



Test & Calibration Division/Newage Testing Instruments

MT-91ASW

Direct Readout Microhardness Test
System with Automatic Traversing

Operation Manual

Version: 8/21/2012



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Section 1: Installation

1.0 Quick Start Do's & Don'ts

Do:

- Always make sure the diamond indenter tip (cone shaped) is higher than the test block before moving the X-Y table to the forward or backward position. **Any impact to the indenter tip will damage it causing bad data and additional expense that is not covered under warranty. Make sure the tip is high enough in the "Z" direction as to not hit anything. See the pictures below.**
- Keep printouts of the setup files and file name catalogs handy. This will expedite program operation and help in the event of a system crash.
- Backup files periodically so that a minimum amount of data is lost if the hard disk should fail.
- Tighten the test block in the mount very firmly by using the top thumbscrews first. Then spin the round black adjuster underneath the test block (just like a vice to push it against the block). Any movement of the test block will cause bad data.
- Keep the diamond indenter tip and shroud clean.

Do Not:

- Hit the diamond indenter with any object, at any time. Be careful of the height when moving the sample during table travel from camera (front) to indenter position (backwards).
- Do not move the X-Y table long distances in the X or Y direction as it could damage the encoder and get stuck in one position. If the X-Y table gets stuck you may need to call Newage.

1.1 Introduction

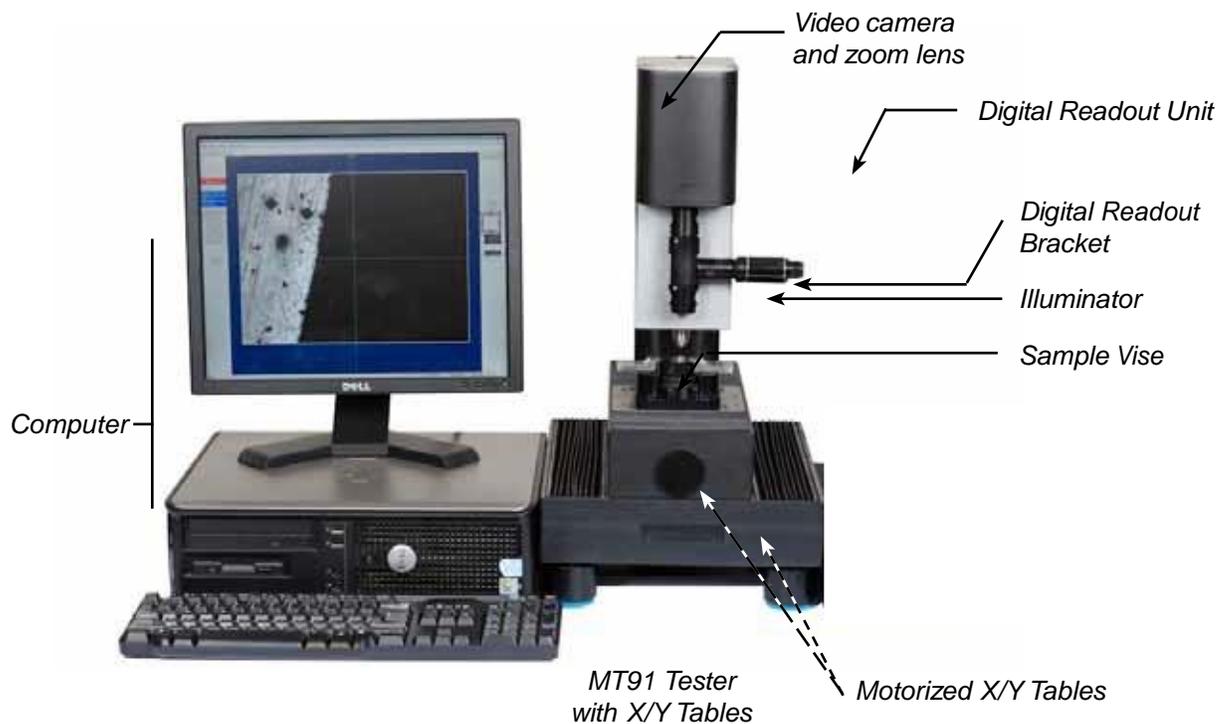
Thank you for buying the Ametek/Newage Testing Instruments MT-91ASW, Automatic Microhardness Testing System. The Newage MT-91 Microhardness Tester uses a Rockwell technique to measure the depth of indentation using low loads (500g to 5kg). The diamond indenter is a cone shape device above the table that has to be protected from impact of any kind, including the X-Y table.

All testing routines are controlled by a computer. The program that the tester follows is designed to guide operators through the basic testing routines. It provides prompts and menus to lead the operator through a test sequence.

This manual is written to take the operator step by step through the program, with examples of the screens, menus and dialog boxes that appear on the display.

NOTE: Some pages in this manual may show screens and printouts which may differ slightly from your system depending on the options purchased. The computer box can be put horizontal or vertical on the table.

1.2 Basic System



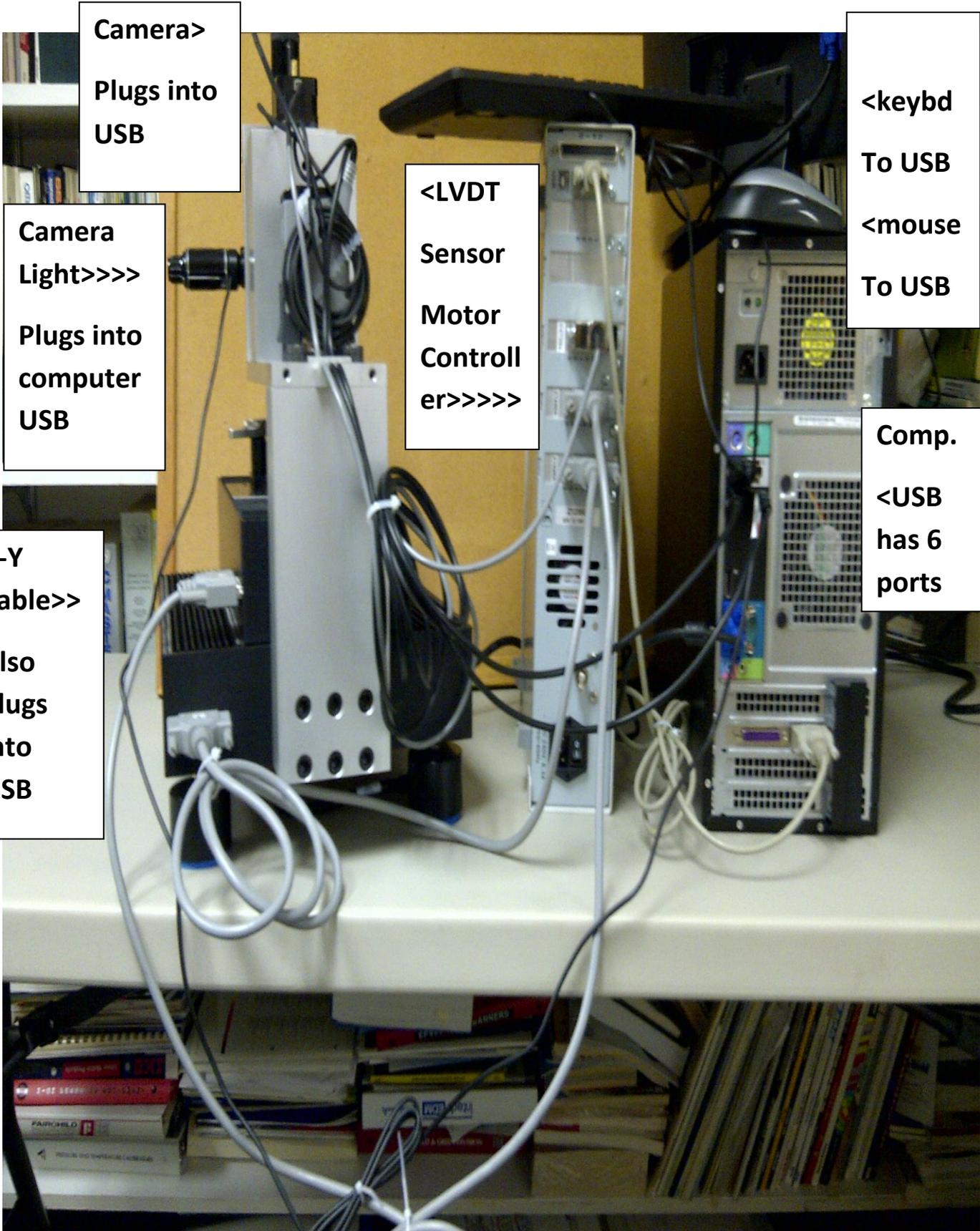
1.3 Initial Setup

1.3.1 Setup/Connection Procedure:

The MT-91ASW system must be installed on a stable desktop or table area of at least 48" wide x 24" deep x 28" high, which should leave adequate room for a printer. Unpack the computer, power cord, mouse, keyboard, monitor and X-Y table. Do not drop the X-Y table. We recommend that you plug things in the sequence below to avoid damage to the equipment and **have provided several pictures below to help with the connections and basic set-up.**

Six (6) devices must be connected to six (6) USB-V2.0 ports on the back of the computer in the following sequence:

- 1) First, plug in the Microscope Camera cable into the top USB Port #1 (one of the 3 cables coming out of the back of the X-Y table). Typically it is a black cable but check it by following it all the way back to the camera. See the picture below.
- 2) Then plug in the Microscope Light into USB Port #2 (another cable coming out of the back of the X-Y table). See the picture below.
- 3) Plug the computer monitor into the back of the computer in the monitor location.
- 4) Plug in the power cord to the computer and the wall socket. We recommend you plug the computer into a surge power strip for protection.
- 5) Turn on the computer.
- 6) Click on the "MT91" icon to start the program and make sure an image appears.
- 7) If an image appears on the computer screen.....Close down the "MT91" software program. If an image does not appear check the connections for the camera to the computer.
- 8) Connect the DSub 25 pin connectors to the X-Y table and the opposite ends of the cables to the USB ports 3 and 4 on the computer. See the picture below.
- 9) Power on the motor controller (switch is on the back) and restart the MT91 program. If the motor table doesn't move, make sure that the motor controller is using computer Com6/Com5/Com4 (Use Device Manager to adjust this to make sure they match).
- 10) Finally, connect the Solatron LVDT sensor (third 3rd cable coming out of the back of the X-Y Table). See the picture below.
- 11) Restart the MT91 program and Click the "**Exit Traverse**" button and try Run Local to check the movement of the table, camera view and basic operation of the tester. See more detailed instructions below as well as additional screen shots.



