Larson Systems Inc.

UTM 3.25 User Manual

Universal Testing Manager

LARSON SYSTEMS INC.

UTM 3.25
Universal Testing Manager

Operator's Manual

LARSON SYSTEMS INCORPORATED

13847 Aberdeen Street NE
Ham Lake, MN 55304-6789

This manual could contain technical inaccuracies or typographical errors. Changes are periodically made to the information herein. These changes will be incorporated in new editions of the manual

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1.0 Introduction

The UTM is a versatile tool to be used by engineers and QA departments. The UTM can be used to fine tune a new product, monitor quality on the production floor, or to ensure vendor supplied parts meet your companies specifications.

The UTM features an easy to use graphical interface, DDE capability for easy communication with spreadsheet based programs like Microsoft Excel, Excel Templates for more flexibility if you prefer Excel over the UTM, has the ability to program test off-line, long file name capability, and now communicates with our Torque Wrench Tester and Torque Wrench Calibration System.

The UTM communicates not only with the entire Larson family of testers but can communicate with any device that output simple ASCII data and can also accept information through the keyboard.

The UTM is fully backward compatible with previous revisions and can even read data files from our older STM program. The UTM is compatible with Microsoft Windows 95, 98, NT and 2000.

2.0 Installation

The UTM comes on one CD-ROM. Put the disk in your CD-ROM drive and run the Setup.exe program. The UTM installer will not autostart. The installer will display a path where it will install the UTM; you can change this path if you like. Once you are satisfied with the install path, continue the installation.

Once the installation is finished you will have a new Program Group called Larson Systems Inc. in the Programs item of the Start Button. In the Larson Systems Inc. Program Group is the shortcut for the UTM. Use this shortcut to launch the UTM program.

3.0 Getting to know the UTM

3.1 Demo Programs

The UTM comes with 4 demo programs that you can use to familiarize yourself with the UTM. These 4 demos are readily available to you and are also used in the Interactive Demos that come with the UTM. The interactive Demos can be accessed from the Run Demo menu within the main Options menu. These demos will automatically load and display data showing different operations and views that the UTM can display. These demos will explain different parts of the UTM. This chapter will explain in more detail how to use the UTM.

3.2 Creating a Test

From the File menu select New. The UTM will ask you to confirm that you want to clear out all specifications and results. Click OK to continue.

Confirmation Message

This will clear all specifications and results currently in memory. Would you like to continue?

[OK] [Cancel]
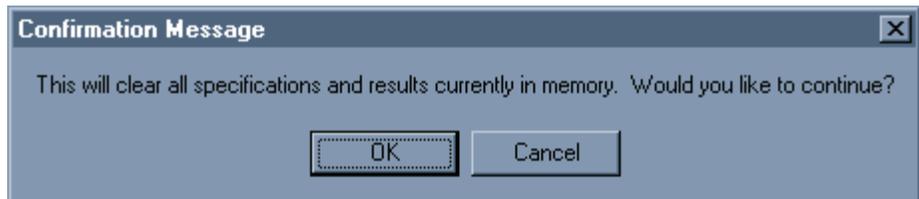
The Specifications Options will be shown with a completely blank test. From here you can choose the testing units you want to use, if you are using a compression or extension test (you cannot mix compression and extension test points, all of the test points in a test will be either extension or compression), UT force and length maximums (these will be compared to all of the UT test parameters before being downloaded to a UT tester), and other various options for a UT tester. When you have selected all of the options you want click OK.

By default the programming mode is UT Batch. As long as you use UT tests the mode stays as UT Batch. If you select any non-UT test the mode will be switched to Interactive and you will receive a notification to this effect.

You can change from UT Batch mode to Interactive mode without selecting an Interactive test. Use the Specification Options (Section 3.2.2) to change the mode.

