



C.A.M.S.[®]
WITH STANDARD OPERATION

Operation Manual
C.A.M.S._Win V.3.2

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SECTION 1: SYSTEM SETUP

1.1 Introduction

Welcome to the Newage Testing Instruments' C.A.M.S.[®]_WIN Program Windows-based image acquisition and measurement software for C.A.M.S.[®] (Computer Optical Measurement System) and for other metallographic measurement needs. This system, composed of hardware and software, was developed to enhance the capabilities of your microhardness tester by allowing you to improve or optionally automate the measurement of test impressions, reduce operator influence on test results, and transfer test results directly to a PC for real time, on-screen data management.

It is assumed that the operator has a basic understanding of Windows operating system and of PCs.

The B.O.S.S. computer program is file based. All setup parameters (such as hardness scale, tolerance limits, part information, etc.) are saved with the data file that contains the test results.

1.2 What's Included

The complete C.A.M.S.[®]_WIN package consists of :

- 1 - 3.5" Program Diskette
- 1 - CD-rom program disk
- 1 - Video camera and possibly an adapter for attachment
- 1 - Video Acquisition Board with connectors
- 1 - Operation Manual
- 1 - Computer System with monitor (unless supplied by customer)

OPTIONALLY

- Self leveling vise
- Other options for automating microhardness testing.

1.3 Minimum System Requirements

Pentium or Celeron processor running WindowsXP Professional[®] or Windows2000[®] with at least a 1.7 GHz operating speed, available PCI slot, two available serial com ports, any size hard drive, USB II, VGA color monitor, video card with "Direct Draw" capability, 3.5" high density floppy drive (non mandatory), CD ROM, keyboard and mouse. Please note that an incompatibility may exist between our software / hardware and some brands of computer. For best results provide a Dell[®] brand PC or check with the factory on the compatibility of your computer prior to sending it in

1.4 Principles of Operation

The Newage Instruments C.A.M.S. Computer Assisted Measuring System uses a video camera connected to a PC to view and optionally measure test impressions made by a microhardness tester. It operates independently of the tester that it is connected to. The PC-does not need to control any of the mechanical or electronic functions of the hardness tester itself, although it may be setup to do so, as well as controlling other provided components. Please refer to the following sections for tester setup and operation.

C.A.M.S. may be used in either manual or automatic measuring mode. In manual mode, the operator locates the tips of the impressions by positioning measuring points on the monitor screen which the

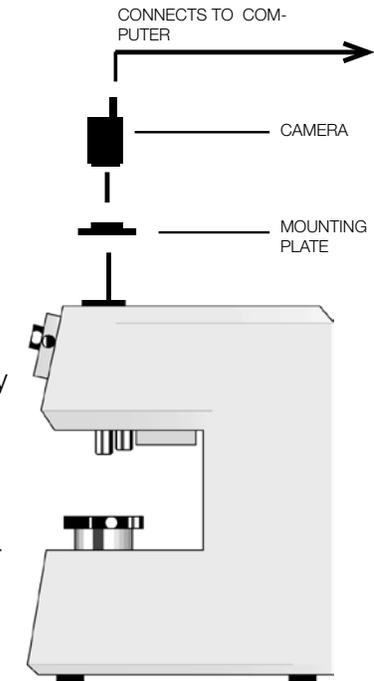
program uses to calculate hardness values or measurement. In automatic mode, the system scans the impression and located the measuring points automatically. The accuracy achieved, especially in the optional automatic measuring mode, can be greatly influenced by the surface condition of the test piece as it would for standard optical testing. The reflective properties of the material, grinding marks, scale, etc, may affect the performance of the system in the automatic mode as well as the operator's ability to determine accurate measuring points in the manual mode. A polished surface will yield the best results.

1.5 C.A.M.S. Hardware Installation

1.5.1 C.A.M.S. Camera Installation:

1.5.1.1 Testers with Camera Port

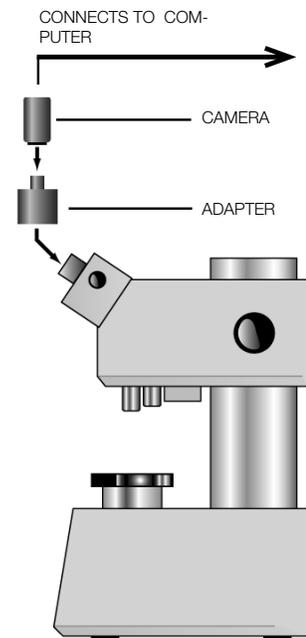
- 1) Access the tester's video camera mounting port.
- 2) Install the camera adapter. (Installation on field units may require drilling & tapping of mounting holes.)
- 3) Mount the camera into the bracket so that the camera model number, is "right side up" (so you can read it.) The camera should be "square" to the rest of the tester for proper image alignment.
- 4) Final alignment of the camera can be performed with a test impression on the PC screen in the Test mode. See the following operation section for further instructions.



TYPICAL INSTALLATION WITH EXISTING CAMERA PORT

1.5.1.2 Testers with Eyepiece Only

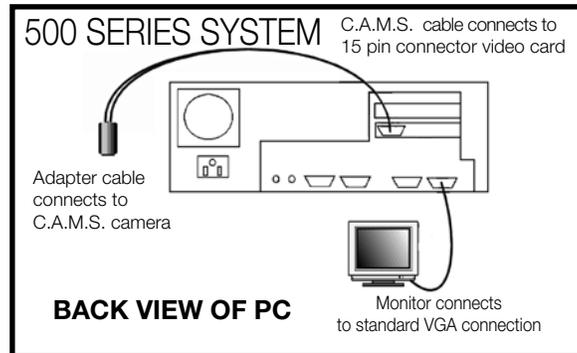
- 1) Install the camera adapter over the tester eyepiece. Position it so that the thumbscrew is to the left or right side.
- 2) Mount the camera into the adapter so that the camera model number, is "right side up" (so you can read it.) The camera should be "square" to the rest of the tester for proper image alignment.
- 3) Final alignment of the camera can be performed with a test impression on the PC screen in the Test mode. Loosen the thumbscrew to move the eyepiece adapter clockwise or counter-clockwise. See the following operation section for instructions for the Test mode.



TYPICAL INSTALLATION WITH EYEPIECE ADAPTER

1.5.1.3 Connections

- 1) Attach all power and connecting cables as shown below: NOTE: The video system uses 2 connectors that plug into the back of the PC. The main connector goes to the camera and has a jumper connector that is plugged in below it.



NOTE:-Computer Connectors May Vary.

1.6 C.A.M.S. Software Installation (with NTSC Camera Systems)

1.6.1 Windows 2000 or XP

NOTE: INSTALL THE SOFTWARE BEFORE INSERTING THE CARD INTO CPU.

- 1) To install the CAMS_WIN program, run the “setup.exe” file on the installation CD. The prompts will guide the entire process. At the end there will be a prompt to insert a diskette in drive A:\ which contains setup, calibration information, and updates to the program. The installation program creates a folder “Newage Testing Instruments” with the proper Icon in it and also places the same icon on the desktop for easy program start.



NEWAGE C.A.M.S. PROGRAM ICON

- 2) Update the Register: the file needed is on the “Drivers” folder on the installation CD. Run klinset.exe. Follow the prompts and select 340 as the address and OK to Reboot the Computer.
- 3) When the system comes back at the desktop, shut it down, insert the Video Acquisition Card into an available PCI Slot and turn the Computer ON. When windows finds the card and asks for the driver, browse and point to the “Drivers” folder on the installation CD which contains the proper driver (mv5w2k.inf). When done check in Control Panel for the proper functioning of the Video Acquisition Card - it is in the group Sound and Video or multimedia. Its Interrupt should not be the same as other sound, video or network cards, ideally it should be 9, 10 or 11. If the device has a question mark or an exclamation mark, select it, click on remove then refresh. When it finds it again, select the “Drivers” folder on the installation CD as the source for the driver. If the conflict persist, try moving the board to a new slot or change or disable another device like the sound card or USB that uses the same interrupt.

1.6.2 Testers Communications

If the system includes a tester connected via the serial port COM1, in the Control Panel, the FIFO box should be unchecked. The FIFO box is found in the Control Panel, System, Device Manager, Ports (COM & LPT) Com1, Port Settings, Advanced.

