Calibrate the Load Cell. See the section titled, Load Cell Calibration. on page 10.
2. Set the test speed according to the test method. See the section titled, Setting Speed on page 10.
3. Attach any fixtures according to the test method.
4. Position the upper Grip at the start point. See the section titled, Positioning Load Cell Assembly on page 9.
5. Set the Limit Switch. See the section titled, Limit Switches on page 9.
6. With the upper Grip at the Start point and fixtures in place, attach the test material.
7. Set the test travel parameters. See the section titled, Set Offset Parameters on page 12.
8. Push the "Test" Control Key to start the test.
9. The Display will show "Running a Test" with the current force reading during data collection.
10. When the test has been completed the display will show the Average of the measured forces. The High, Low, and Elongation numerical values are accessible by pushing the Up↑ key.
11. Additional tests can be started as long as the display is showing either the Average, High, Low, Elongation or Instantaneous value.
12. To start another test, return the Load Cell Assembly to the start position (if the auto return is turned off) and insert new test material.
13. Return to step 6 of this procedure to start the next test.

NOTE: The unit of measure can be changed by pressing the Units Program Key. This will change the units of measurement according to the following sequence: kilograms, grams, Newtons, pounds, ounces.

REVIEWING TEST DATA

The most recent completed test results are maintained in the memory of the TT-1100. This data is accessible for reviewing,. Simply use the Up or Down arrow key to cycle through the Average, Maximum, Minimum, and Elongation values of the most recent test.

EZ-LAB SYSTEM 3.0

OVERVIEW

EZ Lab System software Version 3.0 is designed to enhance your model 1000 or 1100 ChemInstruments test platforms. The following procedure describes how to use the EZ-Lab System. Should you have any problems or questions after following this procedure, please call ChemInstruments at 513-860-1598, or contact us by e-mail at, ci@fuse.net.

INSTALLATION

Insert the EZ Lab disk into the computer. EZ-Lab will self install.

1. If EZ-Lab does not self install, select **RUN, (Drive):\Setup.exe**
2. Follow the on screen instructions to complete the software installation.
3. Connect the test platform's RS232 connection to the appropriate port on your computer with the provided RS232 serial cable.
4. On the computer, open the EZ-Lab program. This file will be located in a folder titled "EZ-Lab" on the C drive.
5. Double click on the file "EZLabv3.0". This will open the EZ-Lab System program and display the Main Screen.
6. Select the appropriate test platform button to activate the program. The operating screen will appear on your display.

OPERATION

This operating system is designed to provide all the necessary instructions on your computer screen. However, the following information will provide additional insight.
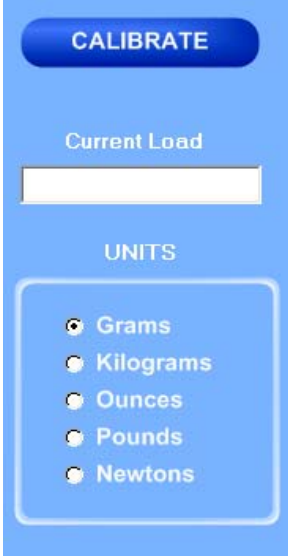
The Main Operating Screen is divided into 3 sections. The left and right sections are titled "**Setup**". Calibration of the load cell and choosing the units of measure are controlled in the left and right "**Load Setup**" section. The right section, titled "**Sled Setup**", is for starting the motor and setting the test speed. The center section, titled "**Run Test**", is for running a test without using the **Home**, **Start**, and **Stop** switches on the AR-1000.

CALIBRATION

In order for the load cell to measure forces correctly it is necessary to calibrate the system. The following procedure describes the calibration process. The test platform uses **Grams** for calibration.

1. Select the "**Calibrate**" button in the Setup section of the Main Screen.
2. Follow the on screen instructions exactly, and make sure to hang the appropriate weight on the load cell Grip when entering the high calibration value.
3. Verify the calibration by hanging some other known weight on the load cell Grip and checking the display in the Current Load field.
4. Click on appropriate bullet to select desired unit of measure.
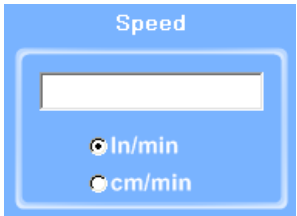
UNITS

Click the bullet next to the unit of measure to select the desired unit for data collection and data analysis. All data will be displayed in the unit selected.

SPEED

"**Speed**" displays the speed the machine is programmed to travel at. The speed is displayed as either inches per minute (**In/min**) or centimeters per minute (**cm/min**). Click the bullet next to the unit to select **In/min** or **cm/min**.