Camera>
Plugs into
USB

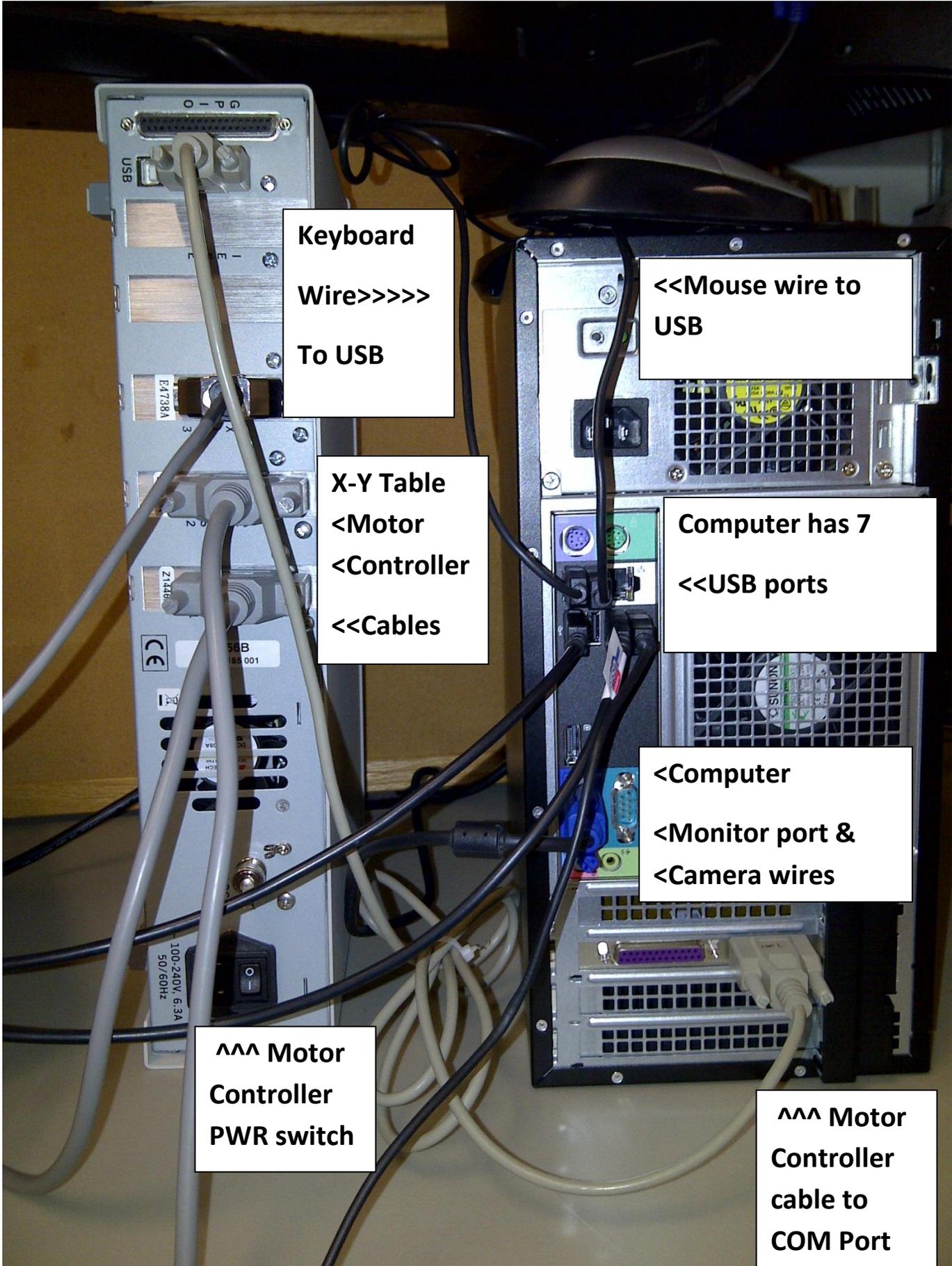
<keybd
To USB
<mouse
To USB

Camera
Light>>>>
Plugs into
computer
USB

<LVDT
Sensor
Motor
Controll
er>>>>

Comp.
<USB
has 6
ports

X-Y
Table>>
Also
Plugs
into
USB



**Keyboard
Wire>>>>
To USB**

**<<Mouse wire to
USB**

**X-Y Table
<Motor
<Controller
<<Cables**

**Computer has 7
<<USB ports**

**<Computer
<Monitor port &
<Camera wires**

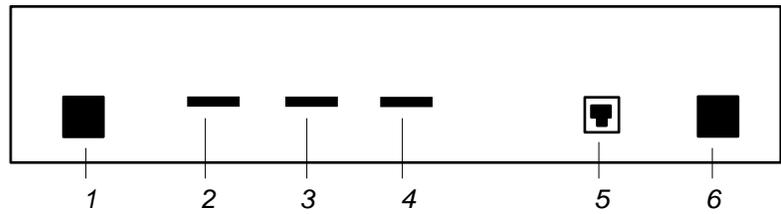
**^^^ Motor
Controller
PWR switch**

**^^^ Motor
Controller
cable to
COM Port**

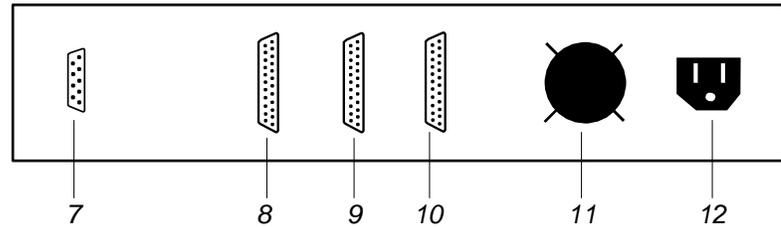
1.3.2 Motor Controller

See next page for diagram of the back and front of the motor controller:

- 1 • **POWER Light**
- 2 • **MOTOR STATUS LIGHT 1**
- 3 • **MOTOR STATUS LIGHT 2**
- 4 • **MOTOR STATUS LIGHT 3 (not used)**
- 5 • **STOP**
- 6 • **POWER CORD**
- 7 • **COM 2 (TO COMPUTER)**
- 8 • **MOTOR CONNECTOR 3 (not used)**
- 9 • **MOTOR CONNECTOR 2**
- 10 • **MOTOR CONNECTOR 1**
- 11 • **FAN**
- 12 • **Power Cord and Switch**



MOTOR CONTROL UNIT FRONT VIEW



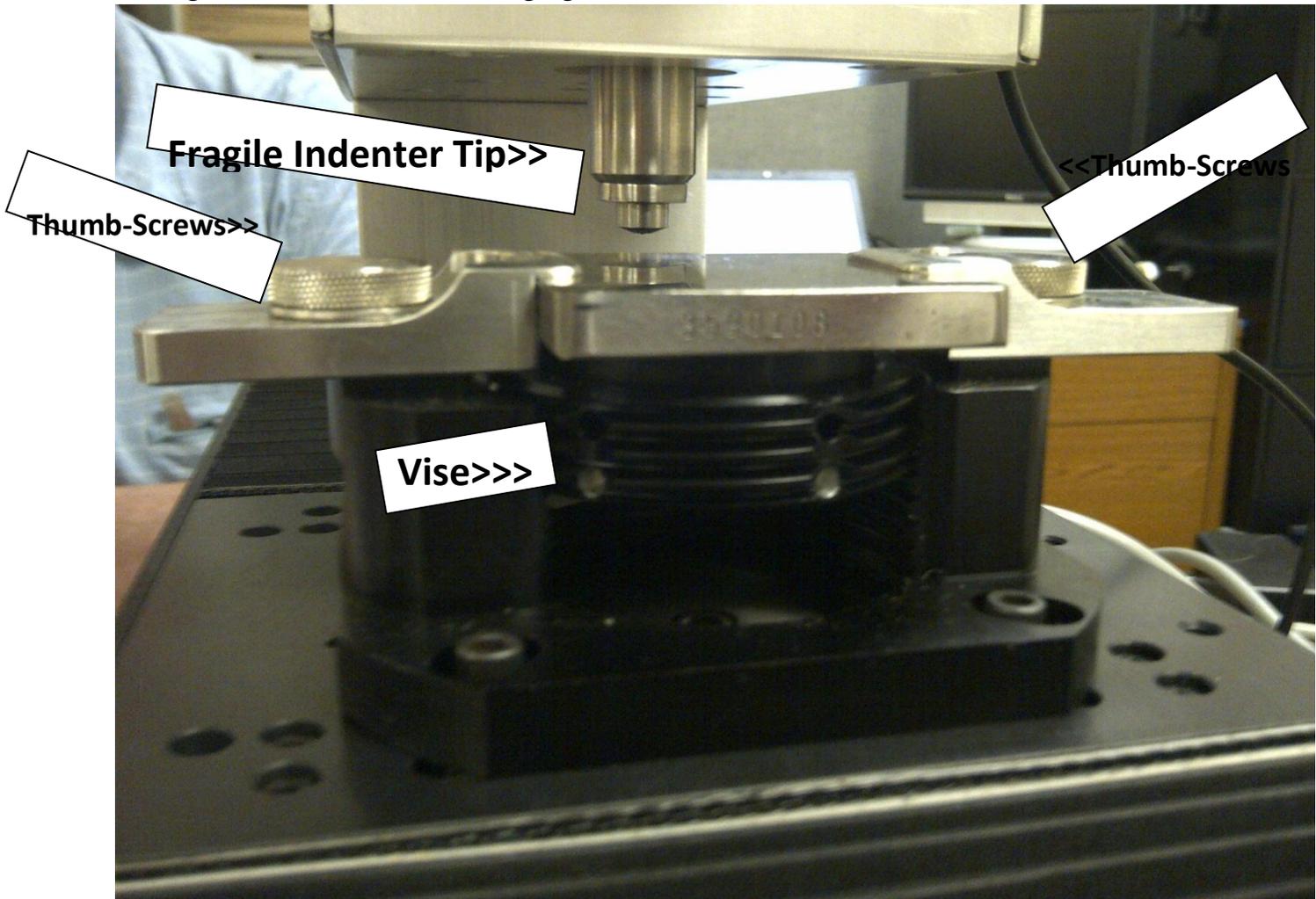
BACK VIEW

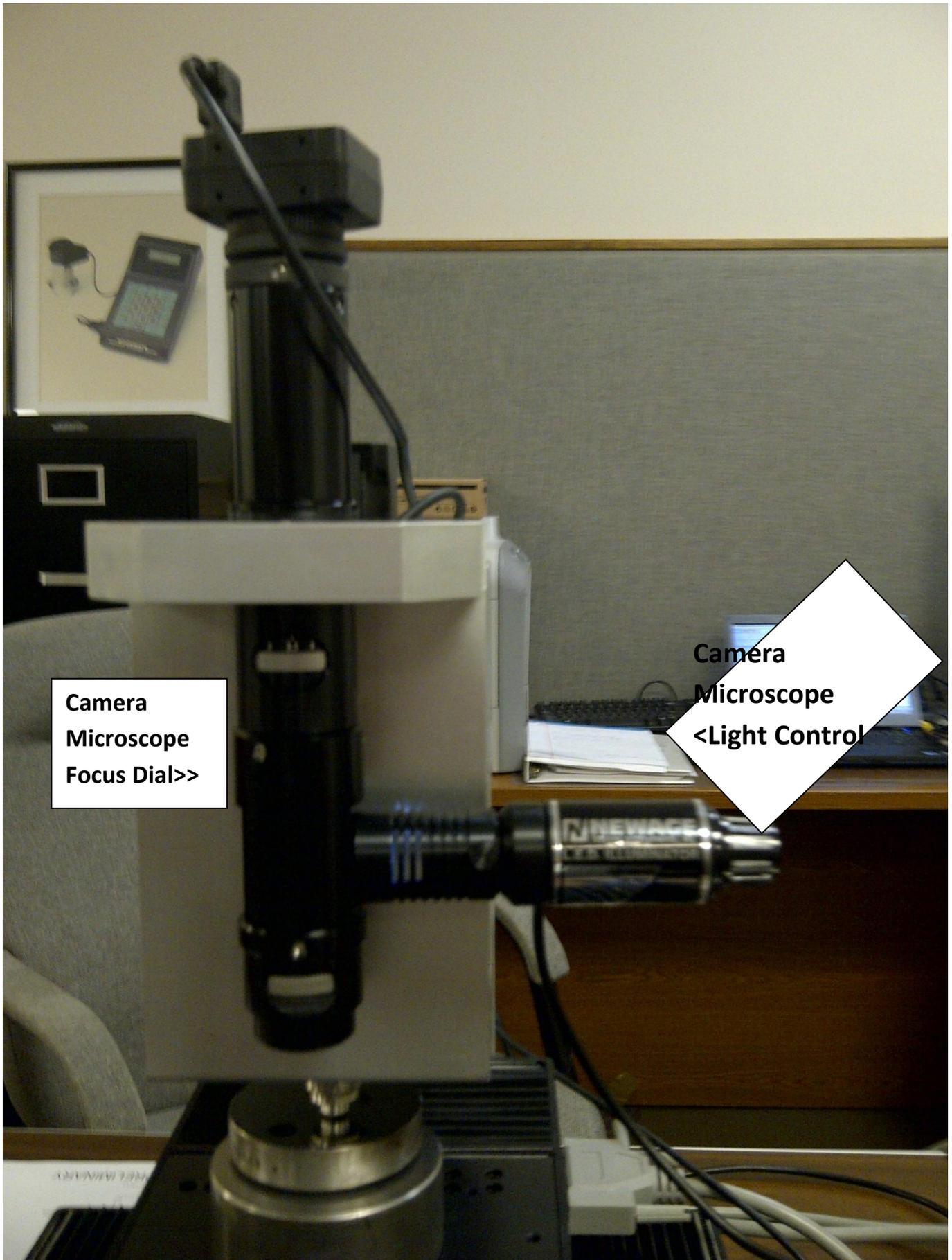
1.4 Software Installation

The software should already be installed on the computer. Instructions for reinstallation are on software distribution media (USB-Drive or CD).

How to Load a Test Block into the Vise:

- 1) Loosen the thumb screws, install the test block
- 2) Tighten the thumb screws so they are snug
- 3) Tighten the Vise so it is snug against the test block





**Camera
Microscope
Focus Dial>>**

**Camera
Microscope
<Light Control**

1.4.1 Initial Software Startup

To adjust the camera and do a test on a block:

- 1) Place a test block into the mount. Tighten the 2 thumb-screws on both sides. Adjust the round vise underneath the test block until the sample will not move.
- 2) Begin the program operation by double clicking the MT91 icon from the Windows desktop.



Using the mouse select the EXIT TRAVERSE button from the lower left of the screen.

- 3) The program will open up to the last file that was in use. If no data files have been created, the operator can create a new file. (See Sec 3.1 Create a New File) Hardness test results will be added to the database of the current open file. Always do a trial test to get the LVDT sensor Sample & Hold Circuit charged before taking the first reading of the day.
- 4) Follow the menu prompts and/or the instructions below:

1.5 X/Y Tables Setup

The motorized X/Y axis tables come pre-installed on the tester.

Section 2: File Setup

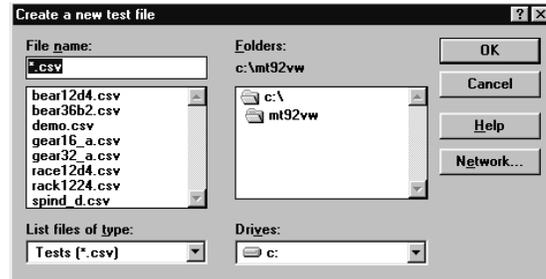
NOTE: The MT91 software starts up in the Traverse mode. To move to the Manual Test mode select the Exit Traverse button from the lower left of the Traverse Test screen.

The Main Menu Bar at the top of the screen contains 5 selections: File, View, Setup, Data, and Help. They can be accessed with the mouse by clicking on the selection. Click on one of them to open up individual selections. *IF THE MAIN MENU IS GRAYED OUT AND NOT ACTIVE, THE OPERATOR MUST SELECT "EXIT TRAVERSE" FROM THE TRAVERSE BUTTONS AT BOTTOM LEFT.*

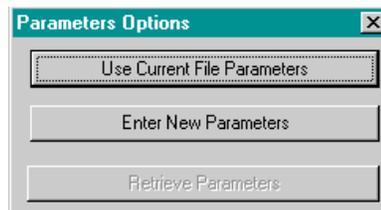
The File Menu consists of 7 different functions: New, Open, Close, Print, Print Preview, Print Setup, and Exit, as well as a listing of the last 4 files that have been in use.

2.1 create a new File

- 1) Select **new** from the File Menu. The **create a new test File** dialog box will appear.
- 2) Type in the name of the file (8 characters maximum) using the **.CSV** extension and select the **OK** button (or press **enter**.)



