

**System Overview
Safety
Setup & Installation
Operation
Maintenance**



Computer Controlled
Series 1600 Universal Testing Machine

Fifth Edition, August 2009

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1600 Series Universal Testing Machine

Instruction Manual

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Preface

Unpacking

Retain all cartons and packing materials until the unit is operated and found to be in good condition. If damage has occurred from shipping, notify Applied Test Systems and the carrier immediately. If it is necessary to file a claim, retain the packing materials for inspection by the carrier.


Warranty

All ATS, Inc. equipment is shipped with a warranty. Units have a warranty against defective parts and workmanship for one full year from date of shipment. See the back page of this manual for details.

After-sale Support









If you have any questions concerning the operation of your unit, contact our Service Department. Before calling, please obtain the serial number from the label on the equipment. The label is shown below.

Serial number _____

| | |
|-------------------------------------------------------------------------------------|------------------------------|
|  | APPLIED TEST SYSTEMS INC. |
| SERIES _____ | FURNACE/OVEN |
| WATTS _____ | VOLTS _____ |
| CONN. _____ | SER.NO. _____ |
| MAX.TEMP. _____ | DATE _____ |

Section 1. Safety

All Applied Test Systems Inc. equipment is designed to be operated with the highest level of safety. To maintain the safe operation of this tester, ATS endeavours to educate the operator about safety issues surrounding certain parts of the tester. These safety issues are addressed through the use of labeling on the equipment. The following labels may appear on your unit:

| | |
|-------------------------------------------------------------------------------------|--------------------------------------------|
|  | Burn Hazard Hot Surface |
|  | Electrical Shock/ Electrocution |
|  | Hand Crush Force From Above |
|  | Protective Earth (Ground) |
|  | European Directive CE Mark |
|  | General Danger |
|  | No Access For Unauthorized Persons |
|  | Read Operator's Manual |

For Owners, Operators, and Maintenance Staff

Read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions regarding operation of the unit or instructions in this manual, contact our Service Department.

In addition to the safety warnings listed below, warnings are posted throughout the manual. Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, personal injury or death.

Warnings

The following statements are warning statements. Unlike caution statements, warning statements alert the operator to conditions that may injure personnel. Operators must be aware of these conditions in order to prevent injuries that may occur while operating this equipment.



Thoroughly understand the safety features and operation of the equipment. This manual will provide operators with safety concerns and general procedures. Be familiar with correct operating principals and use good judgment. Also refer to the appropriate manuals for system component safety instruction manuals.



Do not put your arms or head above or below the moving crosshead. Be aware that hazards may occur beyond the immediate testing area.



If necessary, stop test operation. In case of an emergency, use the emergency stop button on the Universal Testing Machine base in order to abort test operation.



Set the limit switches prior to test operation. The limit switches prevent the moving crosshead from exceeding the pre-set range. Set the limit switches just above and below the ranges set for the moving crosshead.



Use the appropriate protective equipment when operating the 1600 Universal Test Machine with accessory equipment. Oftentimes the materials testing is conducted using high temperature ovens and furnaces. Refer to individual operating manuals for further safety instructions.



Use the software's safety features. Set conditions that cause the test to be aborted if the limits are surpassed.



Use a protective shield to avoid injury caused by test specimen failure. When performing materials testing, the force of moving parts may cause the specimen to break and possibly injure nearby operators. Because materials testing specimens vary so much, it is the responsibility of the owner and user of the UTM to operate it safely.



Perform maintenance procedures safely. Disconnect power before performing maintenance procedures.

Cautions

The following statements are caution statements. These statements alert the operator to conditions that may damage equipment. Operators must be aware of these conditions in order to ensure safe operation of this equipment.



Use caution when moving the UTM. In order to prevent damage to the UTM, only lift the load frame by the housing base or by the moving crosshead. Never lift the load frame by the fixed crosshead.

Section 2. System Overview

General Description

The ATS 1600 Series Universal Test Machine (UTM) is designed to provide a versatile, fully integrated, modular testing system (figure 1). The system consists of a load frame, a personal computer, the necessary hardware, and TestVue®, ATS's Window's based test system software. This system has the following capabilities:

- ☐ Performing compressive, tensile, and cyclic tests
- ☐ Acquiring multi-point data during tests (such as time, displacement, load, strain, and auxiliary)
- ☐ Storing batch and specimen tests
- ☐ Analyzing and summarizing test results
- ☐ Presenting test results on-screen or on paper
- ☐ Rapidly selecting and converting between units of measurement

A. Specifications

The load capacity of the UTM depends on the model:

| | |
|---------------|-------------------------------------|
| Model 1601 | 1,125 pound tabletop model (5.0 kN) |
| Model 1605 | 5,620 pound tabletop model (25 kN) |
| Model 1610-TT | 11,250 pound tabletop model (50 kN) |
| Model 1620 | 22,500 pound floor model (100 kN) |
| Model 1630 | 33,720 pound floor model (150 kN) |
| Model 1660 | 67,400 pound floor model (300 kN) |

The following minimum computer requirements must be met in order to run ATS's TestVue® software.

- Operating System: Windows 9X or better
- Standard PC or Laptop (no computer cards associated with this system)
- Serial Port or USB Port

Specifications subject to change without notice

B. Load Frame

The 1600 Series UTM Load Frame is constructed of a base, columns, an upper crosshead, and a moving crosshead. Other essential parts include the manual control console and the crosshead limit system.

The UTM base houses an electronically controlled, variable speed motor and low-inertia drive system capable of a wide speed bandwidth. A zero backlash ball screw drive system operates the moving crosshead, which can be equipped with various testing accessories.

A manual control console is located on the side of the load frame for manual positioning of the moving crosshead.

A crosshead limit system is provided with both fixed and user-adjustable stops. The fixed stops are factory pre-set to prevent damaging crosshead over-travel conditions. This crosshead limit system provides a means for the user to set custom travel limits on the crosshead based on specific test requirements.



CAUTION: Before operating, set the crosshead limits in order to prevent load cell damage.

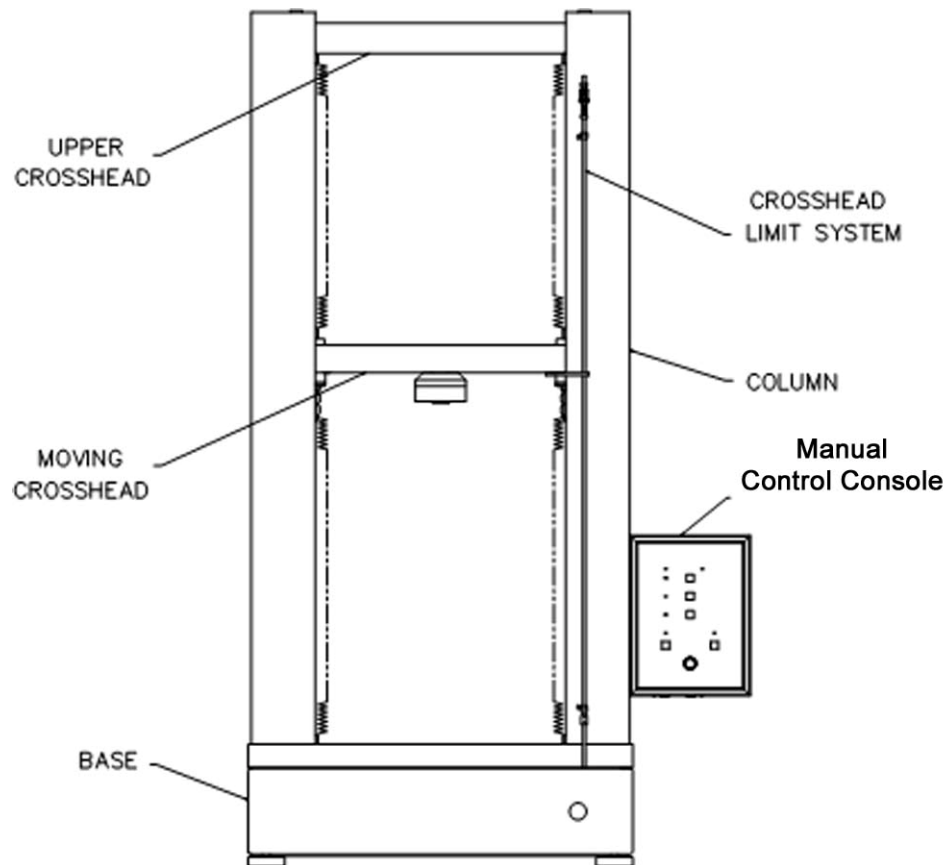


Figure 1, Series 1600 Universal Testing Machine (UTM)

C. Personal Computer

The 1600 Series UTM functions are controlled by Personal Computer (PC) operating in a Windows®-based environment. During testing, the computer controls all UTM functions and collects the data such as load, speed and displacement information, as defined by the user. When tests are not being performed, the computer permits the user to control the load frame functions using the PC keyboard, mouse or functions on the control console, located on the UTM frame.

D. TestVue® Software

TestVue® is a Windows®-based software program that allows the operator to easily control the UTM system. The software provides drop-down menus, radio-button selections, and data entry text boxes for easy update and access to information.

The software is designed to run on a standard PC/Laptop computer connected to the UTM. During operation, the computer communicates with the UTM to start/stop testing, monitor test progress and provide data collection and analysis. The software is organized, so all information required to conduct particular tests is stored in the personal computer. This design allows software enhancements or new releases to be easily added to existing UTM's without the need for hardware additions or modifications.

TestVue® is capable of controlling all aspects of the UTM motion and testing. Specifically, the functions include those listed below:

- ☐ Crosshead Control / Motion
- ☐ Test Control of UTM
- ☐ Test parameter setup and control
- ☐ Data acquisition and storage
- ☐ Test analysis and reporting

E. Sequence of Operation

Below is a description of TestVue's® operational steps. A more detailed description is found in the following sections of this manual.

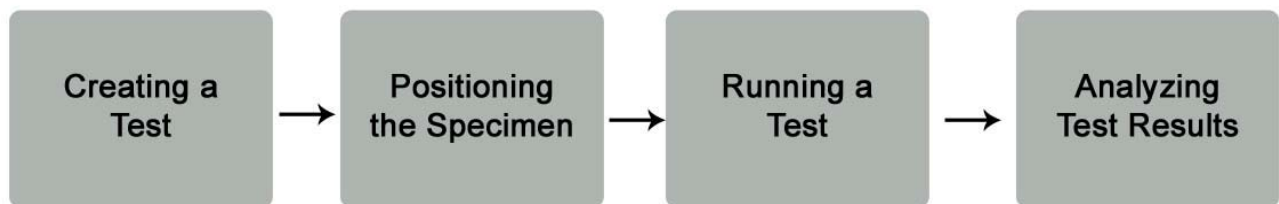


Figure 2, Sequence of Operation

Section 3. Set-Up & Installation

General

The purpose of this section is to give directions for initial equipment installation and setup. These directions include how to unpack and position the Universal Test Machine (UTM) and how to setup the software before performing tests.

Unpacking UTM Equipment

To unpack and prepare the UTM for operation, complete the following steps.

1. Remove the UTM and the computer from the crate.
2. Place the UTM load frame on the floor or a sturdy table, depending on the model type.



CAUTION: In order to prevent damage to the UTM, only lift the load frame by the housing base or by the moving crosshead. **Never lift the load frame by the fixed crosshead.**



CAUTION: If a forklift is used to move the UTM, make sure the forks are far enough under the base to support it on both sides. If there is not adequate support, the load frame may tip, or the components within the base may be damaged.

3. Place the computer system on a work surface near the load frame.
4. Inspect the system for damage during shipment.

NOTE: If damage is found or suspected, notify the shipping company and contact the ATS Service Department immediately.

Connecting Equipment

The following connection cables are shipped with the 1600 CC UTM. Use them for connecting the equipment.

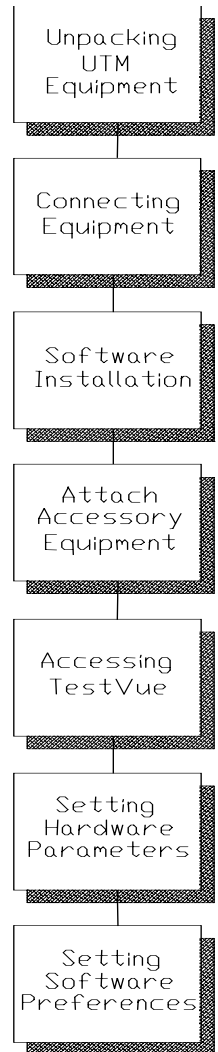
- ☐ Main power cable
- ☐ Load cell cable
- ☐ Communication cable
- ☐ Manual control cable

NOTE: Make sure the cables are undamaged and free of kinks.

1. Connect the main power cable from the bottom right (back) of the UTM base unit to the power supply.

CAUTION: Make sure the appropriate AC power connections are available to the load frame, the control unit, and the PC. The load frame and computer must be properly grounded. Make connections to a surge suppressor or a similar line-conditioning device in order to protect the internal circuitry of both the computer and the load frame.

2. Connect the load cell cable from the back of the load cell, through the clamp located on the moving crosshead, and into the appropriate connection under the manual control console.



3. Connect the communication cable on the bottom left of the UTM base to the computer.
4. Connect the manual control cable on the bottom left of the UTM base and the bottom of the manual control station.

CAUTION: Prevent power loss to the unit by protecting cables from damage.

5. When connecting additional equipment, refer to the manufacturer's literature for details.

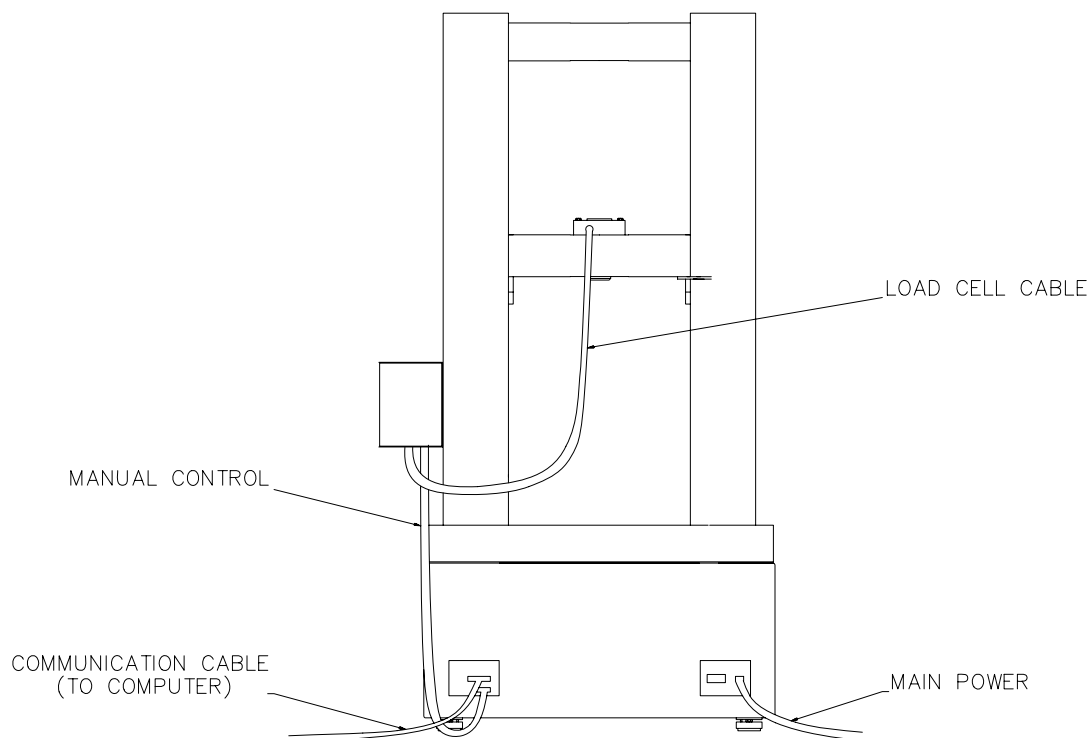


Figure 3, UTM Connections, Rear of UTM

Software Installation

Unless you are providing your own computer equipment, the TestVue® software is already installed on your computer. In order to install TestVue®, refer to the procedure below.