OFFSET

"**Offset**" controls the parameters of the test. The parameters can be set manually or by selecting an existing test method. "**Parameter Change**" allows you to change the operation mode of the machine. The machine will operate in either "**Tensile**, **Compression**, **Cycle**, or **Loop**" mode.
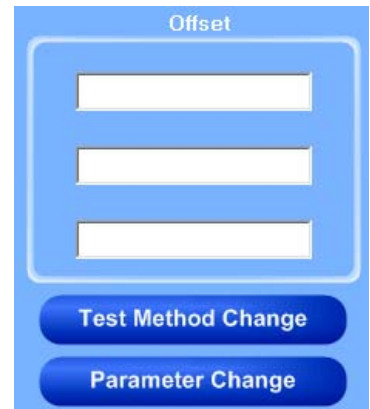
Click the "**Parameter Change**" button to set the parameters of the test.

In "**Tensile**" mode the machine measures forces in the tensile direction.

In "**Compression mode**" the machine measures forces in the compression direction.

In "**Cycle**" mode the machine runs up and down as a cycle. The number of cycles is programmed, and the machine measures forces in the tensile direction.

In "**Loop**" mode the machine performs loop tack tests.
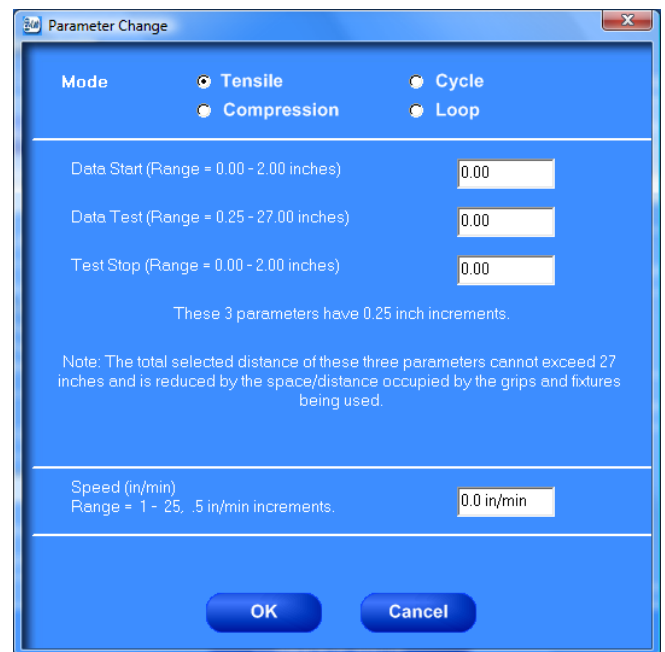
Click the bullet next to the desired mode. Follow the on screen directions to set the parameters of the test. Click "**OK**" to enter the parameters or "**Cancel**" to return to the "**Main Operating screen**".

Click the "**Test Method**" button to program or select a pre-programmed test method. Click the

"**New**" button and follow the on screen instructions to program a new test method. To select and existing test method click the desired test method. Once the desired test method is highlighted, click the "**Select**" button. "**Delete**" will permanently delete a test method and "**Delete All**" will permanently delete all pre-programmed test methods.
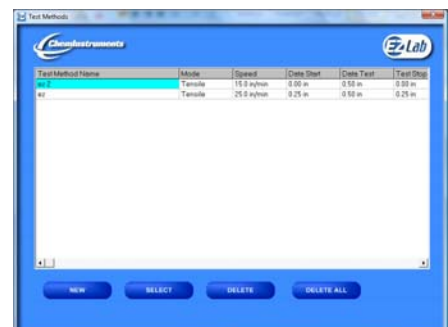
AUTO RETURN

"**Auto Return**" automatically returns the crosshead to the start position of the previous test. Click the bullet next to "**On**" or "**Off**" to access this feature.
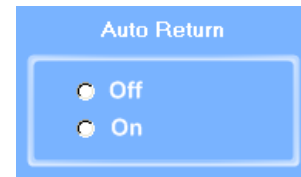
BREAK PERCENT

The "Break Percent" feature is used to stop a test when a break in the test substrate has been detected. When turned on, the machine will detect a percent difference in forces when a break has occurred. You can set the machine to automatically stop the test when it has detected a break percentage of 25, 50, 75, or 100%. Click the bullet next to the desired percent to turn on this feature.
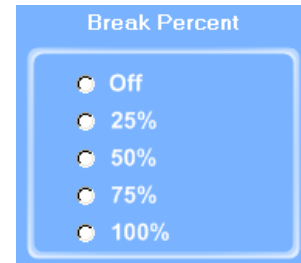
HELP

The help button will open a "pdf" file of the machine manual. This manual contains operation instructions for both the test platform and the EZ Lab software. You must have Adobe Acrobat Reader on your computer to open "pdf" manual file. If the Adobe program is not already installed on your computer, a copy of it is included on the EZ Lab disk.