- 3) The operator is prompted for what set of parameters to use. The operator can select "Use Current Parameters" to enter the file parameters from the most recently used file and then prompted for a new comment to further identify this file. If the operator selects "Enter New Parameters", a completely new set of parameters can be set up. The final selection is "Retrieve Parameters" (optional - appears grayed out when not activated). When activated a prompt appears to enter the file name from which to retrieve the parameters. Then the operator can enter a new comment for this selection.



If the "Enter New Parameters" selection has been chosen, the operator will then be prompted for "Data Part File Information". This information can be used to keep track of Part Number, Description, Order Number, Comments, etc., related to the data file just created. These headings will appear on printouts. Data entry is not required. Select OK when done.

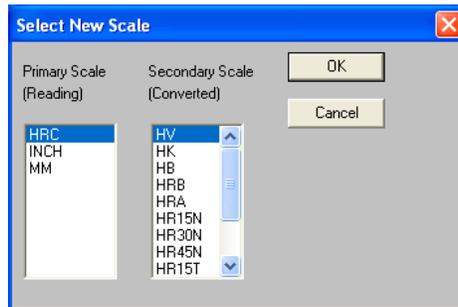
The image shows a dialog box titled "Data File Part Information". It contains ten numbered input fields: 1. PART #, 2. PART NAME, 3. SPEC ORDER, 4. HEAT NUMBER, 5. LOAD NUMBER, 6. FURNACE NUMBER, 7. LAB NUMBER, 8. COMMENT1, 9. COMMENT2, and 10. COMMENT3. To the right of the fields are four buttons: "OK", "Cancel", "Field Names", and two checkboxes labeled "Prompted" and "Sort by Prompt".

Clicking on the checkbox for "Prompted" will cause this screen to appear after each test so the operator can enter relevant data. This function pertains only to single point testing - not traverses. Selecting "Sort by Prompt" will sort data in the printouts by the prompts so commented data can be readily identified.

The operator may create custom headings by selecting the "Field Names" button, (See graphic below) highlighting the name you wish to change, and typing in the new heading. To make the new headings the default headings for all new files you create, select Change Defaults. The "Use Defaults" button will switch everything back to the default headings.

The image shows a dialog box titled "Part Information Field Names". It contains ten numbered input fields with the following text: 1: PART #, 2: PART NAME, 3: SPEC ORDER, 4: HEAT NUMBER, 5: LOAD NUMBER, 6: FURNACE NUMBER, 7: LAB NUMBER, 8: COMMENTS, 9: SCALE, and 10: TEST LOAD. To the right of the fields are four buttons: "OK", "Cancel", "Use Defaults", and "Change Defaults".

- 4) The next dialog box requires you to "Select New Scale". When using the MT-91ASW for case depth analysis the scale selection must be HRC (Rockwell C). If you would like the test result to be converted and displayed in another test value, highlight one of the Converted Scales listed on the right.

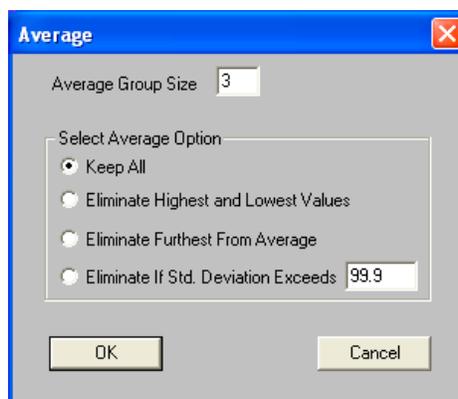


The scale abbreviations which may be

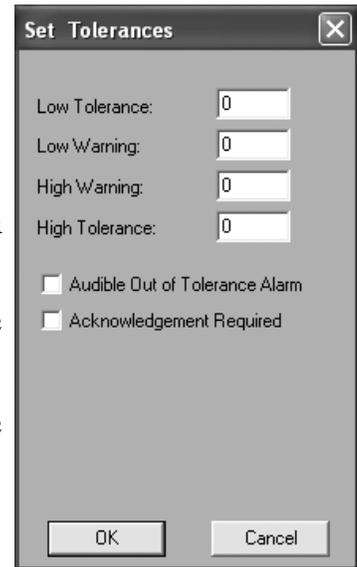
- listed are: HV = Vickers Scale
- HK = Knoop Scale
- HB = Brinell Scale for BOSS
- INCH = Measurement in Inches for linear measurement
- MM = Measurement in Millimeters for linear measurement
- HRC, HRB, HRA, HR15N, etc = Rockwell C, B, A, 15N scale, etc.

NOTE: The scale cannot be changed for a data file that contains test results. The operator will be prompted to change files if he tries to change scales with data in the file.

- 5) After selecting the scale the operator is prompted to select the "Average" option. If available, the operator may select to record averages of multiple tests rather than the individual tests (See Section 4.2.1 for more detail) Otherwise the operator may select "OK" to move to the next setup functions.



6) After the averaging screen, the operator is prompted for "Set Tolerances". The program uses these tolerance and warning settings for statistical calculations and for HI, LO, and OK indications for individual test results. The program does not use these tolerances for the traverse results - which can have tolerances created in "traverse setup" mode). Test results falling within the tolerances are color-coded green on the main single-point-test screen. Those results falling outside of tolerances are coded red, and if warning values are entered, those outside the warning limit but inside the tolerance are coded yellow.



The screenshot shows a dialog box titled "Set Tolerances" with a close button in the top right corner. It contains four input fields, each with the value "0": "Low Tolerance:", "Low Warning:", "High Warning:", and "High Tolerance:". Below these fields are two checkboxes: "Audible Out of Tolerance Alarm" and "Acknowledgement Required", both of which are unchecked. At the bottom of the dialog are "OK" and "Cancel" buttons.

Entering or leaving the values of zero will deactivate the Tolerance function. All readings will then be assigned OK status.

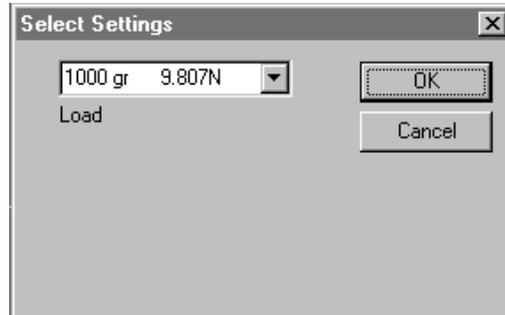
When the Advanced Statistics Option has been purchased the X-Bar/R Chart uses these settings to plot the "high" and "low" test results as red points on the graph; "acceptable" test results are plotted as green points. The operator may also set a high/low warning value - those test results are indicated by a gray color on the Advanced statistics output. The "Warning" test results do not affect statistical calculations.

When the "Acknowledgment Required" box is checked the operator will have to acknowledge every time an out-of-tolerance result is produced, by selecting an "OK" prompt. Also see Section 4.2.1 for information about prompting comments for out of tolerance results.

The "Audible Alarm" checkbox creates an audible signal for the operator to hear when the result is out of tolerance.

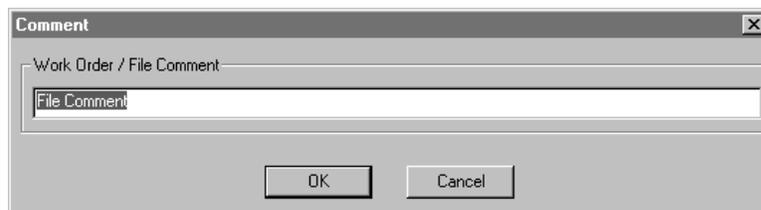
After setting the tolerance values, select OK to proceed.

7) Next the operator is given a chance to establish the load. It is important to select the same load as is being applied by the hardness tester. Otherwise the final measured test result will be incorrect.



To change the default values, click on the arrows with your mouse. A selection of all the possible values will appear. For each scale the operator has selected the possible selections for the load and objective will change.

8) Finally the operator has the opportunity to enter a comment. This comment applies to the entire setup file and it appears only on reports.

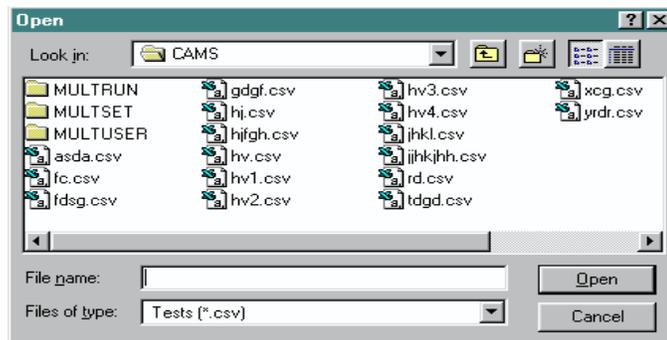


This completes the file setup. After the comment screen the operator should proceed with basic testing in the next section before going on the setup traverse routines in the following section.

2.2 Open an Existing File

If opening a recent (existing) file the operator can select "file" from the main menu then click the name of one of the last four opened files, which appear on the menu selections. Otherwise perform the following:

- 1) Select Open from the File Menu. The Open File dialog box will appear. If the **folder C:\MT92VW** does not appear at the top or if the files have been saved elsewhere, select the proper folder.
- 2) Open the desired file by double-clicking on the file name from the ones appearing or by typing in the file name in the "File Name" box and pressing the "OK" button.



NOTE: If you open a file with another file already open, the current file will be automatically saved and closed.

2.3 Close an Open File

- 1) Select **close** from the File Menu. The file is immediately closed leaving the program still running and on-screen. The operator may then select a new file or exit the program.

NOTE: The operator cannot exit the program by double clicking in the upper left corner of the screen. You must select File from the main menu and then the Exit button.

Section 3: Single Point Testing & Main Screen Functions

NOTE: The tester must be in single-point test mode to make a single test. Systems open as a default into the traverse mode upon start-up. The operator must select the "Exit Traverse" button near the lower left part of the screen if the traverse prompts are appearing and main menu is grayed out.



3.1 Single Point Testing

The operator can make a test by selecting the "Run Test" button when the test position is seen under the crosshairs on the screen. Once the button is pressed, the tester moves the specimen under the indenter, runs a test, automatically provides a hardness result, and returns the tables to the camera position.



If the test specimen is under the indenter, the operator can select the "Run Local" button and the system will take a test without moving the X/Y table.

3.2 Test Results & Tolerance Display

After a measurement has been made the scale and test result appears at the upper left part of the screen. Beneath the result will appear the tolerance limits (if entered in setup

HRC	55.5
HIGH	65.0
LOW	55.0
HV	604

file) and after the Accept button pressed a converted test result (if entered in setup file). Color coded indications - green, yellow, and red - appear when tolerances are entered and the results fall within tolerances, within a warning value, or outside the tolerances, respectively.

3.2.1 Prompt the Comments Screen for Out-of-Tolerance Results

In order to be prompted to enter a comment for out-of-tolerance results, the setup must be done when creating a new file. During the file setup select the Prompted Checkbox from the Part Information Field Names and the Acknowledgment Required Box from the Set Tolerances screen. When an out-of-tolerance result is obtained, the operator will be prompted to enter a comment in the Part Information Screen. The comment entered into the top cell of the "Part Information" screen will appear in the report next to that result.

3.3 Clear Last Button

This selection acts the same as the Data Menu selection for clear last. It removes the last test result from memory. Its works only in single point test mode - not for removing a result in a traverse.

A rectangular button with a light gray background and the text "Clear Last" in a dark gray font.

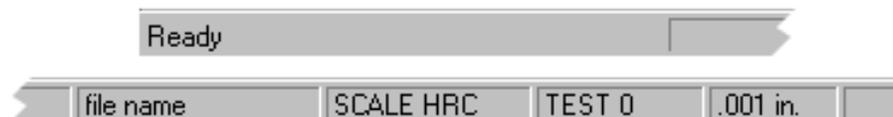
3.4 Reports Button

This function is the same as the View menu selection from the top menu. It will display the currently selected reports. For more details see Section 4.

A rectangular button with a light gray background and the text "Reports" in a dark gray font.

3.5 Status Bar

The status bar at the bottom of the screen shows the systems status (Ready) the file name, scale, sequence number, and the unit of measure for motorized table travel.



3.6 Test Parameters

Display the currently selected load and magnification as well as "TESTER", the default value for the MT90 version of the C.A.M.S. software.



Parameters may be changed using the **Update** button.

3.7 Update Test Parameters

3.7.1 Update: Color, Width

By selecting "Color" or "Width" the operator can adjust the X and Y axis lines in the display for the best width and color.

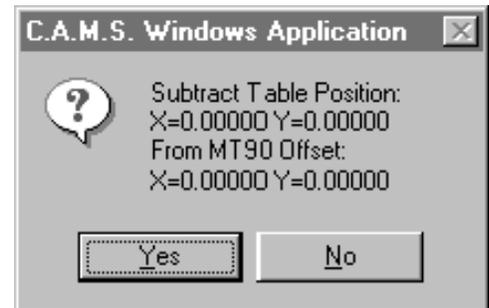


3.7.2 Update: Changing the Table offset

This function controls the relative positioning of the camera/monitor to the indenter.



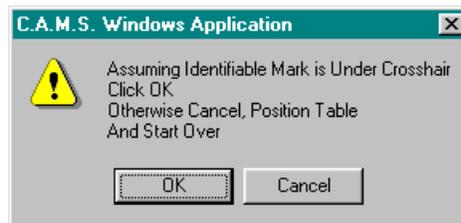
If the cross hairs do not match the center of the penetration after a test has been performed, the operator can perform an adjustment of the camera to indenter position offset. Perform a test. After the table returns back, move the table so the indentation is exactly under the cross hairs and select the **table offset** button from the **Update** screen and enter the password at the prompt. Select "YES" to the "Subtract Table Position" prompt. The coordinates will now align perfectly with the



indenter. Recheck to verify alignment.