If you have a new test (no test points have been programmed) you can enter ST Batch mode either by selecting the Larson ST/MST command from the Command list or by selecting ST Batch Mode from the Specification Options.
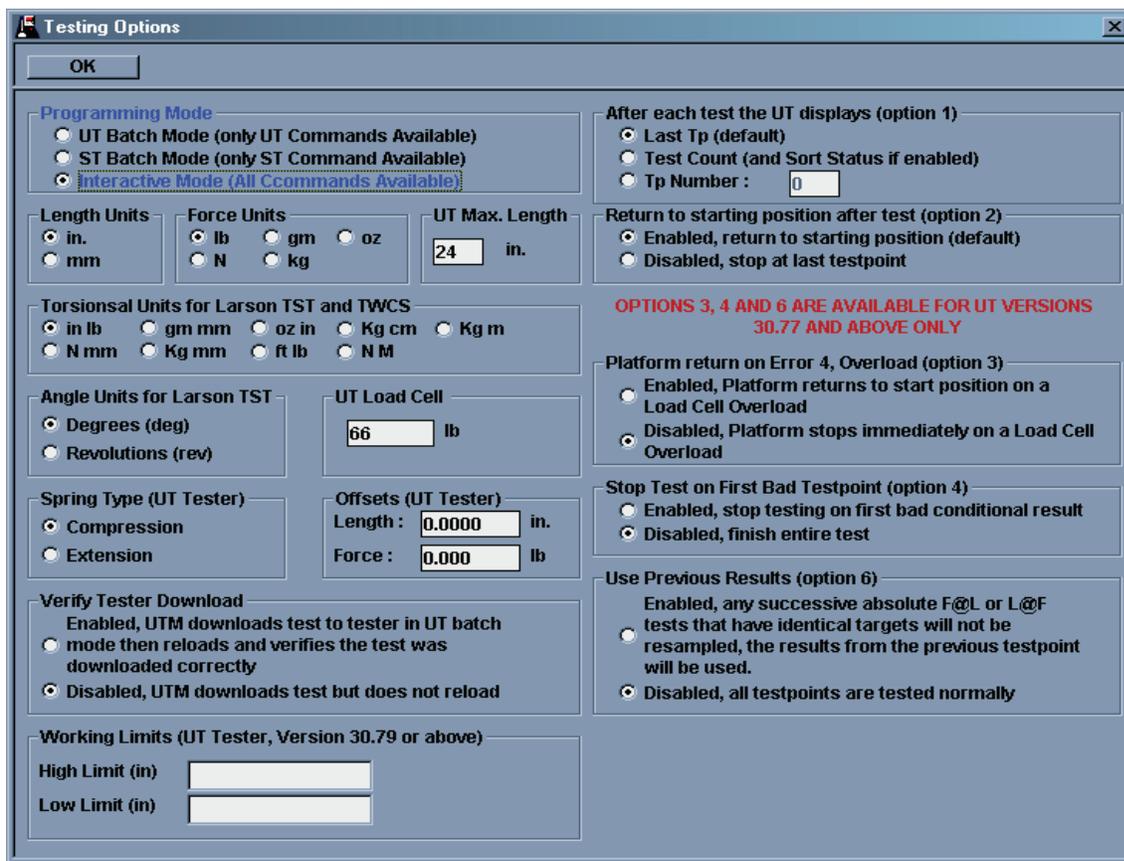
Testing Options

[OK]

Programming Mode
- ○ UT Batch Mode (only UT Commands Available)
- ○ ST Batch Mode (only ST Command Available)
- ⊙ Interactive Mode (All Commands Available)

Length Units
- ⊙ in.
- ○ mm

Force Units
- ⊙ lb   ○ gm   ○ oz
- ○ N   ○ kg

UT Max. Length
24 in.

Torsionsal Units for Larson TST and TWCS
- ⊙ in lb   ○ gm mm   ○ oz in   ○ Kg cm   ○ Kg m
- ○ N mm   ○ Kg mm   ○ ft lb   ○ N M

Angle Units for Larson TST
- ⊙ Degrees (deg)
- ○ Revolutions (rev)

UT Load Cell
66 lb

Spring Type (UT Tester)
- ⊙ Compression
- ○ Extension

Offsets (UT Tester)
- Length : 0.0000 in.
- Force : 0.000 lb

Verify Tester Download
- ○ Enabled, UTM downloads test to tester in UT batch mode then reloads and verifies the test was downloaded correctly
- ⊙ Disabled, UTM downloads test but does not reload

Working Limits (UT Tester, Version 30.79 or above)
- High Limit (in) [   ]
- Low Limit (in) [   ]

After each test the UT displays (option 1)
- ⊙ Last Tp (default)
- ○ Test Count (and Sort Status if enabled)
- ○ Tp Number : 0

Return to starting position after test (option 2)
- ⊙ Enabled, return to starting position (default)
- ○ Disabled, stop at last testpoint

OPTIONS 3, 4 AND 6 ARE AVAILABLE FOR UT VERSIONS 30.77 AND ABOVE ONLY

Platform return on Error 4, Overload (option 3)
- ○ Enabled, Platform returns to start position on a Load Cell Overload
- ⊙ Disabled, Platform stops immediately on a Load Cell Overload

Stop Test on First Bad Testpoint (option 4)
- ○ Enabled, stop testing on first bad conditional result
- ⊙ Disabled, finish entire test

Use Previous Results (option 6)
- ○ Enabled, any successive absolute F@L or L@F tests that have identical targets will not be resampled, the results from the previous testpoint will be used.
- ⊙ Disabled, all testpoints are tested normally

Test Specificiations   _ □ ✕

| Close | Print | Check | Part Number : |

Tp `1`   Insert Tp | Command | Static/Dyn   Speed (in./min)
Enter   Delete Tp | `Length at Force` ▾ | ☐ Dynamic

Abs/Inc	Force (lb)	Length (in.)	Tol. (%)	LSL (in.)	USL (in.)
☐ Inc	`22.550`	`1.5700`	`8.65`	`1.4342`	`1.7058`

TP Comments

3.2.1 Test Specifications

When the Test Specifications window is not shown you can open it from the Specifications menu item and choosing Test.

With this window you will program and view the entire test as well as choosing what test point results to display once results are gathered. The UTM is capable of up to 99 test points. To change from one test point to another either use the Up/Down arrows next to the Test Point text box or change the number in the text box using the keyboard.

In the top of this window is a box to enter a part number, this is optional. This part number will appear on the printout and should be used for part description. This display will be consistent for every test point. It will also appear in the title bar of the UTM.

For each test point you must choose a command to be performed. Different data will be needed for different commands and the layout of the Test Specification window will change according to the command chosen. Some commands require a second window to setup the command, like the SDHT command. All of the command will be explained in detail latter in this chapter. Use the Command drop down list to select the test you want to perform.