DATA SET INFORMATION

Upon completion of every test, the "**Data Set Information**" will automatically appear. This allows the operator to record information about the test performed. It will also allow you select were test data is stored. All fields on the "**Data Set Information"** page are optional. The only required field is "**File Name**".

File Name – the only required field on the Data Set Information page. You must enter a   file name to save the test data.
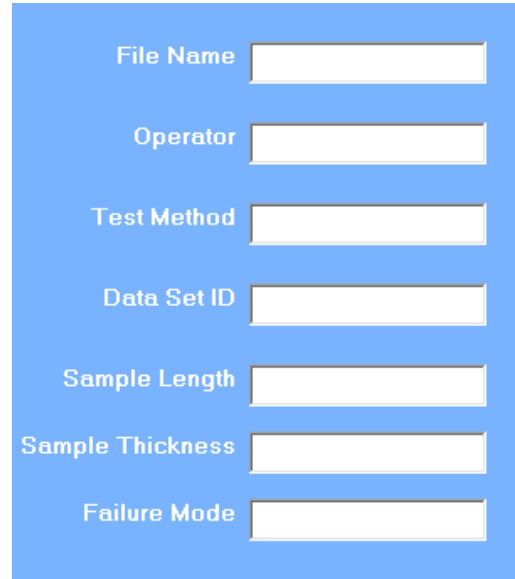
Test Method – optional field.

Data Set ID – optional field.

Sample Length – optional field.

Sample Thickness – optional field.

Failure Mode – optional field.
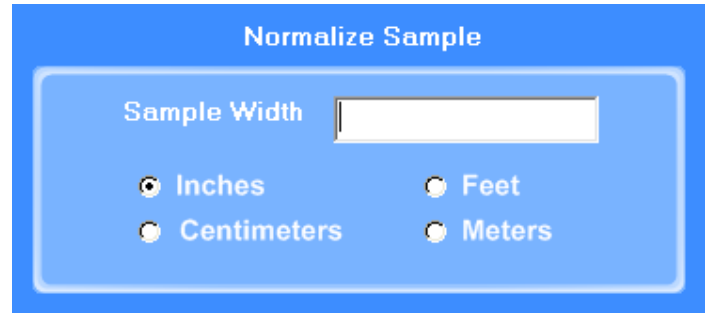
AUTO FILE INCREMENT

"**Auto File Increment**" automatically assigns a sequential number to the "**File Name**". It allows the operator to perform tests without having to rename each test, but add a number to the "**File Name"** to differentiate them. The feature is activated and deactivated by clicking the box. While active, you will not be able to change any information entered into the "**File Name**" field. EZ Lab will automatically assign sequential numbers in ascending order to each new test performed.

(**Example:** *File Name* – Test. Activating *Auto File Increment* will change the *File Name* Test to Test – 001. The next test performed will automatically be named Test – 002, then Test – 003 and so on.)

NORMALIZE SAMPLE

Normalize Sample allows you to record the width of the samples being tested. It also what the "**Normalize Data**" feature uses to calculate force per width.
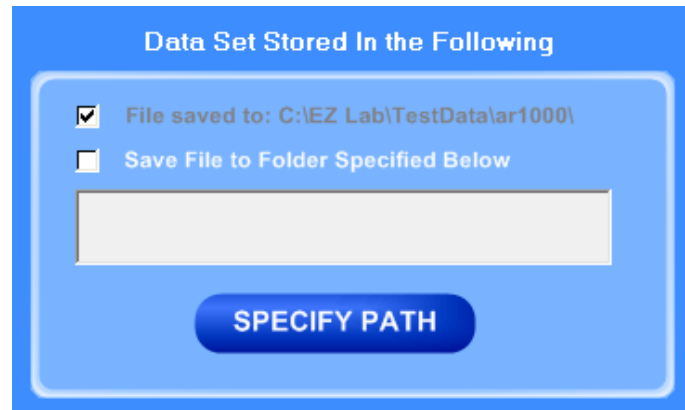
STORING DATA

All data is automatically stored in a folder on the computers C: drive. EZ Lab also has the option to store the "**Specify Path"** button will allow you to select an alternative location to store your data. Once the selection is made it will appear in the box above the "**Specify Path"** button. Click the box next to "**Save File to Folder Specified Below**" to activate the feature. Click the box again to turn the feature off. The previous entered storage location will remain in the box to show the last place data was saved.

FINISH AND ABORT

Once all the information has been correctly entered on the "**Data Set Information**" screen, click the "**Finish**" button. This will save the data and EZ Lab will automatically go to the "**Graph Screen**". The "**Abort"** button discards the data from the previous test and EZ Lab automatically goes back to the "**Main Operating Screen**".