1.6.3 Make an Install/Recovery Diskette

After the system is working properly, the final setup files along with Calibration data can be saved to the Install/Recovery Diskette wit the command Cback.bat. This batch file copies all the pertinent files to the diskette. Using Windows Explorer, view the contents of the C:\MT92VW folder and run the file check.bat. A DOS window opens with the prompt to continue. Insert the diskette in drive A: and press any key and the program does the backup.

1.6.4 DirectX 8.1

If the computer does not have Microsoft DirectX 8.1 software installed and the program requires it, DirectX 8.1 is available on the CD; it can be installed by running the setup file from the folder DirectX8.1

1.6.6 Security Lock Installation

1.6.6.1 USB Key

If the system has a USB Security Lock (Green Key), the drivers for the USB KEY are installed as part of the program installation. Insert the Key, choose the automatic mode, and Windows will display the USB KEY found. Before running the Application, run the Usbkey.reg file found on the CD in the folder KeylockUSB: this will update the registry to search for the lock on the USB ports. Should the system have difficulties installing the drivers, additional drivers for the key are in the folder KeylockUSB.

Note: Plug the Key into all SB ports and install the drivers at this time. Each USB port need the driver installed.

1.6.6.1 Parallel Port Key

If the system has a Parallel Security Lock (Black Dongle), the software for it must be installed; the files are on the floppy disk labelled Keylock or in the folder "Keylockparallel" on the installation CD Run the setupkey.exe file first, follow the prompts, then when done, run the file Everkey.reg, also from the folder "key" on the installation CD. This will update the registry for the lock on LPT1

1.7 Computer Operating System Setup

- 1) The system works best with the video resolution set to: 800 x 600 with High Color (16 bit). The 'Small Fonts' setting must be selected under the Display Properties, Settings screen.

1.8 Initial Software Startup

- 1) Double click the icon to start the program.
- 2) The program will open up using the last data storage file that was in use for holding test results. If no data files have been created, the operator can create a new file. (See Sec 2.1 Create a New File.) Hardness test results are added to the current open data file.

SECTION 2: MENU BAR - FILE HANDLING FUNCTIONS

NOTE BEFORE PROCEEDING: This manual is organized to give the operator instructions to install and use the C.A.M.S. system as quickly as possible. To begin using the unit, read through the manual briefly to get an overview. Then start here with Section 2 to begin actually using the system.

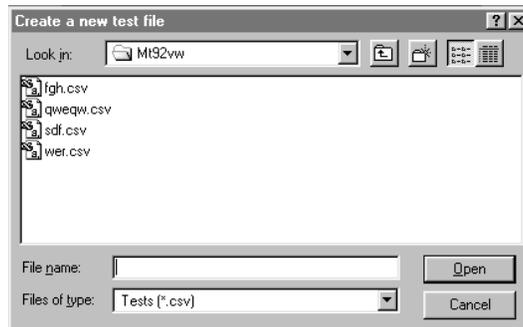
Optional hardware or software options are indicated. If an option is not available, it may be purchased from Newage. Call customer support at 215-526-2200.

The Main Menu Bar at the top of the screen contains 5 selections: File, View, Setup, Data, and Help. In order to best develop the operator's understanding of the system in a sequential manner, the "File" Main Menu selection is described in this section and the rest of the Main Menu selections in Section 4.

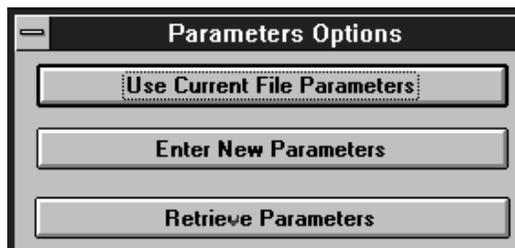
The File submenu selections consist of 7 different functions: New, Open, Close, Print, Print Preview, Print Setup, and Exit, as well as a listing of the last four files that have been in use. They can be accessed with the mouse by clicking on "File" and dragging down to the selection and selecting the desired file function.

2.1 Create a New File

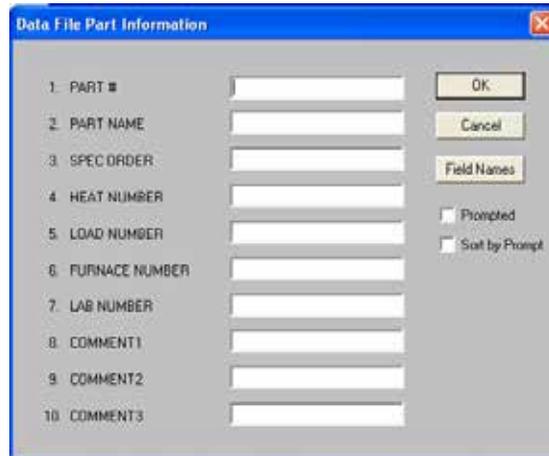
- 1) Select "New" from the File menu in the main menu at the top of the screen. The "Create a New Test File" dialog box will appear.
- 2) Type in the name of the file using the .csv extension and select the OK button (or press Enter.)



- 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.

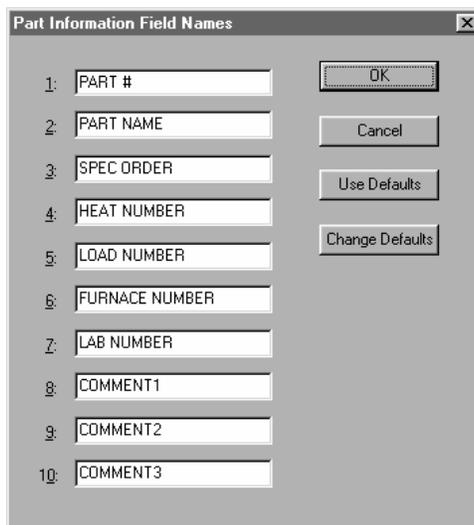


If the "Enter New Parameters" selection has been chosen, the operator will then be prompted for "Data Part File Information". This information can be used to keep track of Part Number, Description, Order Number, Comments, etc., related to the data file just created. These headings will appear on printouts.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

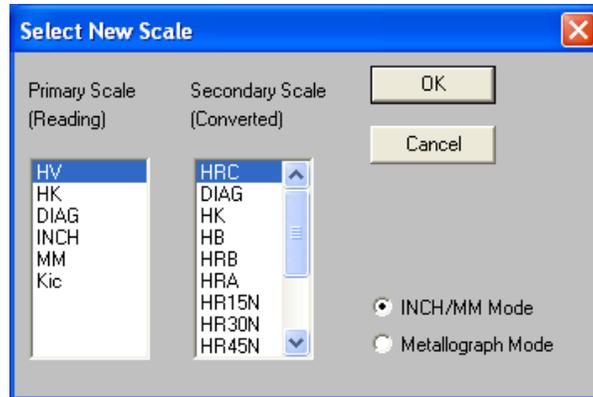


Clicking on the checkbox for "Prompted" will cause this screen to appear after each test so the operator can enter relevant data. This function pertains only to single point testing - not traverses. Selecting "Sort by Prompt" will sort data in the printouts by the prompts so commented data can be readily identified. Also see section 3.2.1 for entering comments only for out of tolerance results

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 you've typed the default headings for all new files you create, select Change Defaults. "Use Defaults" will revert changed headings to the current default headings. (See graphic below)



- 4) The next setup box is "Select a New Scale". Choose one of the primary scales listed on the left by highlighting it with the mouse. For most microhardness testing the selection would be HV (for Vickers scale) or HK (for Knoop scale). If you would like the test result to also be converted to another scale and shown in addition to the selected scale, highlight one of the converted scales listed on the right. For standard testing the radio button INCH/MM mode must be selected. See appendices for use in Metallograph Mode. Select OK when done.