If you a setting up a UT command you have the option of using Dynamic or Static speed. Static speed is the default setting for most UT commands and allows the UT to vary the platform speeds for optimum movement and precise platform placement during the test. Dynamic test speeds force the UT to move the platform at one speed and will result in less precise final platform resting position. The UT will still take readings at the desired position but the final resting position of the platform will not be at the programmed position. The faster the speed is set to, the further the platform will be from the programmed position.

To use Dynamic Speed check the label "Dynamic" and enter a speed in in/min or mm/min depending on what units you have chosen for the test. If the checkbox is left unchecked Static speeds are used. The Dynamic checkbox is located to the right of the Command drop down list when Dynamic speeds are available.

For UT command you also have the option of programming in Absolute or Incremental specifications. Absolute specifications represent the actual length or force you want the tester to find, such as 3 inches or 50 lb. Incremental specifications represent a force or length amount you want to add to the results from the last test. Example, an incremental move of 2 inches will make the tester move the platform in a positive direction a distance of 2 inches. If the platform was sitting at 5 inches the platform will then end up 7 inches. Negative incremental values will cause the tester to move in the negative direction. The result of an incremental test will be an incremental value, that is, the difference in force or length from where it was to where it ended up.

To program an incremental test check the box labeled "Inc". The label above this check box in "Abs/Inc". This box will be to the left of the force or length specification input boxes if the selected command allows incremental testing.

For each test point you can enter a comment. This command is for the test point only and will appear with the test point on the printout. Global comments will be discussed later.

For ease of programming there is a Delete Tp and an Insert Tp button available. To completely remove a test point from the test sequence use the Test Point arrows to find the unwanted test point and click the Delete Tp button. This will

remove the test point and move any test points above it down one to close the hole.

If you want to add a test point in the middle of a test use the Test Point arrows to go to the test point that will get moved forward and click the Insert Tp button. The test point that you are on, and any tests above it, will get moved one ahead and a blank test point will be inserted into the new hole.

The end of the testing sequence is determined by a blank test point. If you leave a blank test point in the middle of a test sequence the test will end earlier than you want it to.

Once you specify all of your tests use the built in checker to verify that there are no errors with the test. The checker will check for things like lengths or forces that are too large, and illegal Rate test points. The Check Point button is to the left of the part number label.

For each of the different UT commands different information such as forces, lengths, tolerances, rates, rate test points, or speeds will be entered. The next section will describe all of the available test and what specification you are expected to enter.

3.2.1.1 Command List
Testing commands fall into two types; UT tests and Interactive tests. UT tests require a Larson UT be attached to the computer. Before the UT can be used the RS232 communication port must be set up. See Section 3.3.3, Setup Ports to do this. Interactive test may or may not require an external device be connected.

Most UT tests require 1 specified number, a force or length usually. For most UT tests you can enter nominal and tolerance specifications. If you enter only nominal specification and not tolerance specifications the UTM will generate a percentage number that represents the difference between the nominal specification and the result. If you specify both nominal and tolerance specification you will also get a Bad Low / Good / Bad High result. If even one test point has a tolerance specification the entire test will have a Good / Bad overall result. For UT tests you can enter the tolerance as either a percentage or as Upper and Lower limits. The UT uses only nominal values and percentage tolerance. If you enter Limits the UTM automatically calculates a nominal value and a percentage tolerance. If you enter a nominal value and a percentage tolerance the UTM will automatically fill in the Upper and Lower Limits.

Most Interactive specifications will be either constants, variables, or results of test points. A constant is a number you specify. As implied it never changes over the course of the test. A variable can hold any number and, as implied, may vary over the course of the test. Any variable used must be named, but does not have to be defined in the beginning of the test, its first appearance can be anywhere in the test.

Some interactive tests allow you to force units onto readings. Units are used to make sense of some numbers and are displayed on the graphics and printouts..

3.2.1.1.1 Force At Length
This is a UT test. You must specify a length for the UT to move to. You can specify a nominal force and a tolerance, either as a percentage or as Upper and Lower Specification limits.

3.2.1.1.2 Length At Force
This is a UT test. You must specify a force for the UT to move to. You can specify a nominal length and a tolerance, either as a percentage or as a Upper and Lower Specification limit

3.2.1.1.3 Preset
This is a UT test. You must specify either a force or a length for the UT to move to, you cannot specify both. You also must specify a number of times for the UTM to make this move. Depending on what option you have purchased for the UT the maximum number of presets is either 99 or 999,999. This test gives no results.

3.2.1.1.4 Free Length
This is a UT test. It will only be performed for compression type tests. No forces or length specifications are necessary. You can enter a nominal length and tolerance, either as a percentage or as Upper and Lower Specification limits.

3.2.1.1.5 Peak Force
This is a UT test. You must specify a length for the UT to move to. This test uses the Dynamic speed option, this means

that the tester will move at one speed until it reached the specified length. The default speed is 15 in/min. You can change this speed if you wish. The tester will monitor the force while moving to the specified length and will store the maximum force it encounters. The tester stops monitoring force when it sees the specified length and then stops the platform. Because this test uses the Dynamic speed the platform may not stop at the specified length exactly, there may be a slight over-travel. The faster the Static speed is defined as, the more over-travel there will be. You can enter a nominal force and a tolerance, either as a percentage or as Upper and Lower limits.