GRAPH SCREEN

EZ Lab will automatically display the "**Graph Screen**" after the data has been entered on the "**Data Set Information**" screen. The Graph Screen will graph the profile of forces recorded during the test and will display the Low, Average, and High values.
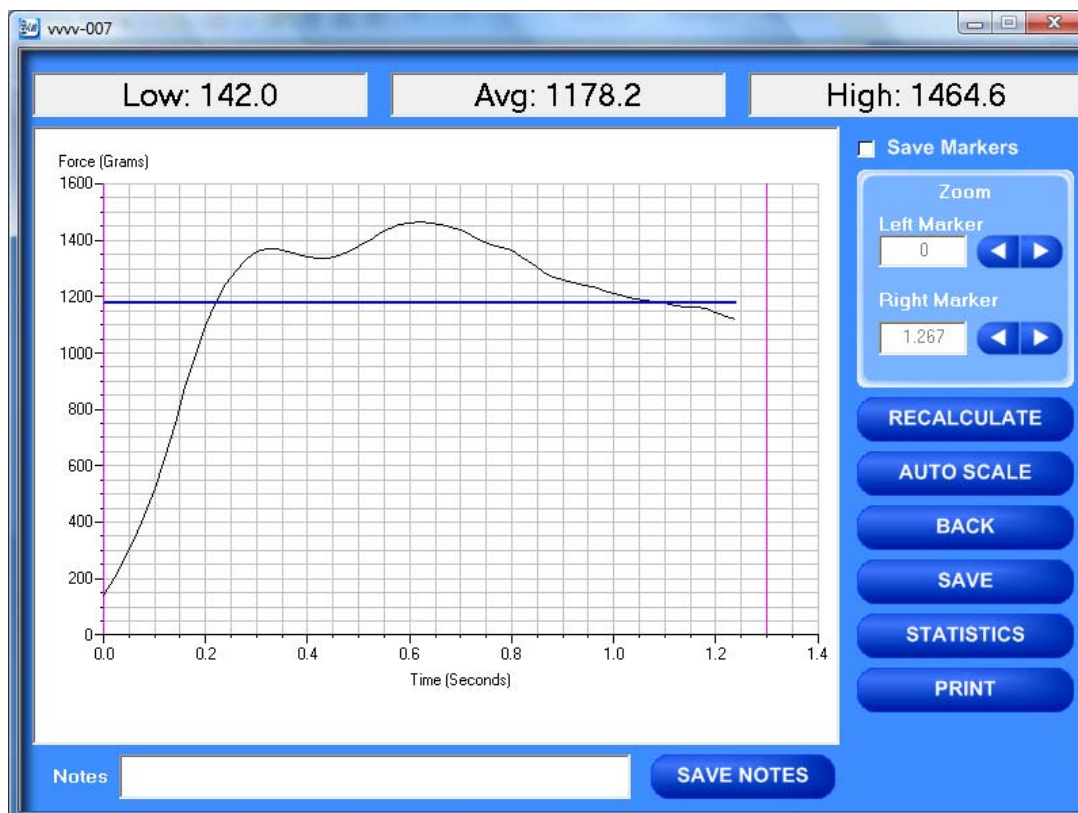
CROPPING GRAPHS

The "**Graph Screen**" provides a cropping feature. Notice the red vertical lines (markers) located at the left and right sides of the graph. These markers can be moved horizontally on the graph by using the arrows labeled "**Left Marker**" and "**Right Marker**". The field next to the arrows will indicate the position of the marker on the graph.

Note: Cropping a graph <u>will not</u> erase the data saved from the original test.

1. Using the arrows, move the left and right markers to the desired location.

2. Click the **"Recalculate"** button. This will change the data displayed on the graph page to reflect the area inside the markers. A graph can be recalculated up to 3 times.

3. After the **"Recalculate"** button has been selected, a **"Save Markers**, **Back**, and **Save**" buttons appear.

SAVE MARKERS

   EZ Lab automatically records the data from the entire test. The "**Save Markers**" feature will hold the place of the left and right marker for future tests. This will automatically crop all test performed while the feature is on. To turn this feature on, click the box located next to "**Save Markers**". A check mark will appear in the box. To turn it off, click the box again and the check mark will disappear. Turning off this feature will reset the left and right marker to the left and right sides of the graph. Future tests will not be cropped automatically.

Note: When the feature is turned on, EZ Lab will save two different files. One file will include all of the data recorded from the test. The other file will be the data automatically cropped by using the "**Save Markers**" feature. These files will be differentiated by the suffix **"-RevA"**. The **"-RevA"** file will be the data automatically cropped by the "**Save Markers**" feature. (Example: Test-001 and Test-001-RevA)

AUTO SCALE

   The "**Auto Scale**" button changes the scale of the Y axis of the graph. This feature allows for an enhanced view of the graph profile. Clicking the "**Auto Scale**" button activates the feature. The button will change to "**Full Scale**". Clicking the **"Full Scale"** button will restore the graph back to the original scale of the Y axis.

