

CHEMINSTRUMENTS
ADHESION/RELEASE TESTER
MODEL AR-1000
OPERATING INSTRUCTIONS

PRODUCT DESCRIPTION.....	3
UNPACKING.....	4
ASSEMBLY.....	5
Key Components.....	7
OPERATION.....	9
Theory of Operation.....	9
Power Up.....	9
Menu Format.....	10
Load Cell Calibration.....	11
Calibration Procedure.....	11
Scale.....	12
Setting Sled Speed.....	13
Halt Mode.....	13
Audible Beep.....	14
Locating Function Switches.....	14
Running a Test.....	15
Test Procedure.....	16
Grip Operation.....	17
File Management.....	18
Review Test Data.....	18
Data Storage.....	19
Deleting Test Data.....	19

EZ-LAB SYSTEM.....	20
Installation.....	21
Operation.....	21
Calibration.....	22
Speed.....	22
Data Set Information.....	23
Storing Data	25
Graph Screen.....	26
Review Data.....	31
File Details.....	32
Save to Excel.....	34
Tabulate Data.....	34
Overlay.....	36
Cropping Graphs.....	37
Changing Directories	39
Previously Saved Tabulate Files.....	41
Previously Saved Overlay Files.....	41
MAINTENANCE	42
Mechanical Maintenance Schedule.....	42
Chain Adjustment	42
Test Sled Engaging Finger.....	43
Test Sled & Linear Rods.....	43
Trouble Shooting	44
WARRANTY	45

PRODUCT DESCRIPTION

Congratulations on the purchase of your new ChemInstruments AR-1000 Adhesion/Release Tester. This versatile, user-friendly, carefully designed instrument allows you to determine adhesion and release values of adhesive laminates at various speeds and at various angles of separation.

The unit has the following features:

- Selectable testing speeds from 12 to 1200 inches per minute.
- Selectable separation angles from 90 degrees to 180 degrees.
- User-selectable data acquisition area on the test sample.
- Selectable units of measure; kilograms, Grams, newtons, pounds, & Ounces.
- Memory storage of up to 20 tests.
- Collected data can be exported via RS232 port.
- Compatible with EZ-Lab System software.

UNPACKING

ChemInstruments has made every effort to ensure that the AR-1000 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 AR-1000 consists of the following parts:

- The test frame, which includes the motor/drive mechanism and the data acquisition system.
- An envelope with this manual.
- The mast for mounting the load cell assembly.(Strapped to the wood 2x2 bracing)

Within the crate is a small box containing the following:

- The pivoting bracket and attached load cell assembly with calibration bracket and wire.
- Power cord.

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



Photo 1 – AR-1000 Adhesion Release Tester

ASSEMBLY

Carefully remove the test frame/drive/data acquisition assembly 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 AR - 1000.* The space required for the unit is approximately 36" long x 13" deep x 25" high (including the mast). As with any precision piece of test equipment, it is preferable to locate the AR-1000 in an area where temperature and humidity are controlled to standard conditions ($72 \pm 2^\circ\text{F}$, $50 \pm 5\%$ relative humidity).

Attach the mast to the test frame using the small clamping bolts that are included. Make sure the mast is mounted with the flat side and the stop pin on the backside. The attachment holes for the mast are located on the back panel of the test frame toward the left end of the frame when viewed from the back. (See Figure 1 – Mast Mounting Locations)

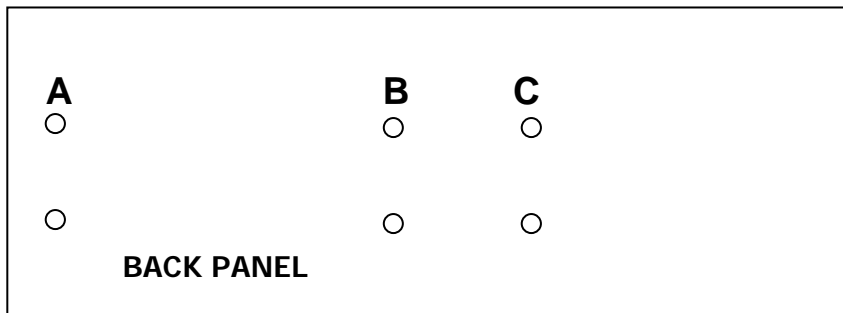


Figure 1 - Mast Mounting Locations

NOTE: If the tests to be run use relatively short sample strips at 90° or 180° , mount the mast using the holes marked "C" in Figure 1. If testing longer strips at 90° , mount the mast using holes marked "B" in Figure 1. The holes marked "A" will be used for mounting the mast if the test use longer strips and the peel angle is 180° .

Slide the pivoting bracket with load cell assembly onto the mast and tighten the large clamping bolt that is part of the assembly. On the side panel of the AR-1000, one end of the load cell cable is permanently attached. Plug the free end of this cable into the socket on the load cell assembly.

One end of the control cable is also permanently attached to the side panel of the control cabinet. The free end of this cable terminates in three white reed switches, marked “Home”, “Start” and “Stop”. Each of these reed switches carries a piece of Velcro® fastener that is designed to attach to the fastener tape located on the back rail of the test frame. Attach the reed switch marked “Home” to this tape at the right end of the test frame. Attach the reed switch marked “Start” to this tape at a location approximately 2 inches to the left of the “Home” switch. Attach the reed switch marked “Stop” to this tape at a location approximately even with the side of the control cabinet.

Connect the power cord to its receptacle on the backside of the control cabinet at the far right side when viewed from the rear. Complete the connection by inserting the male end of the power cord into a convenient AC outlet. Notice that the on/off power switch is located directly beside the power cord receptacle on the backside of the test frame. (See Photo 2 – AR-1000 Cabinet Back)



Photo 2 - AR-1000 Cabinet Back

The ChemInstruments AR-1000 is now ready for calibration and use. Before proceeding with calibrating the AR-1000, it is advisable to become familiar with the Key Components of the AR-1000. These Key Components and a brief description of their function follow in the next section.

KEY COMPONENTS (See Photo 2, Figure 2 and Photo 3)

- **POWER SWITCH** is located on the back panel of the control cabinet directly beside the power cord connection.
- **FUNCTION SWITCHES** control the start and stop of data acquisition. The “Home” switch cycles the data acquisition unit into its “ready” mode. The “Start” switch starts the data acquisition and the “Stop” switch stops the data acquisition.
- **TEST SLED** provides a surface to hold the test material.
- **EDGE BRACKETS** hold test panels in place on the test sled.
- **CLUTCH HANDLE** engages and disengages the test sled with the drive chain.
- **LOAD CELL** measures the forces involved with an Adhesion/Release test.
- **LOAD CELL ASSEMBLY** consists of the mounting bracket for the load cell with grip.
- **GRIP** secures the free end of the test strip to the load cell.
- **MAST** holds the pivoting bracket with load cell assembly and permits running tests at angles between 90° and 180°. A small peg on the backside of the mast allows for convenient positioning of the load cell for testing at a 180° angle.