3.2.1.1.6 Rate
This is a UT test. You must enter two test points to calculate the rate between. These test points must exist and must be UT test points. They do not necessarily have to be defined before this test point, i.e. you may have a three point test where the first is a rate between point 2 and 3 and points 2 and 3 are Force at Length tests. You can enter a nominal rate and a tolerance, either as a percentage or as Upper and Lower limits.

3.2.1.1.7 Pause
This is a UT test. There are no values to specify. This test will stop the testing sequence until a user presses the start buttons on the UT.

3.2.1.1.8 Delay
This is a UT test. You must specify and amount of time for the tester to be inactive. The actual time value is defined as mm:ss.s (two digits for minutes, two digits for whole seconds, and 1 digits for tenths of a second). However, you will enter the time as a 4 digit number in the form mmss.s. The ones and tens place represent two digits for whole seconds. The hundreds and thousands places represent a two digit number for minutes. The tenths place represent the tenths of a second. After the specified amount of time has passed the tester will continue with the testing sequence.

3.2.1.1.9 Initial Tension
This is a UT test. It is the last UT only test in the list. It will only function for an extension type test. You must specify a deflection length. This length is used to slightly pull the extension part. To total deflection will be twice what you enter. Care must be taken when entering this length to avoid damaging the part being tested. A nominal force and tolerance can be specified, either as a percentage or by Upper and Lower Limits.

An extension test consists of three moves. The first is to slightly pull on the part until it is snug between the extension hooks; a very minimal amount of force is applied to do this. The next move deflects the part the specified length. The tester notes and remembers the resulting force. The next move is to deflect the part again the specified length. The resulting force is noted and remembered. The two forces are put through a formula and the Initial Tension is the actual result.

3.2.1.1.10 If…Then Go To
This is an Interactive test. This test will compare two specified numbers and if the comparison is true testing control is passed to a specified test point. If the comparison is false testing control is passed to the next test point. The two specified numbers and the Go To test point can be either constants, variables, or results of test points. Both specified comparison numbers cannot be constants however. Comparing two constants is a redundant task. The comparison can be one of six functions; less than, greater than, equal, not equal, less than or equal to, or greater than or equal to. The result of this test point will be a number representing one of two test points, either the next consecutive point or the Go To test point.
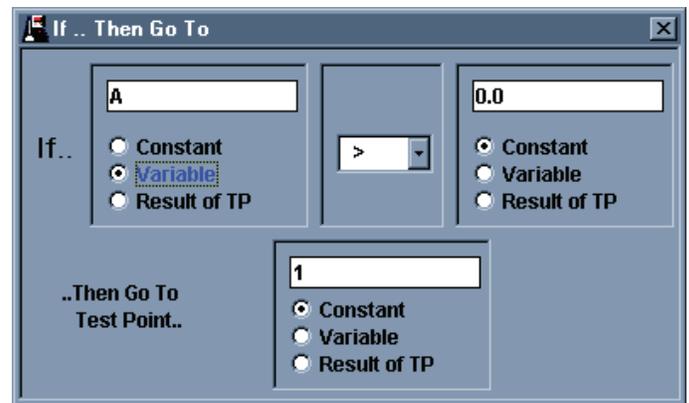
3.2.1.1.11 Go To Testpoint
This is an Interactive test. You must specify 1 number that represents where testing control will be passed to, i.e., what test point will be run after this one. This number can be specified either as a constant, a variable, or a result of another test point. You can use this type of test point in conjunction with an If .. Then Go To test to form an If .. Then
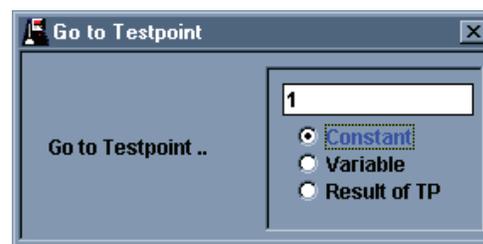
.. Else structure.

3.2.1.1.12 Calculate Variable

This is an Interactive test. For this test you must specify one variable. This variable will be set to the result of a function you enter. The function can contain constants, other variables, the variable on the left side of the equal sign, and results of other test points. The function can contain the operators plus(+), minus(-), multiply(*), divide(/), square root (Sqrt()), power (^), and embedded parentheses(()). The result of this test will be the result of the function entered. The result will also be stored in the variable on the left side of the equal sign.

Calculate Variable

Input calculation desired. You may use constants, variables, and test point results. Indicate test point results with a pound sign (#) before the number of the test point.