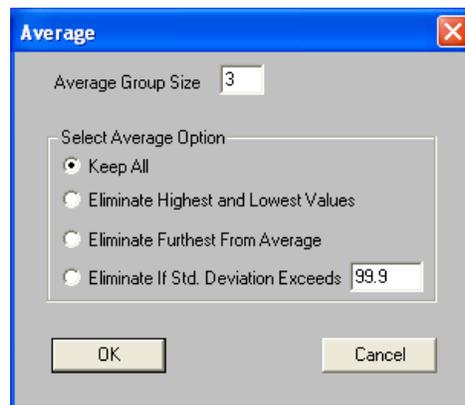


The scale abbreviations which may be listed are:

- HV = Vickers Scale
- HK = Knoop Scale
- DIAG = Verification Program (Optional, See Appendices)
- HB = Brinell Scale for BOSS
- INCH = Measurement in Inches for linear measurement
- MM = Measurement in Millimeters for linear measurement
- Kic = Fracture Toughness
- HRC, HRB, HRA, HR15N, etc = Rockwell C, B, A, 15N scale, etc.

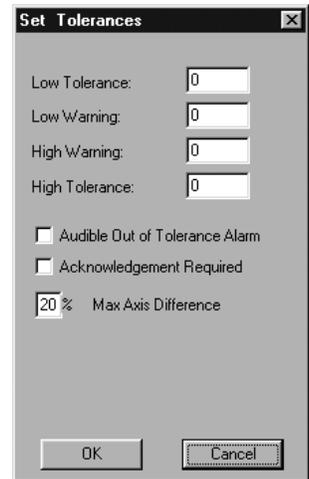
NOTE: The scale cannot be changed for a data file that contains test results. The operator will be prompted to change files if he tries to change scales with data in the file.

- 5) After selecting the scale the operator is prompted to selected 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 (but not 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.

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.

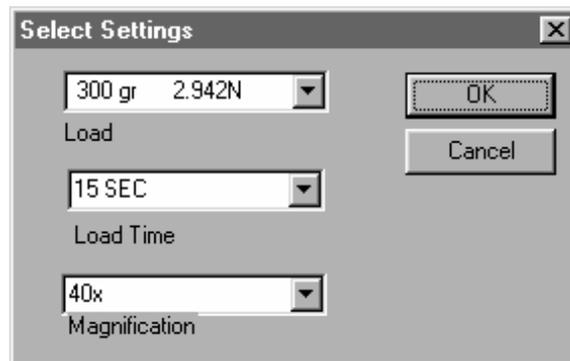
When the "Acknowledgment Required" box is checked the operator will have to acknowledge every time an out-of-tolerance result is produced, by selecting an "OK" prompt. Also see Section 3.2.1 for information about prompting comments for out of tolerance results.

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

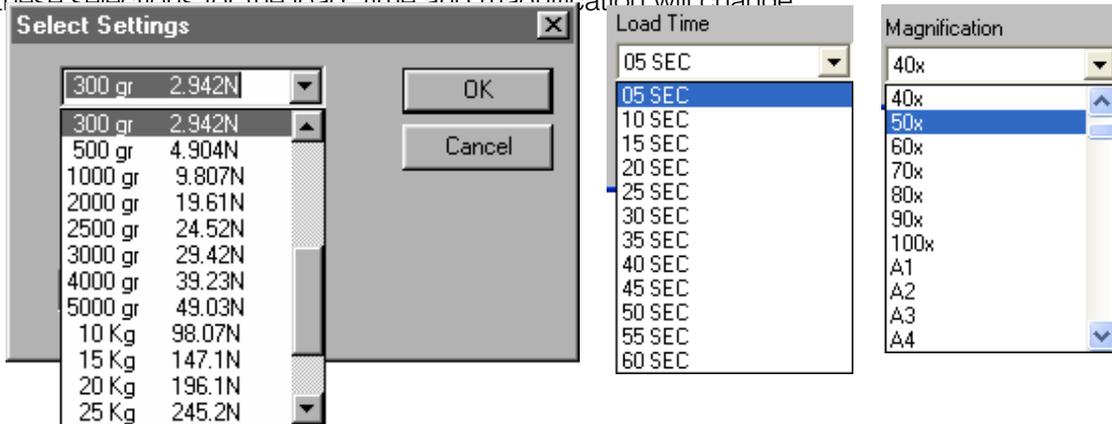
The "Max Axis Difference" is used to adjust the default tolerance setting that controls the allowable measurement difference between the two Vickers axes. Any value other than the defaults 20% value may be entered.

After setting the tolerance values, select OK to proceed.

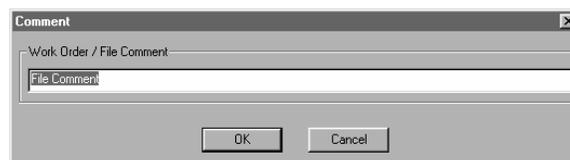
7) Next the operator is given a chance to update the test parameters: load, time at full load, and the high-power camera objective. It is important to select the same parameters for the scale that the tester is using for the testing. Otherwise, the final measured test result will be incorrect.



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 available selections that appear in these selections for the load, time and magnification will change.



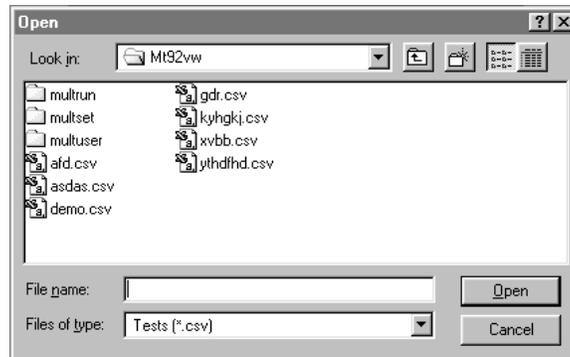
8) Finally the operator has the opportunity to enter a comment. This comment applies to the entire setup file and is used on reports.



2.2 Open an Existing File

If opening a recent 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.



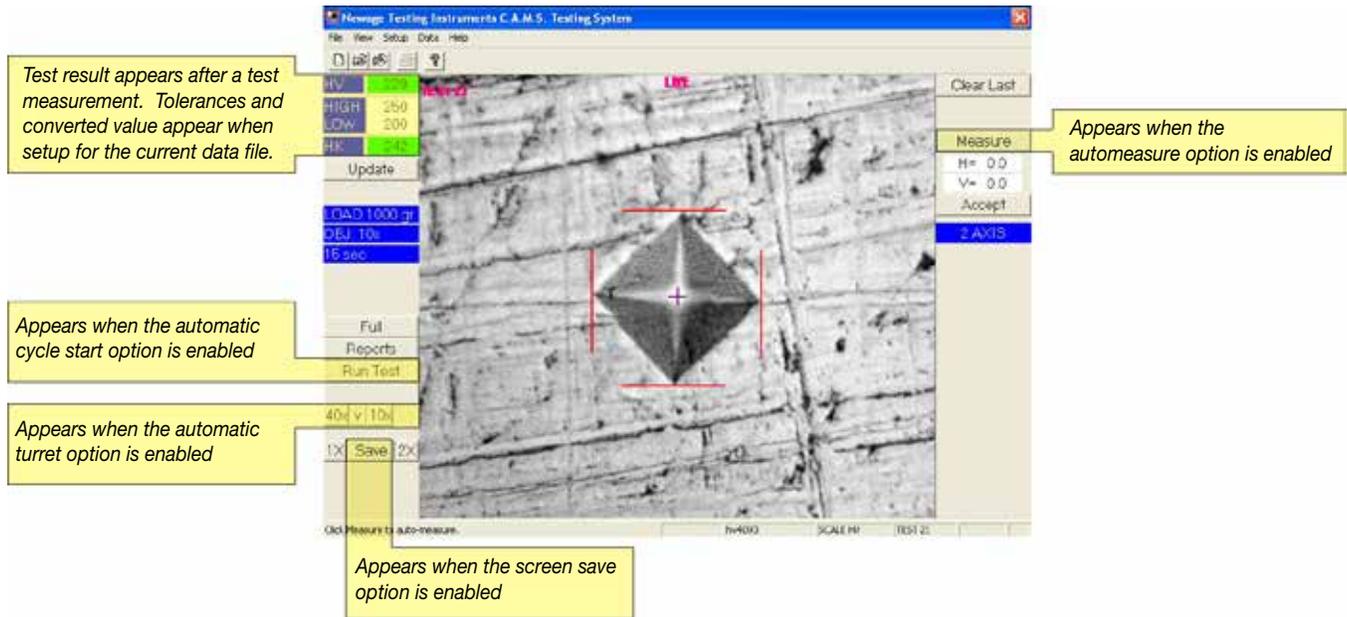
NOTE: If you open a file with another file already open, the current file will be automatically saved and closed.