CAUTION: Only perform the software installation procedures if you supply your own computer. If the computer is shipped from ATS, installation is not necessary.

NOTE: Before installing TestVue® on your hard drive, be sure your computer system meets the required specifications given in this manual.

Install the software on a computer with a hard disk containing at least 100 megabytes of free space. Use the appropriate drive for the CD ROM.

1. Turn the power on to the PC and wait for the computer to complete its start-up sequence.
2. Place the ATS TestVue® Software Disk in drive the CD ROM of the computer.
3. Initiate installation as prompted on the screen.

4. Another method is to locate the SETUP.EXE file in the directory found on the TestVue software CD. This action will initiate the software installation progress.
5. Follow the instructions and prompts on the screen.

Updating Software

Periodically, TestVue® is updated. When an updated copy of the software is received in the mail, follow the procedure previously described.

CAUTION: Prior to re-installing TestVue software or installing an updated version, make sure to backup all the files located in the TestVue32 directory. Refer to the attached diagram. Failure to backup these files will result in lost data that cannot be retrieved.

Attach Accessory Equipment

A wide range of accessory equipment such as grips, fixtures, and laboratory ovens can be used with the 1600 CC UTM. Attach this equipment before testing. Refer to the appropriate equipment manuals. For more information about accessory equipment available for your UTM, contact your ATS Sales Representative.

Accessing TestVue®

1. Turn the UTM and the computer power on. Enter the Windows® software, and double-click on the TestVue® icon.
2. Follow prompt for centering Jog Pot.
3. The Login window appears as shown below. Enter your user name and password. For initial use login as "New User." The corresponding password is "password." This initial user has system administrator privileges.] The purpose of this password feature is to control user access to testing.



Figure 4, Login Screen

Setting Hardware Parameters

In order to properly control and monitor UTM tests, TestVue® must have an accurate list of analog components that are used on the load frame. These parameters must be defined before conducting tests. Normally, the machine is set up with the correct parameters before leaving the factory, but changes to the components may be done after the UTM is in service. The TestVue® Setup Menu provides an easy way for the user to specify the transducer values that will be used during testing.

Channel Set-up

Channel set-up must be completed before any tests are performed. All elements of the system have specific characteristics. The software must recognize these values to be able to work with them.

NOTE: Complete the following setup procedure below (for each transducer) *only if the transducers being used are not ATS-modified*. Complete this procedure for each transducer.

NOTE: If the UTM transducers are supplied by ATS, they will contain information within the transducer cable that will automatically perform this setup when the transducers are connected. *In these cases, no extra setup for the Analog Input channels is required.*

NOTE: If supplying a load cell, a new EPROM will need installed or a prompt will advise there is no calibration record for this load cell. Until EPROM is installed, click ok to bypass. Refer to diagram below.

1. In order to configure the analog input, perform the steps below.
 - a. Select Setup from the main menu.
 - b. Select Channels from the vertical menu.
 - c. Select Analog Input from the menu, and the Analog Input Configuration window will appear as shown below.

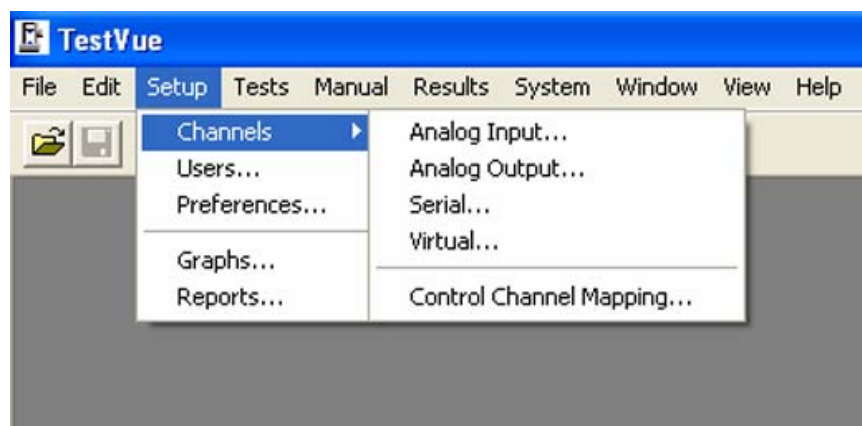


Figure 5, Setup Channels

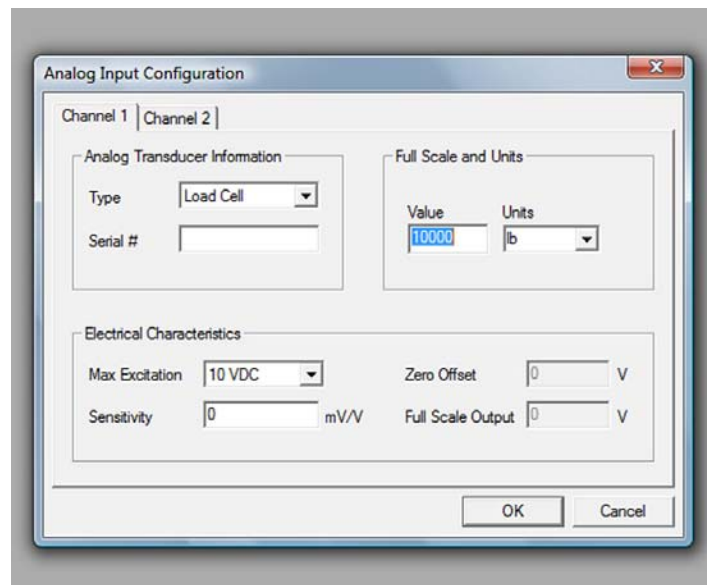


Figure 6, Analog Input Configuration Screen

d. Configure each channel for the requirements of the device connected to it. Four channels are available. Two are standard and two are optional. Each has a pull down list that includes common devices that may be configured. Enter or select the following. (If a channel is empty, specify None.)

Analog Transducer Information - Select the type of equipment connected to this channel. Enter the serial number of the equipment type in the appropriate box.

Electrical Characteristics - Enter the maximum excitation amount, values for the sensitivity, zero offset, and full-scale output. Refer to Specifications, if necessary.

Full Scale and Units - Enter the Full-Scale Value and Unit of Measurement for each channel.

e. Select OK to exit this window.

2. Scale the analog output by assigning a channel to communicate with an external device.

NOTE: The hardware required for analog output ability is optional. If this hardware is provided, the analog output can be accessed from cables attached to the back of the computer, next to the communications cable.

a. Select Setup from the horizontal menu.

b. Select Channels from the vertical menu. The channel type may already be determined by the device type chosen.

c. Select Analog Output from the menu, and the Analog Output Scaling window will appear.

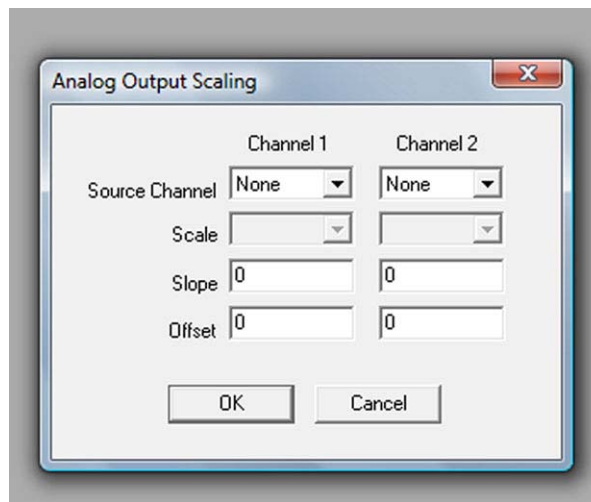


Figure 7, Analog Output Scaling

- d. Enter or select the following from the pull-down menu.

Source Channel - Select a channel from the pull-down menu. ("Ain" is analog input.) The source channel will communicate with an external device.

Scale - Select a voltage scale from the pull-down menu.

Slope - Enter a slope value. The slope is the selected units per volt (for example, KN/v). If zero is selected, no analog output will be generated.

Offset - Enter an offset value.

- e. Select OK to exit the window.

3. In order to configure the serial channel, establish operating parameters for communication with serial devices connected to the system.

- a. Select Setup from the main menu.
- b. Select Channels from the vertical menu.
- c. Select Serial, and the Serial Channel Configuration window will appear as shown below.

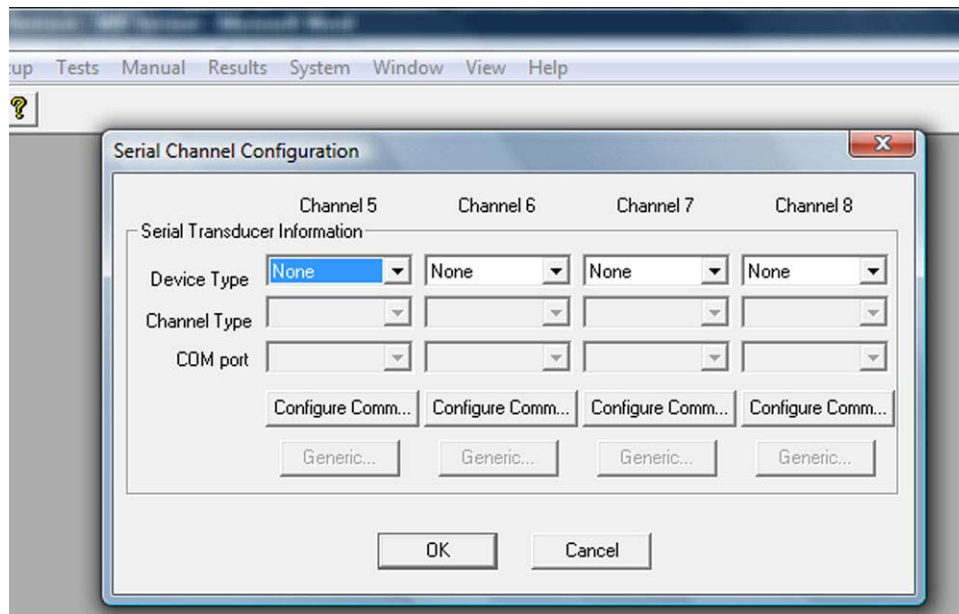


Figure 8, Serial Channel Configuration

- d. Enter or select the following from the Serial Channel Configuration window:

Serial Transducer Information:

Device Type - Choose the device type from the pull-down menu.

Channel Type - Choose the channel type from the pull-down menu.

COM Port - Choose the port number from the pull-down menu.

Configure Comm - Select this button and the window appears as shown below. Select the appropriate information.

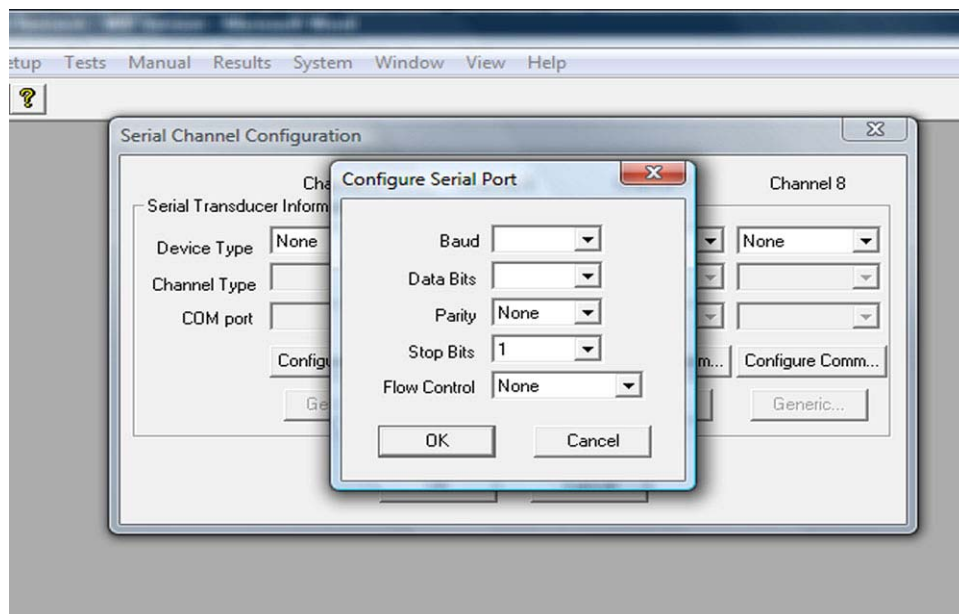


Figure 9, Configure Serial Port

Generic - Select this pushbutton if the generic Device Type was chosen previously. The window will appear as shown below. Enter the transducer type, communication format, measurement scaling, and plotting limits.