BACK

The "**Back**" button is used to undo changes made when cropping the graph. It will appear after the graph has been cropped by moving either of the markers and clicking the "**Recalculate**" button. "**Back**" will only undo the last recalculation done to the graph.

SAVE

The "**Save**" button will save the cropped data as a new file with the same "**File Name**" as the original file but add the suffix "**-RevA**". (Example: Test-001 becomes Test-001-RevA) Only one **"-RevA"** file per original test can be saved at a time. Anytime you click the "**Save**" button, a **"-RevA"** file will be saved. If there is an existing file name with a "**-RevA**" file already, the existing "**-RevA**" file will be replaced.

STATISTICS

The "**Statistics**" button will open a new window and display the **Variance**, **Standard Deviation**, and **Work (joules)** of the data displayed on the graph. The data displayed on this screen will change anytime a change is made to the graph. To exit out of this screen, click either the "**OK**" button or the red "**X**" button. EZ Lab will automatically go back to the graph page.

PRINT

"**Print**" will allow you to use any printing feature available to your computer. Highlight the desired printer and click the "**Print**" button. This will take you to your computers print menu. You may exit this screen by clicking either "**Cancel**" or the red "**X**" buttons.
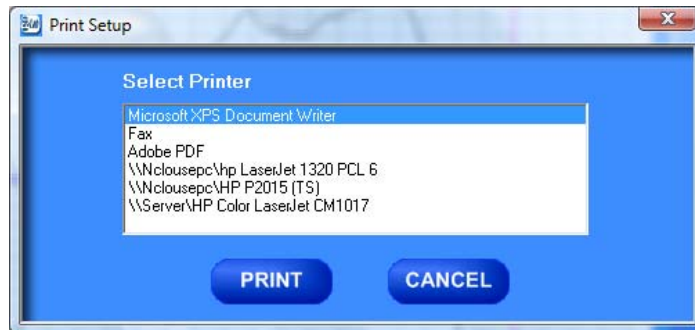
NOTES

The "**Notes**" field allows you to enter notes. Clicking the "**Save Notes**" button will save the notes. The notes will be stored with the information entered on the "**Data Set Information**" page.

HELP

The help button will open a "pdf" file of the machine manual. This manual contains operation instructions for both the test platform and the EZ Lab software. You must have Adobe Acrobat Reader on your computer to open "pdf" manual file. If the Adobe program is not already installed on your computer, a copy of it is included on the EZ Lab disk.

REVIEW DATA

The "**Review Data**" button is located on the Main Operating Page. The "**Review Data**" feature will allow access previously recorded test data. The "**Review Data**" button will take you to the screen pictured below.

Every time the "**Review Data**" feature is accessed, the screen will automatically display the test data located in the **EZ Lab** test data folder located on your computers **C:** drive. The individual tests will be displayed in chronological order with the most recent test appearing on the top of the list. This screen will display the test's File Name, date and time the test was performed, Low, Average, and High values for the test performed. To access the test data from a test file, click the File Name. You will notice the File name is now highlighted. Once a file is highlighted, you may now use the buttons on the screen to access the test data.

GRAPH

The "**Graph**" button will access the "**Graph screen**". This is the same "**Graph Screen**" displayed immediately following the "**Data Set Information Screen**". For instructions on operating the "**Graph Screen**".

FILE DETAILS

"**File Details**" will display all the information entered on the "**Data Set Information screen**". It will also display the Test Speed, Length of Test, Average, High, Low, Stand Deviation, Variance, Work, and Notes recorded for the individual test. File Details will only display this information for one test.

DELETE

"**Delete**" will permanently delete the test file.

DELETE ALL

"**Delete All**" will permanently delete all the test files located in the **Test Data Folder** located on your computer's **C:** drive.

HELP

The "**Help**" button will open a **PDF** file of the machine manual. This manual contains operation instructions for both the test platform and the **EZ Lab** software. You must have Adobe Reader on your computer to open **PDF** manual file. If the Adobe program is not already installed on your computer, a copy of it is included on the **EZ Lab** disk.

The following instructions allow you compile test data from multiple files

In order to compile test data from multiple tests, you must first create a list of the test files you would like to compile. To create a list, highlight a test file and click the "**Add To List**" button. To delete a test file from the list, click the desired file on the list and then click the "**Remove From List"** button. The "**Clear List**" button will clear all the files from the list. There is no need to highlight the files first.
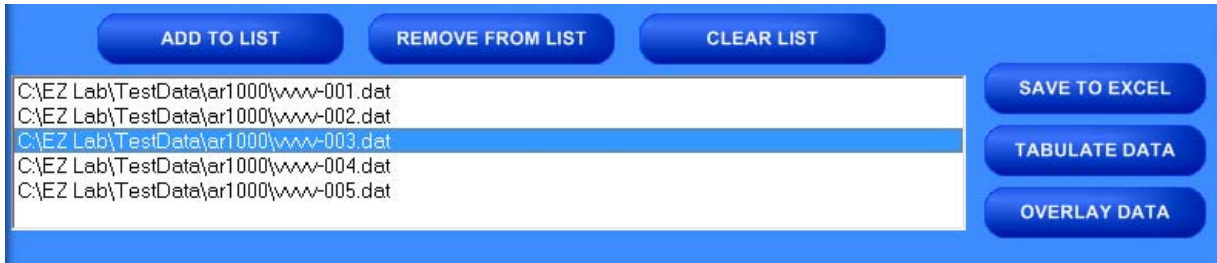
SAVE TO EXCEL