3.7.3 Update: Calibrate Button

This function controls the relation of the monitor picture to table motion as controlled by the magnification of the camera. First move the zoom lens to full magnification (the normal viewing position). Select Update and then the Calibrate button. The operator will be prompted to enter a password. Then a prompt will appear requesting the operator verify the position of an indentation or other identifiable mark under the camera position.



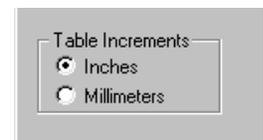
Select OK to the prompt and motors will move the point will move to the top right quadrant.



After the point moves to the top right quadrant click on the point then the OK to the prompt the mark will move under the cross hair.

3.7.4 Update: Changing the unit of measurement

The system can be setup to move and display table movements in increments of microns or thousandths of an inch.



3.8 Image Magnification and Screen Capture (Save)



The "Save" function allows the operator to capture the camera image. The captured image consists of the live image without the program controls and buttons appearing. While in single point test mode, select the Save button.

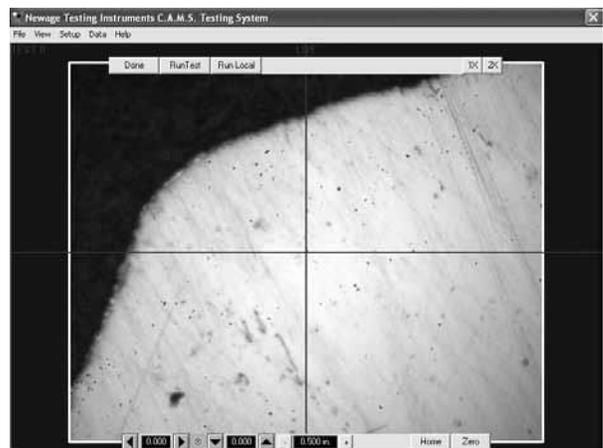
A window will appear to prompt the operator to enter a file name and optionally of full path statement. A screen capture of the camera image will be saved in bitmap format. The file name extension, ".bmp", is added automatically if the operator does not enter it. It is saved to the current directory or to a different directory if the operator types in a full path name. This image can be printed using most graphics programs.

The Image Size buttons, 1X and 2X, allow the operator to view the image as if magnified at 2X or at standard 1X view. The Image Capture does not work at 2X.

3.9 Full Button

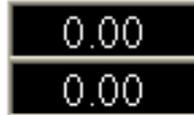


By selecting the full button the operator is able to view more of the surface area of the test specimen. The same controls are still available for moving the X/Y tables and taking tests, but they are located in a horizontal bar at the top and bottom of the screen.



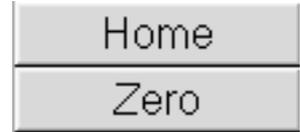
3.10 Basic Motorized X/Y Table Operations

There are three means of moving the motorized X/Y tables: Using the arrows, right clicking on the screen and using the electronic joystick.



The first way to move the table: If the operator clicks on one of the table motion arrows (*See above and at left*), the table will move in that direction by the amount indicated in the increment box. Underneath the table motion arrows is a display of the coordinate location of the table compared to the home position. There are two numbers. The first shows the X or side-to-side location and the second shows the Y or front-to-back location.

Coordinate Location



The home position is the base or (0.00, 0.00) position. The home position is not an absolute location of the table. Any position of the table can become the home position if the Zero Button (*See at left*) is pressed. The purpose of the home position is to locate the beginning position for a traverse, and it is a reference position to orient the operator in setting up the traverse.

At any time the operator can move back to the home position by selecting the Home Button. The table will immediately move to the Home position when it is pressed.

Beneath the coordinate location of the table display is the display of the increment of motion. If this number is set for .010 then the table moves an increment of 10 thousandths or 10 millimeters (depending on the setup



Increment of Motion

menu selection for metric or inches) every time an arrow button is selected. The motion) as seen on the screen, when the arrows are selected, appears to move the view in the direction of the arrow. If an arrow that is pointing between vertical and horizontal is selected then the table moves ten microns in both axes.

The increment of motion is in either millimeters or thousandths of an inch. The selection of metric or inches is seen in the status bar at the bottom of the screen at the right side. The setting of metric or standard measure can be changed in the top menu bar under Setup Menu selection and then select Test Setup.

The second way to move the table: If the magnification is set for full, the operator can move the cursor to a point on the screen displaying the camera image and click with the right mouse button. The X/Y tables will move so that the point that was clicked on is located under the center point of the screen, at the position of the crosshairs. The magnification of the lens and the setting in the software (See under the Update button) must be the same or the motion will be incorrect.

If the operator is viewing the impression with the zoom at lowest power, the operator should hold down the Shift key when the mouse key is clicked. The motorized tables will adjust and the table will move the proper amount for the clicked-on point to move to the crosshairs. If the operator clicks on the display when the higher power magnification is being used, the X/Y tables will move the image of the center of the screen.

3.11 Traverse Button

Changes the system into Traverse Mode. See Traverse Operations.



Section 5, of this manual for more information.

3.12 Space Bar (on keyboard)

During some X/Y table operations the space bar will stop the tester and tables. The operator will be prompted to return the table to the home position. This can be useful if the operator sees that the indenter is going to

test on one of the clips of the specimen mount, run off the specimen or perform some other undesirable function.

3.13 Indenter Height Adjustment

The height of the diamond off the part in the vise is preset to about ½ mm (0.020”). The height of the diamond can be adjusted easily from within the software as follows:

- 1) Exit Traverse Mode.
- 2) Enter FULL Mode (button on left control panel).
- 3) Set increment to 0.1 mm and click the up or down arrow at the bottom.
- 4) When the diamond is at the desired height, click the ZERO button.

Section 4 Main Menu Bar Functions

4.1 Main Menu Bar: View

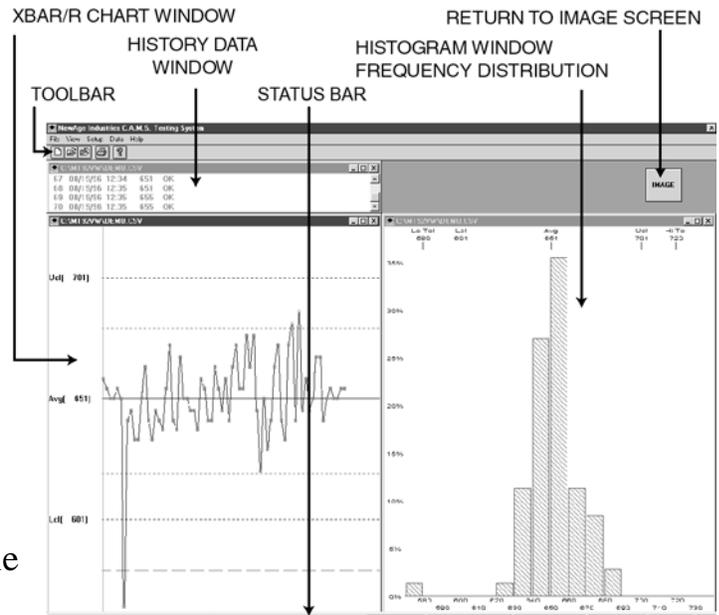
4.1.1 Reports (advanced Statistics Software)

The View Menu consists of 7 different functions: X Bar/R Chart, Histogram, History Data, Tile, Auto Tile, Tool Bar and Status Bar. When activated, a check mark will appear in front of the function listing.



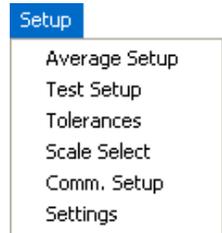
Click on View to display the available functions. Click on the individual functions to activate.

- Reports - Shows the data in the current file, as well as a histogram and X-Bar/R Chart of the data.
- Tile - Resizes and rearranges All open windows so that they fill the screen.
- Auto Tile - Opens all windows, and automatically resizes and rearranges them so that they are restored to the original arrangement.
- The Tool Bar & Status Bar can be turned on and off by clicking on them.
- The Image Selection returns the system to the main testing screen.



4.2 Setup Menu

The Setup Menu consists of six different functions: Average, Test Setup, Tolerances, Scale Select, Communication Setup, and Settings.



4.2.1 Average Menu [Appears when averaging option is enabled]

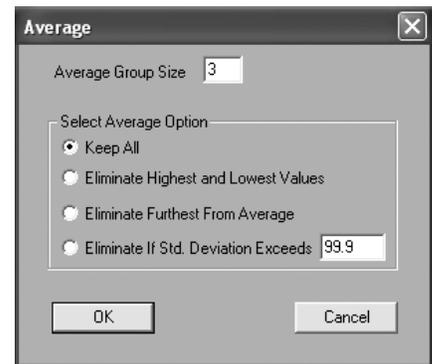
The operator may select to record averages of multiple tests rather than the individual tests. The data file must be empty to perform or change Average Mode selections. If there are tests already in the file, the Set Average Group Size button will not appear activated.

To operate the averaging function open a new file or clear all data out of an existing file. Select the first option from the Setup menu: Average. Enter a value in the average group size box.

After the group size value is entered, some or all of the options will be enabled. To disable the functions enter a "0" value.

NOTE: Each averaging function does something different which will require you to experiment to determine what is best for your data.

The averaging functions explanations are below.



Average Screen showing 3 functions enabled.

Keep All - The default setting calculates an average in the normal manner.

Eliminate Highest and Lowest Values

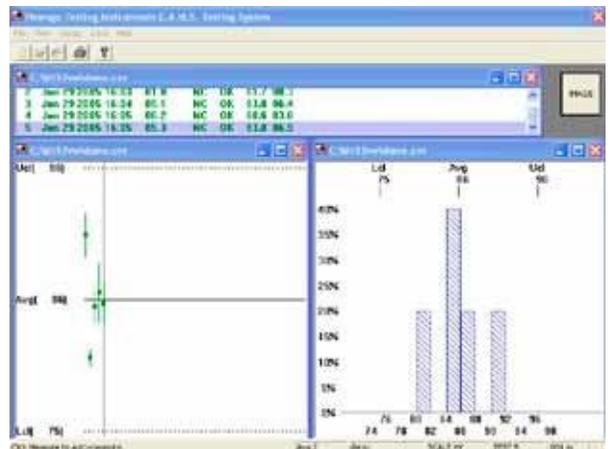
When 3 or more tests are selected to be averaged the system will remove the highest and lowest values from the group average. For example, if the average is set for 5, then 3 results will be averaged. If an average of 2 is selected the function is disabled (see above).

Eliminate furthest from the average

Once the testing is completed the system calculates the average and removes the one test that is furthest from that average. If an average of 2 is selected both values are kept.

Eliminate the furthest from maximum standard deviation - The operator is prompted to enter a maximum standard deviation value. When the testing is done the value furthest from the standard deviation allowable is removed. If all the values fall within the standard deviation then none are removed.

When averaging is running, after every set of results the report menu will appear showing the averaged value and intermediate values in the top window. The X-Bar & R Chart will show a position for the averaged value and a line extending through the average value indicating the range of the results. Note: If one of the results is selected in the X-Bar & R chart it will have a line extending through it from the top to bottom of the screen, and in the data the selected result will be highlighted.



Select the Image button to return to test mode.

4.2.2 Test Setup

The Test Setup is used to enter file parameters that apply to reports and data storage.

The Company Name box allows for up to three rows of data to be input. This name will appear at the top of all the report. The Top Margin box allows the operator to control how many blank lines are entered at the top of the form. Work Order/ File Comment box which

The screenshot shows a 'Test Setup' dialog box with the following fields and options:

- Top Margin: 3
- Company Name: [Text Box]
- Test Facility: [Text Box]
- Network Drive (N:\Directory): [Text Box]
- Work Order / File Comment: [Text Box]
- File Comment: [Text Box]
- Save All (checked)
- Save Optional
- Save None
- Traverse Mapping: None (selected), Fast Mapping, Normal Mapping, Slow Mapping

Buttons: OK, Cancel

also appears at the top of the printed report.

The Traverse Results option enables the operator to set a default for saving traverses. If the operator selects Save Optional, a window will appear prompting the operator to save or not save after the traverse. Otherwise the results are either automatically saved or not depending on the selection.

The Network Drive option allows the operator to automatically copy the current data file to an additional location. The data copy function occurs every time the file is closed.

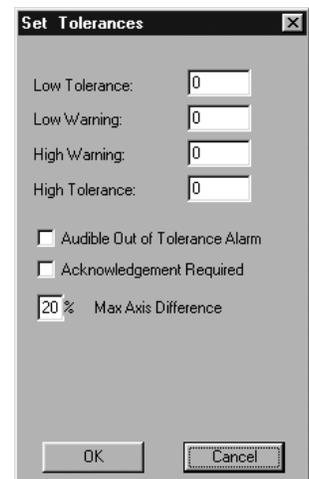
The Traverse Mapping selection allows an operator to create an outline of a test sample in order to improve navigation when selecting multiple traverse locations. Enabling the mapping here, makes the mapping routine prompts appear during the traverse test sequence.

4.2.3 Tolerances

The tolerance selection is for changing tolerances in an existing file. Its operation is exactly the same as the initial file setup. (Refer to the **File open** section.)

NOTE: Entering zero values for both will deactivate the Tolerance function. All readings will then be assigned an "OK" status. Also, once a file has been set up with tolerance settings, changing the tolerances will affect the statistical calculations for all the test results that have been entered to that point.