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.

SECTION 3: SINGLE POINT TESTING AND MAIN SCREEN FUNCTIONS

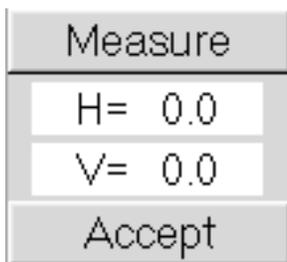
The functions that appear onscreen depend on selections and purchased options.



3.1 Making Measurements

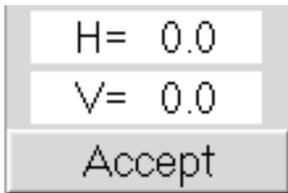
Making test indentations is done using the tester in the normal manner per the microhardness tester instructions. After the Measure button (optional) is pressed or the first manual measurement line has been placed manually, the image of the impression is frozen on the screen (no longer a live image). The other lines can be placed or adjustments to the measurement made to the frozen image. Accept the reading or click the right mouse button to return to the live image. The resulting measurement values appear for both the horizontal (H) and vertical (V) scales in microns (see at left) for Vickers and in one or the other if setup for Knoop.

3.1.1 Automatic Measuring [Systems with Auto-measure Option]



(The Measure function is optional in the C.A.M.S. system using HV and HK scales and is not present on the linear measurement scales, IN and MM).

Press the Measure button to automatically make a measurement of the Vickers, or Knoop impression. The resulting measurement appears for both the horizontal (H) and vertical (V) scales in microns (see at left). The measurement lines appear when the Measure button is selected. They can be repositioned if not positioned properly. Repositioning is accomplished by clicking and dragging the lines or clicking at the proper location for the line. Press the Accept button to enter the reading. Note: If the impression is not located in the middle of the screen the measurement lines may not appear automatically and/or may need to be dragged to the proper locations.



3.1.2 Manual Measuring [Available on all systems - appearance depends on Knoop or Vickers scales and Update button selections]

The measuring lines can be manually positioned without using the Measure button. The operator must make a judgement as to the location of the edges of the impression and click the mouse at the top, bottom, right and left when the cursor is at the correct position.

3.2 Result/Tolerance Display [All Systems]

After a measurement has been made the test result appears at the upper left part of the screen. Beneath the result will appear the selected tolerance limits and after the Accept button pressed a converted test result - if these test parameters have been selected. Color coded indications - green, yellow, and red - appear when tolerances are entered and the results fall within tolerances, within a warning band, or outside the tolerances.

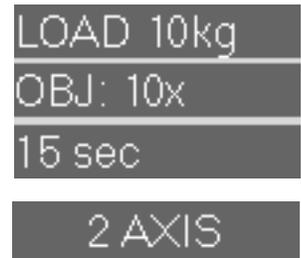
HV	679
HIGH	695
LOW	655
HRC	59.2

3.2.1 Prompt for Out-of-Tolerance Results [All Systems]

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 Test Parameter Displays [All Systems]

The selected test load, objective magnification (high power), and test dwell time appear at the left of the screen. Additionally, the measurement axis appears at the right side of the screen: "2 AXIS" for Vickers, "H AXIS" or "V AXIS" for Knoop. The operator has an opportunity to establish these values when setting up a new file. Changes can be made through the Update button if the operator needs to change any parameters on the data setup file.



3.4 Status bar [All Systems]

The bottom right corner of the screen has a menu bar that shows the currently selections for: file name, test scale, and test number.



3.5 Clear Last Button [All Systems]

Removes the most recently accepted test results. This selection acts the same as the Data Menu function - Clear Last Test.



3.6 Reports Selection [All Systems]

Reports

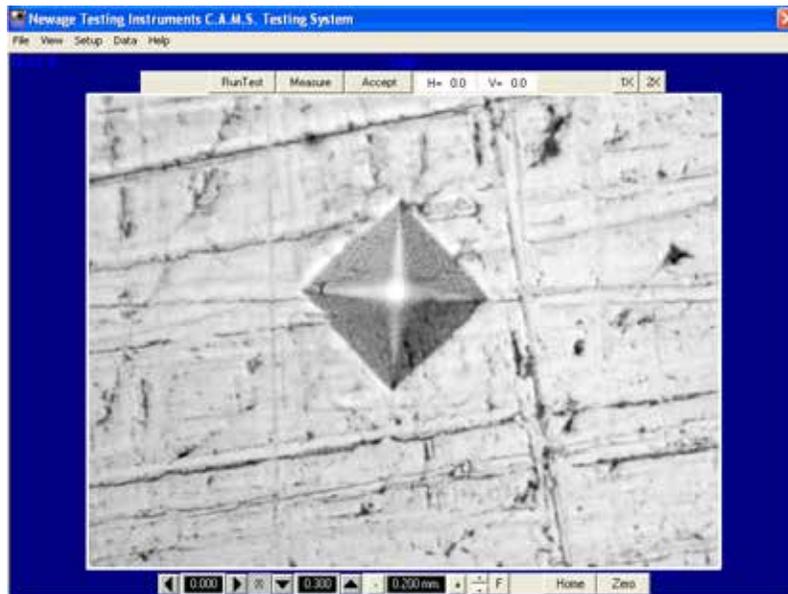
This function is the same as the View menu selection from the top menu. It will display the currently selected reports. For more details see Section 4.

3.7 Full Screen Mode [All Systems]

Full

Full Screen mode enables the operator to see the entire screen filled with the image of the test specimen with only a little area covered by the most basic operation controls.

Most of the same controls are for measurements and optionally for moving the tables and focusing (if those options are added to the system) as in full screen mode



3.8 Tester Remote Controls [Systems with Automatic Cycle Start and Automatic Turret Options]

The optional Run Test button will initiate the tester to begin making a test impression. Note: Not all testers can have their test cycle initiated

automatically. If the Run Test button is selected the system will make a single point test at the position under the crosshairs in the center of the screen. First the system will prompt for the operator to rotate the tester turret so the indenter is in the test position. When the OK is pressed the tester will make a test, a window will appear after the test to prompt the operator to move the turret back to the camera position.

Run Test

20x v 10x

The optional "40x", "v", and "10x" buttons are part of the Automatic Turret Option. These buttons allow the operator to use C.A.M.S. controls to select the high power objective (in this case 40x), the indenter position (v), or the low power objective (10x) on the microhardness tester. When selected the microhardness tester will automatically switch the turret to these positions. This option can only be used for those testers which have an automatic turret option installed and a tester capable of being automated. These controls are active whenever they appear.

3.9 Image Size and Image Capture (Save)



["SAVE" button appears when Image Capture Option is enabled]

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. To capture and image 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.

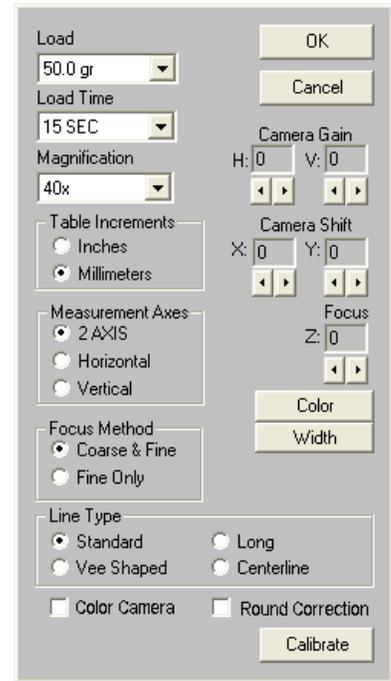
3.10 Update Test Parameters [Button Appears with all Systems]



3.10.1 Update: Load, Time, & Magnification [Appears with all Systems]

The options at the top left of the screen allow the operator to view and change test parameters (to match those set on the tester) which are used to determine a hardness value: load and magnification.

In this window the operator can click on the Load, Load Time, or the Magnification selections with the mouse to change to another option. A list of all the possible selection for each variable is displayed in a drop-down selection. Changes in these selections only change the tester if that option has been purchased.