Legal mathimatical functions: +. -. *. /, Parentheses (), Sqrt (x), and Power (^)

Example : A = A + 12 - B / 2 * Sqrt (C) + #5 ^ 2

A = A
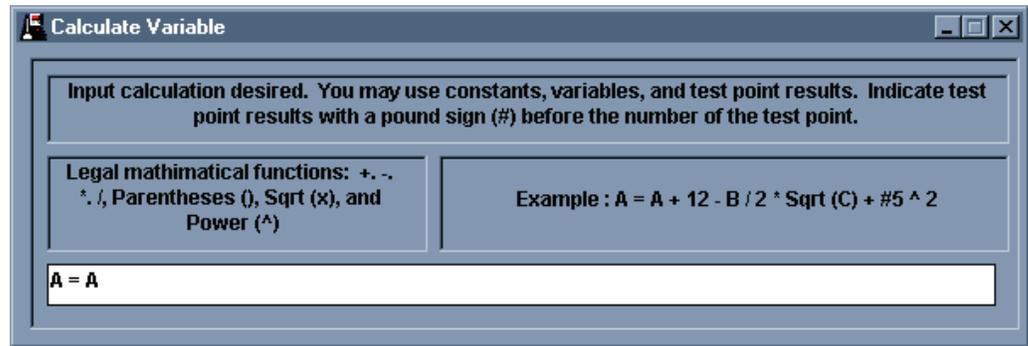
3.2.1.1.13 Variable Tolerance

This is an Interactive test. For this test you will specify three numbers. The numbers can be constants, variables, or results of test points. You must specify a result value, a nominal value, and a tolerance value. The tolerance value can be defined as a percentage (+/- X%) or as a whole number (+/- X units). The result value will be compared to the nominal value and the difference between the two will be expressed as a percentage. The difference will be compared to the tolerance and a Bad Low / Good / Bad High result will be generated. The result of this test will be the result value that was specified.

Variable Tolerance

Result	Nominal	Tolerance ☑ %
A	0	+/- 0
○ Constant	⦿ Constant	⦿ Constant
⦿ Variable	○ Variable	○ Variable
○ Result of TP	○ Result of TP	○ Result of TP
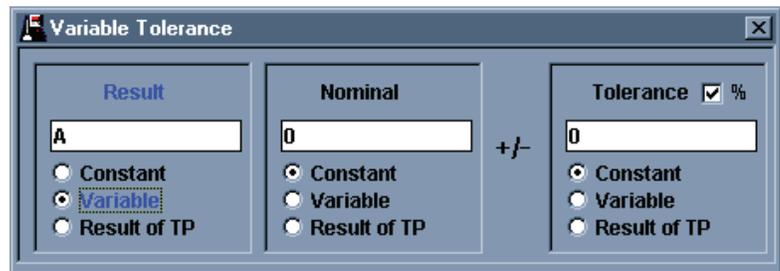
3.2.1.1.14 Set Variable

This is an Interactive test. For this test you will specify a variable name and a value. There is no limit enforced for the variable names. The value the variable is set to can be a constant, another variable, or the results of a test point. The result of this test point will be what is entered in for the value with either a "C" if the value was a constant, a "V" if it was a variable, or an "R" if it was the result of a test point.

Set Variable

Variable

A = 0

⦿ Constant
○ Variable
○ Result of TP
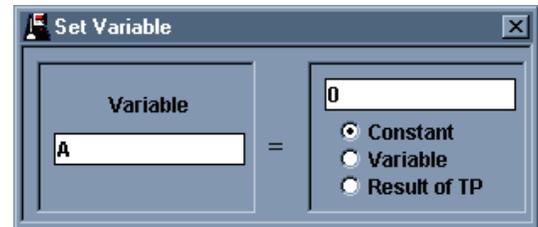
3.2.1.1.15 Read Keyboard

This is an Interactive test. With this test you can prompt the user to input data from the keyboard. The data expected can be either text data or numerical data. Numerical data can have a nominal and tolerance specification applied to it. For either type of data you can specify the prompt that the user sees when asked to enter data. The nominal and tolerance numbers can be entered as constants, variables, or results of test points. Constant zeros will result in no tolerances being applied. The tolerance number can be expressed as a percentage or as whole units. You can also specify what units the entered data will have, force units, length units, no units, or user defined units.

Read Keyboard

Display Prompt for Input :
Enter Result:

○ Text Input   ⦿ Numeric Input :

Nominal Value	Tolerance ☑ %	Units Used :
0	+/- 0	○ Other
⦿ Constant	⦿ Constant	⦿ Length (in.)
○ Variable	○ Variable	○ Force (lb)
○ Result of TP	○ Result of TP	○ No Units
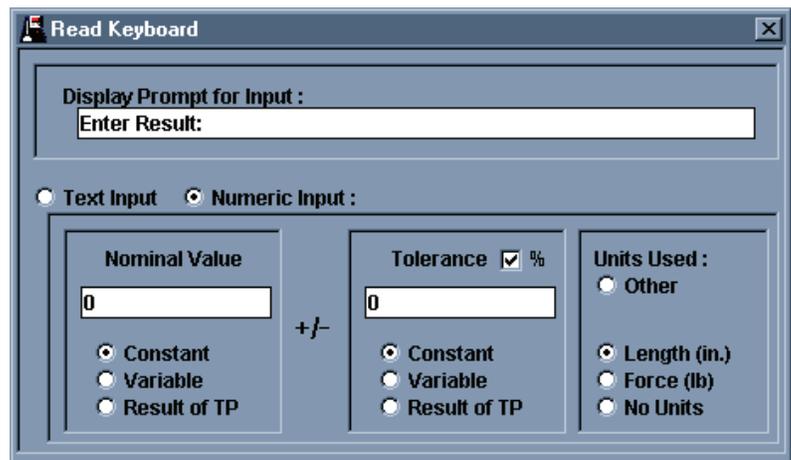
3.2.1.1.16 Read Serial Port