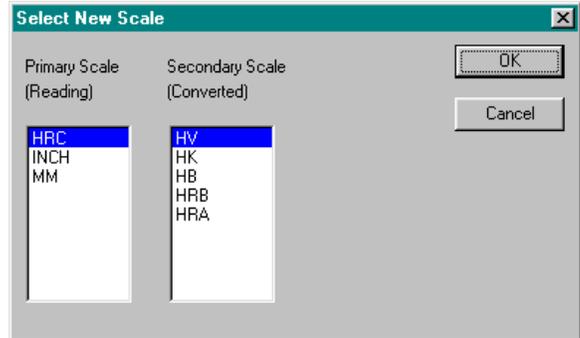
The **audible out-of-tolerance alarm** beeps the operator when a result is obtained that it out of tolerance. When the **acknowledgment required** box is checked the operator will have to acknowledge every time an out-of-tolerance result is produced.



4.2.4 Scale Setup

This is used to select new Primary and/or Converted Scale designations. The function is exactly the same as has been described earlier under the **File open**.

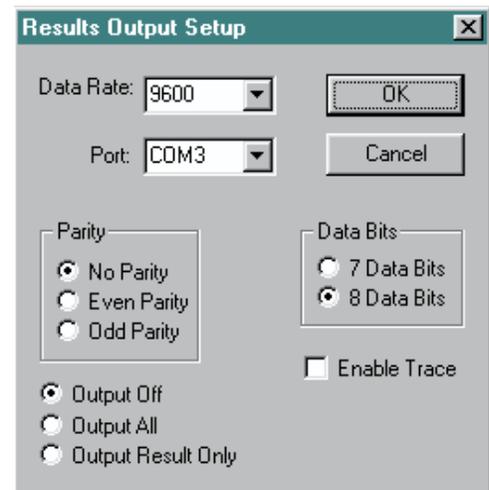
The scale can only be changed while setting up a new file. Once data has begun being collected, you cannot change the scale for the current open file. If you try to do so, a dialog box will appear prompting you to close the current file. To change the scale, clear all data from file (See data menu.)



4.2.5 Communications Setup

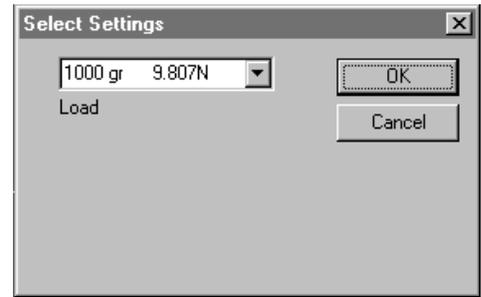
Communications Setup is used to set the parameters of the Serial output for communications with a serial printer or to another computer. At the end of each test (when the result is accepted), the information can be sent through the serial port. The data string selections are Parity, Data Bits, Data Rate (Baud) and Port.

Check boxes are provided for the type of output; if the entire string of the history data is to be sent to the serial port (the same string as it appears in the data line) then select "Output All"; if the "Output Result Only" box is checked, only the actual value accepted is transmitted. If "Output Off" is selected then no data is sent. If the **enable trace** box is checked, the data seen at the lower left part of the toolbar in the main window (File name, Scale, Test number) is added to the test result in the serial output.



4.2.6 Settings

The settings selection allows the operator to set the same load in the computer to the load being used by the tester.

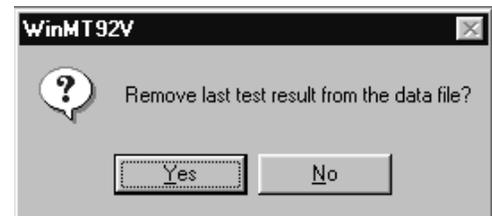


4.3 Main Menu Bar: Data

The Data Menu consists of 4 different functions: **clear Last Test, Clear Test #, Clear all Tests, Statistics, and Part information.**

4.3.1 Clear Last Test

This function is used to clear the last test result from memory. It is the way in which you can delete an erroneous reading caused by machine or operator error and not affect the statistical calculations. This is the same as the UNDO-button

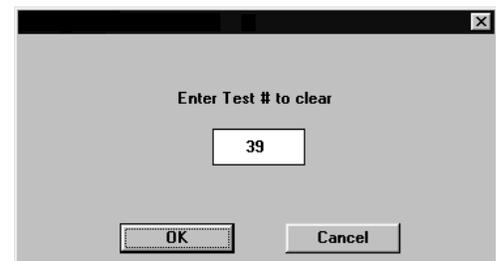


- 1) Select **clear Last Test** from the Data Menu. A dialog box will appear asking you if you are sure that you want to clear the last test taken.
- 2) Select the **Yes** button to delete the last test.

4.3.2 Clear Test Number

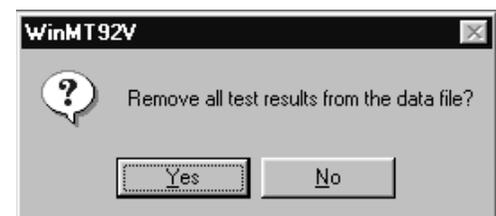
This function is used to clear any of the test results in the current file from memory.

Select **Clear Test #** from the Data Menu. A dialog box will appear asking the operator to enter the test number. Enter the number to be deleted. After the number is entered the operator is prompted to verify that it is the proper number.



4.3.3 Clear all Tests

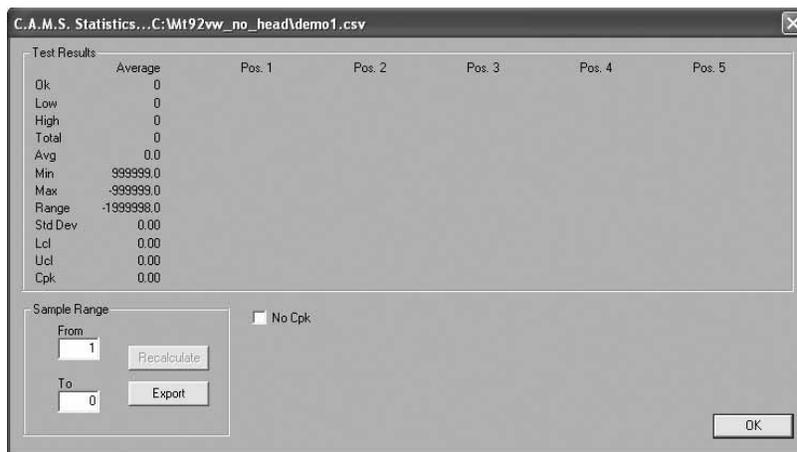
This function is used to clear all of the test results in the current file from memory.



Select **clear all tests** from the Data Menu. A dialog box will appear asking you if you are sure that you want to clear all tests in the current file. Select the **Yes** button to delete all tests.

4.3.4 Statistics

This function provides an on-screen listing of statistics. The operator can select a range of results (at bottom of screen) and the statistics will automatically change to reflect the selected range. "No Cpk" will eliminate this value from the reported information. Any selected range of data can be exported to a comma-delimited .csv file. If Averaging has been implemented under the setup menu, the averaged values and the values comprising the average (up to 5) appear under Position 1, 2, etc.



4.3.5 Part information

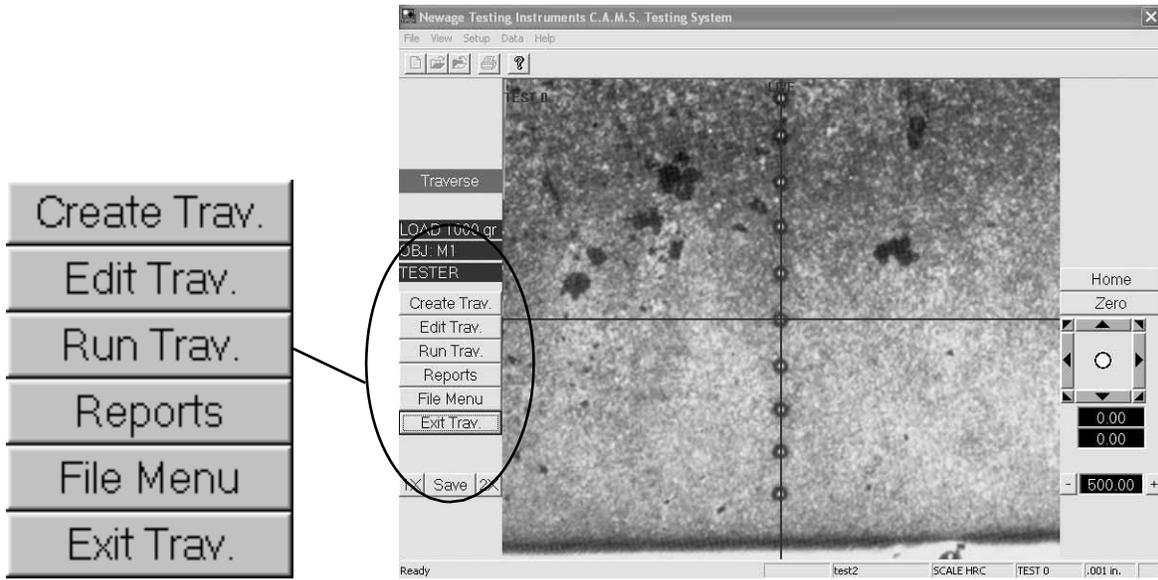
This function is used to enter part information in each file that will appear on the reports (almost the same as appears in creating a new file). Select Part Information from the Data Menu. A dialog box will appear where the operator can enter descriptive information. This function pertains only to single point testing - not traverses. Selecting "Sort by Prompt" will sort data in the printouts by the prompts so commented data can be readily identified.

Differing from the Data File Part Information found in creating a new file, the checkbox for "Prompted" and the "Field Names" button are grayed out so the operator cannot access them.

The image shows a software dialog box titled "Data File Part Information". It features a list of ten input fields on the left, each with a corresponding label: 1. PART #, 2. PART NAME, 3. SPEC ORDER, 4. HEAT NUMBER, 5. LOAD NUMBER, 6. FURNACE NUMBER, 7. LAB NUMBER, 8. COMMENT1, 9. COMMENT2, and 10. COMMENT3. To the right of these fields are several controls: an "OK" button, a "Cancel" button, a "Field Names" button, and two checkboxes labeled "Prompted" and "Sort by Prompt". The dialog box has a standard Windows-style title bar with a close button in the top right corner.

NOTE: You can type anything you want in the boxes above. This should help you keep track of specific data as you test different parts with different process parameters at different times and days. Remember that if a button is not highlighted you cannot choose that option.

Section 5: Traverse Operations



By pressing the Traverse Button on the single point test mode screen the operator is able to access Traverse procedures. These functions (at left) provide many options for creating, editing and running traverse test procedures and obtaining reports and providing for documentation and descriptive information.

5.1 Create Traverse

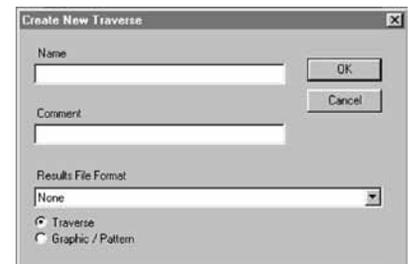
Create Trav.

By pressing the Create button operators can start the process of creating traverse specifications with specific test locations and descriptive information. This is often done to facilitate testing a single type of part or group of parts while keeping the data in its own database. It is best to have a test specimen in place prior to traverse setup so the operator can view the specimen while positioning test points.

Create a name

The first step in creating a traverse specification is providing the name of the test sequence and optionally a comment.

This screen also allows the operator to select the format of the network data storage.



If the arrow at the right side of the Result File Format field is pulled down, three options appear: None, Block Record, and Row Record. If “None” is selected then there is no network record. If “Block Record” is selected then the data is stored in Column format so

that each record has data extending vertically. If “Row Record” is selected then the Data is stored so that each record extends horizontally in a row format. Data is stored in folder C:\MT92VW\MULTUSER.

Another selection in the Create New Traverse window is the selection for Traverse vs. Graphic Mode Traverse. The Traverse is the standard mode. If the Graphic Mode option has been purchased please refer to the Appendices for a description.

Part Information Field Names

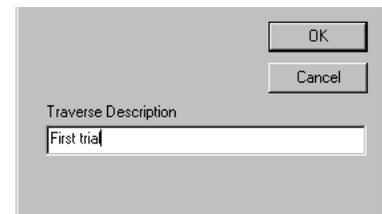
This screen allows the operator to setup unique labels for the descriptive data that can be entered during the actual testing, e.g. "PART#" can be changed to "MODEL#". To change the labels enter new labels and press the change defaults button and the operator will be prompted to confirm the entries. If the operator is in the middle of changing the defaults, he can revert back to the previous values with the USE DEFAULTS as long as he has not confirmed the changes.



The screenshot shows a dialog box with ten numbered input fields: 1. PART NAME, 2. SPEC ORDER, 3. HEAT NUMBER, 4. LOAD NUMBER, 5. FURNACE NUMBER, 6. LAB NUMBER, 7. COMMENT1, 8. COMMENT2, 9. COMMENT3. On the right side, there are three buttons: "Cancel" at the top, "Use Defaults" in the middle, and "Change Defaults" at the bottom.

Traverse Test Description

The operator will have an opportunity to enter a description for traverse #1 of this setup. If multiple traverses are created in one file, then the operator can give each traverse a distinct name, so later the operator who is running the traverse knows which traverse location or type is about to be done



The screenshot shows a dialog box titled "Traverse Description". It contains a text input field with the text "First trial" entered. At the top right, there are two buttons: "OK" and "Cancel".