3.10.2 Update: Measurement Axes [Appears with all systems]

[Appears with all systems]

Selection for testing Vickers in "2 Axis" or Knoop "horizontal" (appearing on main screen as "H AXIS") or "vertical" (appearing as "V AXIS")

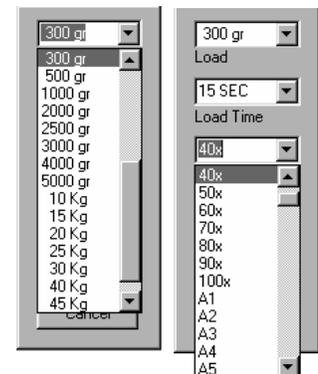
3.10.3 Update: Line Type [Appears with all systems]

Displays selections for the impression measurement line types. Click on each to see which is better in your application

3.10.4 Update: Image Adjustments [Appears grayed out in all CAMS systems]

3.10.5 Update: Camera Gain [Appears with systems using Auto-measure Feature]

This option adjusts the positioning of the lines. Adjustment is not usually necessary. To adjust the operator can repeatedly press the forward and backward arrows under the horizontal or vertical scales. This will adjust the lines wider or narrower with respect to the edge of the indentation. If the operator wants to make a test to check the adjustment, he can press the Measure button to perform a test. If the gain is not set correctly he can adjust it further.



Load, Load Time and Magnification Parameter Updates

3.10.6 Update: Camera Shift [Appears with all systems]

This option adjusts the position of the sets of lines (horizontal or vertical) in relation to the edges of the indentation. Changing the values moves the sets of lines left/right or up/down, respectively, for the X, Y, or Z (up/down for focusing) axes

3.10.7 Update: Color and Width [Appears with all systems]

Use these functions to adjust the way the measuring lines are viewed on the display.

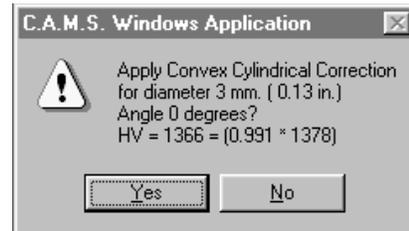
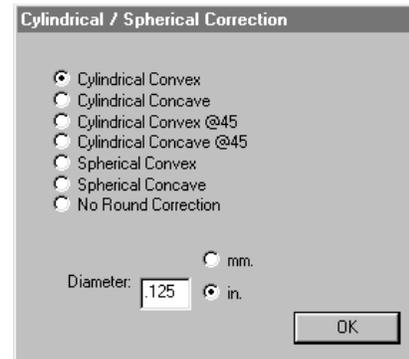
- 1) Select Update from the main screen. The Update parameters dialog box will be displayed.
- 2) Click on Color button to change line color: green, light blue, red, yellow, black, or blue.
- 3) Click on Width button to change line thickness: fine, medium, or heavy.
- 4) Select OK when done.

3.10.8 Update: Round Correction

[Appears with all systems with loads over 1kg]

If the selected load in the C.A.M.S. program is over 1000g AND the round correction checkbox is marked, then a round correction factor will be prompted for after each test. Options for round correction are available for spherical and cylindrical specimens as well as concave and convex, and on cylindrical specimens when they are oriented at 45 degrees from horizontal/vertical.

The operator is prompted to enter the diameter of the test specimen and the unit of measure, then prompted to accept or reject the converted result. If the result is accepted the most recent selections become the defaults for the next round correction.



3.10.9 Update: Calibrate [Appears with all systems]

- 1) Select the Calibrate button. Place the stage micrometer on the specimen stage and align it on the display.
- 2) Use the mouse to click on the measurement points.
- 3) Compare the numbers in the measurement window on the right side of the screen to the actual dimensions of the stage micrometer. If they are equal the system does not need calibration. If calibration is needed, see the following.
- 4) Select the Calibrate Button. The next prompt requests which axis to calibrate.
- 5) Key in the actual dimension. Select OK when done. The number in the measurement window on the screen's right side will show the corrected number.
- 6) Repeat the procedure with the second axis if necessary.
- 7) When finished, select OK to complete the procedure.

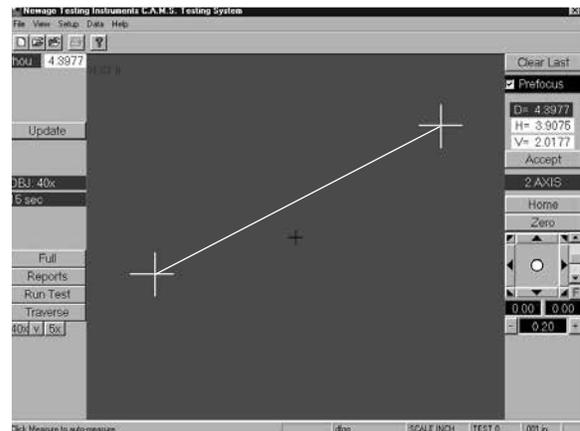
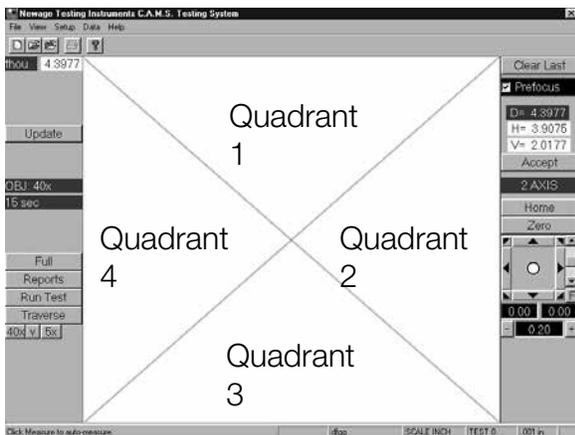
3.10.10 Update: Color Camera [Appears with color camera option attached]

The color camera checkbox only appears if a USB camera is not used. It is designed for use with the 500 Series Color Camera.

3.11 Distance Measurement [Appears when inch/millimeter measurement option is enabled]

If "inch" or "mm" is selected as the scale during the test setup, the tester will allow the operator to measure distances at any angle. To make a measurement the operator must select the end points - in both x and y axis. Start by clicking in each quadrant and drag each line that appears to one of the end points so there is a vertical and horizontal line at each point.

The result is as seen below. The distance between the two crosses is the measurement as indicated by the arrows. It appears at right with x-axis offset, y-axis offset and total distance offset. It can be accepted just like a test measurement, which will show the result and a converted value (not appearing below) at the upper left along with tolerance indicators (if entered).



SECTION 4 MENU BAR: OTHER FUNCTIONS

For instructions on the File Selection on the Main Menu, see section 2. The other Main Menu selections are discussed here.

4.1 View Menu

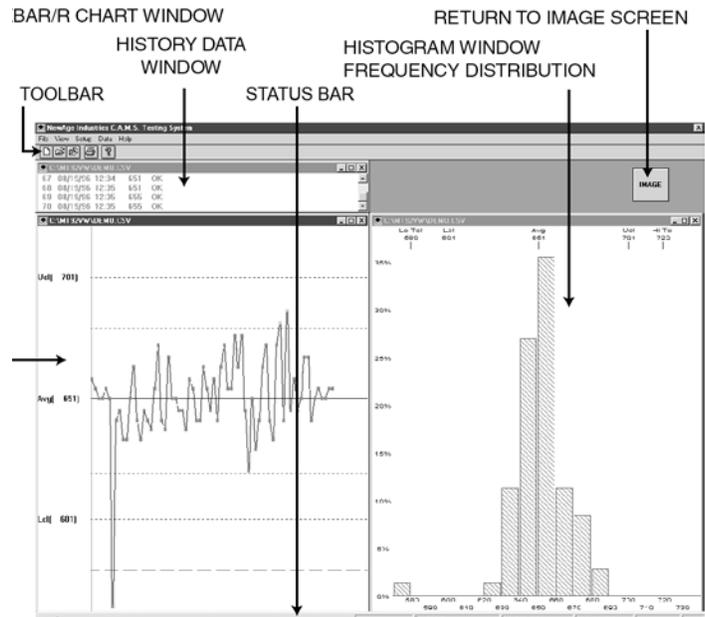
4.1.1 Advanced Statistics Software

The View Menu consists of 6 different functions: Reports, Tile, Auto Tile, Tool Bar and Status Bar and Image. When activated, a check mark will appear in front of the function listing.