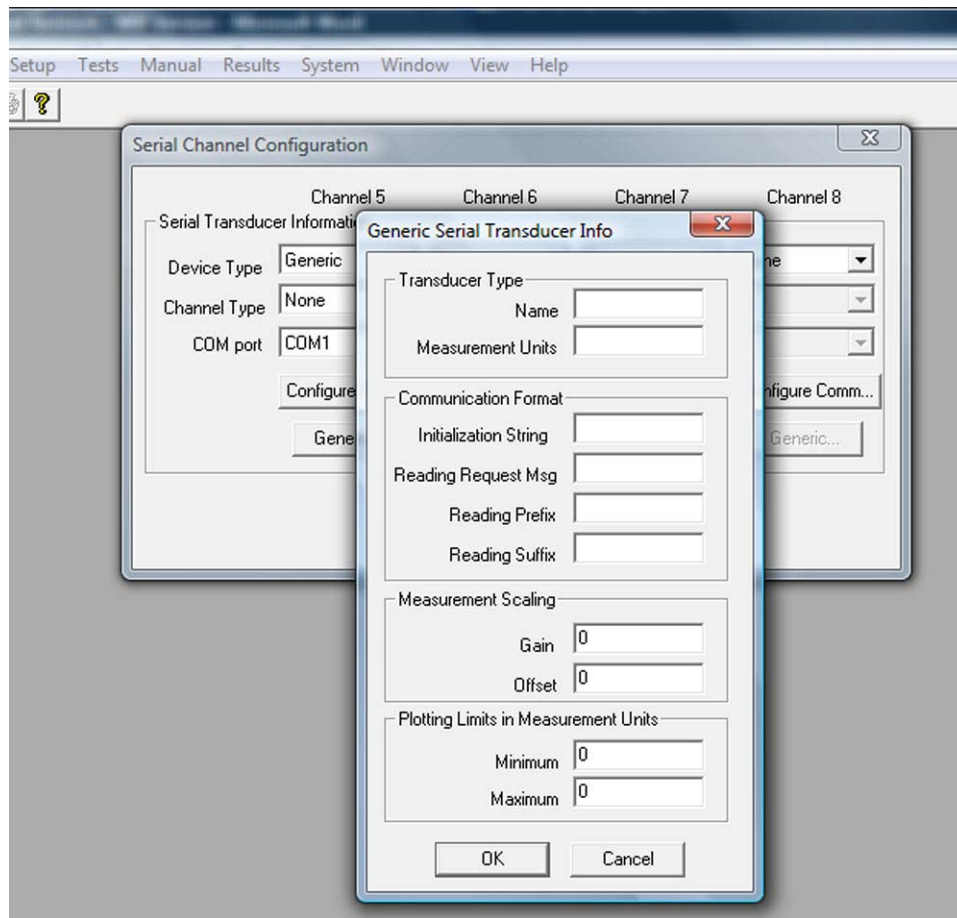


Figure 10, Generic Serial Transducer Configurations

e. Select OK to exit the window.

4. Configure the virtual channels.

NOTE: Virtual channels are channels that may be assigned by the user to combine one or two of the normal channels and a math function.

Results from virtual channels may be treated as results from any other device and included in graphs or reports. They cannot be used as a control channel for running tests, such as load, strain, or displacement control. The virtual channels may also be selected as elements of the run time graphs that appear during a test. Channels 9 - 11 are available as virtual channels.

a. Select Setup from the horizontal menu.

b. Select Channels from the vertical menu.

c. Select Virtual. The Virtual Channel Configuration window will appear as shown below.

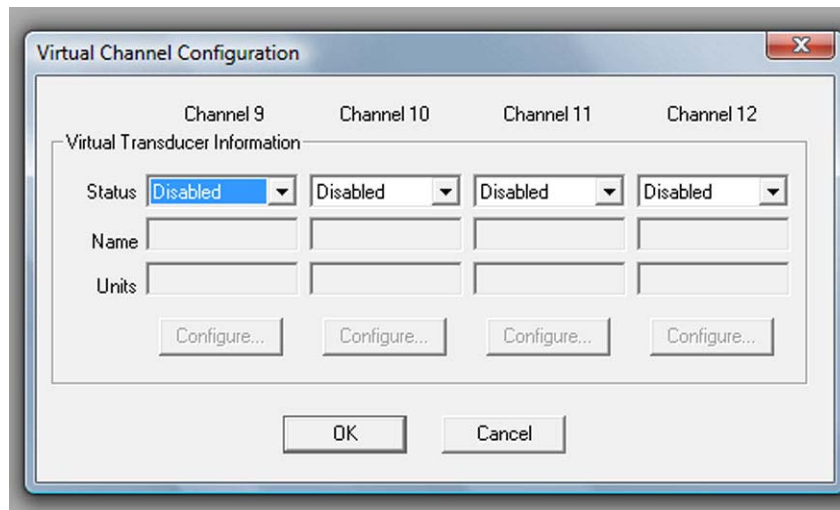


Figure 11, Virtual Channel Configuration

d. Enter or select the following:

Virtual Transducer Information:

Status - Select Enabled in the pull-down menu.

Name - Enter a name for the transducer. This name will appear on any graphs created with this channel, and the name will appear on the .CSC files and Excel reports.

Units - Enter the type of units. This unit designation is just text. It will not alter the numerical value of the data or the results of any calculations.

Configure - Select this button to establish device parameters.

e. Enter or select the following:

Variables - In order to assign the "normal" channel(s) such as load or strain to virtual channel(s) A and/or B, K (Constant) values may be added.

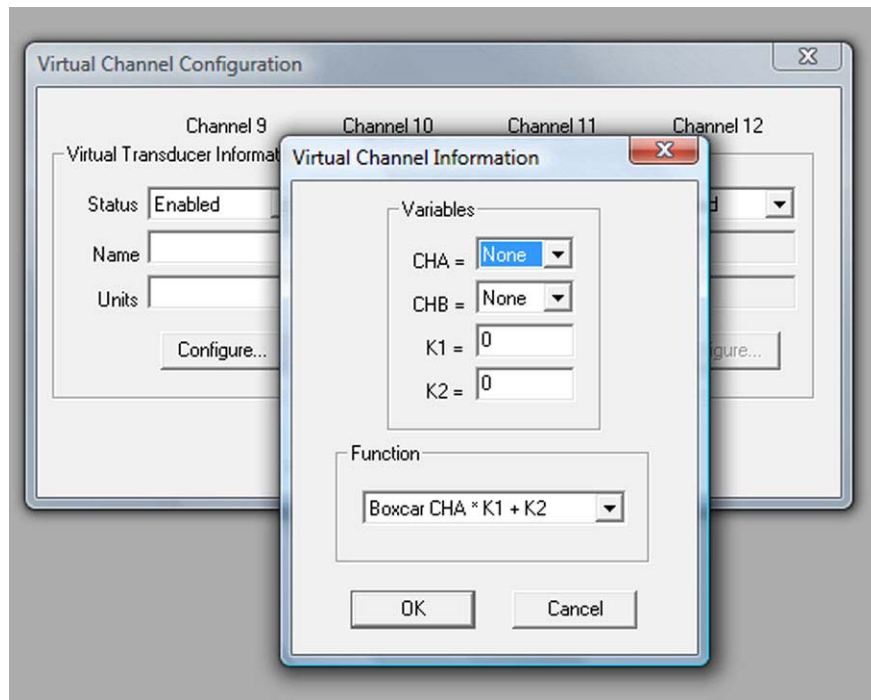


Figure 12, Virtual Channel Information

Function - Select a function from the pull-down menu. The purpose of the Function selection is to assign the calculation.

- f. Select OK to exit the Virtual Channel Configuration window.
 - g. Select OK to exit the Virtual Channel Information window.
5. Map the control channels.

NOTE: Control channels are channels that provide test control.

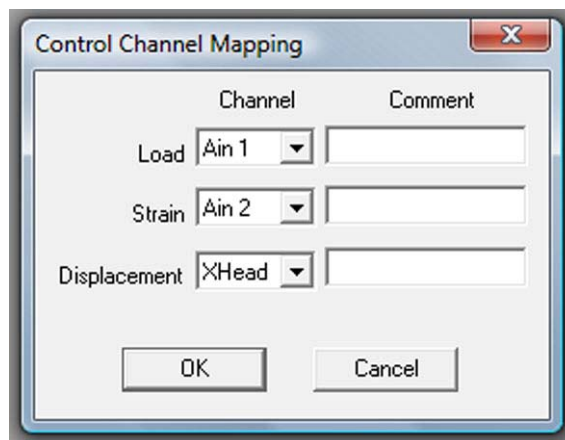


Figure 13, Control Channel Mapping

- a. Select Setup from the horizontal menu.
- b. Select Channels from the vertical menu.
- c. Select Control Channel Mapping, and the window will appear as shown below.

- d. Enter or select the method of control.

Load - Select the channel pertaining to the load transducer.

Strain - Select the channel pertaining to the strain transducer.

Displacement - Select the crosshead or channel pertaining to a displacement transducer.

Comment - Comments may be entered for use on this screen only. These comments will not appear on other screens.

- e. Select OK to exit the window.

After the system is configured, the system setup is saved. If changes are made to the hardware configuration, revise the software setup accordingly.

Setting Software Preferences

Establish preferences for software operation. These preferences allow the user to select options such as report headings, ability to run the test in DEMO mode, require passwords, and establish new paths for saving test information, among other options. Refer to the figure below.

1. Select Setup from the horizontal menu.
2. Select Preferences, and the window below will appear.

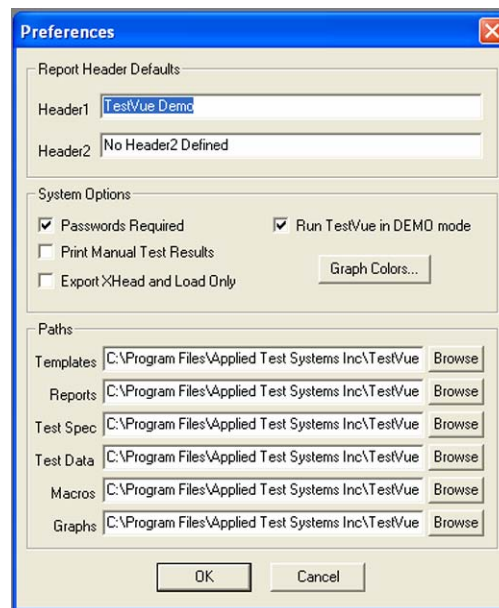


Figure 14, Preferences

3. Enter or select the following.

Report Header Defaults - Enter a name for Header 1 and/or Header 2. These headers appear on reports that are generated within TestVue®.

System Options - Select the boxes beside the available options in order to modify access to the software or program functions.

NOTE: Regardless of whether or not the PASSWORDS REQUIRED is selected, be aware that users who are designated as System Administrators will always be required to enter a password. When this box is *not* selected, other users will not be required to enter a password.

Select the GRAPH COLORS button in order to change colors that appear on the graphs generated by TestVue®.

Paths - The default paths are shown in the Preferences window shown on the previous page. However, the path selections can be changed. These path names allow users to establish the location of files within their computer's hard drive.

NOTE: Use the BROWSE button in order to view other existing paths.

4. Select OK to exit the window.

Creating Graphs

Graphs can be created by selecting Graphs from the Setup menu, or graphs can be created by selecting Generate Graph from the Results menu. (Choose the CREATE button from the Generate Graph window).

Creating Reports

Reports can be created by selecting Reports from the Setup menu or Generate Reports from the Results menu. (Choose the CREATE button from the Generate Test Report window.)

Pre-Set Information

During normal operation, it is not necessary to access information in the System file.

WARNING: Unless instructed by ATS personnel, do not alter the information contained in the System menu.

Options

If desired, the user may view a summary of the selected configuration options.

1. Select File from the main menu.
2. Select View Configuration, and the Select Configuration Options window will appear.

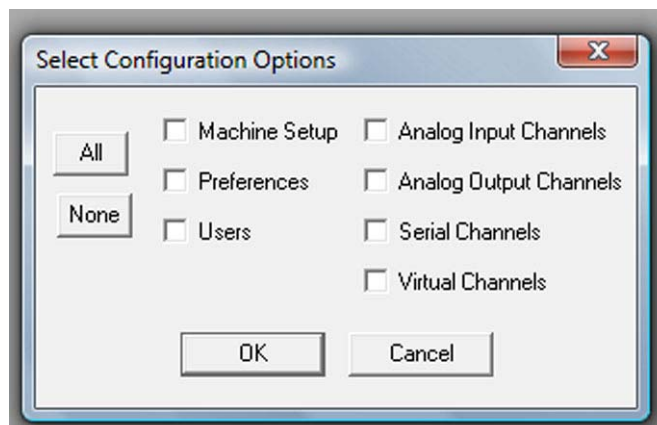


Figure 15, Select Configuration Options

3. Choose which subject you would like to view and select OK. A System Configuration window will appear with the configuration information in summary form.

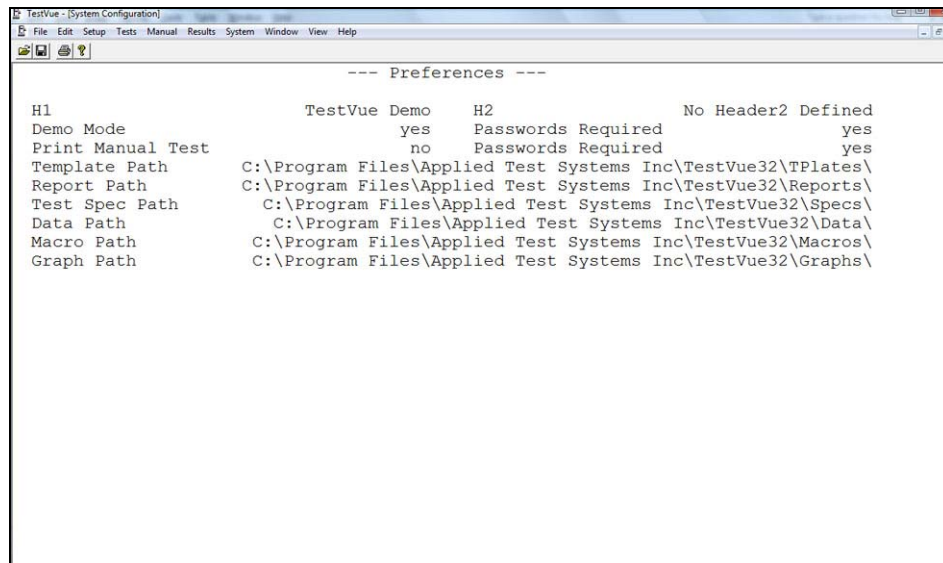


Figure 16, System Configurations

User Definition

User definition is a TestVue® security feature that prevents certain users from accessing and modifying information. This feature allows the System Administrator to control who has access to various testing features. This user definition step is an important safety feature that enables the System Administrator to control privileges of operators. Since this feature is very important in maintaining the safety and security of the testing, it is advised that the users are setup at this point and only users with System Administrator responsibilities have a copy of this User Definition section.

NOTE: Only a user with System Administrator privileges can add a user or modify the parameters of an existing user.