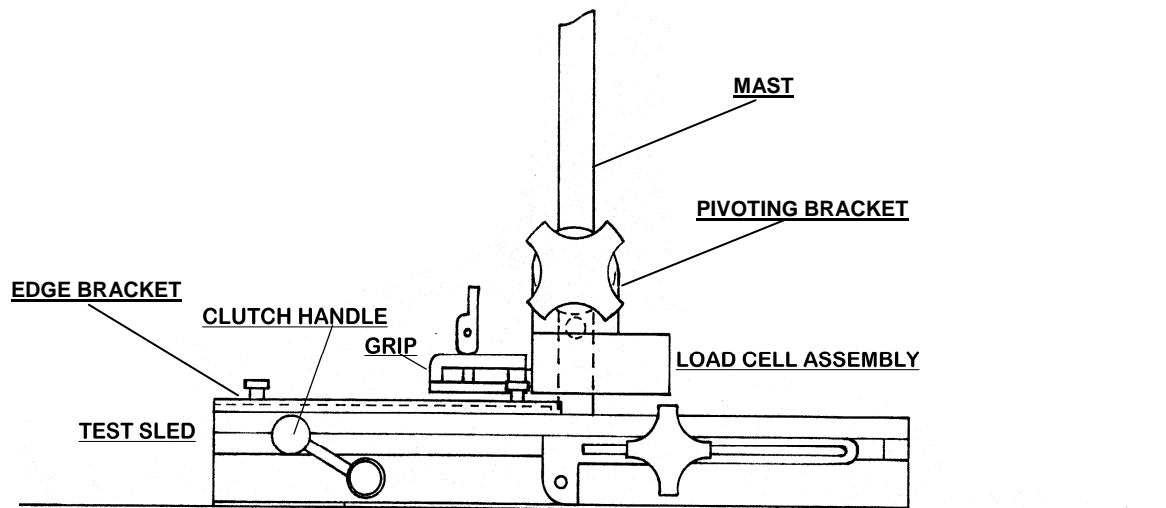


Figure 2 – Test Sled and Load Cell Assembly

- **DIGITAL DATA DISPLAY** provides test data results and system status information.
- **PROGRAM STATUS INDICATOR** these three LED lights identify the operating status, either; Run, Print, or Setup Menus are active when LED light is on.
- **UNITS INDICATOR** there are five LED lights indicating the units of measure for the data collected and two LED lights indicating the units of measure for the speed.
- **CONTROL KEYS** control the various features of the data acquisition and operating system. There are 5 keys consisting of Select, Enter, Up↑, Down↓, and Units.
- **RS232 CONNECTION** data output port for downloading test data, located on the side of the cabinet.



Photo 3 – AR-1000

OPERATION

THEORY OF OPERATION

A pressure-sensitive adhesive laminate sample is peeled at a selected angle (typically 90° or 180°) and at a selected speed (from 12 - 1200 inches per minute). An electronic load cell measures the peel/release force, then feeds the information to a data acquisition unit. Movable reed switches are positioned along the test bed and determine the portion of the test sample data to be recorded by the data acquisition unit. The data acquisition unit collects the selected portion of test data from the load cell and stores these data points in memory for use in calculating the maximum, minimum and average values. The data acquisition unit assigns a file number and saves the results in its memory. This data can be downloaded through the RS232 connection port, to an appropriate receiving program (EZStats) on your PC.

POWER UP

Turn on the master power switch, which is located on the back panel of the control cabinet directly beside the power line receptacle. The internal circuit board will go through a self-test and then as a safety measure put the chain drive in the Halt mode. Pushing any of the Control keys will start the chain drive and allow normal operation.



" 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."

MENU FORMAT

There are three distinct Menus for the AR-1000. They are the Run menu, Print menu, and Setup menu. Each menu has an indicator light that will be on when that menu is active. Within each menu there are a series of modes that display the data collected, calibration sequence, test speed, and data storage/transfer.

Each of the three menus use the Up ↑ and Down ↓ arrow keys to access the modes within the menu. When the desired mode is displayed the Enter key is used to access the parameter settings for that mode. Once a parameter selection is made the Enter key is used a second time to record the setting and return to the Run menu.

The following is an outline of the three menus and the modes contained within each menu. Use this chart to quickly identify the location and proper path to access any of the settings.

RUN MENU

Modes

I Instantaneous force
A Average of last test
H Maximum of last test
L Minimum of last test

PRINT MENU

Modes

P Data transfer to PC
St Data storage:
 on/off/Fl
dL Data storage delete

SETUP MENU

Modes

SP Speed
F Force
 LC Low calibration
 HC High calibration
rS EZ-Lab connection
bE Beep on/off
HA Halt motor

There is a Units key that allows you to change the unit of measure to any of the five choices: kilograms, Grams, newtons, pounds, & Ounces. The green LED lights to the right of the display indicate the current active unit of measure. When accessing the Speed mode in the Setup menu the Units key will control the units of measure for speed between, Inches per min, and Centimeters per min. The green LED lights indicate the current active unit of measure for the speed.

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 software of the AR-1000. This procedure should be followed upon first use of the AR-1000 and whenever necessary thereafter. The following is the step-by-step procedure for calibrating the load cell. (See Figure 3 – Calibration Setup)

MAKE SURE THE AR-1000 HAS BEEN ON AND RUNNING FOR 30 MINUTES BEFORE PROCEEDING WITH CALIBRATION. To avoid this warm-up period, leave the AR-1000 on and use the Halt mode when not in use.

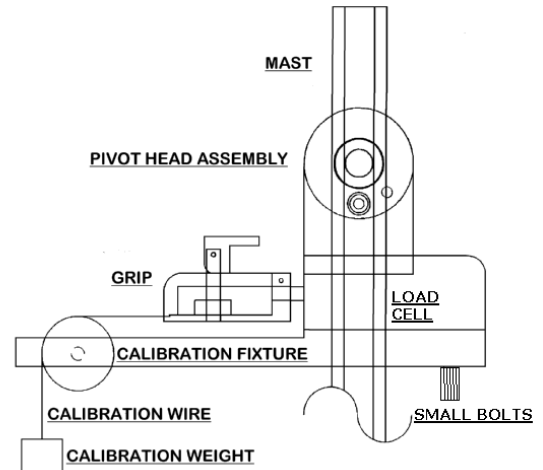


Figure 3 – Calibration Setup

CALIBRATION PROCEDURE

1. Move the pivot head assembly containing the load cell assembly to a position approximately 8 inches above the surface of the test frame.
2. Confirm that the load cell is mounted at the same angle as the test angle.
3. Attach the calibration fixture onto the bottom of the load cell mount using the two small bolts. (See Figure 3 – Calibration Setup)
4. Place the knotted end of the calibration wire in the jaw of the grip taking care to keep the wire in a straight line from the grip to the pulley. Run the wire over the pulley so that a calibration weight can be attached to the end of the wire.
5. Simultaneously press the Select and Enter keys for 3 seconds to access the Setup menu.
6. From the Setup menu, press the Up↑ to select “F” (Force) for the calibration mode.
7. When the “F” is visible in the display, press the Enter key to access the calibration sequence.

8. At the “LC” display determine the Low Offset Value desired (Typically 0.00). Make sure that you **do not** have a weight hanging from the calibration string and press the Enter key. The display will change to, HC for high calibration value.

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

9. At the “HC” display select a calibration weight close to the maximum expected test value and hang the weight on the loop end of the calibration wire making sure the wire is able to move freely.
10. 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.
11. Make sure the **calibration weight is completely at rest**, and then press the Enter key. The display will change to the “I” mode showing the current reading of force.
12. Verify the calibration by hanging a **different calibration weight** on the calibration wire.
13. Engage the test sled to simulate running a test. After the test sled has traveled to the left end of the test bed, confirm that the average measured force is the same as the selected weight hanging from the calibration string.
14. Repeat the calibration procedure if necessary.

SCALE

A current force reading is available by accessing the “I” mode in the Run menu. To access this mode, simply press the Select key until the display shows “I #####” where the # will be the current force being measured. This reading should be used only as a quick reference. To check the calibration of the load cell, refer to steps 12 and 13 of the Calibration Procedure.

NOTE: It is important to remember that the load cell is measuring forces at a rate of 400 times per second. The rate of display on the video screen cannot cycle at this speed. Therefore, the value in the “Scale” reading is only one of the many data points that the load cell is measuring and it is not necessarily representative of the total data reading.

SETTING SLED SPEED

To perform a test correctly, it is necessary to set the sled speed in accordance with the selected test method. The following is a step-by-step procedure for setting sled speed.

1. Press the Select and Enter keys for 3 seconds to enter the Setup menu.
2. At the display of “SP”, press the Enter key to access the settings for the speed.
3. To change the speed, press the appropriate Up↑ and Down ↓ keys.
4. To record the speed setting, press the Enter key.
5. This will return the unit to the Run menu and control the chain drive at the new set speed.

NOTE: the unit of measure for speed can be changed with the Units key during access of the Speed mode. The LED indicators to the right of the display will change with each press of the Units key.