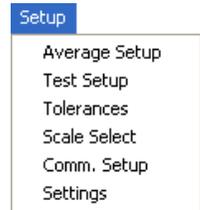
Click on View to display the available functions. Click on the individual functions to activate.

- 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 menu selection returns the system to the main testing screen, as does the Image button at upper right.



4.2 Setup Menu

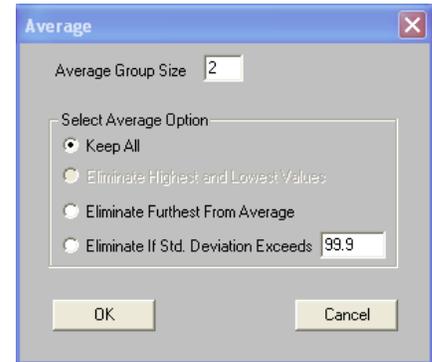
The Setup Menu consists of six different functions: Average, Test Setup, Tolerances, and Scale Select Communication Setup, and Settings.



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 a 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.



Average Screen showing 3 functions enabled.

To disable the function enter a "1" value. Data must be deleted from the file to turn off averaging. The averaging functions are as follows.

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).

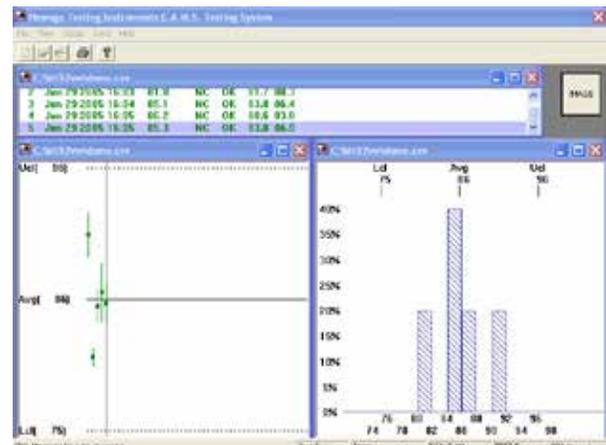
Eliminate furthest from the average

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 [Appears with all systems - some functions grayed out depending on options]

The Test Setup is to enter some 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 also appears at the top of the printed report.



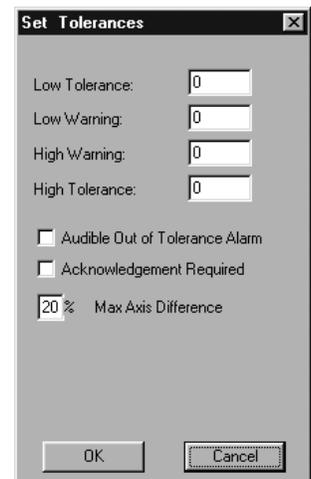
The Network Drive option allows the operator to automatically copy the current datafile to an additional location. The data copy function occurs every time the file is closed

4.2.3 Tolerances [Appears with all systems]

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.

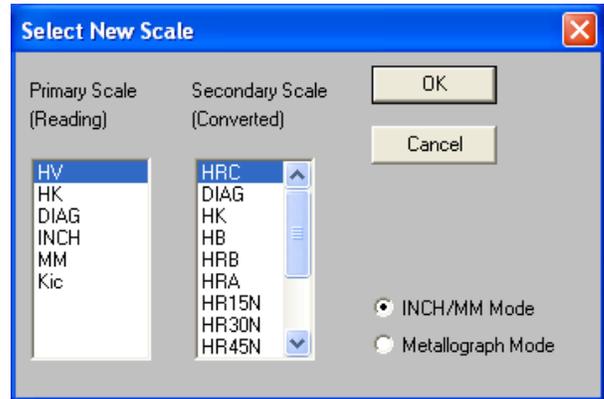
When the Acknowledgment Required box is checked the operator will have to acknowledge every time an out-of-tolerance result is produced. In the Max Axis Difference box the operator can also enter the default error-checking value to limit differences in the relative measurement of the two axes on the Vickers scale.



4.2.4 Scale Setup [Appears with all systems - some scales may not appear depending on options]

This function 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 section

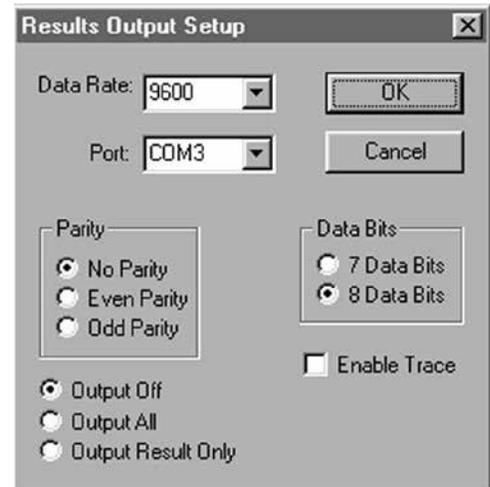
The scale can only be changed when setting up a new file. Once data has begun being collected, you cannot change the scale designation for the current open file. If the operator attempts to do so, a dialog box will appear prompting you to close the current file. To change the scale clear all data from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



4.2.5 Communications Setup [Appears with all systems]

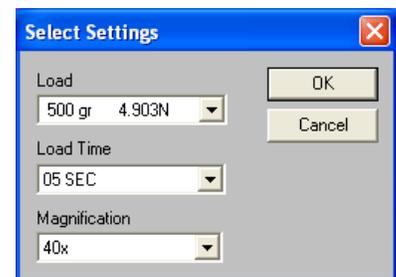
Communications Setup is used to set the parameters of the Serial output for communications with a serial printer or to another computer. At the end of each test (when the result is accepted), the information can be sent through the serial port. The data string selections are Parity, Data Bits, Data Rate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

Settings Menu selection prompts the operator to change the load, test time and magnification. This function is the same as is found under the Update button.



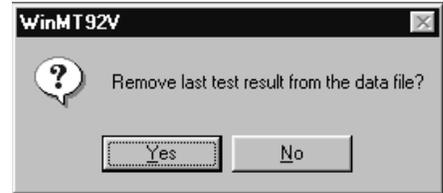
4.3 Data Menu

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 [Appears with all systems]

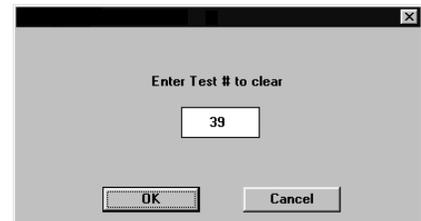
This function is used to clear the last test result from memory. It is the way in which you can delete an erroneous reading caused by machine or operator error and not affect the statistical calculations. This is the same as the Clear Last button on the main screen



- 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.
- 3) If the system is operating with Averaging, the system will prompt whether to remove the average from the group

4.3.2 Clear Test Number [Appears with all systems]

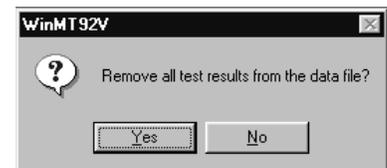
This function is used to clear any of the test results in the current file from memory.



- 1) Select Clear Test # from the Data Menu. A dialog box will appear asking the operator to enter the test number.
- 2) Enter the number to be deleted. After the number is entered the operator is prompted to verify that it is the proper number.
- 3) If the system is operating with Averaging, the deleted result will be the averaged value, not one of the intermediate values.

4.3.3 Clear All Tests [Appears with all systems]

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



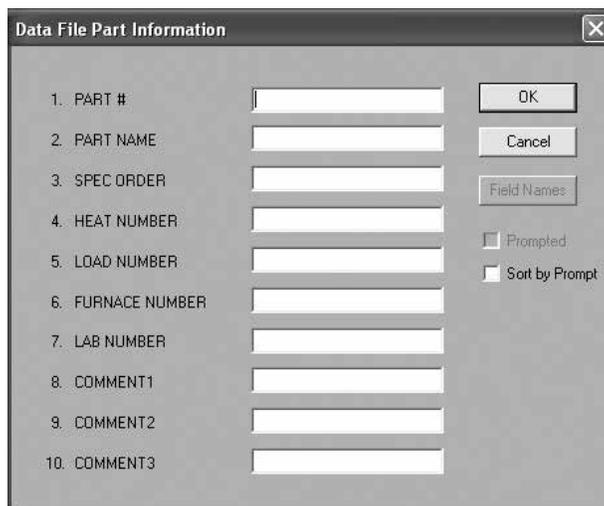
4.3.4 Statistics [Appears with all systems - different screens appear depending on options]

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 [Appears with all systems]

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.