Move to Origin

The operator must now move the table to align the edge of the part to the origin (the beginning point at the very edge of the test specimen. Use the low magnification and roughly position the specimen. Use the arrow keys or click with the mouse to move the specimen around. The increments of table motion can be changed with the buttons below the arrows. (See Section 3.10)

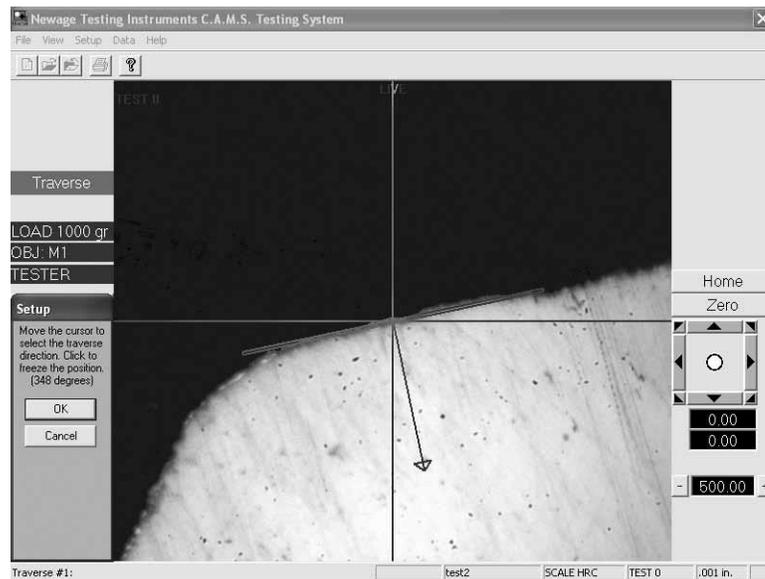
Move the specimen until the edge is precisely located in the crosshairs. The edge of the specimen does not need to be perpendicular to the travel of the motors. After positioning the origin select OK from the Prompt.



The screenshot shows a dialog box titled "Traverse Setup". It contains the text "Move the table to the origin, then press OK." At the bottom, there are two buttons: "OK" and "Cancel".

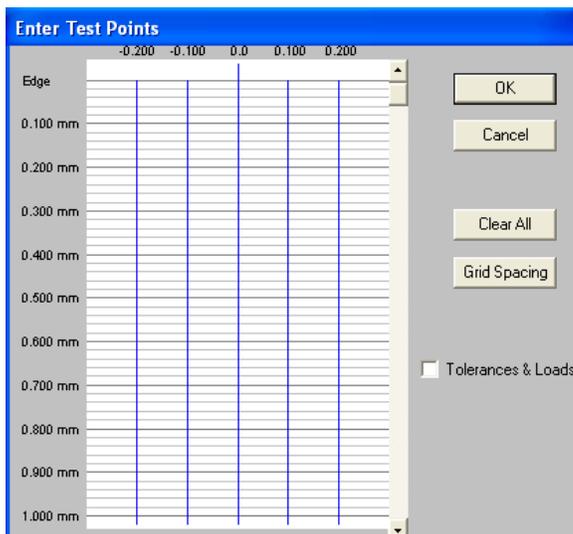
Traverse Direction

The operator must now click and drag on the screen to move the arrow so that it points in the direction that the traverse will follow. The actual degrees shown in the prompt box will change as the operator moves the arrow and will freeze at the final angle when the operator hits the enter key or OK.

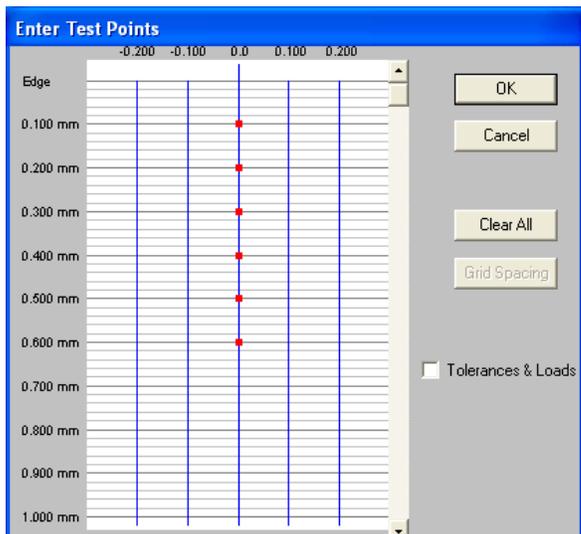


Enter Test Points

The operator must now locate the traverse test points by positioning the cursor in the traverse layout grid and clicking on the grid which will make a red mark. If one point is not in the correct position, it can be removed by clicking on it a second time. All points can be removed by selecting the "Clear All" button.



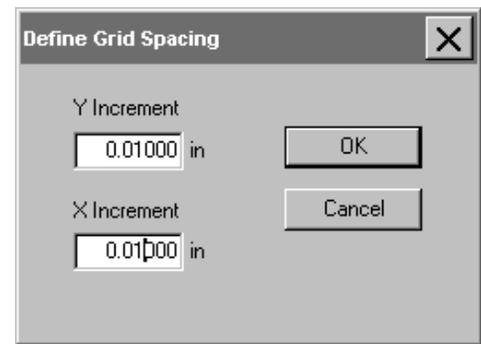
Traverse Test Point Screen



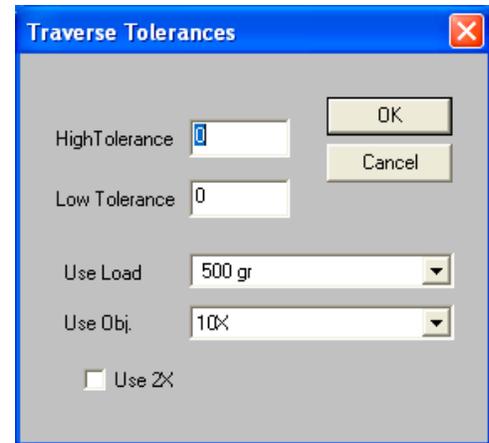
Traverse Test Point Screen after entering test points.

If the operator needs to make tests at increments different from the default setting of the Traverse Layout Grid he can select the Grid Spacing button prior to setting the points. There are two axes available. For standard straight line traverses adjust the Y axis increment only.

Note: Changing the unit of measure from inches to metric must be done in Single Point Test Mode using the Update button.



If the operator selects the "Tolerance & Loads" check box, then after every test point is created the operator will be prompted to enter tolerances values for the test results and/or to change the loads and objectives. The box can be checked or unchecked as any specific test point is created to create tolerances and changed loads for specific points. If the system does not have the optional automatic turret, the "Use Obj." and "Use Load" selections will be grayed out.

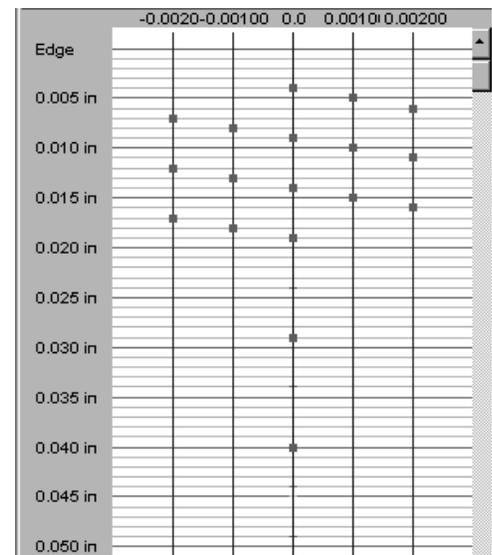


Creating Staggered Traverse

If the operator needs to position tests closer than the minimum distance allowable (twice the distance of any stress deformation or fractures so that there is no overlap of deformation) for a given load, the operator must stagger the tests so they maintain the appropriate distance but they still step from the surface in the correct increments.

To create a staggered traverse select the Grid spacing and select the values desired for both the Y and X axes. Position the first point closest to the surface and the next should be offset laterally by at least the minimum distance and stepped one increment deeper. This procedure is repeated a number of times. To keep the path of the traverse perpendicular to the surface as much as possible, the sideways offset can be reset to the first test after the minimum distance has been reached.

For example: Below is a Staggered traverse sequence in .001" increments from the surface where the minimum distance between points is .005" and the first test is located at .004" from the edge of the specimen. The next is shifted to the right by .005" and back from



Grid spacing for staggered traverses

the edge by .001” more. The third test is offset the same amount. The next test point is moved to the left by .020” and back by .001” to start a new row then the .005” offsets are repeated. Finally at the end of the traverse is created in a straight line. Note: each test is .001” farther from the Edge position than the last but each is located at .005” from the others.

Traverse Setup: Effective Case Hardness Values:

The operators are next prompted to enter the desired effective case hardness values they are seeking (in Rockwell scale hardness numbers and the maximum and minimum effective depth tolerances (in thousandths of an inch). Up to three case hardness values can be entered for each file; each having its own effective depth tolerances.

Additionally, Surface and Core values can be entered with their related depth tolerances. Finally a Quit value may be entered which will end a traverse sequence if this value is reached. The Surface, Core and Quit values are not used in the effective case depth graphs or case depth calculations, just reported as results.

There are check boxes for User Defined, Nitride Case, Eht Case, Rht Case and Nht Case. User Defined is the Standard and default setting.

With the box for Nitride Case checked the system will add 100 Vickers points to the core value and use this sum as the case hardness to calculate the depth. If no core value is generated then the last result is used in its place. The Eht, Rht, and Nht Cases all calculate the case depths per ISO and DIN specifications.

There is also a button labeled "Change Defaults." If the case hardness values in this screen are changed then selecting the Change Defaults button will cause all following traverse setups to automatically use the same defaults (unless it is changed manually.)

Dual Traverse Mode

Setting up a second traverse will enable the operator to perform multiple traverses in the same specification or optionally select only one of the traverses to run. When it is selected the Traverse setup routine repeats.

The screenshot shows the 'Traverse Setup' dialog box with the following fields and options:

- Case Hardness:** A table with columns 'Hardness', 'Min Case', and 'Max Case'. It contains three rows of input fields with values: (50.0, 0.00000, 0.00000), (40.0, 0.00000, 0.00000), and (30.0, 0.00000, 0.00000).
- Test Type:** Radio buttons for 'User Defined (Standard)', 'Nitrided Case (Core + 100. HV)', 'Eht Case (ISO/DIN)', 'Rht Case (ISO/DIN)', and 'Nht Case (ISO/DIN)'. 'User Defined (Standard)' is selected.
- Surface Test:** A table with columns 'Offset', 'Min Hard', and 'Max Hard'. It contains three rows of input fields with values: (0.00000, 0.0, 0.0), (0.00000, 0.0, 0.0), and (0.00000, 0.0, 0.0).
- Core Tests:** A table with columns 'Offset', 'Min Hard', and 'Max Hard'. It contains three rows of input fields with values: (0.00000, 0.0, 0.0), (0.00000, 0.0, 0.0), and (0.00000, 0.0, 0.0).
- Quit Value:** An input field with the value 20.0.
- Buttons:** 'Change Defaults', 'OK', and 'Cancel'.

The screenshot shows a dialog box with the text 'Would you like to create another traverse?' and three buttons: 'Yes', 'No', and 'Cancel'.

Save Traverse

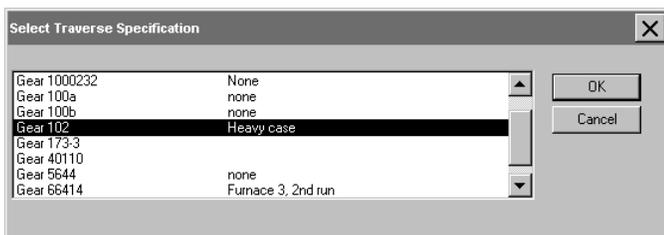
After setting up the traverse the operator can select to save or cancel the setup. The system will revert to the Traverse Menu.



5.2 Edit Traverse

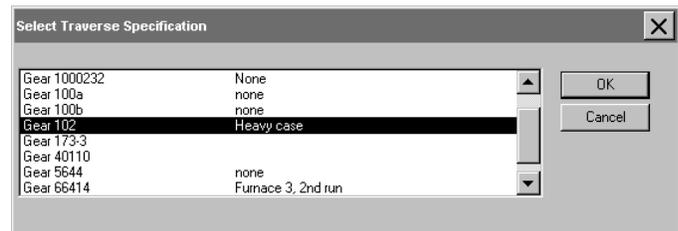
To edit a traverse the operator must select the Traverse button from the Main screen and then choose the Edit button. The screen allows the operator to select which setup to choose. After a traverse specification has been selected the same procedure for editing a traverse specification is used as is used for creating. Please refer to previous section

The operator must move through the entire procedure until the Save function appears at the end in order to save the edited Specification information. If the operator backs out by selecting Cancel or Escape, the edited data will not be saved.



5.3 Run Traverse

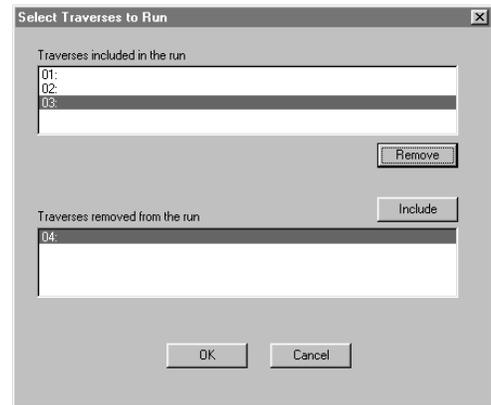
When the operator is in Traverse Mode and selects "Run Traverse" button, he is prompted for the traverse specification to choose. Click on the file name and the "OK" button.



Next the Data Part File Information Screen will appear. This information appears on the printouts and is stored in the data file. Just as in the original file creation the data and the labels can all be changed. The Sort-by-Prompt checkbox enables sorting data in the printouts by the prompts so commented data can be more readily identified.