HALT MODE

When the power is initially turned on, the AR-1000 is in the Halt mode with the chain stopped and the display showing “HALt”. Pressing any Control key will place the unit in the Run mode, starting the chain drive. There are three modes to the Halt operation; On, Halt, and Off.

ON will cause the AR-1000 to repeatedly halt the chain drive after 2 minutes of inactivity.

HALT will cause the AR-1000 to immediately halt the chain drive until a control key is pushed.

OFF will allow the AR-1000 to run continuously until a different Halt mode is selected.

To set the Halt mode follow the procedure below.

1. Simultaneously press the Select and Enter keys for 3 seconds to access the Setup menu.
2. From the Setup menu, press the Up ↑ key to select the Halt mode.
3. When the Display shows “HA”, press the Enter key to enter the Halt menu.
4. Use the Up ↑ key to select On, Halt, or Off.
5. Press the Enter key to record the setting and return to the Run menu.

AUDIBLE BEEP

The AR-1000 has an audible beep feature that sounds each time a Control key is pressed. This provides confirmation that electrical contact has been made by the key. This feature may be turned off by following this procedure.

1. Simultaneously press the Select and Enter keys for 3 seconds to access the Setup menu.
2. From the Setup menu, press the Up ↑ key to select the Beep mode.
3. When the display shows “bE”, press the Enter key to access the settings.
4. Press the Up ↑ or Down ↓ keys to turn the beep feature off or on.
5. After selecting the appropriate setting press the Enter key to activate your choice and return to the Run menu.

LOCATING FUNCTION SWITCHES

To record test data properly, it is necessary to position the function switches so that the data collected is from the center of the test material. The following is the step-by-step procedure for locating the function switches.

1. Determine the test method to be followed and the position of the sled for the start of the test.
2. Place the HOME switch so that it is aligned with the magnet on the back of the sled when the Sled is at the starting position.
3. Place the START switch at least **1.5 inches** to the left of the HOME switch.
4. Place the STOP switch far enough to the left of the START switch, to gather all the test data.
5. Adjust the function switches' location so that the “heart” of the test material is the data collected. A few practice tests with similar size samples are advised.

NOTE: As the test sled moves past the Start switch the display will change to show “r n”, indicating that data is being collected. The display will also show a sampling of the data as it is being collected.

RUNNING A TEST

Peel adhesion tests run according to written test methods, such as ASTM, PSTC, TLMI and others. These tests are conducted to determine the peel adhesion values of the selected PSA material as it is removed from a stainless steel test panel. The AR-1000 will accommodate test panel dimensions of 2" wide by 5" or 6" in length. For both a 90 degree and 180 degree test method you will need to attach the panel edge brackets to the test sled, using the four small bolts and the holes closest to the left end of the test sled. Be sure that the recessed area of the edge brackets face to the inside and that the closed ends are to the right. This will allow the test panel to slide easily into the edge brackets from the left side. For a 180° peel test, the test sled and the load cell must be in the horizontal position, with the load cell assembly at the lowest position on the mast. (See Figure 4 – 180 Degree Peel Setup)

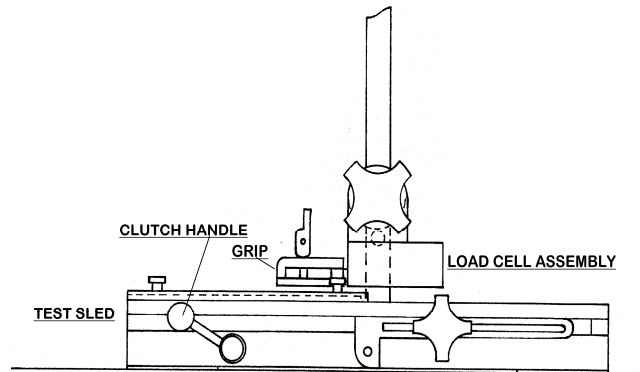


Figure 4 – 180 Degree Peel Setup

Make sure the load cell has been calibrated at this 180° angle.

For a 90° peel test, loosen the clamping bolt on the rear of the pivot head assembly and slide the bracket up the mast. Retighten the clamping bolt then loosen the opposite clamping bolt on the front of the load cell assembly. Tilt the load cell assembly counterclockwise until it snaps into a detent. Tighten the front clamping bolt. The load cell will now be at a 90° angle to the raised test sled. (See Figure 5 – 90 Degree Peel Setup)

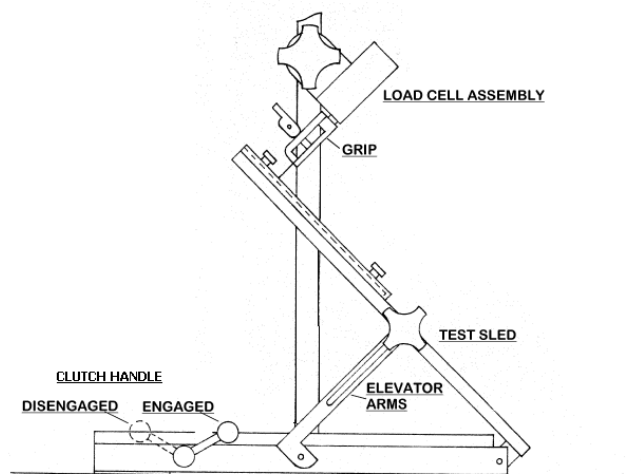


Figure 5 – 90 Degree Peel Setup

Make sure the load cell has been calibrated at this 45° angle.

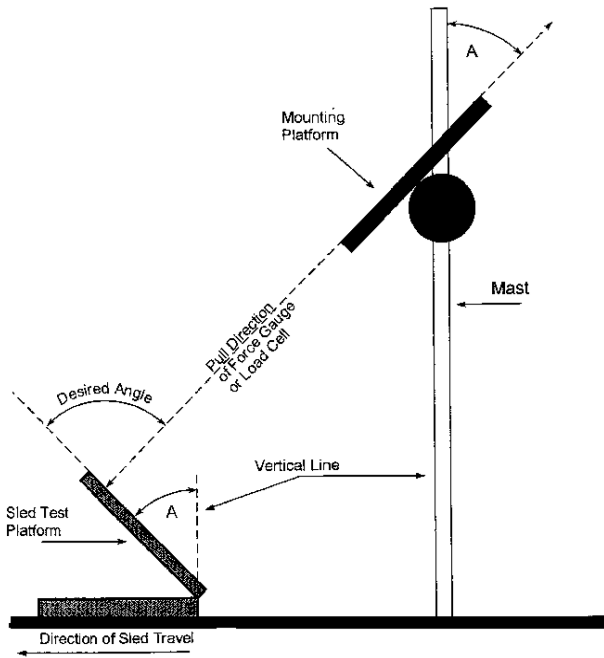


Figure 6 – Test Angle

Test angles between 90° and 180° can be established using the following setup formula (See Figure 6 – Test Angle).

1. Determine the angle desired for the test method to be performed.
2. The angle for the test sled and load cell (A) will be equal. This angle is determined by dividing the desired test angle by 2. This result is the angle (A) that is used in setting the test sled and the load cell.

3.

run your test as described in the following Test Procedure.

Make sure the load cell has been calibrated at the proper angle (A) before proceeding with the Test Procedure.

TEST PROCEDURE

1. Slide the test panel with the test material into the edge brackets so that the free end of the test strip is to the left. Bend the free end of the test strip back over the end of the test strip and insert it into the grip. (See Grip Operation page 17)
2. Turn the clutch handle on the test sled to disengage it from the drive chain and move the sled to the start position at the right end of the test bed.
3. Set the test sled speed if necessary. (See Setting Sled Speed, page 13)
4. Make sure the AR-1000 is in the Run Menu.

NOTE: In order for the test data to be collected properly it is important that the Test Sled be positioned to trigger the HOME Switch prior to engaging the Test Sled.

5. Engage the test sled by rotating the clutch handle clockwise. As the test sled moves past the start switch the Display will change to “r n”.
6. When the test sled has moved past the Stop switch the Display will show the Average value of the test data collected.
7. To run additional tests, replace the test material and repeat the procedure starting at step 5. It is not necessary to enter any Control key commands if the same test method is to be repeated.