EZ Lab collects data throughout the entire test. This is done by collecting individual data points. These individual data points are used to display the Low, Average, and High values displayed from the test. The "**Save To Excel**" feature allows you to view a list of the individual data points from every test on the created list. The values will be displayed in the unit of measure selected on the "**Main Operating Screen**". Click the "**Save To Excel**" button. Follow the instructions on your screen to create a file name and save the file to the desired location on your computer.

TABULATE DATA

"**Tabulate Data**" will create a table of data from the files on the list created. Create a list of the desired test files and click the "**Tabulate Data**" button. The screen below will appear. The units of measure displayed will be the units selected on the "**Main Operating Screen**".

File Name	Avg	High	Low	StDev	Var	Work (joules)
C:\EZ Lab\TestData\ar1000\www-001.dat	11.5	127.7	0.0	28.1697	793.532	2.377268E-02
C:\EZ Lab\TestData\ar1000\www-002.dat	455.8	1174.5	0.0	452.8895	205108.9	.5676897
C:\EZ Lab\TestData\ar1000\www-003.dat	141.3	1169.7	0.0	320.9726	103023.4	.1454381
C:\EZ Lab\TestData\ar1000\www-004.dat	281.4	1585.0	0.0	497.5603	247566.3	.2313028
C:\EZ Lab\TestData\ar1000\www-005.dat	518.0	914.0	0.0	315.6199	99615.93	.2579064
Averages	281.6	994.2	0.0			0.2452219
Standard Deviations	189.1383	483.6318	0			.18166
Variances	35773.29	233899.7	0			.033

Units: Grams **SAVE LIST** **SAVE TO EXCEL** **PRINT**

SAVE LIST

"**Save List**" will save table as a file on the **C:** drive of your computer. This will allow you to recall the table at a later time. Click the "**Save List**" button. Follow the on screen prompts to select a location to save and name the table. The table should be saved in the **Test Data folder** for the AR-1000 located on your computers **C:** drive. You may save the file in another location, but it must be moved into this folder in order to be recalled.

SAVE TO EXCEL

"**Save To Excel**" will save the table to the Microsoft Excel program in the same format displayed on this screen. The unit of measure the data is reported in will be saved and displayed in the upper right hand corner of the table. This allows you to use any of Excels feature to further analyze the test data. Click the "**Save To Excel**" button. Follow the on screen prompts to create a file name and save the table.

PRINT

"**Print**" will allow you to use any printing feature available to your computer. Highlight the desired printer and click the "**Print**" button. This will take you to your computers print menu. You may exit this screen by clicking either "**Cancel**" or the red "**X**" buttons.

OVERLAY DATA

"**Overlay Data**" allows you to overlay graphs from up to five different tests. Create a list. Click the "**Overlay Data**" Button. The following screen will appear. The file names of the graphed tests will appear in the box labeled Legend. The file names are color coded to correspond with the colors of the graph.
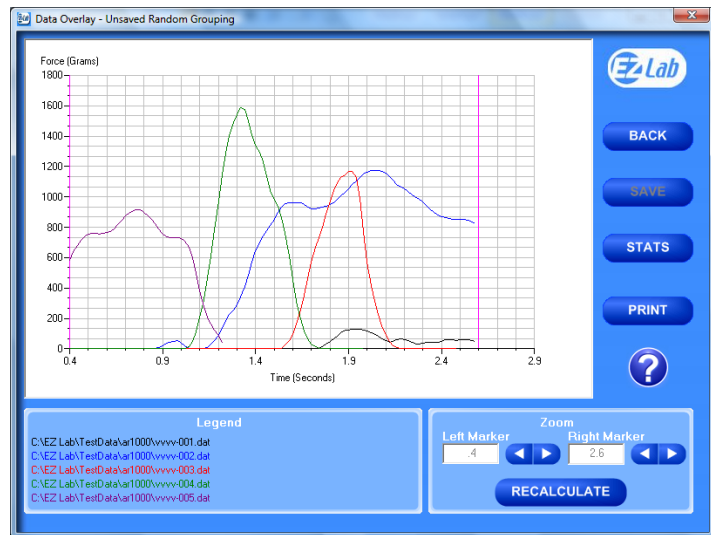
CROPPING GRAPHS

The "**Overlay Screen**" provides a cropping

feature. Notice the red vertical lines (markers) located at the left and right sides of the

graph. These markers can be moved horizontally on the graph by using the arrows

labeled "**Left Marker**" and "**Right Marker**". The field next to the arrows will indicate

the position of the marker on the graph.