1. Select Setup from the main menu.
2. Select Users.

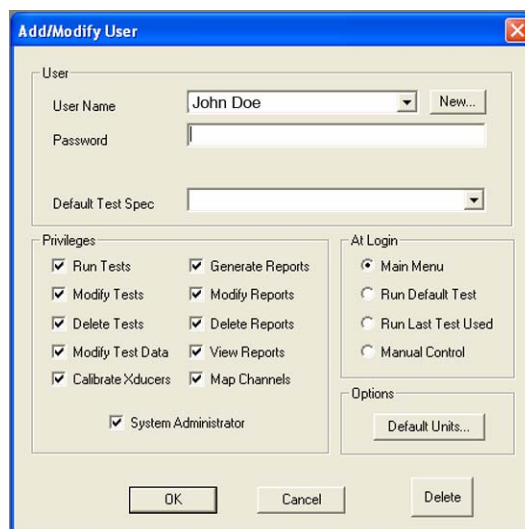


Figure 17, Add / Modify Users

3. Enter or select the user information such as the user's name, user's password, and the default test specifications. The Default Test Spec choice determines the default test type.

Privileges - Assign privileges by selecting (or de-selecting) the box beside those items. This feature gives the System Administrator the option to assign or restrict user access to specific areas of the software.

NOTE: After the System Administrator assigns user privileges, only the Administrator can access and change these privileges.

At Login - Select the point when the user must log in. Operating procedures described in this manual assume that Login occurs when entering the main menu, but this can occur at other restricted places in the software such as before running a default test.

Options: Select default units of measurement for that user. All values within TestVue® will be represented in terms of these units. The only exceptions are in a report and when modifying a graph, where the units can be custom selected. The Unit OPTIONS button accesses the window shown below. Make the appropriate selections within this window.

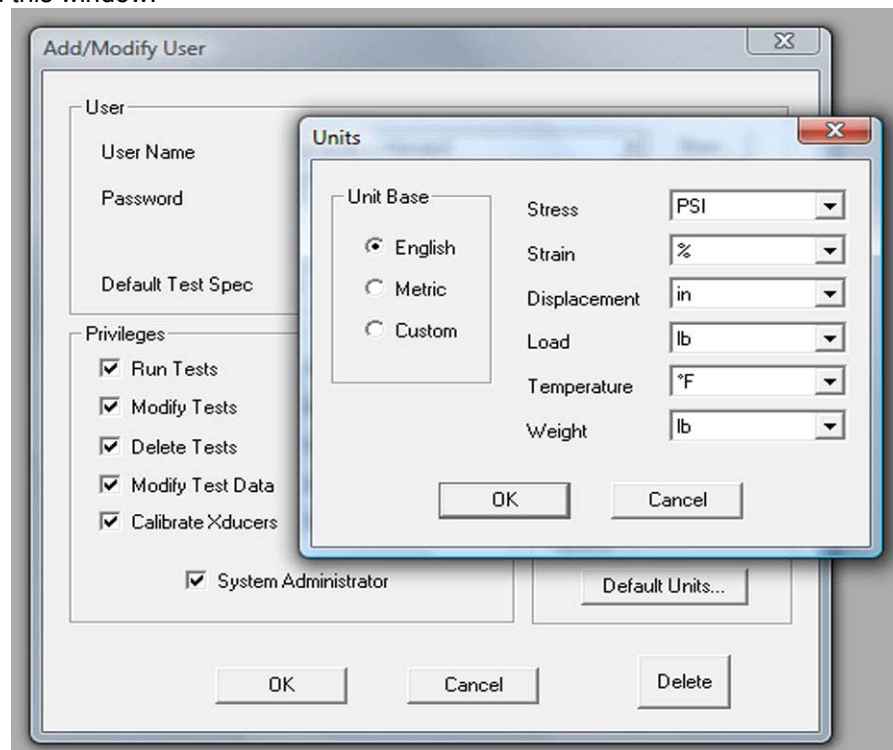


Figure 18, Default Units Option under Add/Modify User

4. Select OK to exit the Units window.

5. Select OK to exit the Add/Modify User window.

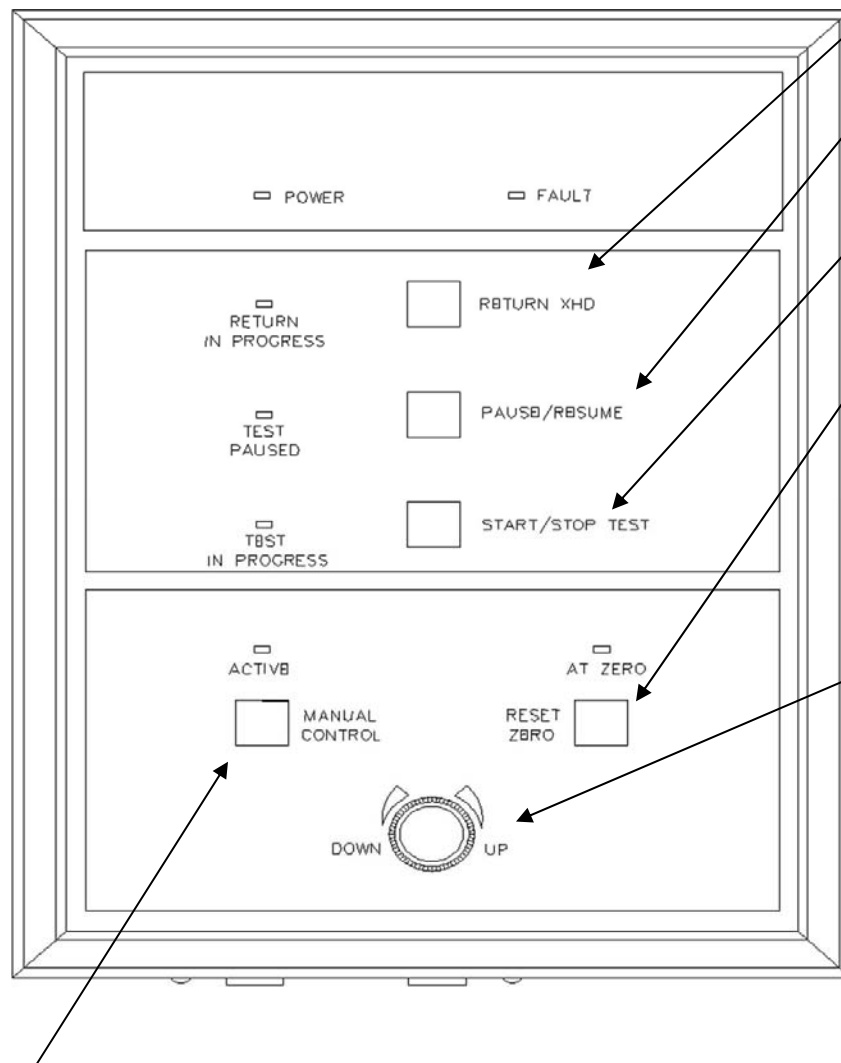
In the future, if it is necessary to modify user access, simply select the user's name (or add a user), and modify the privileges before exiting the screen.

Section 4. Controls

Manual Controls

The Series 1600 Universal Testing Machine (UTM) is computer-controlled, but limited functions can be controlled manually. The manual control station is mounted on the load frame and provides several test controls at this position. Below is a list of controls used during operation. Refer to Figure 2.

NOTE: In order for this equipment to be controlled manually, the TestVue® software must be in operation.



Return XHD - This pushbutton (with corresponding LED) will return the crosshead to the zero position.

Pause/Resume - This pushbutton (with corresponding LED) will hold a test in progress or resume a paused test when pressed.

Start/Stop Test - This pushbutton (with corresponding LED) will start/stop the test from the load frame.

Reset Zero - This pushbutton resets the zero position of the crosshead to its current location when the button is pressed. The ACTIVE indicator and the Manual Control Window on screen must be present for this function to operate. An LED indicator above the button will indicate when the crosshead is at zero.

Jog Pot - This jog is a proportional control, permitting the user to manually operate the up and down movement of the loading crosshead. As the jog is turned in either direction, the moveable crosshead speed gradually increases. When the knob is released, the moveable crosshead movement stops. The active indicator and the Manual Control Window must be ON for this function to operate.

Manual Control - This pushbutton will enable the manual controls, by pressing the button and holding for 3 seconds. An illuminated LED indicator above the button shows when the manual control functions are active. When activated, the manual control window will appear on the computer screen. Manual control is accessed from either the load frame or the computer.

Emergency Stop - This pushbutton is mounted on the base of the UTM and provides an instant stop of all machine functions when depressed. The Emergency Stop function is available at all times when power is applied to the UTM. When pushed, the pushbutton will lock the power off. In order to restore power, turn the button.

Computer Control Functions

The ATS Series 1600 Universal Test Machine is primarily computer-controlled using the TestVue® software. Figure 3 shows a list of the software menu items available with TestVue®. This manual will explain how to perform functions in all the menu items except for some items available in the SYSTEM menu, as they should be accessed by ATS personnel only.

| | | | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <div>FILE</div> <div> Open Save Save As Print Print Preview Print Setup Import View Configurations Logout Exit </div> | <div>EDIT</div> <div> Find </div> | <div>SETUP</div> <div> Channels Users Preferences Graphs Reports </div> | <div>TEST</div> <div> Start Test Manual Specimen Location Add/Modify Test Spec View Test Spec Re-enter Post Test Data </div> | <div>MANUAL</div> |
| <div>RESULTS</div> <div> Generate Report Modify Report Reprint Specimen Report Generate Graph Modify Report Edit Plots Edit Axis Add Specimen Calculations Set Specimen Start of Data Export Data to ASCII File Next Point </div> | <div>SYSTEM</div> <div> Tests Calibration Setup Machine Reinitialize Machine </div> | <div>WINDOW</div> <div> Cascade Tile Vertically Tile Horizontally Close All Arrange Icons Tool Bar Status Bar Font </div> | <div>VIEW</div> <div> Tool Bar Status Bar Refresh </div> | <div>HELP</div> <div> About TestVue </div> |

Figure 19, TestVue® Menu Items

Section 5. Operation

General

The purpose of this section is to describe procedures related to operating the 1600 Computer Controlled Universal Test Machine (UTM). Before a test can be conducted, TestVue's® Hardware Parameters and Software Preferences must be set.

- ☐ Creating a Test
- ☐ Positioning the Specimen
- ☐ Running a Test
- ☐ Manual Operation

Creating a Test

In order to custom-make a set of test specifications, perform the steps below.

1. Select Tests from the main menu.
2. Select the Add/Modify Test Spec box. The Add/Modify Test Spec screen will appear as shown below. (In order to use an existing test, select a test name from the pull-down menu.)

The screenshot shows the 'Add/Modify Test Specification' dialog box. It has a title bar with a close button. The main area is divided into several sections. At the top left, there's a 'Specification' pull-down menu with 'trw' selected, a 'Revision' text box, and a 'Description' text box. Below these is a 'Specimen Type' pull-down menu with 'Round' selected. To the right of these is a 'General Conditions' section with checkboxes for 'Print at Test End' (checked) and 'Load Cell Verification' (unchecked), each with a 'Setup...' button. Below these are buttons for 'Global Stop Test Conditions...', 'File Name Codes...', and 'Displacement Zero'. The middle section is divided into three columns: 'Segment Number' with a pull-down menu showing '1', 'Insert', 'Delete', '<<', '>>', and 'GoTo' with a text box '0' and 'times'; 'Segment Messages' with checkboxes for 'Start...' and 'Stop...'; and 'Segment Control Parameters' with 'Control' (Displacement), 'Mode' (Increase), 'Rate' (0.0 in/min), and a list of checkboxes for 'Break', 'Displacement', 'Load', 'Stress', 'Strain', and 'Time'. At the bottom left are checkboxes for 'Make Compression Values Positive', 'Measure Specimen Weight', and 'Report Specimen Density'. At the bottom right are buttons for 'Data Acquisition Setup...' and 'Calculation Parameters...'. At the very bottom are 'OK' and 'Cancel' buttons.

Figure 20, Add / Modify Test Specification

3. Modify the information on the screen.

Test Name - For new tests, enter a name. To modify an existing test, select the test name from the pull-down menu.

Description - Type a short description of the test (optional). This text is used for user reference.

Specimen Type - From the list of standard shapes, choose a selection that best describes the specimen shape, or type. The type of specimen selected will affect the calculations performed on the generated data.

Reports - Select the box beside Print at Test End, if desired. Selection of the SETUP box permits the user to ADD and REMOVE reports and graphs that will be printed directly after completion of a test.

Load Cell Verification - In order to verify that the correct calibrated load cell is chosen before running a test, select the ENABLED box and the SETUP button. Select the minimum and maximum capacities.

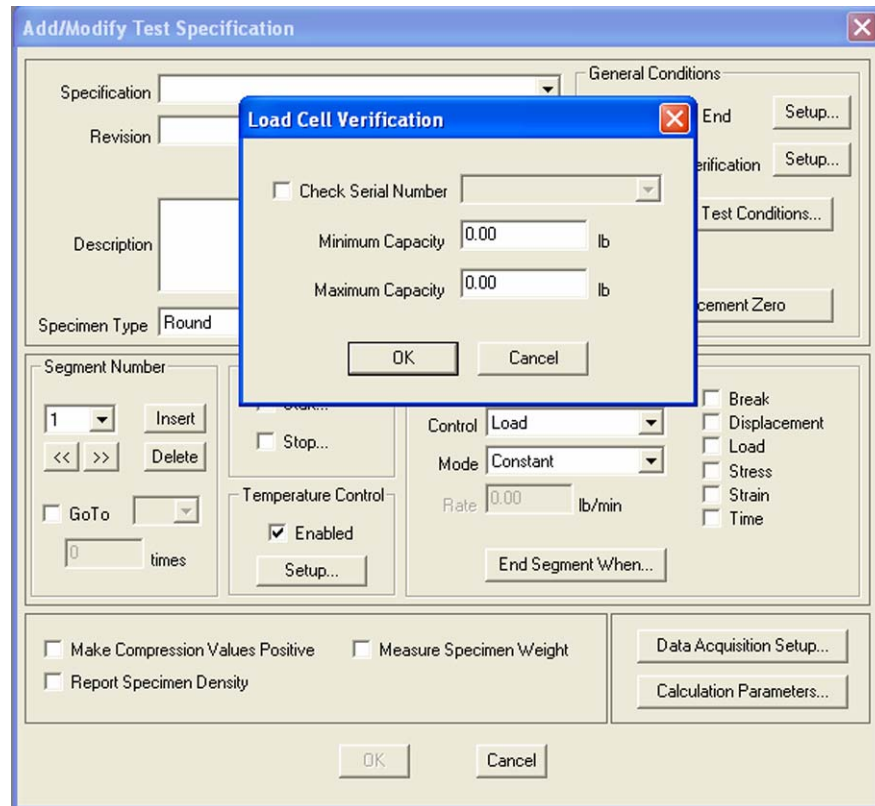


Figure 21, Load Cell Verification

Enter the information relevant to the desired load cell.

Global Stop Test Conditions - The GLOBAL STOP TEST CONDITIONS button accesses the Conditions window. Select the buttons in order to set conditions under which the test should be stopped. This option is important because it may protect the specimens and load cell from over-range travel. It may also protect any temperature or environmental chambers from over-travel of the components.