NOTE: The units of measure can be changed by pressing the Control key identified as UNITS.

GRIP OPERATION

The grip opens by moving the lever to its down position (See Figure 7b – Grip Open). Insert the free end of the sample into the open grip and close the grip by moving the lever to its upright position (See Figure 7a – Grip Closed). The grip opening may be adjusted by rotating the lever – clockwise for thinner samples, counterclockwise for thicker samples.

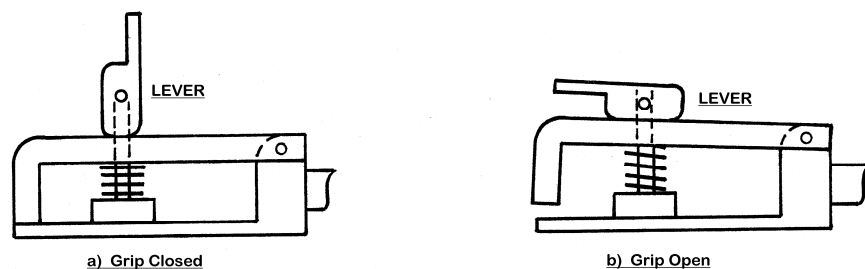


Figure 7 - Grip Operation

NOTE: The grip is attached directly to the load cell. Do not move the grip sideways or up and down. When opening and closing the grip, support it with one hand and operate the lever with the other hand to avoid damaging the load cell. For proper operation of the load cell it is necessary for the grip to be mounted with a space between the load cell housing and the grip. DO NOT TIGHTEN THE GRIP AGAINST THE LOAD CELL HOUSING.

WARNING: Rotating the Grip on the threaded mounting rod, causing the Grip to come in contact with the wall of the load cell housing will damage the load cell. There must be a physical gap maintained between the Grip and the load cell housing for the load cell to function correctly.

FILE MANAGEMENT

There are four file management functions available in the AR-1000. They are Review, Download, Store, and Delete. These four functions are available in three different modes within the Print Menu. The following sections describe each of these functions and the procedure for enacting the particular function.

REVIEWING TEST DATA

When the Data Storage is turned on, test data is maintained in the memory of the AR-1000. This data is accessible for reviewing, downloading and deleting. The following procedures will describe how to review data contained within each test file.

1. Press the Select key to access the Print menu. The Display will show the letter “P” indicating Print mode.
2. Press the Enter key to access the Print mode.
3. The Display will show “P #####” where # represents the number of test currently stored in memory.
4. Pressing the Down ↓ and Up ↑ key will allow you to select any of the individually stored test files.
5. After selecting the file number to be reviewed, press the Select key two (2) times to access that particular file’s data. The Display will change to the “I” or current force reading.
6. Pressing the Up ↑ key will change the display from “I” to “Average, High, and then Low”. The numerical values displayed are the test data stored for the selected test file.
7. A new test can be run while in the review mode. Simply set up your test material and engage the sled. The Display will revert to the current test data at the conclusion of the test.

NOTE: The current test data, (Average, High, and Low values) are always accessible in the Run menu by pressing the Down ↓ or Up ↑ key. Each push of an arrow key changes the display in the following sequence: I current, A average, H high, and L low.

DATA STORAGE

The AR-1000 can store test files in the memory or operate without storing test files or automatically download data at the completion of a test. The following procedure describes how to select the memory storage operating function.

1. Press the Select key to select the Print Menu. The Display will initially show the “P” mode.
2. Press the Up ↑ to select the “St” storage mode. The Display will show either, “St On”, “St OFF” or “St FI”.

Note: When selecting “StFI” for automatic download all stored test data files are erased. Please record or download any stored test data prior to using this setting.

3. Press the Enter key to access the storage mode.
4. Then press the Up ↑ or Down ↓ key to toggle the Display between “St On”, “St OFF” or “StFI”. When the St oN is selected the AR-1000 will store the individual test data in files. There is a limit of 20 files or 720 seconds total storage.
5. When “StFI” is selected, test data is downloaded automatically at the completion of the test.
6. Press the Enter key to record the setting and return to the Run menu.

DELETING TEST DATA

The limit of the AR-1000 memory is 20 test or 720 seconds. When either of these limits is reached, an error message, “SE FULL” is displayed. It is then necessary to delete test data from the memory in order to allow additional test data to be stored. Deleting test files before the memory is full is also accomplished with this procedure.

1. Press the Select key to access the Print Menu. The Display will show the letter “P” indicating Print mode.
2. Press the Up ↑ key to select the “dL” then press the Enter key to access the Delete mode. The Display will show “dl 00##” where the ## indicates the number of test files stored in memory.

3. Pressing the Select and Enter keys together for 3 seconds will delete the test files and return the Display to the Run Menu and I mode.

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

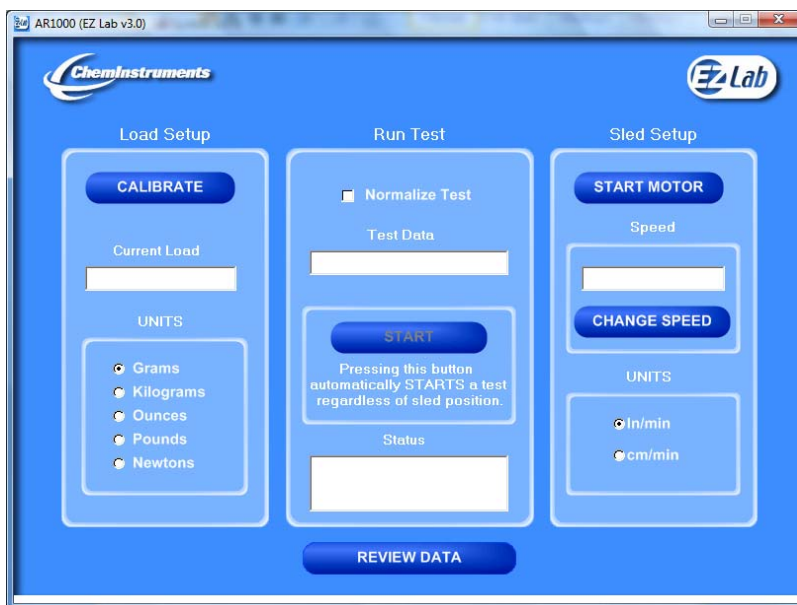
Insert the EZ Lab disk into the computer. EZ-Lab will self install.

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

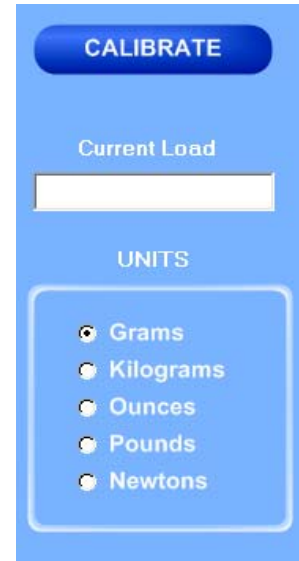


the left and right "**Load Setup**" section. The right section, titled "**Sled Setup**", is for starting the motor and setting the test speed. The center section, titled "**Run Test**", is for running a test without using the **Home**, **Start**, and **Stop** switches on the AR-1000.

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 SETUP

The test speed of the AR-1000 can be changed. The following procedure describes the process of setting the speed.

1. Click the “**Start Motor**” button to start the motor.
2. Select the “**Change Speed**” button in the “**Load Setup**” section on the right side of the Main Screen.
3. Follow the on screen instructions.
4. Select “**OK**” and the test platform will now run at the selected speed.
5. The selected speed will appear in the window above the “**Change Speed**” button.