This is an Interactive test. With this test you can bring in data from external devices that are connected to you computer. You must specify what RS232 communication port the device is connected to. If you do not know what port you are using consult your I.T. department or computer supplier. Be sure to enable the port with the correct communication protocols from the Port Setup menu (see section 3.3.3). You must also specify a delineation for the device. A delineation is a character that the external device sends out that signals the receiving device (the UTM) that it is finished sending data. Typical delineations are the carriage return, the line feed, or the tab character. A delineation could also be a specific number of characters. If your device does not provide any delineation you may use Delay. If Delay is used for a delineation the UTM will wait the specified number of seconds after it receives the first character and then end the character gathering. Whatever characters were sent within that amount of time is what it accepts for a result. Check the owner's manual of you device to verify what its delineation is.
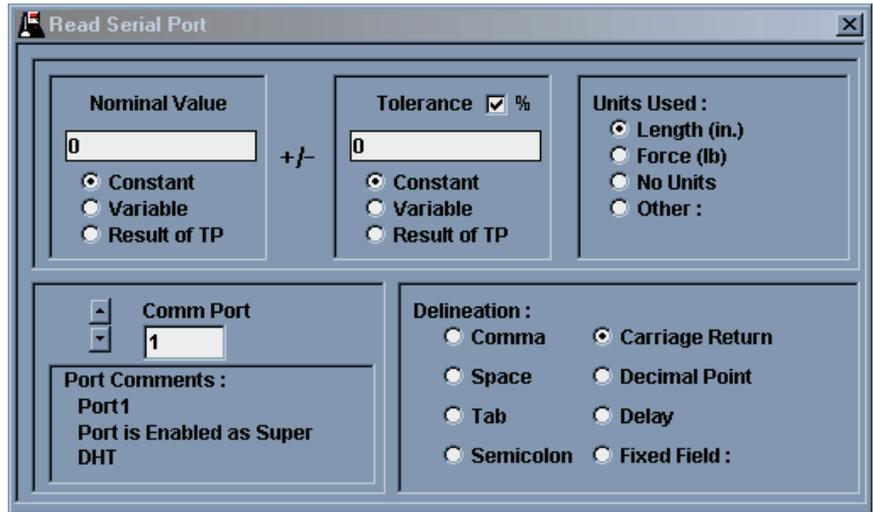
You may also specify a nominal and tolerance value for the reading. Both number can be either constants, variable, or results of other test points. The tolerance can be specified as either a percentage or whole units. You can apply units to the reading also, either force units, length units, no units, or user defined units. The result of this test point is whatever the external device sent over.

3.2.1.1.17 Testpoint Comments

This is an Interactive test. This test allows information or instructions to be given to the person who is performing the test. There are two options when displaying these comments. First is the option of having the user acknowledge these comments before the test will continue. The user must acknowledge the comment before the test continues. The second is to just have the comment displayed until the next test point has finished gathering its data. After displaying the comment the UTM proceeds with the next test. The comments will be displayed until that next test finishes. The person performing the test may or may not see these comments for this second case.
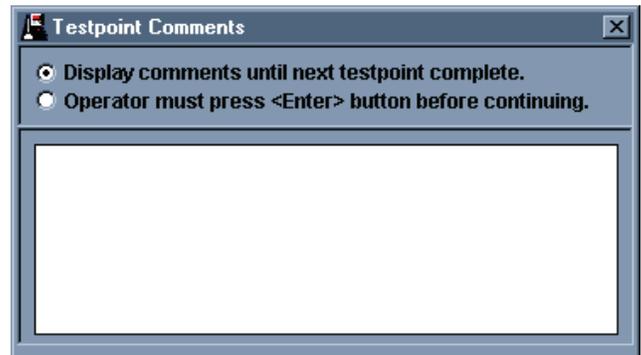
3.2.1.1.18 Sorter Output

This is an Interactive test. It does, however, necessitate the use of a Larson UT tester. A sorting signal and an amount of time must be specified for this test. Both specifications can be either constants, variables, or results of other test points. For this test the UTM will create a sort table with one condition and will formulate a one point test that will result in a true status for the one condition in the sort table. This will result is the sorting signal specified to be generated. The sorting signal will last for the specified time interval. The result of this test will be the sorting signal specified.
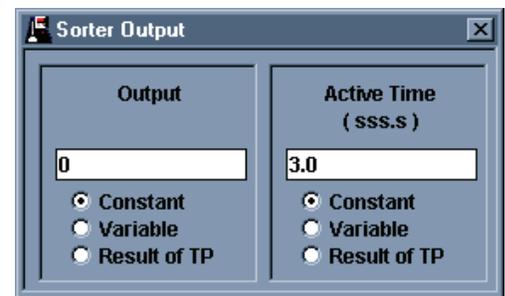
3.2.1.1.19 Timer

This is an Interactive test. The UTM contains a general purpose timer that runs off the computer's clock. It can count up or down and has a resolution of 1 tenth of a second. The Timer test actually has 4 functions. All but one involve specifying a certain amount of time. The amount of time specified can be entered as a constant, a variable, or the result of another test point.

The Stop Timer function does not specify an amount of time nor does it require knowing if the timer is moving up or down, it simply stops the timer if it is running. The result of this function is the value of the timer when it was stopped.