Note: Cropping a graph <u>will not</u> erase the data saved from the original
test.

1. Using the arrows, move the left and right markers to the desired location.
2. Click the **"Recalculate"** button. This will change the data displayed on the graph page to reflect the area inside the markers. A graph can be recalculated up to 3 times.
3. After the **"Recalculate"** button has been selected, a **"Save Markers**, **Back**, and **Save**" buttons appear.

BACK

The "**Back**" button is used to undo changes made when cropping the graph. It

will appear after the graph has been cropped by moving either of the markers

and clicking the "**Recalculate**" button. "**Back**" will only undo the last recalculation done to

the graph.

SAVE

The "**Save**" button will save the cropped data as a new file with the same

"**File Name**" as the original file but add the suffix "**-RevA**". (Example: Test-001 becomes

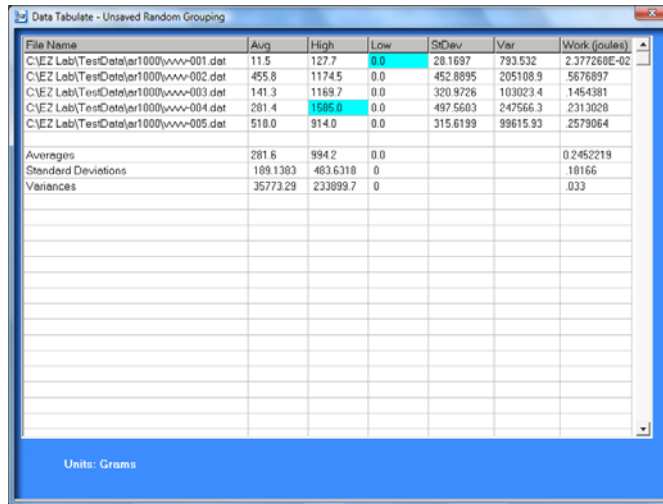Test-001-RevA) Only one **"-RevA"** file per original test can be saved at a time.

Anytime you click the "**Save**" button, a **"-RevA"** file will be saved. If there is an existing file name with a "**-RevA**" file already, the existing "**-RevA**" file will be replaced.

STATS

The "**Stats**" button will open a new window and display the **Low**, **Average**, **High** **Variance**, **Standard Deviation**, and **Work (joules)** of the data displayed on the graph.
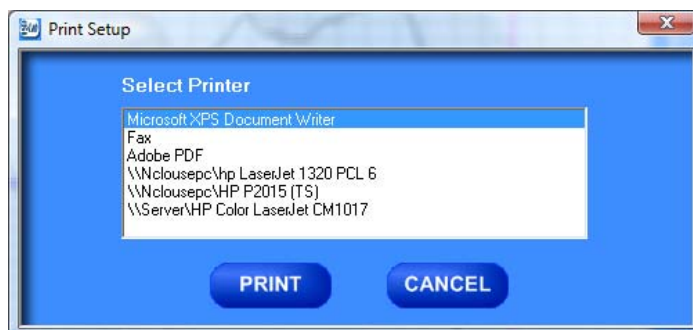

PRINT

"**Print**" will allow you to use any printing feature available to your computer. Highlight the desired printer and click the "**Print**" button. This will take you to your computers print menu. You may exit this screen by clicking either "**Cancel**" or the red "**X**" buttons.

HELP

The help button will open a **PDF** file of the machine manual. This manual contains operation instructions for both the test platform and the **EZ Lab** software. You must have Adobe Reader on your computer to open **PDF** manual file. If the Adobe program is not already installed on your computer, a copy of it is included on the **EZ Lab** disk.

CHANGING DIRECTORIES

EZ Lab allows you to store your test data in multiple locations. Files can be stored in any location connected to your computer. This is accomplished on the "**Data Set Information screen**". To change directories, click the drop down menu bar located on the top of the "**Review Data screen**".

Click "**Select files to export to excel, tabulate, or overlay graph**" (above). This will bring you to the following screen.

This screen will display all the test files located in the on your computer under the directory **C:\EZ Lab\TestData\ar1000**. To change directories, click the button located to the right of the directory address bar. Scrolling over the button will pop up a window "**Press this to change directories**". Follow the on screen prompts to select files from a different directory.

This screen allows you all of the same features as the "**Review Data screen**". It also allows you the ability to display previously saved tabulate files and overlay graphs.