UNITS

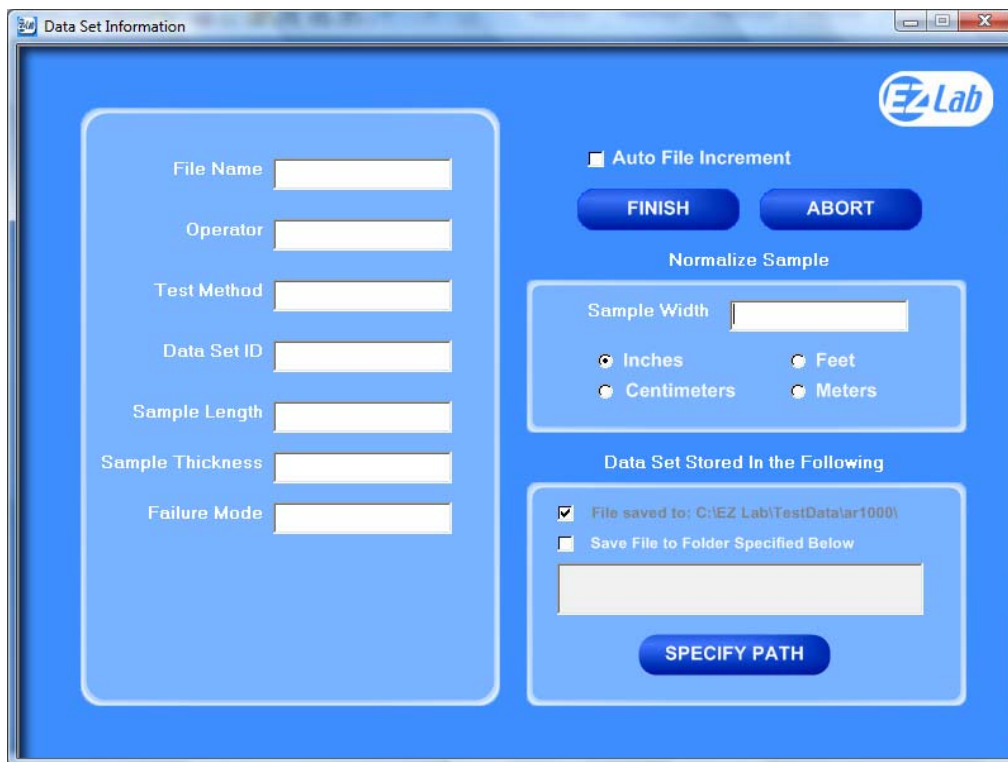
Click the bullet next to the unit of measure to select the desired unit for data collection and data analysis. All data will be displayed in the unit selected.

RUNNING REMOTE TEST

The “**Start**” button automatically starts a test. To stop the test, move the cart past the “**Stop**” switch on the AR-1000, or press the “**Stop**” button on EZ Lab.



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 where 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.

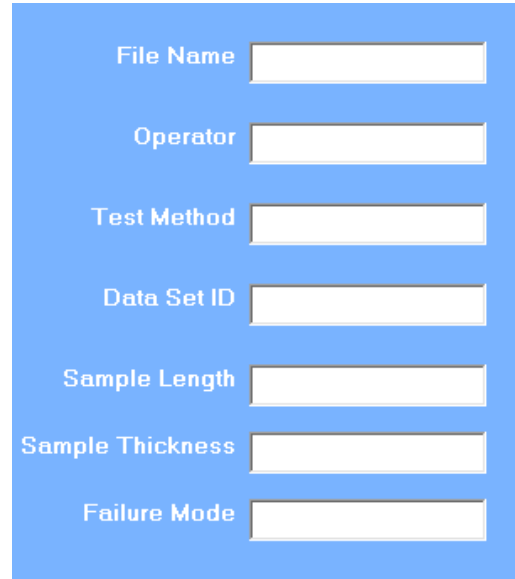
Test Method – optional field.

Data Set ID – optional field.

Sample Length – optional field.

Sample Thickness – optional field.

Failure Mode – optional field.



The image shows a screenshot of a software interface with a blue background. It contains seven input fields, each with a label to its left and a white rectangular box to its right. The labels are: File Name, Operator, Test Method, Data Set ID, Sample Length, Sample Thickness, and Failure Mode. The fields are arranged vertically from top to bottom.

AUTO FILE INCREMENT

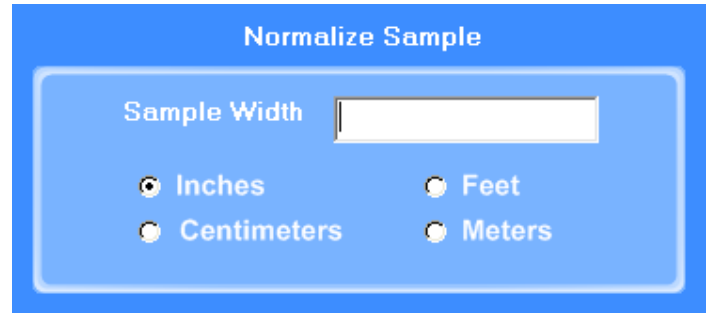
Auto File Increment

“**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.



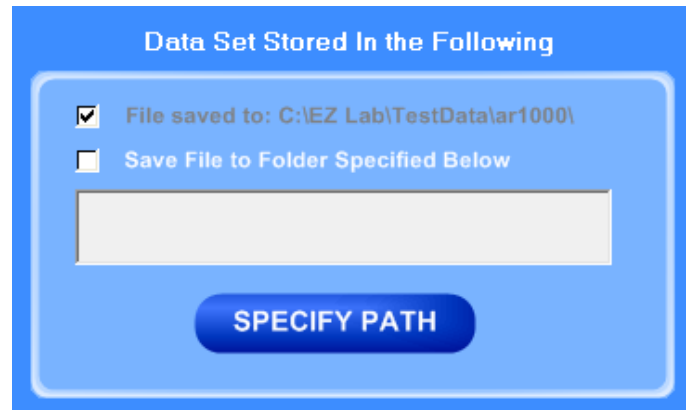
Normalize Sample

Sample Width

Inches Feet
 Centimeters Meters

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.