APPENDIX A1: VERIFICATION (OPTIONAL)

The verification function allows for the verification of the tester according to the Standard used, (ASTM, ISO etc.). This is for the indirect verification of the entire system, which includes the load, the indenter and the measuring device. (For direct verification of only the measuring device, see the calibration section).

In order to use this function, there must be an existing verification file; after the existing file is opened, a new file must be created using the existing parameters (see section 2.1.). This sets the system in the verification mode and allows the entering of the tolerance limits for error and repeatability (under the tolerance function) as well as the test block information (under Part Information).

The nominal value of the test block must be entered in Vickers or Knoop values, the Max Error and Repeatability are automatically calculated according to the appropriate table.

The number of tests to average per verification is entered in the tolerance module, and the average pull down is disabled.

Set Tolerances

Audible Out of Tolerance Alarm

Low Tolerance: 0

Low Warning: 0

High Warning: 0

High Tolerance: 0

Acknowledgement Required

% Max Axis Difference

At the end of a series of tests, the report section shows how the verification resulted compared with the specified tolerances. The reference used is the nominal value of the block. Under print preview, the history data section shows a recap of the verification, with a line stating the pass or fail status. This can be printed to obtain a certificate.

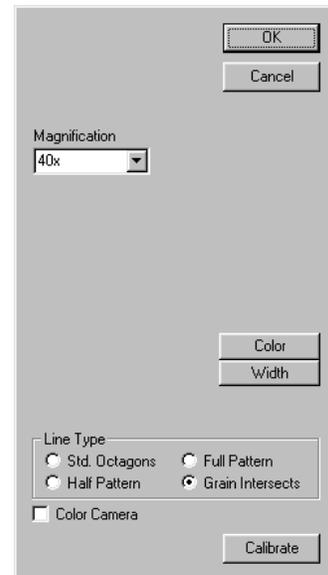
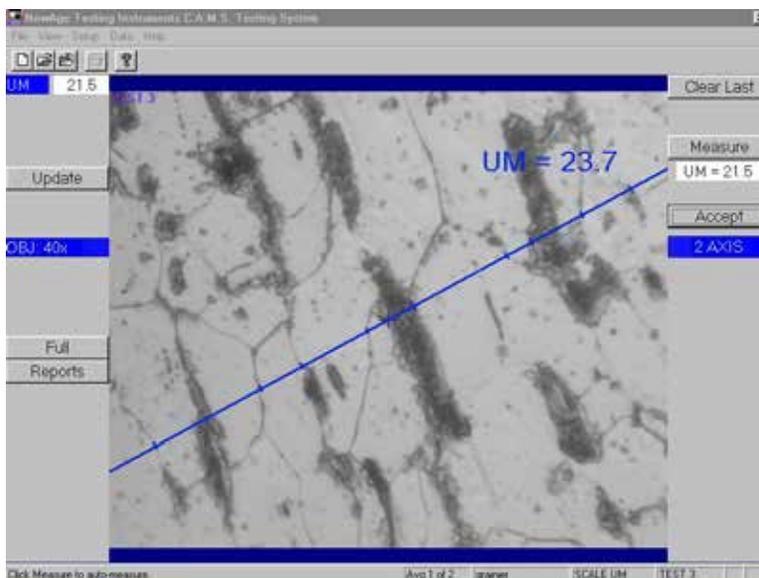
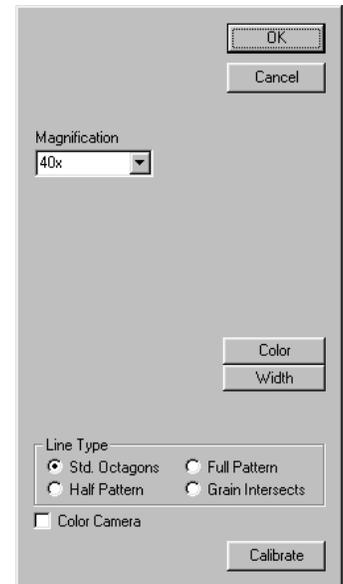
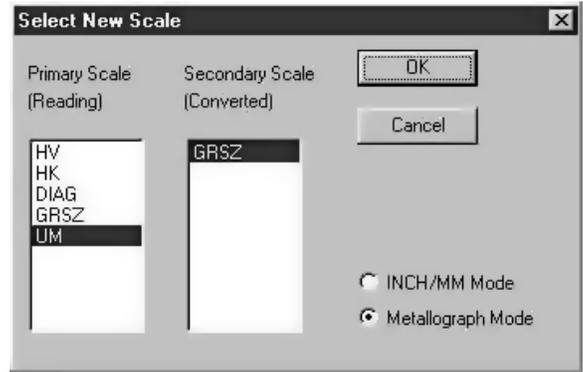
APPENDIX A2: GRAIN SIZING (OPTIONAL)

The Grain Size option enables the user to measure the grain size of a sample seen on the monitor.

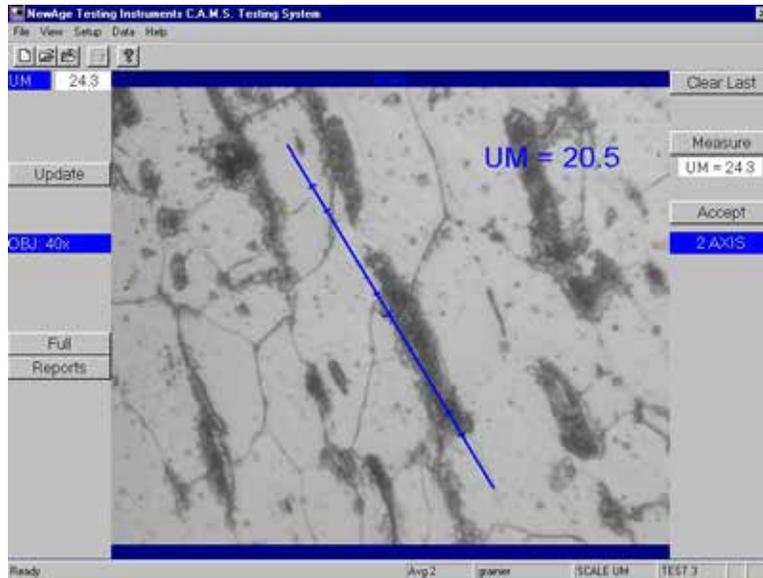
The grain sizing option must be setup during the new file setup procedure. After selecting the file name and the descriptive information, the operator must select the Metallograph Mode radio button and the UM scale [UM Stands for "µm" or micro meters or thousandths of a millimeter] or the GRSZ scale [indicating "grainsize"].

There are two basic grain measurement methods built into the system. A direct measurement method, called Grain Intersects, and three indirect-measurement size-matching techniques. When Grainsizing has been selected as the scale the operator can toggle between measurement systems using ALT-T. Alternatively the operator can change the grain size measurement system using the UPDATE button located on the main screen. The choices are listed in the Line Type section in the graphic of the Update functions, seen to the left. (If the lines types selections are different than those seen here, then most likely the operator has not selected the a valid scale for grain sizing during the setup, in which case the standard Line type selections are shown for measuring microhardness indentation sizes.)