PREVIOUSLY SAVED TABULATE FILES

To recall previously saved tabulated files, click the bullet next to "**Display previously saved tabulate files**". You will notice all previously saved tabulate files stored under this directory will appear in the box. Highlight the desired file and click "**Add to List**". Click "**Tabulate Data**" to display the previously saved tabulate file. To remove an item from the list, highlight the item on the list and click the "**Remove From List**" button. The

"**Clear List**" button will automatically clear the list; there is no need to highlight the file first. You can only display one previously saved **Tabulate** file at a time.
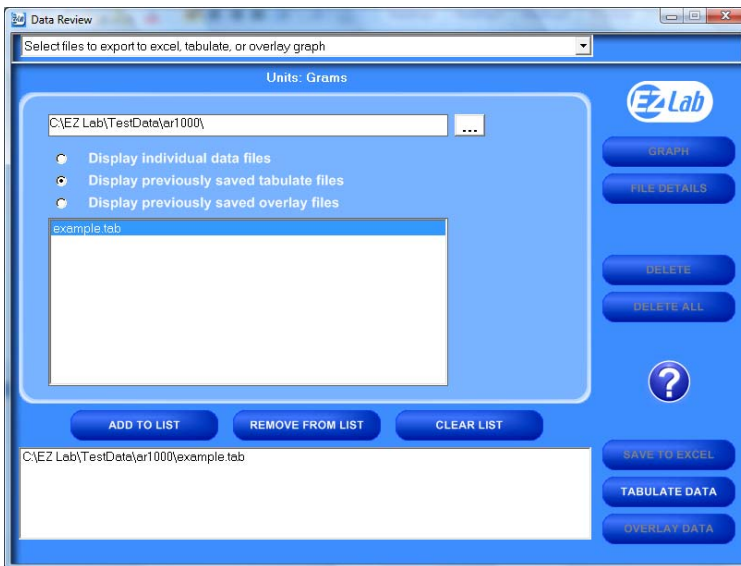
PREVIOUSLY SAVED OVERLAY GRAPHS

To recall previously saved overlay files, click the bullet next to "**Display previously saved overlay files**". You will notice all previously saved overlay files stored under this directory will appear in the box. Highlight the desired file and click "**Add to List**". Click "**Overlay Data**" to display the previously saved tabulate file. To remove an item from the list, highlight the item on the list and click the "**Remove From List**" button. The "**Clear List**" button will automatically clear the list, there is no need to highlight the file first. You can only display one previously saved overlay file at a time.
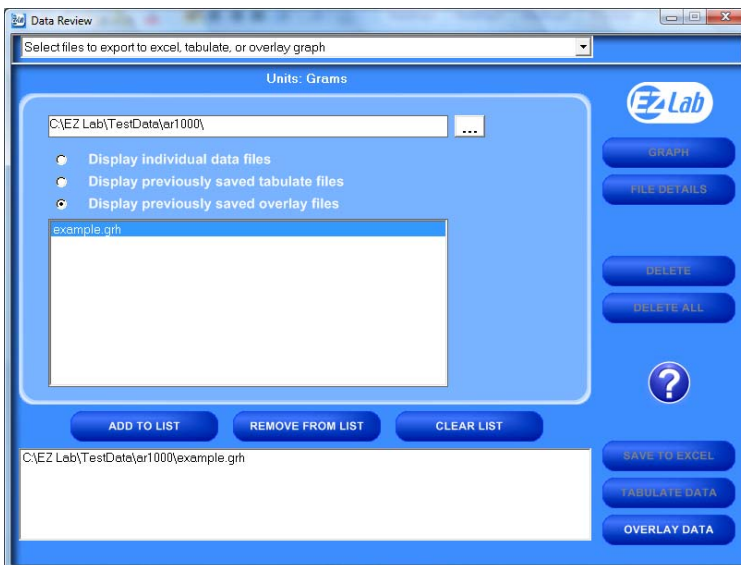
The Display previously saved overlay files screen will bring up the "**Overlay Graph**" screen. To operate this screen, see "**Overlay Data**".

MAINTENANCE

As with any precision equipment it is important to provide care and maintenance to ensure proper performance and long life. General cleaning and care will along with keeping the drive clean will ensure accurate test and trouble free performance.

TROUBLESHOOTING

In the unlikely event you experience problems with your TT-1100 Tensile Tester, the following list of probable causes and corrective procedures may provide a solution.

Problem	Probable Cause	Procedure
No Data collected	Test parameters improperly set	See Setting Offset Parameters
	Not in Run Menu	Refer to Running a Test
Data measurement consistently Low/High	Improper calibration	Check calibration
	Bad calibration	Refer to load cell calibration
Calibration drifts	Bad or damaged load cell	Replace load cell
Error Message "DO Error"	Overload on load cell	Jog in opposite direction.
"DO Error" when jogging downward	Overload on load cell & Bad Calibration	Jog up then Recalibrate