Data Set Stored In the Following

File saved to: C:\EZ Lab\TestData\ar1000\
 Save File to Folder Specified Below

SPECIFY PATH

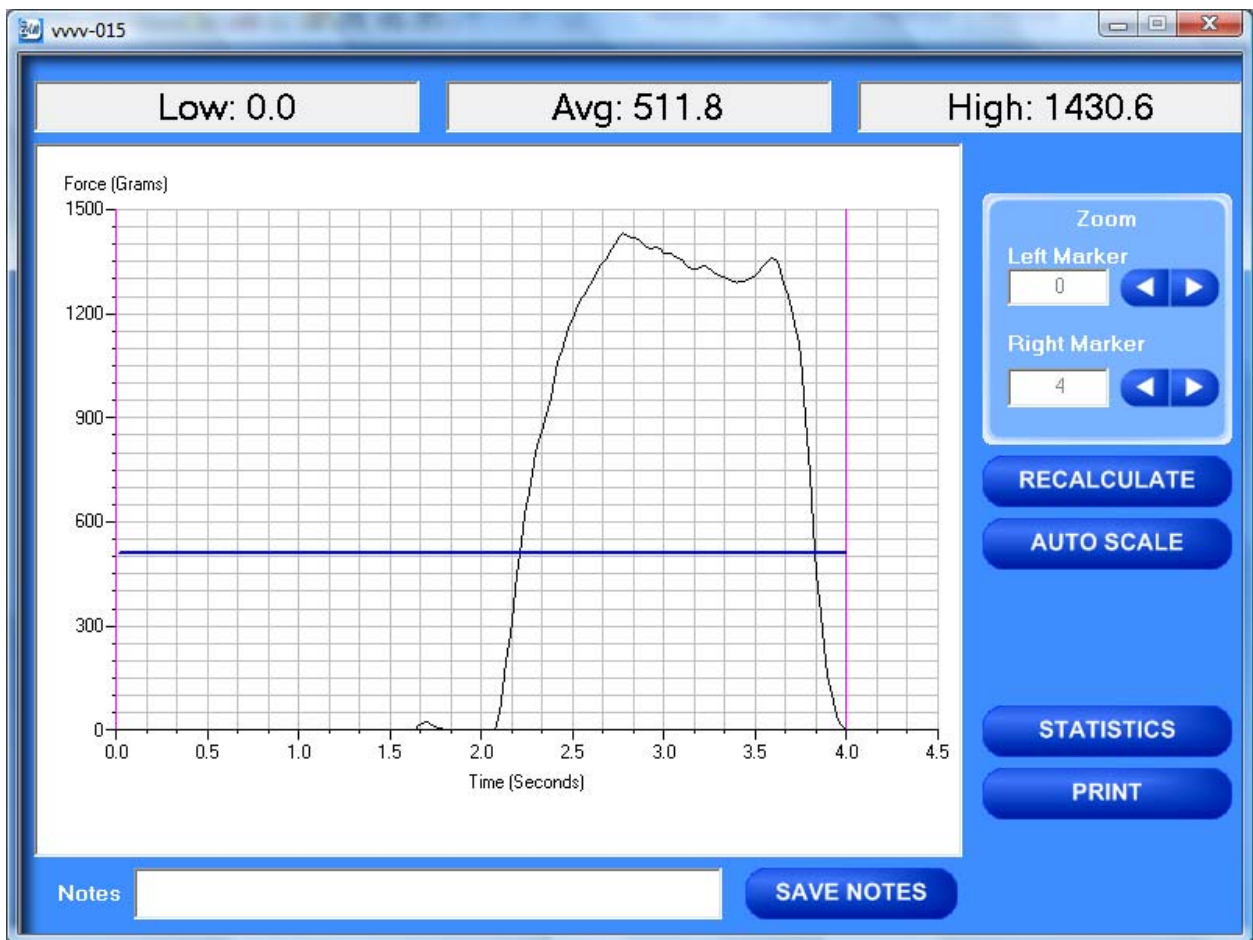
FINISH AND ABORT

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**”.



FINISH ABORT

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 will not 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

A blue rectangular button with a white checkmark icon on the left and the text "Save Markers" in white on the right.

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

A blue rounded rectangular button with the text "AUTO SCALE" in white.

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.

A blue rounded rectangular button with the text "FULL SCALE" in white.

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

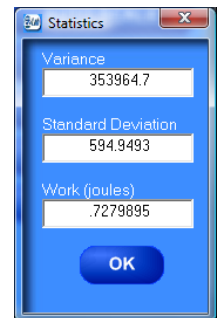


The “**Save**” button will save the cropped data as a new file with the same “**File Name**” as the original file but add the suffix “**-RevA**”. (Example: Test-001 becomes Test-001-RevA) Only one “**-RevA**” file per original test can be saved at a time. Anytime you click the “**Save**” button, a “**-RevA**”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

STATISTICS



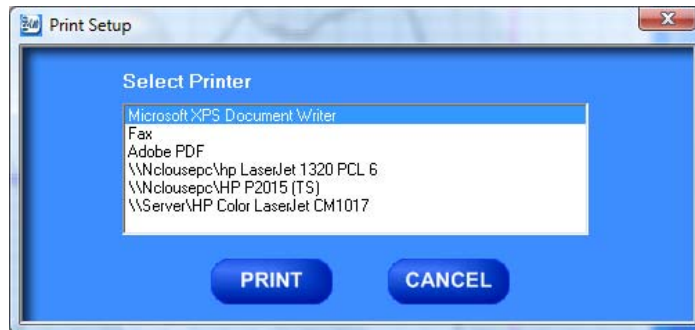
The “**Statistics**” button will open a new window and display the **Variance**, **Standard Deviation**, and **Work (joules)** of the data displayed on the graph. The data displayed on this screen will change anytime a change is made to the graph. To exit out of this screen, click either the “**OK**” 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.

File Name	Date	Low	Avg	High
www-017-RevA	01/16/09 04:11 PM	25.5	1056.8	1577.0
www-017	01/16/09 02:39 PM	0.0	835.0	1577.0
www-016-RevA	01/16/09 01:58 PM	0.0	631.2	993.5
www-016	01/16/09 01:58 PM	0.0	391.6	1062.6
www-007-RevA	01/16/09 01:58 PM	1223.0	1363.5	1464.6
www-015	01/16/09 10:49 AM	0.0	511.8	1430.6
www-013	01/16/09 10:39 AM	0.0	116.0	790.8
www-012	01/16/09 10:38 AM	0.0	903.6	1619.1
www-011	01/16/09 10:38 AM	0.0	224.8	1528.5
www-009	01/16/09 10:15 AM	204.4	878.1	1069.9
www-008	01/16/09 10:13 AM	232.3	784.2	954.6
www-007	01/16/09 10:13 AM	142.0	1123.4	1464.6
www-006	01/16/09 10:06 AM	9.6	727.1	975.6
www-005	01/16/09 10:06 AM	0.0	518.0	914.0
www-004	01/16/09 10:06 AM	0.0	281.4	1585.0
www-003	01/16/09 10:06 AM	0.0	141.3	1169.7

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

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

“**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.



The screenshot shows a software window titled "File Details: vvv-017-RevA" with the ChemInstruments and EzLab logos. The window is divided into two main sections. The left section contains input fields for: File Name (vvv-017-RevA), Operator (vvvvvv), Test Method (vvvv), Data Set ID (vvv), Sample Length, Sample Thickness, Sample Width (4 inches), and Failure Mode. The right section displays test results: Test Speed (100.0 in/min), Length of Test (2.1 seconds), Average (1056.0 Grams), High (1577.0 Grams), Low (25.5 Grams), Std Deviation (467.8664), Variance (218899), Work (6163062 joules), and a Notes field with a dashed border.

DELETE

DELETE

“**Delete**” will permanently delete the test file.

DELETE ALL

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

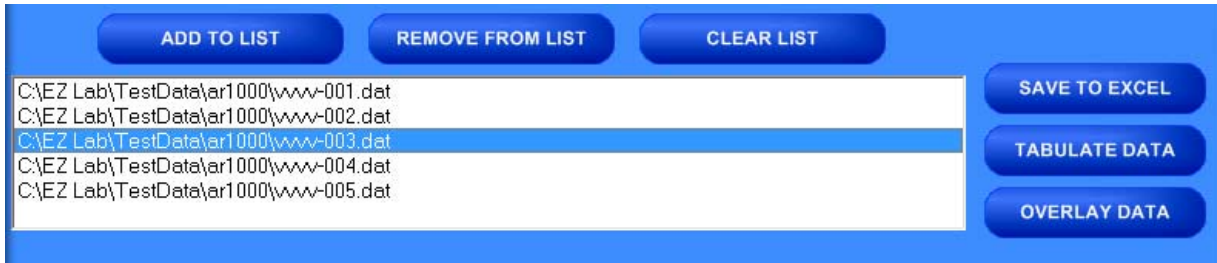


The “**Help**” button will open a **PDF** file of the machine manual. This manual contains operation instructions for both the test platform and the **EZ Lab** software. You must have Adobe Reader on your computer to open **PDF** manual file. If the Adobe program is not already installed on your computer,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

The following instructions allow you compile test data from multiple files

File Name	Date	Low	Avg	High
www-016-RevA	01/16/09 01:58 PM	0.0	631.2	993.5
www-016	01/16/09 01:58 PM	0.0	391.6	1062.6
www-007-RevA	01/16/09 01:58 PM	1223.0	1363.5	1464.6
www-015	01/16/09 10:49 AM	0.0	511.8	1430.6
www-013	01/16/09 10:39 AM	0.0	116.0	790.8
www-012	01/16/09 10:38 AM	0.0	903.6	1619.1
www-011	01/16/09 10:38 AM	0.0	224.8	1528.5
www-009	01/16/09 10:15 AM	204.4	878.1	1069.9
www-008	01/16/09 10:13 AM	232.3	784.2	954.6
www-007	01/16/09 10:13 AM	142.0	1123.4	1464.6
www-006	01/16/09 10:06 AM	9.6	727.1	975.6
www-005	01/16/09 10:06 AM	0.0	518.0	914.0
www-004	01/16/09 10:06 AM	0.0	281.4	1585.0
www-003	01/16/09 10:06 AM	0.0	141.3	1169.7
www-002	01/16/09 09:31 AM	0.0	455.8	1174.5
www-001	01/16/09 09:31 AM	0.0	11.5	127.7