For the Start Timer function you must specify if the timer is counting up or down. The Timer can start with a time offset that you enter. Starting with an offset of zero and counting up counts how much time has passed. Starting with a nonzero offset and counting down could represent an amount of time you desire the test to finish in. The result of this function is the value of the time offset.

The Set Timer function simply sets the time offset. It does not need to know if the timer will be counting down or up. The timer does not start or stop with this function. It will reset the timer to the specified value if the timer is running. The result of this function is the time value that was set.

The Wait Until Timer Is function will hold up testing until the timer becomes the specified value. If the timer is not running it will start it. It will override the direction of timing if the timer is running. The result of this function is the value that the function waited for.
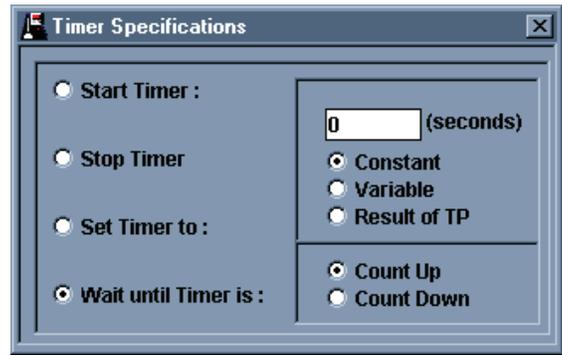
3.2.1.1.20 Larson TST

This is an Interactive test. With this test you can get one piece of data from a Larson Torsion Spring Tester. The TST is capable of sending two or more pieces of data at once but, as stated, this test only reads one piece of data. Multiple Larson TST tests can be programmed to receive all possible pieces of data sent from a TST.

This test can either wait for new data sent from a TST (by using the Send button on the tester) or it can use data that was sent over previously to this test point getting test control. If you are looking for one piece of data only or for the first piece of multiple pieces of data you would want to select Wait for TST Send Button Press.. If you are looking for the second or later pieces of data from a TST you would want to select Use Previously Send Data.
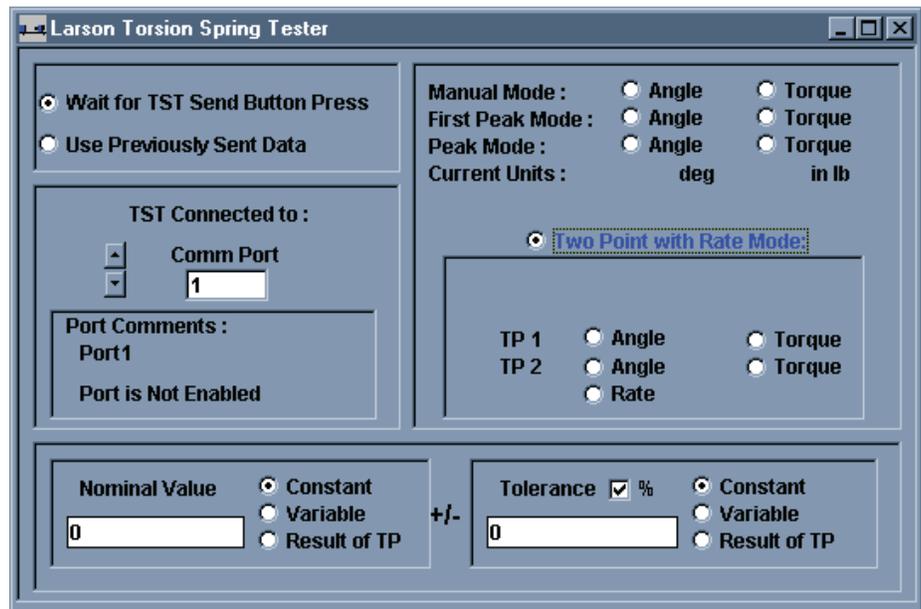
You must specify what RS232 communication port this test will be using because it is possible to connect more than one TST to you computer.

Next you must specify what piece of data you want to capture. The TST is capable of having 4 different testing modes; Manual, Peak, First Peak, and Two Point with Rate modes. For Manual, Peak, and First Peak modes are capable of generating two pieces of information; torque and angle. The Two Point with Rate mode generates five pieces of data; two sets of torque/angle readings and a Rate. You must choose what piece of information you wish to capture. If you want both or all five you must have either two or five Larson TST tests defined. The first defined test point should always have the Wait For TST Send Button Press button selected. The second or second, third, fourth, and fifth defined tests point should always have the Use Previously Send Data button selected. Each test point should have a different torque or angle selection selected.

For each torque or angle reading you can specify a nominal and tolerance to apply to the data from the TST. The tolerance can be specified as either a percentage or as whole units. The units of the result will be either torque or angle units.

3.2.1.1.21 Larson Super DHT

The Larson Super DHT is similar to the Larson TST as far as the setup. The Larson Super DHT is capable of five testing modes; Manual, Peak, First Peak, Switch Contact, and Two Point with Rate modes. Manual, Peak, and First Peak modes can generate 2 readings, Two Point mode can generate 5 readings and Switch Contact mode can generate 9 readings. If you want to capture all of the data for the Mode you are testing in you must have 1 test point for each reading. For each test point defined you should select a different reading.