NOTE: This GLOBAL STOP TEST CONDITIONS selection will over-ride all end segment conditions.

Figure 22, Global Stop Test Conditions

Select the box beside the desired conditions and enter the conditions in the appropriate areas, depending on the test. Refer to the notes below for additional information about specific selections.

Specimen Breaks At - The percent value entered will stop or pause the test sequence at any point during the test if the load drops to specified percentage of the peak load.

CAUTION: Do not choose this percentage arbitrarily. If the value is too high, a premature stop could occur. Likewise, if the value is too low, over-travel may occur. Carefully select the value according to test type and material.

Load - Select the box beside Load and type in the < (*less than*) and > (*greater than*) values.

NOTE: The < (*less than*) value may be set at a negative number to prevent the test from ending at start-up from load train slack or movement. The > (*greater than*) value is set at the maximum point where the specimen or machine will reach.

NOTE: Displacement, Stress, and Strain operate similarly to Load as described above.

After exiting the Conditions Screen, the Add/Modify Test Spec Screen re-appears.

Figure 23, Add / Modify Test Specifications

Segment Number – TestVue® □ assigns a number to a segment before it is configured. Most tests have one (1) segment as shown above. However, if cyclic and load hold, more than one segment is required. Segments may be inserted and deleted. Select INSERT to define the current segment and allow the following segment to be created. Select GO TO and enter a segment number in order to set the segment cycle. Segments may be repeated for the specified number of cycles. Enter this amount in the TIMES box.

NOTE: A maximum of 10 segments is possible for a single test.

Segment Messages - Messages may be given at the start and end of a segment.

NOTE: Before selecting the START and END buttons under segment message, make sure the appropriate segment number appears in the segment number box. For example, if a message should appear at the beginning of segment 3, a 3 should appear in the segment number box when you are setting up the segment message.

Select the START button, and the Segment Start Message window will appear as shown below. Note that the End Segment Message screen is setup the same way.

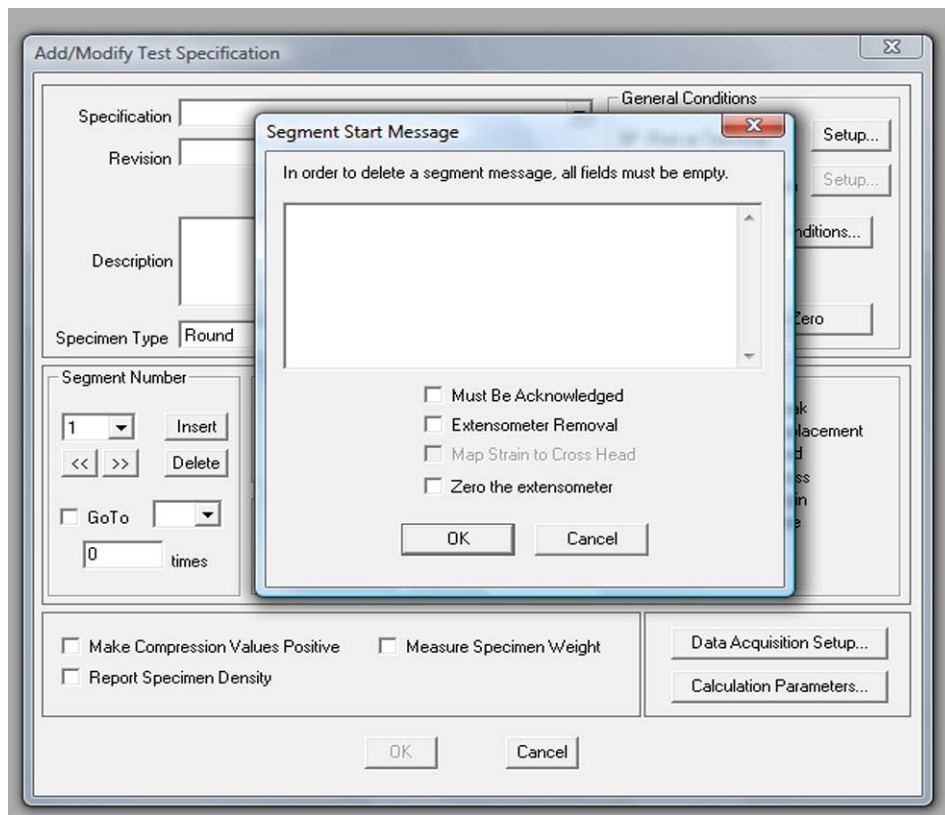


Figure 24, Segment Start Message

If desired, type a message, and it will appear at the start of each segment. If **Must Be Acknowledged** is selected, the test cannot proceed until the operator actively acknowledges the query. Select the box beside **Extensometer Removal** and the test will continue after this action occurs. At this point, TestVue® will combine the strain data from the extensometer to the displacement data from the crosshead.

Segment Control Parameters:

Control - Select the control type: load, displacement, or strain.

Load refers to the tensile or compressive force on the load train (as reported by the load cell during the test).

Displacement refers to the distance of crosshead motion that occurs during the test (as reported by the control system or a separate displacement transducer).

Strain refers to the change in length or shape of the specimen (as reported by an extensometer or similar strain measuring device).

Mode - Select the mode: constant, increase or decrease.

Constant is used to hold the current value of the control channel.

Increase is used when an increasing value is required.

Decrease is used when a decreasing value is required.

Rate - If Increase or Decrease is selected as the mode, enter a rate in the specified units.

End Segment When - This button accesses the same options available in the previously explained Conditions window used when stopping or pausing a test. When a condition is

specified, that condition will appear in the boxes to the right (such as yield, break, or displacement).

Make Compression Values Positive - Select this box in order to reverse the polarity of the load cell, crosshead, strain, and any virtual channel for compression testing.

Measure Specimen Weight - Select this box in order to measure the weight of the specimens. A Mettler balance must be configured to a serial channel for this to operate.

Report Specimen Density - This selection is available only if Measure Specimen Weight has been selected. Choose this box if it is necessary to obtain the density of the specimens.

Data Acquisition Setup - Select this box in order to setup what data needs to be acquired at the end of the test. The values shown below are default values obtained by clicking the Defaults box.

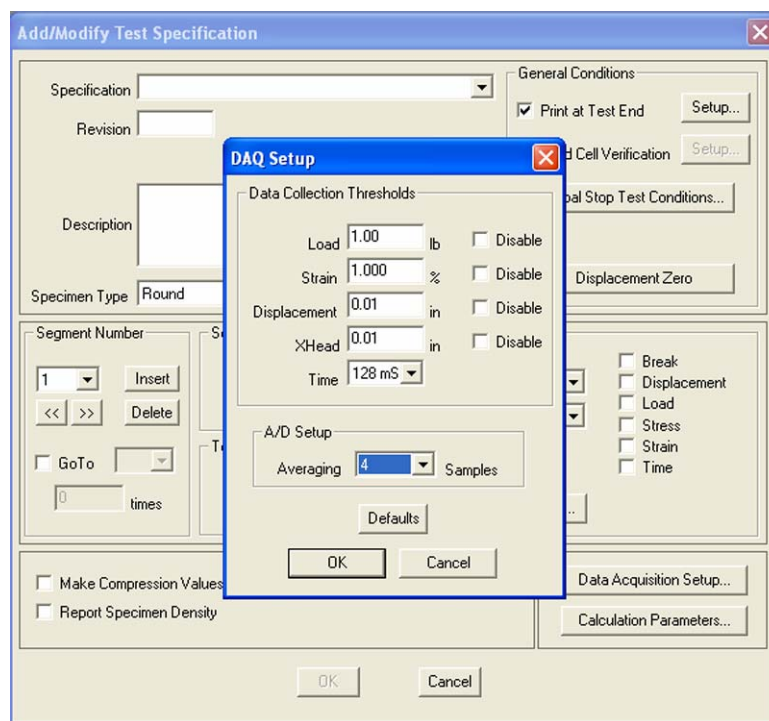


Figure 25, Data Acquisition Setup

A/D Setup - Enter the average number of data points. As data points are collected, they are averaged within a "moving window" of a size assigned by this value.

Data Collection Thresholds - Set the minimum points at which the software will begin to collect information about the following parameters: load, strain, displacement, crosshead and time. These thresholds act independently of each other. In other words, every time just one threshold changes, a data point will be mapped. Refer to the example in the DAQ Setup screen shown above. The data collected at these settings will add a data point every time the load changes 1 lb., the strain changes 1%, the displacement changes 0.010 inches, the crosshead moves 0.010 inches, and 128 mS pass.

Note that only thresholds applicable to the specific test will be mapped. For example, if no extensometer is being used, the data collection will ignore the Strain % DAQ setting.

CAUTION: Do not select a DAQ setting higher than the capacity of the device. For example, do not select 1010 lb. as a DAQ setting for a 1000 lb. load cell. The result is an uninterrupted data collection stream which may cause numerous errors in TestVue®.

Defaults - Select this button, and the default values are reinserted.

Calculation Parameters - Select this box, and the window shown below will appear. Choose calculations to add to the Selected Calculations list.

Modify Calculation parameters by choosing the location of Point 1 and Point 2. Users may make graphical point selections if the appropriate box is selected. In order to choose a calculation as the primary yield / modulus, select the appropriate box.

The MS Word® Template Keyword applies only if the user has MS Word® installed on the computer.

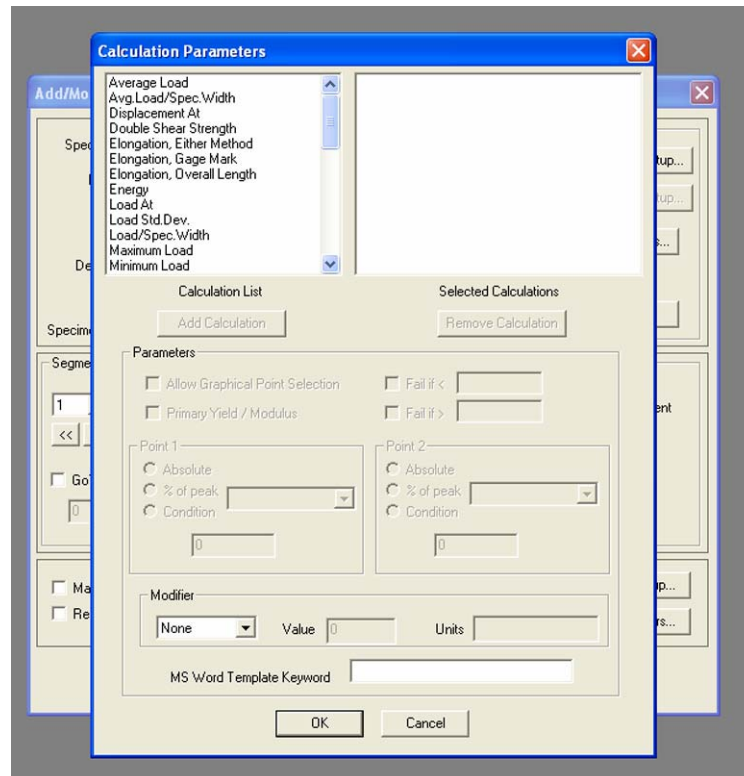


Figure 26, Calculation Parameters

4. Select OK to exit the Calculation Parameters screen.
5. Return to the Main Menu by selecting OK to exit the Add/Modify Test Spec Window.

Viewing Test Specifications

In order to view the test specification of an existing test, follow the steps below. This feature offers the operator a way to view a description of any existing test.

1. Select TESTS from the main menu. Then select VIEW TEST SPEC from the Test menu.
2. Scroll down the list of the existing test names and select one for a description. If no description appears, then no description has been created.

Adding a Test Description to an Existing Test

If no test description appears after the test name is chosen, a description can be added by returning to the Add/Modify Test Spec screen.

1. Select CANCEL in order to return to the main menu.
2. Choose TESTS from the horizontal menu.
3. Select ADD/MODIFY TEST SPEC from the vertical menu.
4. When the Add/Modify Test Spec screen appears, use the arrow by the Test Name to scroll through the available tests.
5. Choose the test name that needs a description.
6. Enter a description of the test in the text box under the test name.
7. When the description is complete, select OK in order to return to the main menu.

Positioning the Specimen

1. Position the specimen. If using ATS accessory equipment, refer to the appropriate equipment manual for specific instructions.



WARNING: After positioning the specimen, prevent personal injury by shielding yourself from the specimen in case the specimen breaks or shatters. If a shield is not available, stay a safe distance from the load frame.



WARNING: Set the limit switches prior to test operation. The limit switches prevent the moving crosshead from exceeding the pre-set range. Set the limit switches just above and below the ranges set for the moving crosshead.

Running a Test

1. Select TESTS from the main menu. Select START TEST from the vertical menu. The Start Test screen will appear as shown below.

Figure 27, Start Test

2. Enter or select the following information:

Test Specifications:

Test Spec - Select the test name from the Test Spec window.

NOTE: The test description will automatically appear in the large window after a selection is made.

View - This button allows the user to view and/or print the test specifications.

Edit - Use this button to verify and/or change the test parameters for the current test.

NOTE: Changes made to the test specifications when using the EDIT selection are temporary, and the specifications will revert to the previously set conditions after the test is complete.

Create - Use this button to verify and/or change the test parameters. Any changes made to the test specifications when using the CREATE selection are permanent and will apply to all future tests unless they are reset using a CREATE command.

Batch ID - If desired, enter a Batch ID number. This number allows the user to assign new tests to previous batches.

Assigning batch identification numbers allows the user to run tests using the originally defined batch specifications, regardless of what specifications are currently set on the Add/Modify Test Spec screen.

A specimen information screen will appear as shown below. This allows the user to alter the specimen information, use manual control, and start the test.