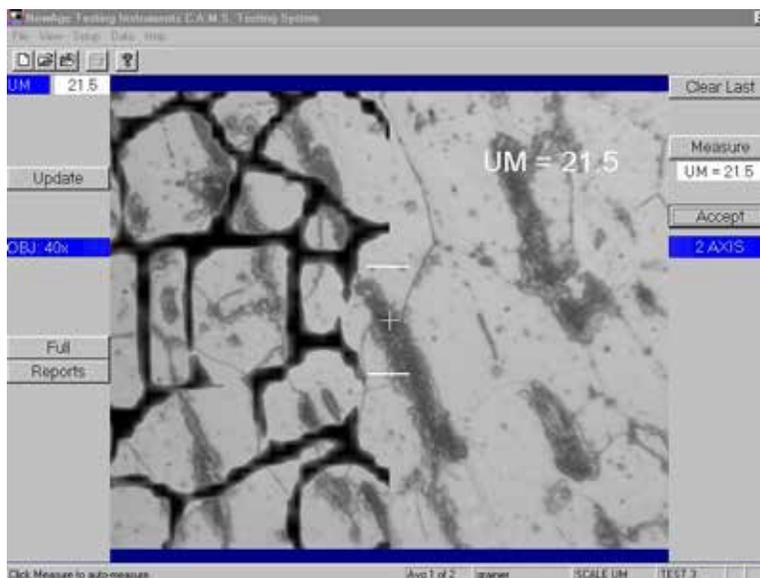
In the direct measurement method, called Grain Intersects, the operator is presented with a screen displaying the test sample. When the operator clicks somewhere on the image a line is displayed that runs through that click point and the center of the screen. The operator can drag this line around to the best angle when he first clicks on the screen. The operator must click on all spots on the line where that line intersects the edge of a grain. Any line can be removed by clicking on it a second time. When all the intersections have been located, select the Accept button to obtain an average measurement in mm.



To increase the accuracy the operator may select the average function (Located under the Setup Menu selection during the file setup procedure). When the average is setup with "2" selected the operator proceeds with a measurement in the regular fashion, but after the first measurement he can strike a second line perpendicular to the first and get an averaged result after it is measured (as per the screens above and below). The three indirect size matching methods for grain sizing are "Half Pattern", "Full Pattern" and "Standard Octagons".



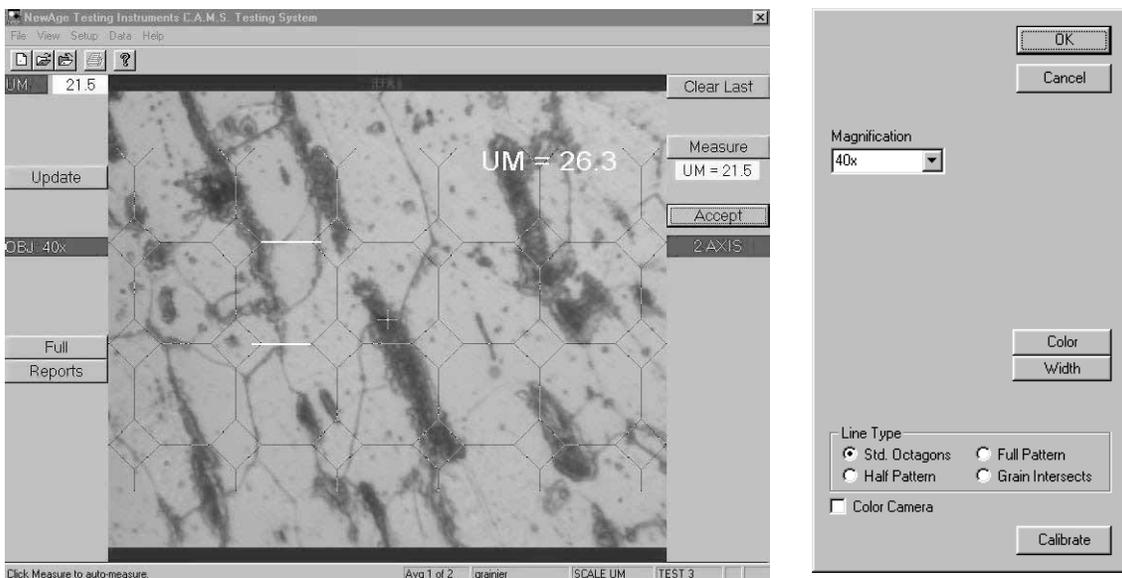
If "Half Pattern" is selected (see top graphic), the operator can change the scale of the overlay until it best fits the grain size of the live image of the sample. To start click on the screen above and below the center mark. The overlay will appear showing the surface of the test sample on one side without the overlay. The "Full Pattern" (See below) allows the operator to get a better view of the overlay since it is full screen.



To adjust the overlay size click and drag the selection bars (shown in white above and below the center spot on the screen) farther from or nearer to the origin point (the cross) in the middle of the screen. As the scale selection bar is dragged farther from the origin, the scale of the overlay image increases and vice versa. The "Half Pattern" screen above shows the size scaled larger. Below the "Full Pattern" has an adjustment that shows the size scaled smaller. When the proper size is reached, select the Accept button to confirm the measurement.



The third of the indirect grain size matching methods is "Std. Octagons". If "Std. Octagons" is selected as a method of measuring the grain size (see below), the operator can click at a point approximately indicating the top and bottom edges of a grain, which causes selection bars (in white) and octagon shapes to appear. The operator can change the scale of the overlay until it best fits the grain size of the sample by clicking and dragging the selection bars (shown below in white above and below the center spot on the screen) farther from or nearer to the origin point (the cross) in the middle of the screen. As the scale selection bar is dragged further from the origin point in the vertical axis the scale of the octagon screen will enlarge and vice versa. When the best fit size is obtained, select the ACCEPT button on the right of the screen to obtain a test result.



APPENDIX B: TROUBLESHOOTING

NO PICTURE OR POOR CLARITY (C.A.M.S.-UNIT)

- Check the bulb for the scope. See your hardness tester operation manual.
- Make certain that system components are plugged in, properly connected and turned on.
- Check the focus on the tester.
- Check the test head height adjustment

Check all fuses and connections on each of the different components.

PROGRAM WILL NOT PROCEED

- Make certain that system components are plugged in, properly connected and turned on.

CHECKS TO MAKE BEFORE CALLING THE FACTORY

If you run into problems:

- 1) Reboot the computer
- 2) Consult the Windows Manual for troubleshooting information
- 3) Contact Newage Testing Instruments, Inc. Technical Customer Service at

215-526-2200
FAX: 215-526-2192

APPENDIX C: FILE LAYOUT

ilefmt.doc: FILE FORMAT, Version 2.0

Line 1:

```
char FileSignature Version [14];
char Comma;
char RecordCount[5];    // count of records in the file
char Comma;
char RecordLength[3];   // length of fixed-length records
char Comma;
char ExtraHeaderLength[3]; // length of additional header written
char Comma;
char AvgCnt[2];
char Comma;
char ConvertScale[5];
char Comma;
char LoadTime[2];
char Comma;
char Flags[5];
// Report view mode
char Comma;
char Header2Len[3];
// length of header2
char Comma;
char ExtraFieldDefLen[3];
char Comma;
char MaxStdDev[7];
char Comma;
char Objective[5];    // objective 10x... 100x
char Comma;
char Load[7];        // Load in grams or kg.
char Comma;
char Ball[4];        // Ball diameter or PIN type
char CrLf1[2];
```

Line 2:

```
char Scale[5];
charComma;
char Label1[7];    // "LO:"
charComma;
char LoTol[7];
charComma;
char Label2[7];    // "LW:"
charComma;
char LoWarn[7];
charComma;
char Label3[7];    // "HW:"
charComma;
char HiWarn[7];
charComma;
char Label4[7];    // "HI:"
charComma;
char HiTol[7];
char CrLf2[2];
```

fLine 3:

```
char FileComment/Work Order[80];
```

```
char CrLf3[2];
```

Lines 4 - 13:

```
charFieldName[15];  
charComma;  
charFieldInfo[20];  
charCrLf2[2];
```

Line 14:

```
** Data **  
  // header line
```

Lines 15+:

```
charSeqNum[6];  
charComma;  
charDate[10];  
  // "mm/dd/yy"  
charComma;  
charTime[7];  
  // "hh:mm"  
charComma;  
charConvertValue[7];// eg. Dia for HB or HRC for HV  
charComma;  
charValue[7];  
  // Average if in average mode
```

If the test is an average mode test then the following additional fields are on each line.

```
charComma;  
charMin[7];  
charComma;  
charMax[7];  
charComma;  
charStdDev[7];  
charComma;  
  // will be n comma value pairs  
charIndividualValues[7];// separated by commas
```

APPENDIX W: LIMITED WARRANTY

Should Newage Instruments equipment require service, we will repair or replace, at our option, any part or product, which upon examination by a Newage Instruments 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 owners date of purchase.

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 Instruments service technician.

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

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



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