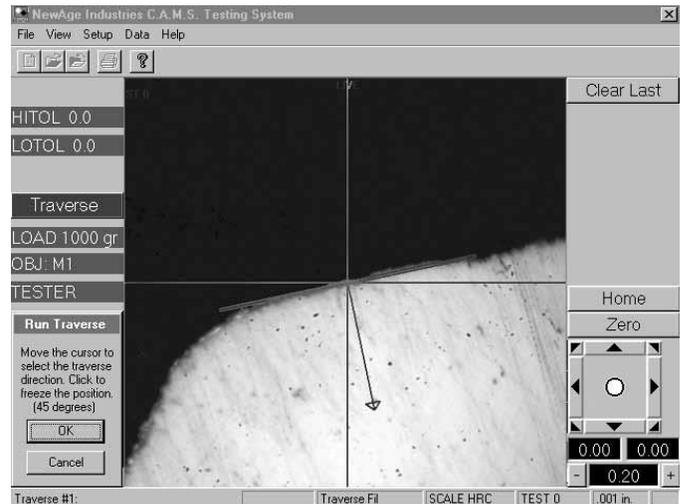
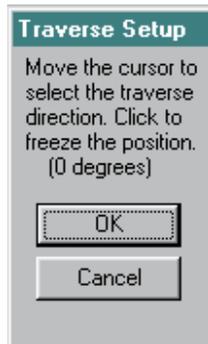
If there are multiple traverses created in a single setup files, the operator is prompted to select which of them to remove from this particular this traverse sequence.



Next the operator is prompted to locate the “origin” of the motor test sequence. This origin location is usually the edge of the part, from which the traverse will proceed. Select the OK button.



Next orient the direction of the traverse. In the picture below you can see the test being oriented at 326 degrees which is off to the lower right on the screen. To move the traverse arrow, move your mouse over the screen in the location you desire and then right click the mouse. The arrow will follow the mouse clicks. The center of the line that meets the edge of the specimen has a clear area in the middle for improved positioning of the surface. Click the mouse to freeze the arrow position. Then select OK.



If multiple traverses are setup to be performed, the operator will be prompted to find the traverse origin and angle for the remaining traverses; the tester will perform all traverses automatically.

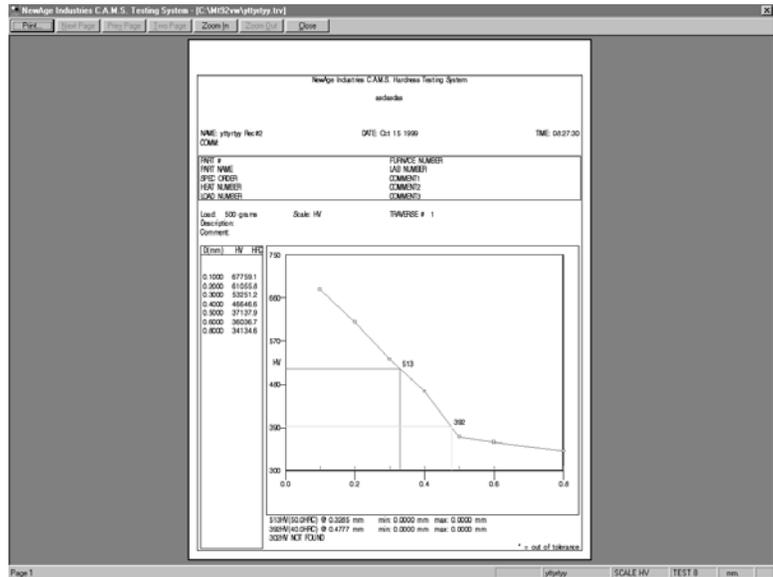
Next the operator is prompted to OK the start of the test procedure as seen at right. At this point the traverse testing commences and all the tests are performed and the motorized tables bring the specimen back to the camera position when complete.



Once the comment screen is OK'd a small view of the Graph of the results is displayed. The operator can Zoom in to see details, see all of the graphs in sequence (in multiple traverse operations) or see both traverses side-by-side

(in multiple traverse operations), and print the results. Comments appear in various places on the results and the case depth results are printed at the bottom.

The lines indicating the location of the effective case depth locations are green if the result is at the correct location as defined in the tolerances or in red, if not. If no tolerances are used then the lines are green. Individual results that are out of tolerance are indicated with an asterisk.



See next page for an almost full-size printout of the report.

asdasdas

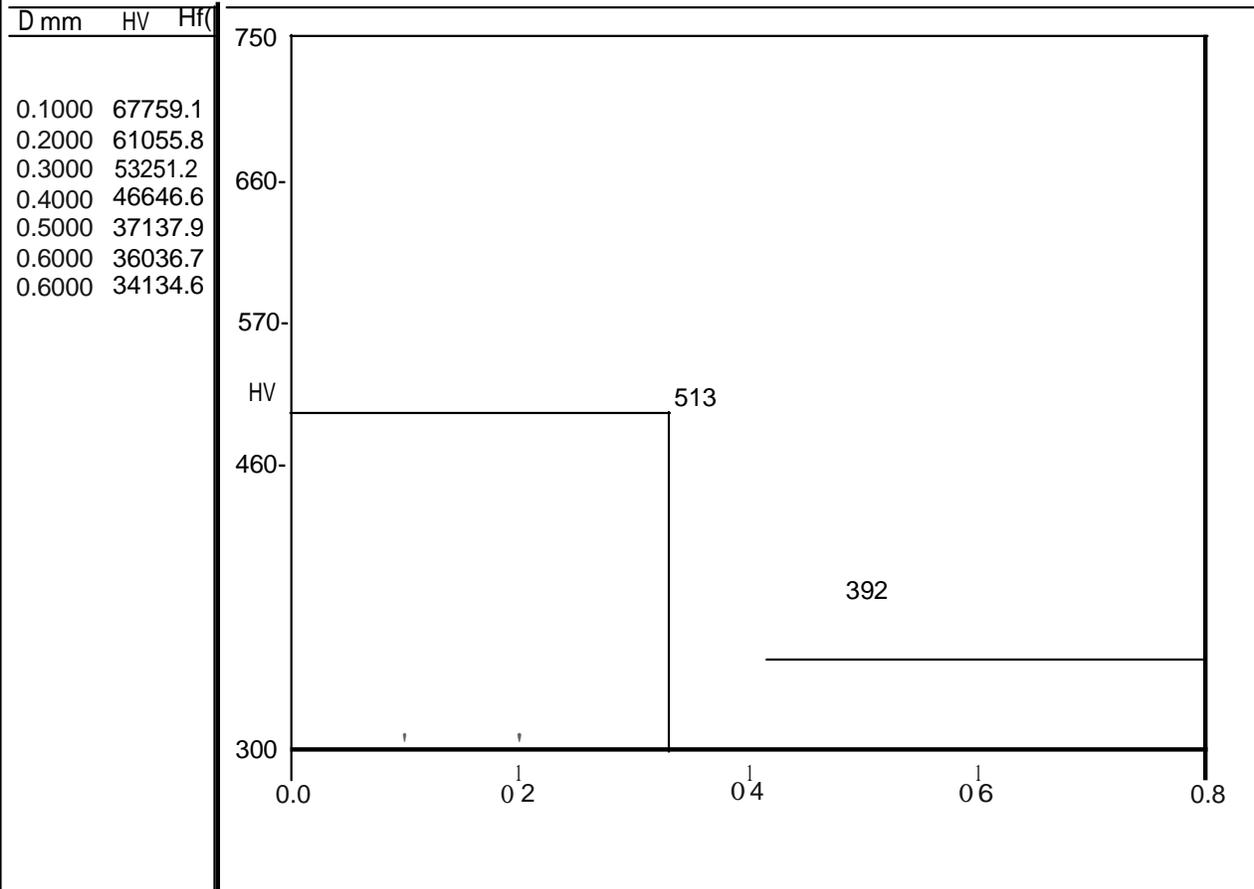
NIME: ytttytyy Fleel'2
CD.IM:

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IIME:08:27:30

FUJIT >IAME SEI: (JIJER HEAT NUMBER LQID NUMBER	FURE NUMBER IAB NUMBER CD.IMENT1 CD.IMENT2 CD.IMENT3
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Imd: 500 garro Scale: HV 11\o\IERSE t 1
 DescriptOn:
 Comment

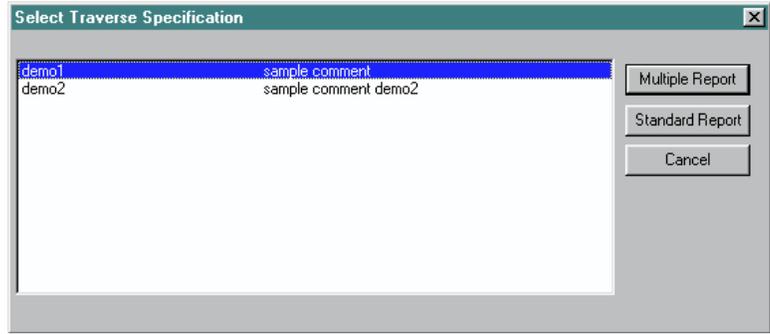


513HV(50.0HAC) @ 0.3285 mm min: 0.0000 mm max: 0.0000 mm
 392HV(40.0HAC) @ 0.4777 mm min: 0.0000 mm max: 0.0000 mm
 302HV Ia faJNJ

• = out of tolerance

5.4 Traverse Reports

The Traverse Reports Button provides the same reports as appear after a traverse, and there are options for more advanced reporting. To see the reports select the Traverse then Reports button and select a Traverse Specification.



5.4.1 Standard Reports (See following pages)

If the operator selects Standard Reports after selecting a traverse specification, a screen will present a list of all the traverses taken using that specification in chronological order. Each traverse selection lists the record number, date, time, and comment. After selecting an individual report, select to view a combined or standard “display” report. See next page to view samples.

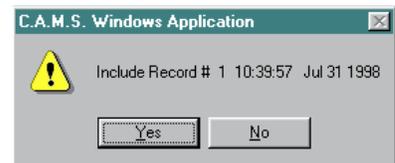


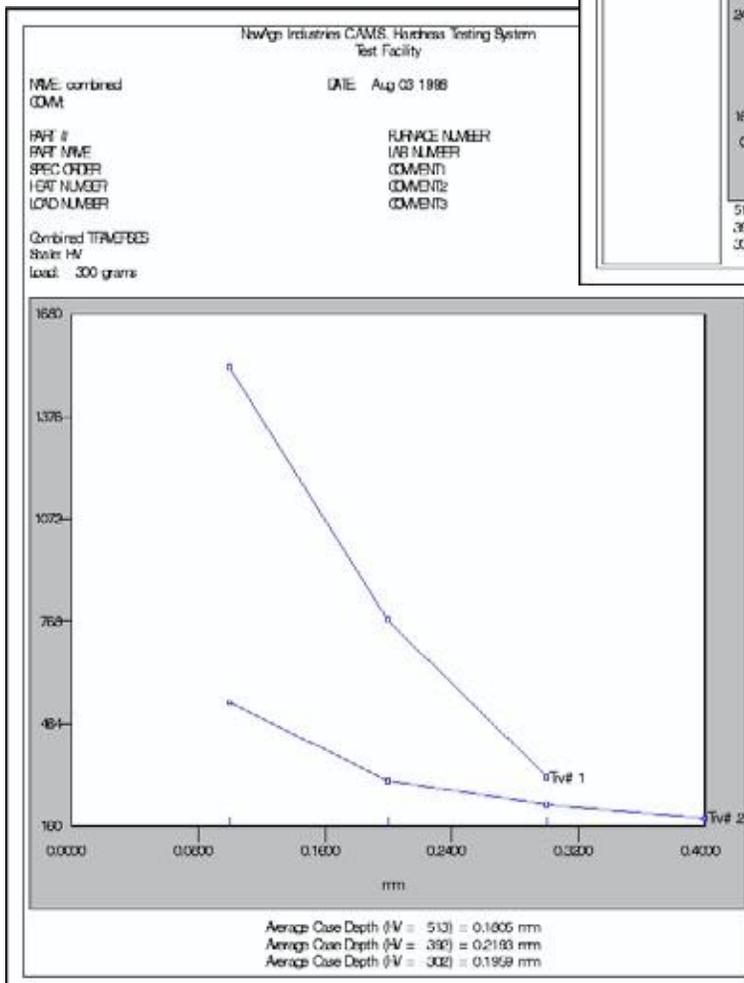
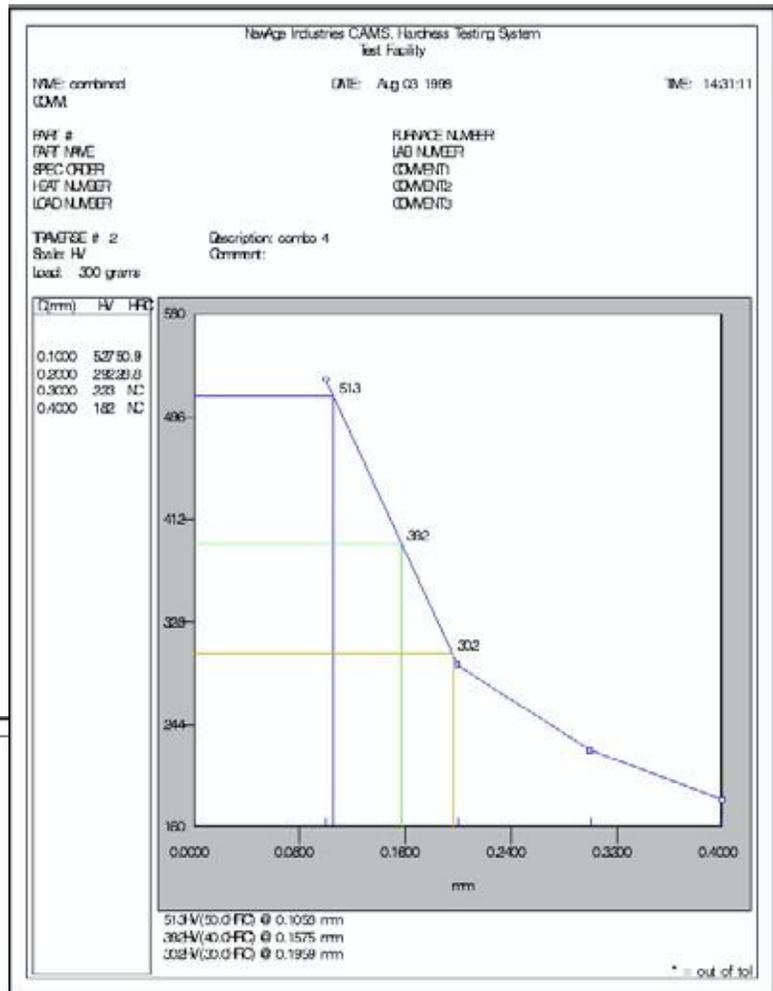
5.4.2 Multiple Reports (See following pages)

If the operator selects multiple reports after selecting the basic traverse specification, he will be allowed to select the specific traverse (if the specification had a combined traverse there may be more than one). Then the operator will be prompted sequentially to include each of the traverse records stored in the file.