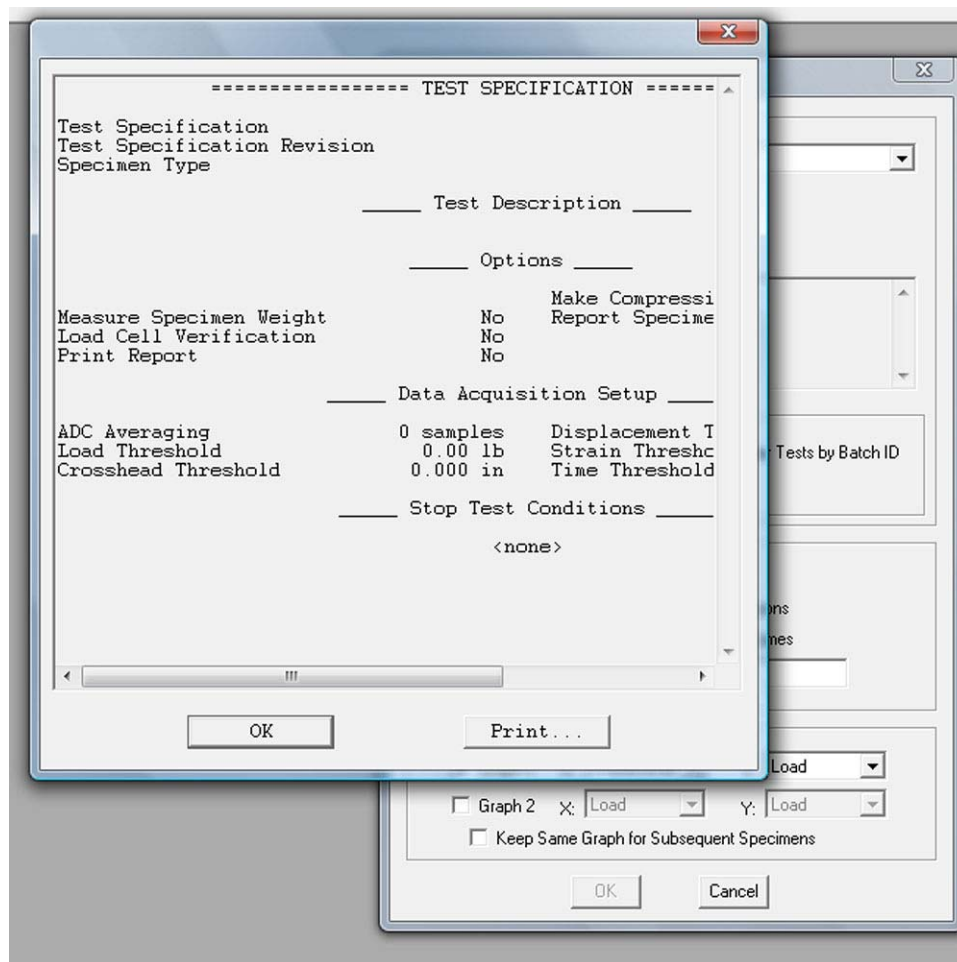


Figure 28, Specimen Information Screen

Filter Tests by Batch ID - Select this box in order to group the tests according to the batch identification number.

Options - Choose any of the three listed options: (1) Print Report at End of Test, (2) Individual Specimen Dimensions, and (3) Auto-Generate Specimen Names.

NOTE: If the box beside Individual Specimen Dimensions remains unchecked, the specimens are assumed to be identical. To prevent repetitive commands, only leave this box unchecked if the specimens have different dimensions.

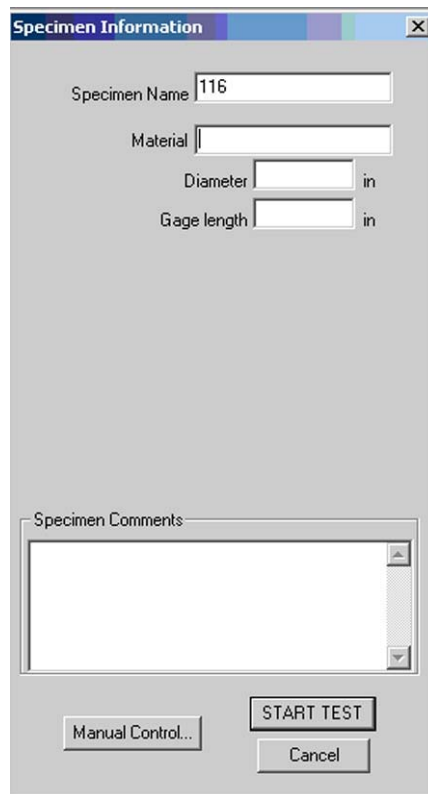
Specimen Name Prefix - When AUTO-GENERATE SPECIMEN NAMES is selected, the user can define a prefix used to identify or group specimens.

Run Time Graphs - Select graphs 1 and/or 2 to indicate the graphs used during the test. Indicate the X (horizontal) and Y (vertical) axis by selecting a choice in the pull-down menu. If KEEP SAME GRAPH FOR SUBSEQUENT SPECIMENS is selected, the same graph with the previously plotted data will be used for each new specimen. The same graph will be used for all specimens until the operator chooses to change graphs. If this option is not selected, each specimen starts with a clear graph.

3. Select OK to exit the window.

4. The Specimen Information screen will appear as shown below. Enter the appropriate information in the applicable fields.

NOTE: If necessary, use the manual controls for final positioning of the specimen and to apply a preload.



The image shows a software dialog box titled "Specimen Information". It contains several input fields: "Specimen Name" with the value "116", "Material" (empty), "Diameter" (empty) followed by "in", and "Gage length" (empty) followed by "in". Below these fields is a "Specimen Comments" section with a large text area. At the bottom of the dialog are three buttons: "Manual Control...", "START TEST", and "Cancel".

Figure 29, Specimen Information

NOTE: If the box for Individual Specimen Dimensions was checked in the Start Test screen (step 1 of this procedure), the appropriate fields will be blank each time a new specimen is tested (see Options). If the fields are blank, enter data before proceeding with the test.

NOTE: If the box for Auto Generate Specimen Names was checked on the Start Test screen (step 1 of this procedure), it is not necessary to enter the specimen name.

Specimen Name - Select a unique specimen name.

Material - Describe the material of the specimen.

Diameter - Enter the diameter (or other dimension, such as length or width) of the specimen. This information is used to determine the cross-sectional area of the specimen for any stress calculations.

Gauge Length - Enter the gauge length of the specimen. This information is used in calculations to determine the strain. If an extensometer is being used, enter the gauge length of the extensometer. If no extensometer is being used, use the distance between the fixtures.

Specimen Comments - Enter any comments concerning the specimen.

5. Select the Start Test button.

6. The Run Time Graphs will appear on the monitor and give a graphic representation of the test as it runs.

As shown below, the left graph displays the load vs. the displacement. The right graph shows load vs. time. These were selected in the Start Test screen. Both graphs are generated during the testing process. Note that the run time data appears at the top of the screen during the test.

NOTE: The graph will automatically scale as the data points reach the maximum point for each graph template. The final graph gives a true representation of the real-time results.

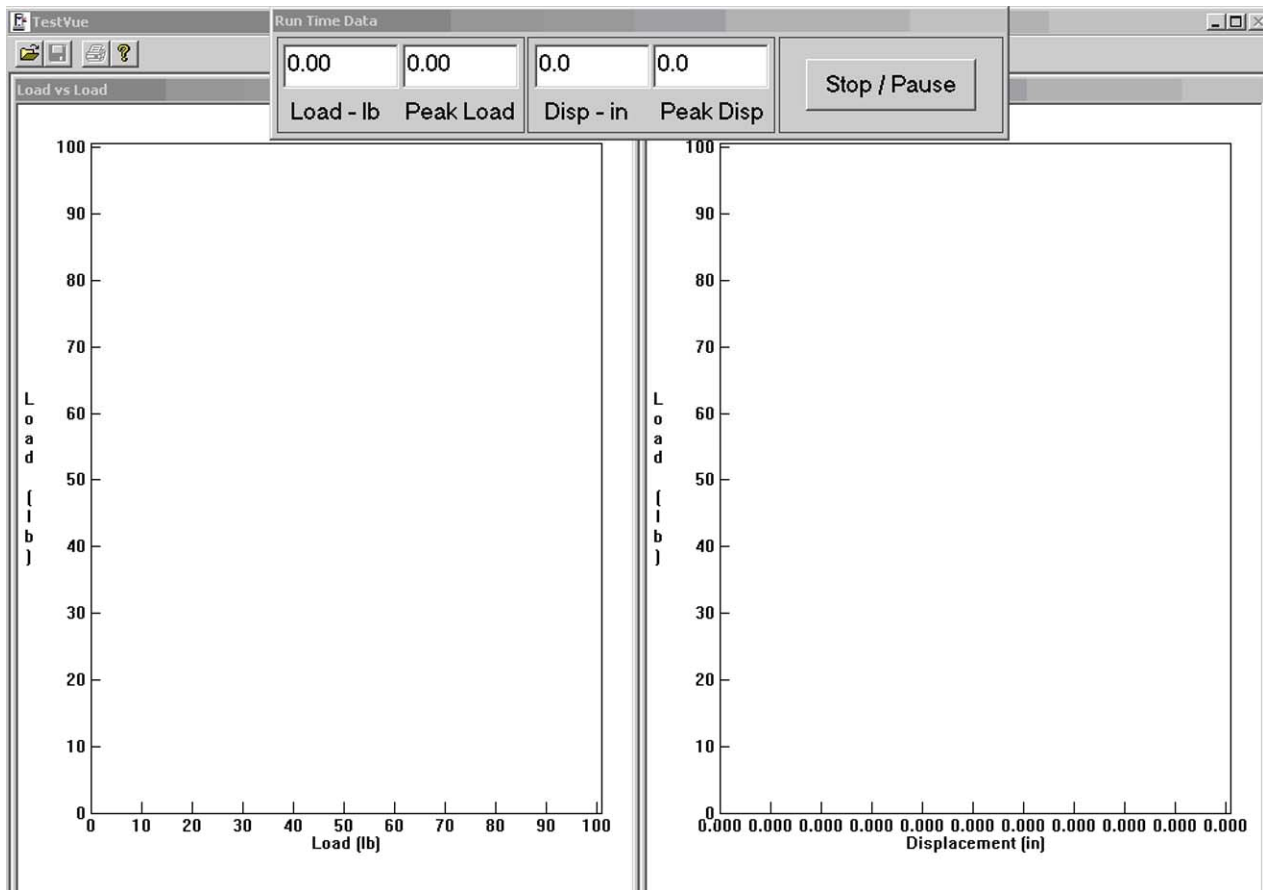


Figure 30, Real Time Data Graph

Detailed graph results can be obtained at the end of the test. During crosshead movement, the Run Time Data is presented at the top of the screen. The current load and displacement values are updated as the computer obtains the data. The peak values are updated at the same rate as the DAQ rates chosen in the DAQ Setup screen.

NOTE: The user may choose to Stop or Pause a test by selecting the appropriate button. Then the user will then be given a choice to resume or abort the test.

7. When the test is complete, the user may save the results. A specimen comments screen will appear as shown below. Enter any comments related to the test.
8. The user may choose to return the crosshead to its original position.