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

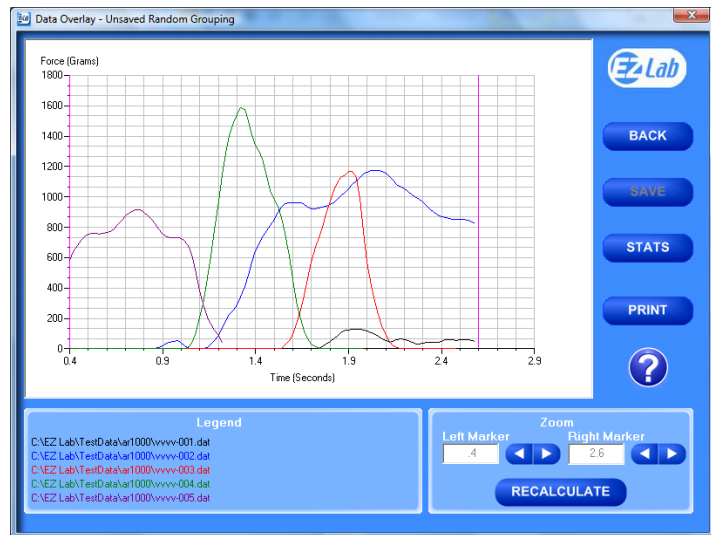


“**Print**” will allow you to use any printing feature available to your computer. Highlight the desired printer and click the “**Print**” button. This will take you to your computers print menu. You may exit this screen by clicking either “**Cancel**” or the red “**X**” buttons.



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 will not 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

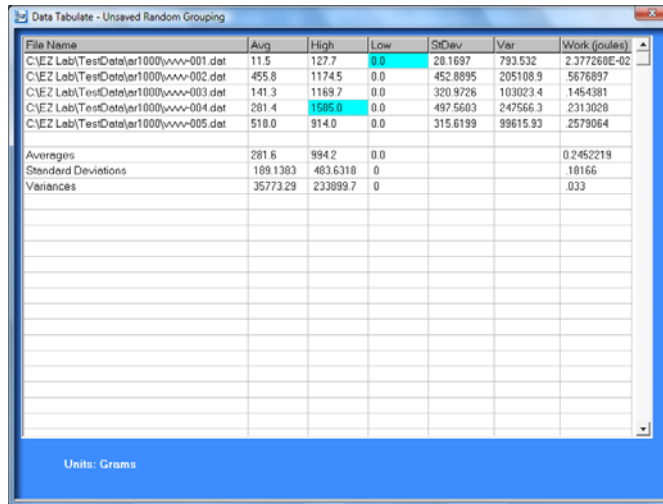


The “**Save**” button will save the cropped data as a new file with the same “**File Name**” as the original file but add the suffix “**-RevA**”. (Example: Test-001 becomes Test-001-RevA) Only one “**-RevA**” file per original test can be saved at a time.

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.



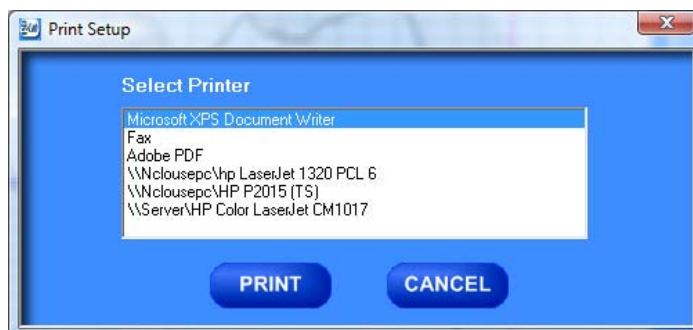
File Name	Avg	High	Low	StDev	Var	Work (joules)
C:\E2 Lab\Test\Data\ar1000\www-001.dat	11.5	127.7	0.0	28.1697	793.532	2.377260E-02
C:\E2 Lab\Test\Data\ar1000\www-002.dat	455.8	1174.5	0.0	452.8895	205108.9	5676897
C:\E2 Lab\Test\Data\ar1000\www-003.dat	141.3	1169.7	0.0	320.9726	103023.4	1454381
C:\E2 Lab\Test\Data\ar1000\www-004.dat	281.4	1595.0	0.0	497.5603	247566.3	2313028
C:\E2 Lab\Test\Data\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	463.6318	0			18166
Variances	35773.29	233899.7	0			033

Units: Grams

PRINT

PRINT

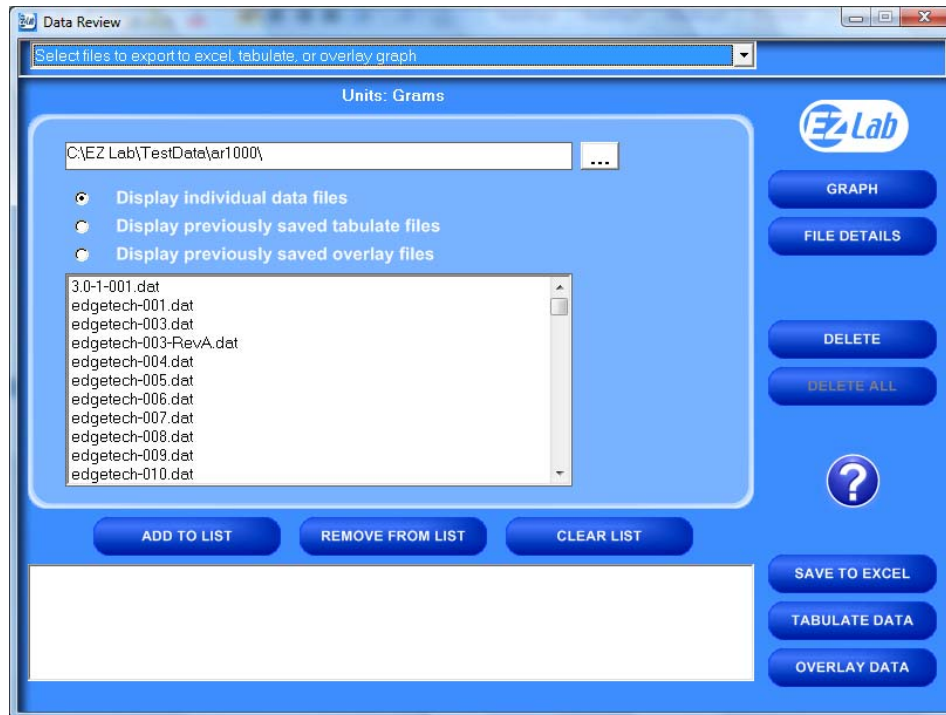
“**Print**” will allow you to use any printing feature available to your computer. Highlight the desired printer and click the “**Print**” button. This will take you to your computers print menu. You may exit this screen by clicking either “**Cancel**” or the red “**X**” buttons.