There are three types of Multiple Reports: Graph, Chart, and Display. Graph shows every traverse in the file simultaneously. The Chart Report shows a Graph of the Case depths plotting the case depths side-by-side. The Display Report shows the case depths in a tabular format





The Display Report, above, shows the standard report that appears after testing. If multiple traverses are setup under this traverse specification then two pages will be printed out showing each curve.

The Combined Report, left, will display all the curves at the same time in instances where the report specification calls for more than one traverse.

```

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      COUIGtd G4Jibl ot TdlTtUuf 1
      RetOEdf 4 Jul 31 1998 U S7 "
      R'COU** 2 .11.1131 11118 u s6 "
      eot4f 3 Jul 31 1990 u S7
      -kcoEdf 1 Jul 31 1. u ss "
  
```

Graph Report

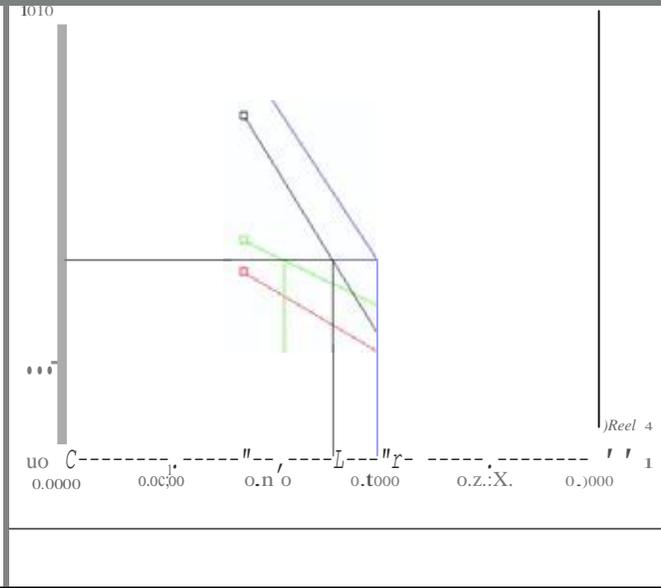


Chart Report

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 0 4 ttm II:St 59
) JUL)1 1998 U S7 19
 : Jul)1 1998 U S7 19
 I ol(1.)l 1??0 P: S B

NewAge Industries C.A.H.S. Hardness Testing System
Test Facility

IUJol: aol

Ru>o. ., ot c...c PtpbtI tot;
 HIJI SSr RV \$13 IIV 2 IIV 302
 Tr.c C:ul nr:ml3(aa)
 U:n: n 0.00000 0.1*12 0.1U1J
 U:st:11 0.UUS 0.1 3 0:2011
 U:SG:11 0.114.4 0.1t'itU
 U:SS:Sl 0.149*0 0.11*064 0.1062)

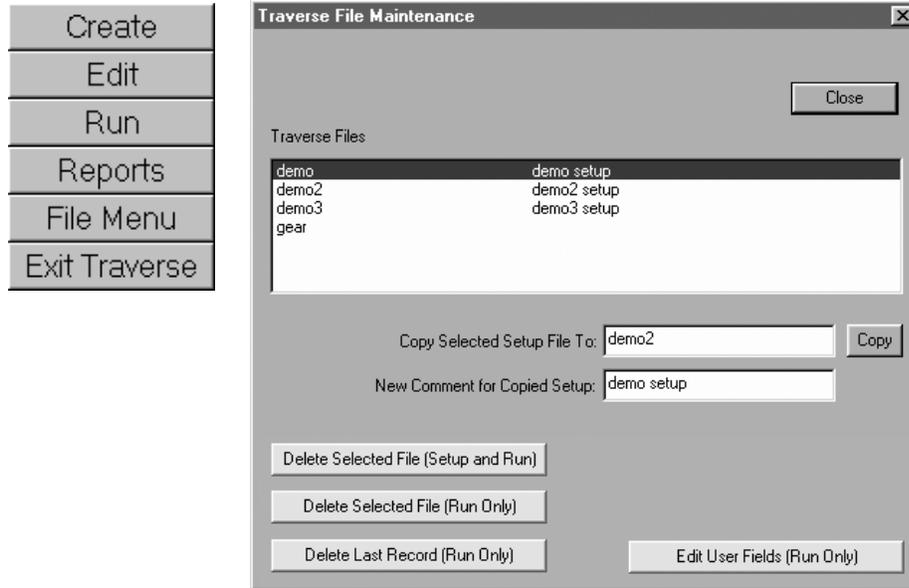
Date	U:st:11	U:SG:11	U:SS:Sl
Jul)1 1998	0.UUS	0.1 3	0.1062)
Jul)1 1998	0.114.4	0.1t'itU	
Jul)1 1990	0.149*0	0.11*064	0.1062)

Display Report

5.5 Traverse File Menu (Maintenance)

The operator can select the Traverse "File Menu" button in order to handle maintenance issues such as copying traverse sequence files or deleting them. The screen shows a list of traverse files and their descriptions.

By Selecting a traverse specification file name the operator can select to delete the file setup (Setup and Run), delete all the data (Run Only), or delete the last record in the file (Run Only).



The operator can also copy the file setup sequence to another name to replicate the setup details and change the comment for this file. The Copy button must be selected after a new name is provided for the file.

The Edit User Fields button allows the operator to go into the File Part information Entries and edit the content that was entered during the testing process.

Select the Close button to exit.

Section 6: Machine Calibration Checking

- Check the accuracy and repeatability of the tester using microhardness test blocks, NIST-traceable Rockwell C scale test blocks or Newage/Yamamoto TNY Rockwell C scale test blocks. Take 5 readings in each quadrant of the test block.
- The allowable range of repeatability from those readings should be within HRC 1.7 pts. at HRC 60, (or equivalent microhardness values) and within HRC 3.0 at HRC 30 (or equivalent microhardness values). This is based on being equivalent to the specification for HV1000 in ASTM E-384.
- The allowable range of accuracy for the machine is based on the average of five tests in each area. They should be within 1.1 pts. of the test block value at HRC 60 and within 2.25 pts. at HRC 30.
- Refer to Calibration and Zero Set Key for instructions if the tester needs adjustment.

Calibration:

NOTE: We recommend calling the factory but explain the basic concepts below.

The file C:\Mt92vw\Mt91.dat contains the values used for calibration. Typically it contains three lines, as follows:

```
30.97 16.502  
45.8 12.56981  
62.03 7.864
```

Where 30.97, 45.8 and 62.03 are the 3 test blocks used and 16.502, 12.56981 and 7.864 are the average depths (microns) of the tests on the test blocks. Removing the file mt91.dat (or its entries) will cause the tester to operate in un-calibrated mode and cause the depths to be reported. At this point MT91.dat is created and/or edited by hand. Up to 18 test block values and associated depths can be used, but HRC 30, 45 and 60 blocks should be enough. These values can be easily acquired by creating a "Test Blocks" traverse (check box in first dialog when creating new traverse), which will run multiple tests on multiple blocks, prompt for their hardness value and tabulate the results.

Section 7: Troubleshooting Guide

General Visual Type Problems (No picture/Poor Picture)

- Check to make certain the screen saver is turned off, as it can affect the camera sometimes.
- Make certain that all video system components are plugged in, turned on, and properly connected with one another.
- Make certain that the contrast settings (update button) and are set properly.
- Check the position of the specimen to make certain that the mounting clips have not loosened, making the specimen seat at an angle or at a higher position.
- Check the focus of the camera lens. This should be set while set at the maximum power setting to ensure that the lens is in focus for the entire travel of the zoom.
- Make certain that the test head is adjusted to a height of .030 -.060" above the specimen.

CROSSHAIR & CAMERA/INDENTER OFFSET POSITIONING PROBLEMS

- Perform the camera/indenter offset routine in the Manual Test Mode.
- If the offset changes in one or both axes, make certain the focus adjustment on the lens is securely tight. If it is not, the test head shroud may have to be removed and the lens tightened.
- Make certain that the table, specimen mount, specimen, and indenter are all tight.

- Make certain the motors are securely tightened onto the shafts of the lead screws on the tables. Apply light pressure to the table by hand and move the table using the arrow keys. If this easily magnifies the error, tighten the motor/table clamps after removing the console shroud.
- Test the table bearings by spinning the ends of the lead screws (after removing the console shroud.) There should be no slack between the rotation of the lead screw and the movement of the table.
- Make certain there is nothing jamming the motion of the table while it travels; especially from camera to indenter position.
- If there is a grinding sound, apply lead screw oil to the lead screws. Move the tables back and forth and then re-check for positioning problems. If they persist, contact the factory.
- If all the aforementioned procedures have been followed, run the X/Y table back and forth in each axis, by varying distances, to see if there is an offset. Start the movement from a clearly defined position such as that of a test penetration. Also, run the manual test procedure a number of times to determine the size and direction of the offset.

PROGRAM WILL NOT PROCEED

- Make certain a valid key is being used.
- Check to see if the [CURSOR LOCK] and/or the [CAPS LOCK] are on. If so, unlock.
- Use the **esc** escape key to back the program up to the desired place.
- Reboot the system, and check the position of the motorized tables to verify that they have not over-traveled the limit switches.
- Make certain power is turned on to the motorized tables.
- Check all fuses and connections on each of the different components.

If a persistent problem exists, contact the factory.

INACCURATE OR NON-REPEATABLE TEST RESULTS

- Check the test results on a Yamamoto quality test block at various areas of the block. If the results are not acceptable, check the following:
- Make certain the specimen, mount, tables and test head are all tightened.

- Check the height of the specimen from the indenter. This should be between .030 and .060". If it is much higher, it can read high. If set too close to the specimen surface the indenter can have an impact effect and the results will lose repeatability.
- Check that the indenter area and shroud are clean with no damage. Any residue on the specimen in the area of the indenter or on the indenter itself must be removed.
- Make certain the specimen mount is holding the specimen in a level position. Be sure that each clip screw is positioned at an equal height.

Section 8: Maintenance, Service & Repairs

8.1 Maintenance

Clean the indenter area with a brush or lint-free rag and residue-free, non-water base cleaner to remove gums, oils, and particulate matter buildup.

NOTE: No other maintenance procedures are required or recommended.

8.2 Service

Call our Technical Customer Service Team to make arrangements for service.

8.3 Moving the Tester

Follow the directions for packing of the computer and parking the disk found in the PC manual before moving the computer.

The Test Head should be kept in an upright position and impact should be avoided.

The other components should be disconnected and handled with normal care.

8.4 Packing The Tester For Shipment

If the Ametek Newage Service Department has been called to confirm the unit needs to be returned:

Caution: Packing peanuts and other loose fill which allows shifting of the contents is Not equivalent to bubble pack. The test head is heavy and fragile, so great care must be taken to provide adequate padding.

- 5) Pack the entire X-Y table, with cables and motor controller in a crate with the padding as specified previously.
- 7) Mark the box as “Fragile” and insure for the value of the components you are shipping back.
- 8) Include a contact name, phone number, and brief description of the problem.
- 9) Ship to Newage address on last page.

Appendix A1:

Specifications

Power: Clean & stable 110V, 60HZ, 6A, single 3-prong outlet.

Test cycle speed: 7 seconds for single test cycle with test specimen located under indenter; 20 seconds approximately including the table travel from camera to indenter and back.

Accuracy & Repeatability: Within those prescribed by ASTM E18 for Rockwell Hardness Testing Systems (using test blocks calibrated for micro loads.)

Method of testing: Depth measurement similar to ASTM E18 but with non-standard loads and indenter. Readout values given correspond to Rockwell C values and are designated as HRC.

Limited Warranty

Should Newage Testing Instruments, Inc. equipment require service, we will repair or replace, at our option, any part or product which upon examination by a Newage service technician, shows to be defective in material or workmanship. This warranty is extended to the original purchaser only, for a period of one year (12 months) from owner's date of purchase. Excluded

from this warranty are any parts that are to be replaced as part of normal product operation, such as indenters.

This warranty IS NOT VALID IF THE INSTRUMENT HAS BEEN MODIFIED, MISUSED OR DAMAGED in any way. This includes damage caused by disassembly by any person other than an authorized Newage service technician or damage from returns during shipping.

Please read all operating instructions supplied with the instrument prior to operation.

Ametek Newage Testing Instruments, Inc. is not responsible in any way for losses, damage, or other form of consequential damage resulting from equipment failure or use.



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