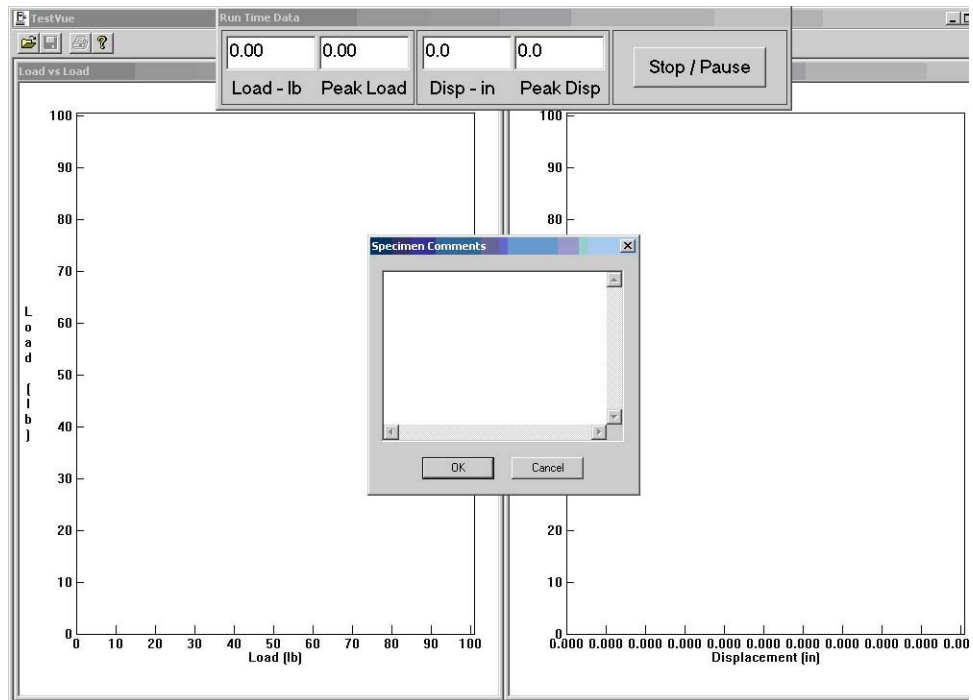


Figure 31, Specimen Comments

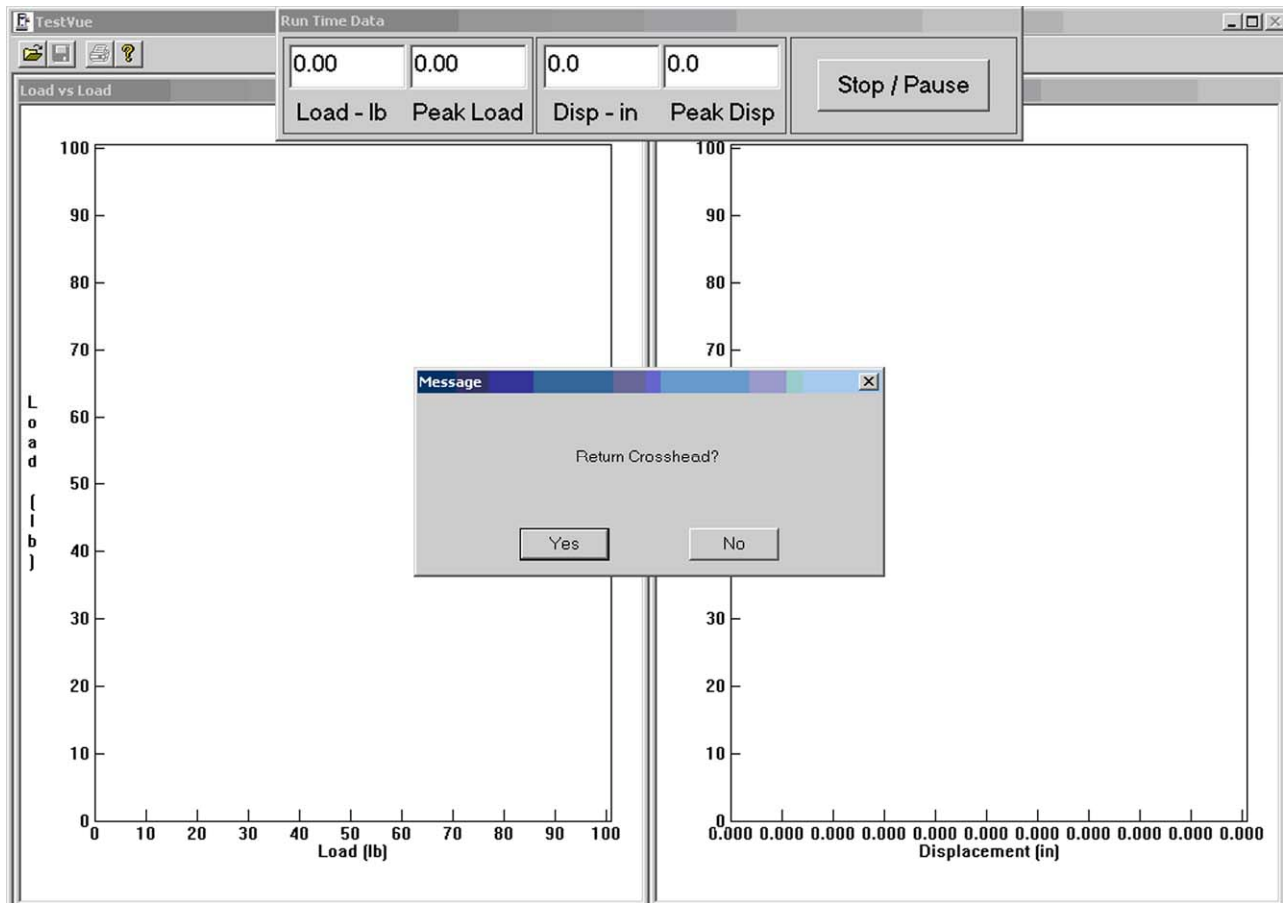


Figure 32, Return Crosshead

9. At the next screen choose 'Yes' to perform another test, or choose 'No' to return to the main menu.

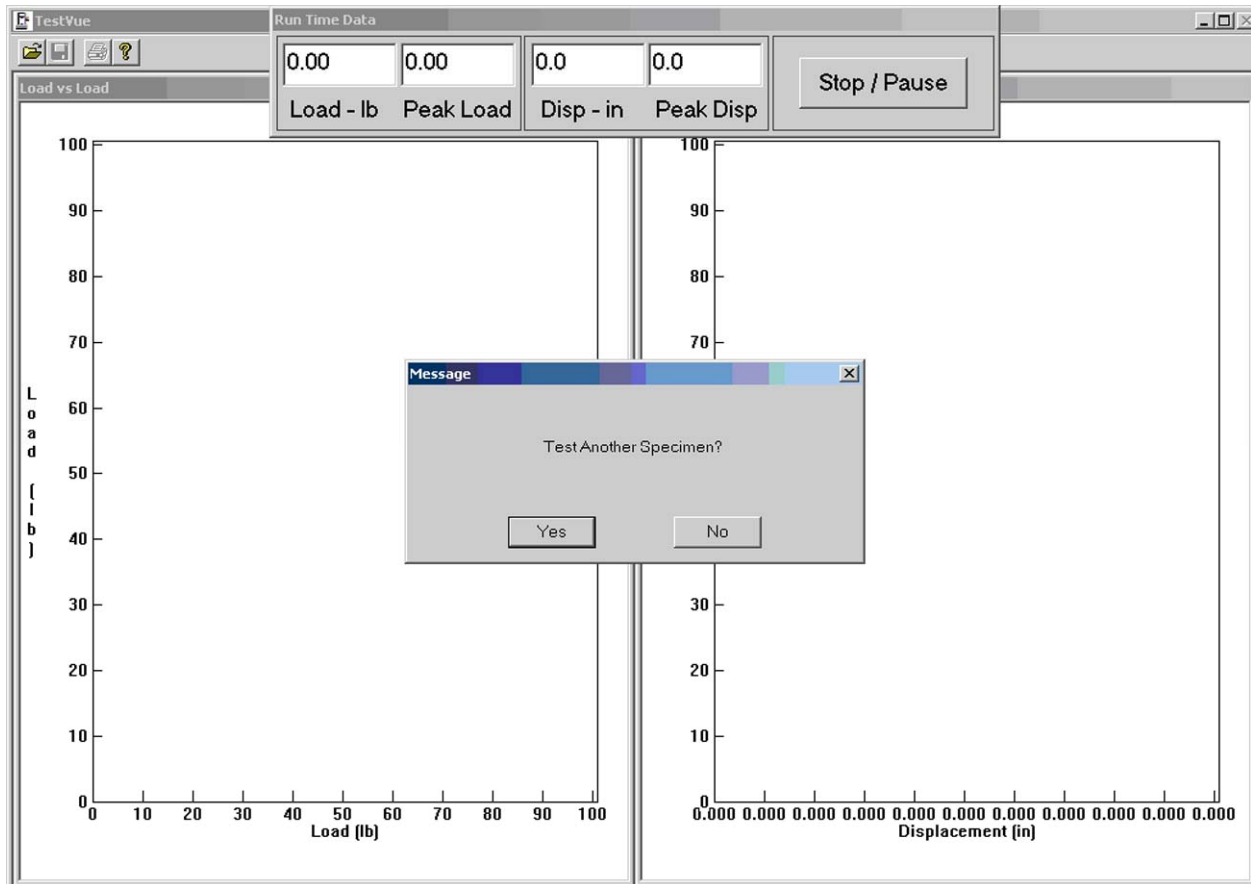


Figure 33, Test Another Specimen

10. For additional tests, repeat the appropriate procedures as required for additional tests.

Manual Control

Manual control can be used for setting up tests, moving the crosshead, or for the most rudimentary of testing. Before starting a controlled test, set the parameters within the Add/Modify Test Spec screen.

1. Select Manual from the horizontal menu.

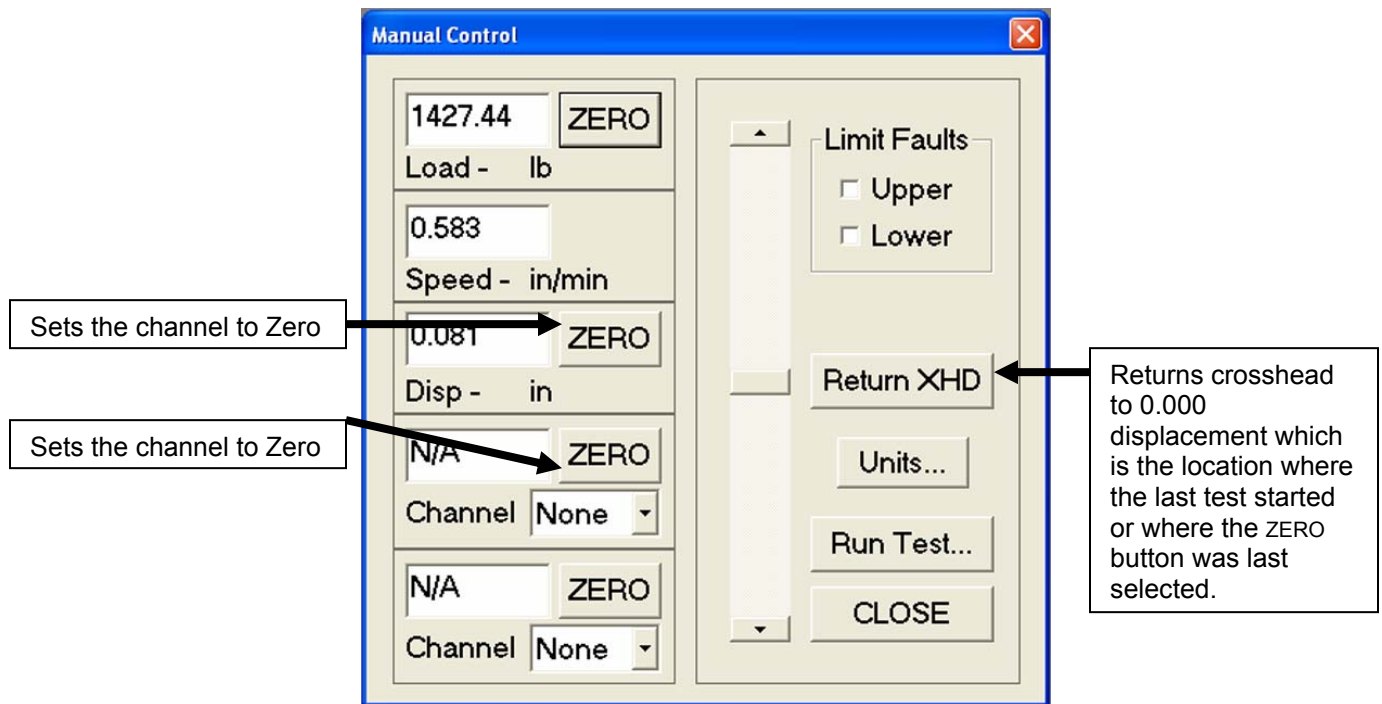


Figure 34, Manual Control Window

2. Use the controls on the manual control station to perform some of the basic functions. Refer to Controls if necessary.

Section 6. Obtaining Results

General

After completing a test, reports and graphs can be generated and created. This section will explain how to generate and create custom-made reports and graphs.

Generating a Report

After testing a sample, the user can generate a report of the test results. To generate a report, complete the procedures below. In order to create a new report.

1. Select Results from the main menu.
2. Select Generate Report, and a Generate Test Report.

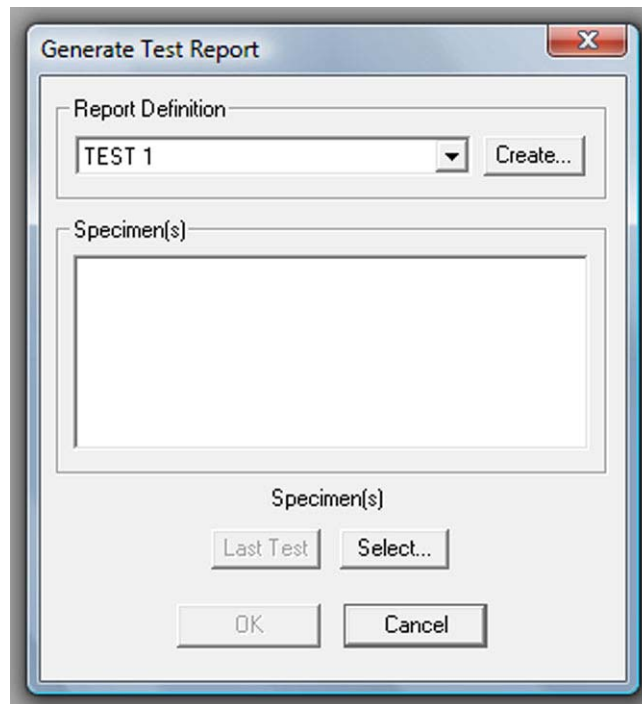


Figure 35, Generate Test Report Window

3. Select a report from the pull-down list of existing test report names.

NOTE: At this point, if it is necessary to generate a custom report, select the CREATE... button, and the Report Layout Editor will appear.

4. Click on the SELECT button, and the Select Specimen(s) window will appear.

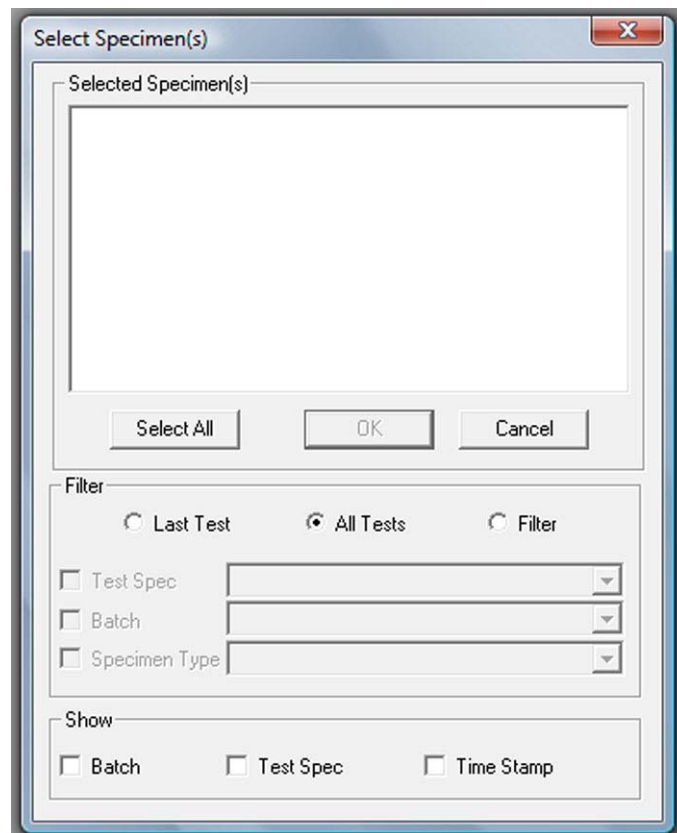


Figure 36, Select Specimen Window

5. Select the following in order to identify which specimen information is used in the report.

Selected Specimens - Specimens may be selected individually or as a group. Use the Ctrl key to select more than one specimen, or click on the Select All button to select all of the specimens.

Filter - Indicate what specimens are used: last test, all tests, or filter. When selecting filter, specify the Test Spec, Batch, and/or Specimen Type.

NOTE: To enter more specific specimen information, make selections from the pull-down menu concerning the Test Spec, Batch, and Specimen Type.

6. Select OK to exit the window.
7. At the Generate Test Report window, select OK to begin generating a report.
8. At the prompt, choose the file name and directory path to which you want the report to be saved.

Printing a Report

Reports may be viewed on screen or printed. In order to print a report that has been generated, complete the procedure below.

1. When the report is shown on the screen, select Print from the File menu.
2. Verify that the correct printer options are selected, and press ok to begin printing.

Creating a Report

In order to create custom reports, follow the steps described below.

1. Select Setup from the main menu.
2. Select Reports, and the Report Layout Editor screen will appear.
3. Enter the following details on the Report Layout Editor screen.

Figure 37, Report Layout Editor

Report Details:

Report Name - Enter a name for the new report.

Title - Enter a title for the report.

Header 1 - This first header appears at the top of the report.

Header 2 - This second header appears at the top of the report just beneath the first header.

Report Generation Mechanism:

Report Type - Select one of the four choices from the pull-down menu: Built In, MS Word Template, Excel Macro, or Statistical.

NOTE: The MS Word Template requires Microsoft Word to be installed, and the Excel macro requires Microsoft Excel is installed.

Report Options - Select any of the four options for their inclusion in the report.

Statistical Report Options - If statistical was chosen as the report type, the selections listed in this box are available.

Template/Macro File Name - Type in a template or macro file name if applicable.

General Options:

Report Units - Select this button to choose the appropriate units of measurement such as English, Metric, or Custom base units. Within each selection, more specific units of measurement are available.