HELP



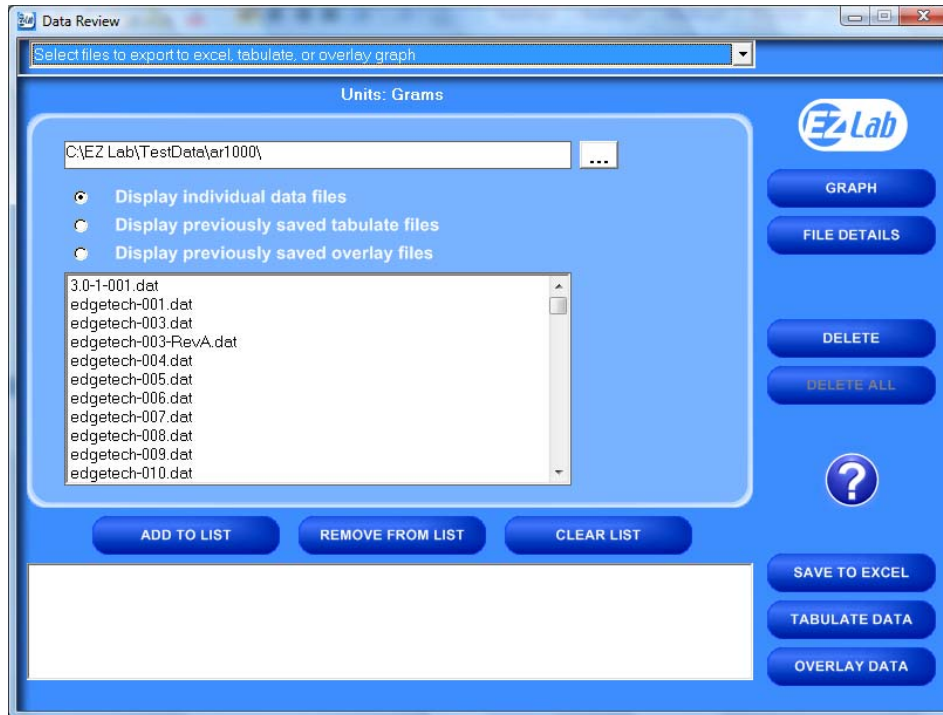
The help button will open a **PDF** file of the machine manual. This manual contains operation instructions for both the test platform and the **EZ Lab** software. You must have Adobe Reader on your computer to open **PDF** manual file. If the Adobe program is not already installed on your computer,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

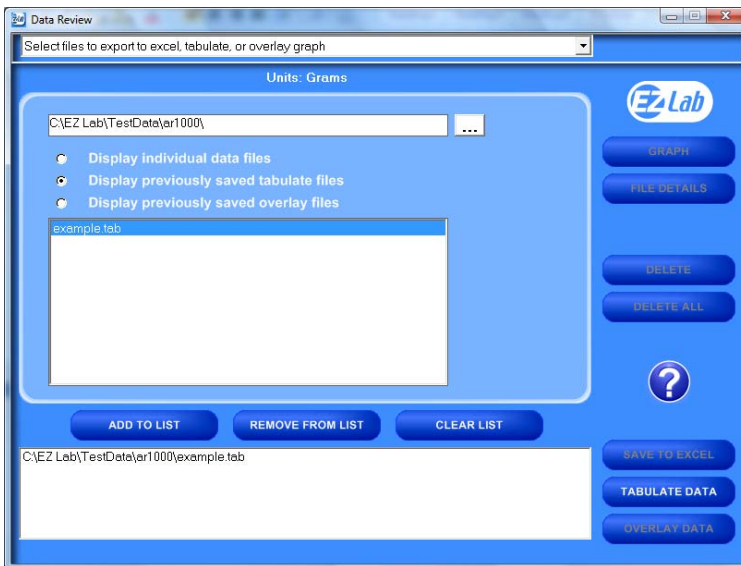


This screen will display all the test files located in the on your computer under the directory **C:\EZ Lab\TestData\ar1000**. To change directories, click the button located to the right of the directory address bar. Scrolling over the button will pop up a window **“Press this to change directories”**.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

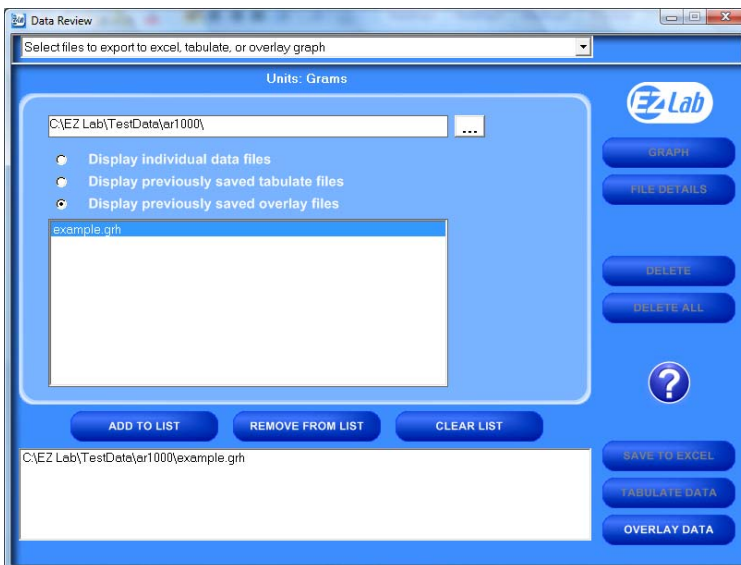
PREVIOUSLY SAVED TABULATE FILES

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. The following section will address certain procedures for making changes in the AR-1000 and providing care for proper operation.

MECHANICAL MAINTENANCE SCHEDULE

The AR-1000 Adhesion/Release tester is a durable and well-designed piece of testing equipment requiring only minimal maintenance. In addition to normal and weekly general cleaning, ChemInstruments recommends that the following additional steps be performed on a scheduled basis or as required.

Monthly

- Check and adjust, as needed the drive chain.
- Clean and lubricate linear rods.
- Check and adjust the engaging finger on the test sled.
- Clean and lubricate the drive & idler shafts and their bronze bearings.

These simple steps, if performed regularly, can ensure the continued reliable performance of your AR-1000 Adhesion/Release tester.

CHAIN ADJUSTMENT

After an extended period of use the chain on the AR-1000's drive will stretch. This can cause undue vibration and improper drive for the test sled. This chain can be easily adjusted by performing the following procedure.

1. Make sure the AR-1000 has been turned off and unplugged from the electrical outlet.
2. Remove the top guard in order to gain access to the four locking bolts on the bearing slide.
3. With a 7/32 Allen wrench loosen the four locking bolts on the bearing slide.
4. Locate the adjusting screws on the end plate at the right end of the test bed.
5. With a 3/16 Allen wrench, turn each of the adjusting screws ¼ turn.
6. Check the tension of the chain before turning the adjusting bolt again. Proper adjustment will allow the chain to flex between sprockets, and engage the test sled without skipping.

7. Once adjusted, retighten the four locking bolts described in step 3.

TEST SLED ENGAGING FINGER

The engaging finger on the bottom of the test sled must be positioned 90° to the bottom of the test sled in order for it to catch the chain. To adjust the engaging finger, perform the following procedure.

1. Make sure the power to the AR-1000 has been disconnected.
2. Check the position of the engaging finger by moving the clutch handle to the “engage” position. The engaging finger should be positioned at 90° to the bottom of the test sled.
3. To adjust the engaging finger, turn the clutch handle to the 12 o’clock position.
4. Using a 3/32” Allen key loosen the setscrew on the engaging finger and rotate it so that it is fully extended downward. Retighten the setscrew.

TEST SLED & LINEAR RODS

The components of the test sled require maintenance to ensure proper performance. Every 3 months, or as needed, the following procedure should be performed.

1. Disconnect the power to the AR-1000.
2. Remove the top guard to the test bed.
3. With a soft clean cloth, wipe the linear rods. These rods provide the surface for the test sled’s linear bearings to travel on as tests are conducted.
4. Wipe the rods with a light lubricant.
5. Lubricate the drive & idler shafts and their bronze bearings with a light lubricant.

TROUBLESHOOTING

In the unlikely event you experience problems with your AR-1000 Adhesion/Release tester, the following list of probable causes and corrective procedures may provide a solution.

Problem	Probable Cause	Procedure
SE Full message	Either 20 test or 720 seconds of data have been collected	Refer to Delete
No Data collected	Home Switch not tripped	Reposition Home switch
	Start switch too close to Home or Stop switch	Move Start switch at least 1.5 inches away from Home & Stop switches
	Not in Run Menu	Refer to Running a Test
	Magnet missing on test sled	Reattached magnet to test sled
	Test sled skips	Loose chain
	Test sled engaging finger out of adjustment	Refer to Adjusting Test Sled Engaging Finger
Data measurement consistently Low/High	Improper calibration	Check calibration and/or calibration angle
	Bad calibration	Refer to load cell calibration
Calibration drifts	Bad or damaged load cell	Replace load cell