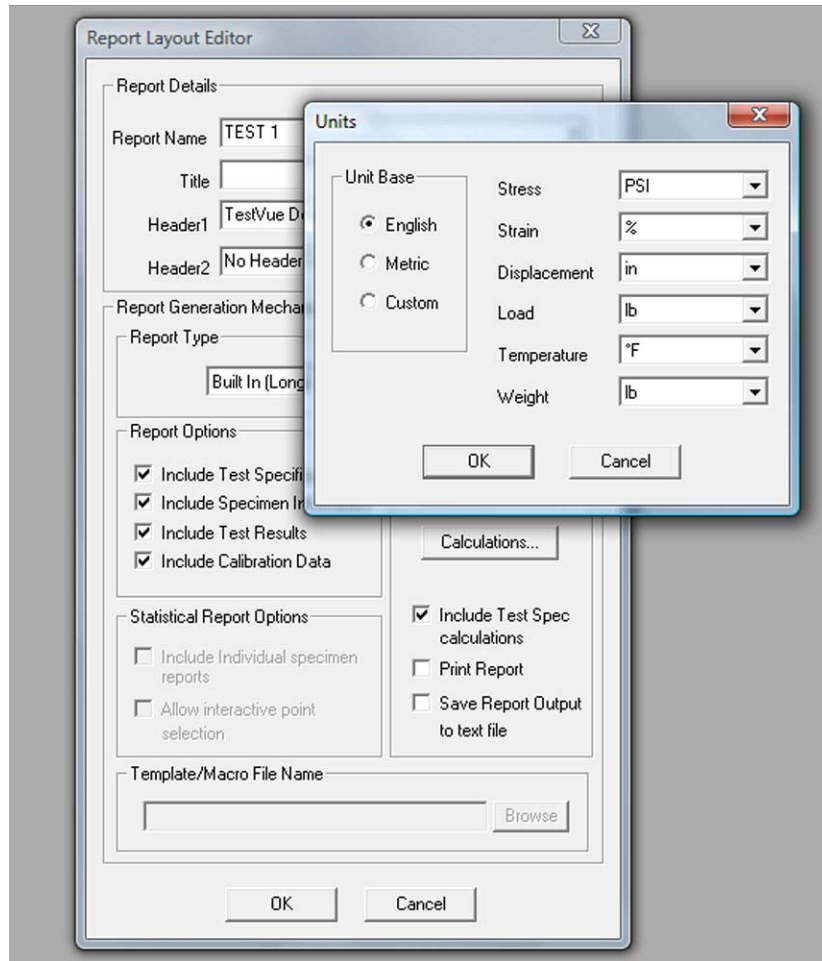


Figure 38, Units of Measure

Calculations - Select this button, and the Calculation Parameters window appears as shown on the next page. Use the ADD CALCULATION button to select calculations from the existing list. Set additional parameters as applicable.

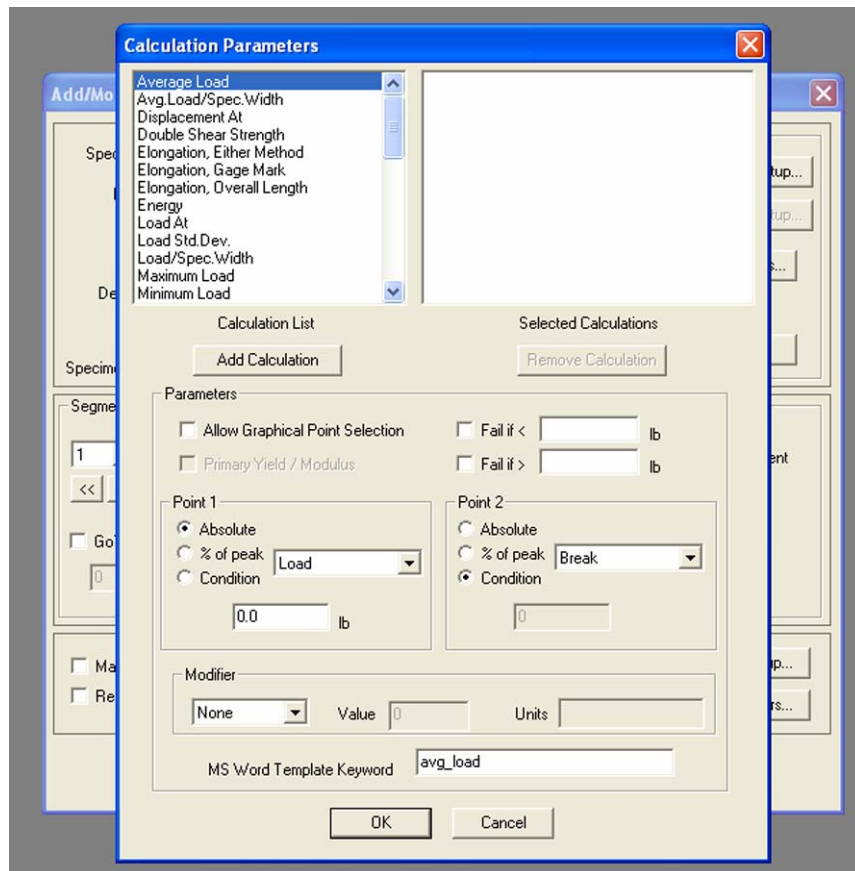


Figure 39, Calculation Parameters

NOTE: To remove items from the window on the right, highlight the item in the window and select the REMOVE CALCULATION button.

4. Select OK to exit the Report Layout Editor. The new report will be saved as an existing report.

Opening a Report in Microsoft Word

After generating a report it can be opened in Microsoft Word. Follow the procedure below.

1. Generate the report that will be opened in Microsoft Word.
2. When that report is displayed on screen, select Save As from the File menu. Save the report in TestVue®'s Reports subdirectory or another directory of your choosing. Be sure the assign a file name to the document.
3. From Microsoft Word, select Open from the File menu. Specify the appropriate path and file name. Specify ALL FILES under List Files of Type, and select OK. The report will appear on screen.

Generating a Graph

In order to generate a previously saved graph, complete the procedure below.

1. Select Results from the main menu.
2. Select Generate Graph, and a Generate Graph screen appears as shown below.

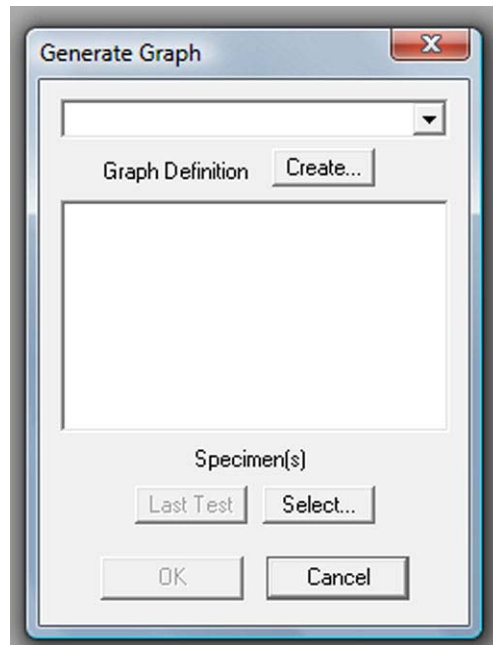


Figure 40, Generate Graph Window

3. Select the graph name from the pull-down list, and a description of the graph will appear in the window.

NOTE: The user may create a new graph at this point by selecting the CREATE... button.

4. Choose the Specimens that you want to graph by selecting either the LAST TEST button or the SELECT... button. The SELECT... button will display the Select Specimen(s) screen shown below. Edit or select the specimens and filter options.

NOTE: In order to select several individual specimens, depress the <Ctrl> key while selecting the specimen name.

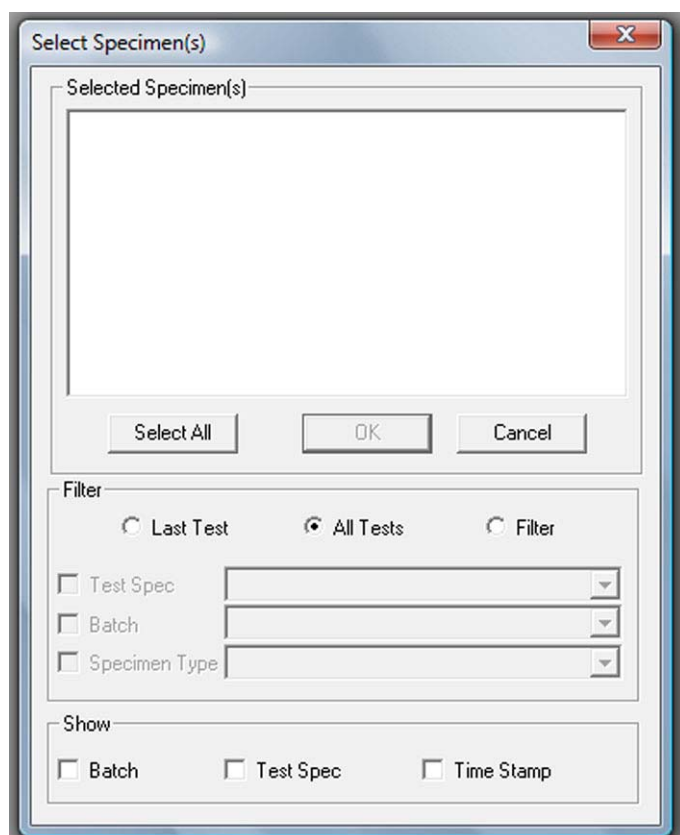


Figure 41, Select Specimen(s) Window

5. Select OK to exit the screen.

Creating a Graph

1. Select Setup from the main menu.
2. Select Graphs, and the Graph Parameters screen will appear as shown below.

Figure 42, Graph Parameters

3. Enter the following details on the Graph Parameters screen:

Graph Name - Enter a name for the new graph.

Format - Choose if you want the actual or offset values to be displayed on your graph. An offset format will create multiple specimens to be offset by 5% of the peak X axis value on the same graph.

Labeling - Enter a title for the graph and the X and Y axis.

Scaling - Choose between automatic and manual scaling.

Options - Choose from the available options that allow you to customize the grid and line types.

4. Select OK to exit the Graph Parameters.

NOTE: After a graph is created and displayed on screen, the user may select Modify Graph to make any temporary changes. This section also allows the user to select different units. *This option is not available in the Create Graphs screen.*

Zooming In On a Graph

If the user chooses to zoom in on a section of a generated graph, use the mouse to draw a frame to select the area of the graph that should be enlarged.

Exporting Data to ASCII File

Test Data can be exported as ASCII by following the procedure described below.

1. Select Results from the main menu.
2. Select Export Data to ASCII File, and the Export Specimen Data screen will appear as shown below.

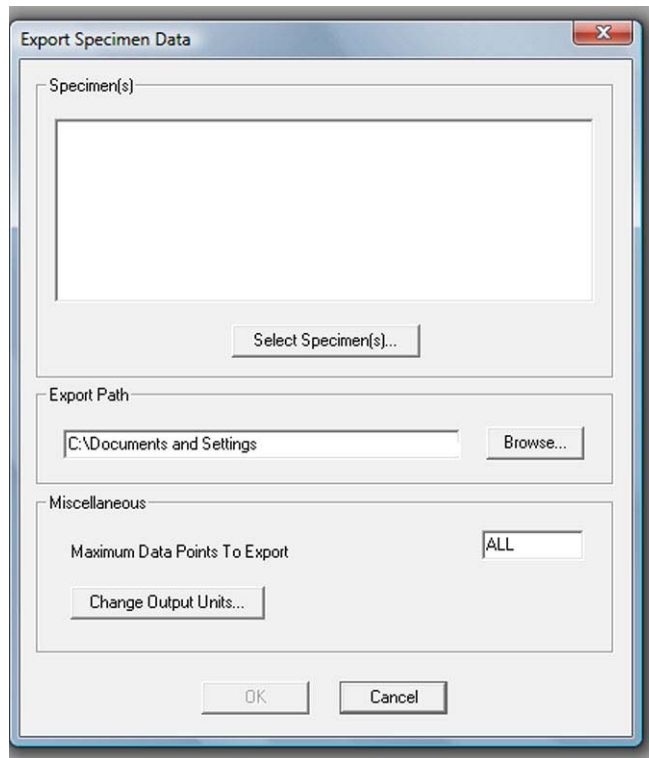


Figure 43, Export Data Window

3. Choose the SELECT button in order to choose which specimens should be exported.
4. Select the filter type to view specimens. Choose from SELECT ALL, ALL TESTS, or FILTER.
5. Choose individual specimens or use the SELECT ALL button to choose every specimen shown.

NOTE: In order to select several individual specimens, depress the <Ctrl> key while selecting the specimen name.

6. Select OK and the Export Specimen Data screen will appear and display the specimens chosen in step 5.
7. If desired, choose a number of maximum data points to export. The default selection is ALL.
8. Select the BROWSE button and the Open screen appears as shown below. Scroll down the list of file names, and select the path to which the exported files should be saved. Select OK when completed.

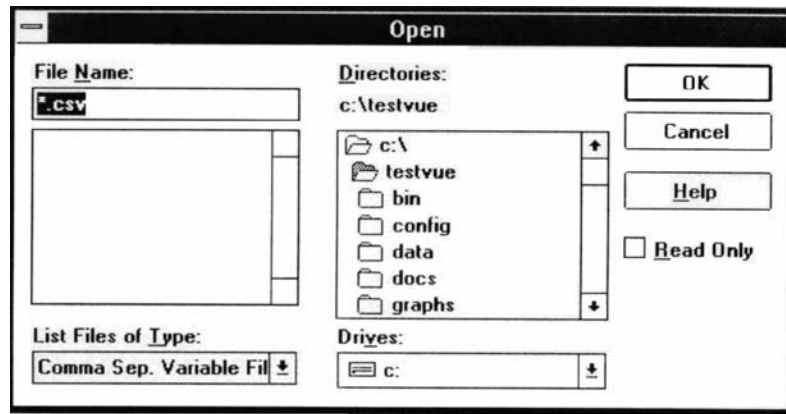


Figure 44, Exporting Data to ASCII File

9. The OUTPUT UNITS button allows the user to choose the units of measurement for the exported files. Make the appropriate selections.
10. Select ok and the files will be saved in ASCII in the path previously selected path.

Section 7. Maintenance

Maintenance

The ATS Series 1600 UTM is relatively maintenance free. However, some basic procedures should be followed to keep your system running trouble free. Information for specific components of the system is contained within the manufacturers' literature. This includes information concerning the mechanical elements such as gear reducer, drive assembly, and the servo motor system.

To facilitate smooth movement of the crosshead, the ball screw assemblies are factory lubricated with Dow Corning 321 Dry Film Lubricant and are protected by screw covers. Under normal use there is no need to re-lubricate. If at any time, the ball screw cover(s) become detached and expose the ball screw, it would be good practice to re-lubricate the screw before re-attaching the cover(s).

1. Move the crosshead to a position that will expose the maximum vertical length of the ball screws. If the test area is below the crosshead, this position will be at the uppermost point of travel and vice versa. The adjustable limit stops will likely need to be moved. Do not change the position of the factory set fixed stops.
2. When the ball screws are sufficiently coated, return the crosshead and the adjustable stops to the appropriate positions to resume testing.