If the test point is capturing only 1 reading or the first of multiple readings from a Super DHT send you should select the Wait for SDHT Send Button Press. If the test point is capturing the second or successive readings from a SDHT send you should select Use Previously Send Data selection.
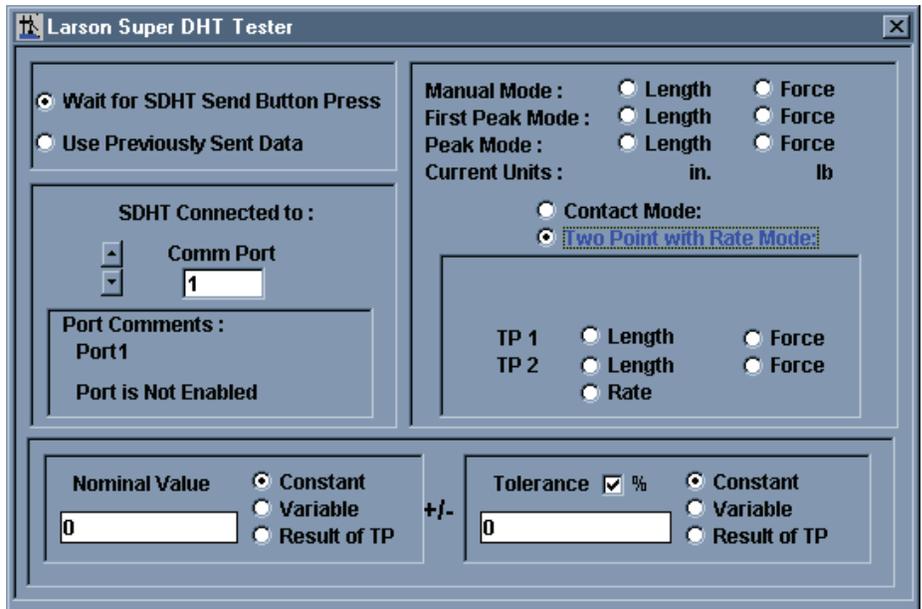
For each reading captured you can specify a nominal and tolerance to apply to the data from the SDHT. The tolerance can be specified as either a percentage or as whole units. The units of the result will be either force or length units.

3.2.1.1.22 Larson ST/MST

This is the ST Batch Mode test. From this test you can communicate with Larson's older ST and MST machines. This
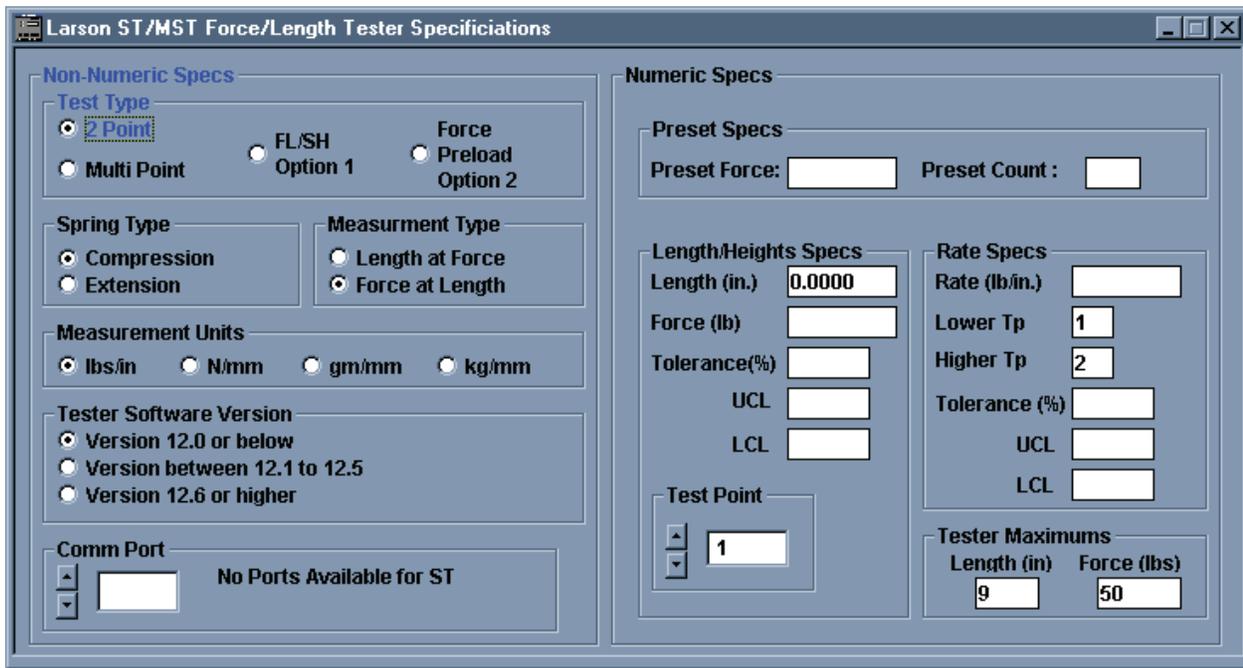
test point includes all the programming options available for the ST machines.

To start, the ST can be set to run in 1 of 4 modes. Two point, Multi point, Free Length/Solid Height, and Force Preload. Two point mode allows only two points to be programmed. The Rate is automatically calculated and the tolerance specified is applied to both points and the Rate. Multi point mode has a maximum of 10 point to program. Each point can have a different tolerance and the Rate can be calculated between any 2 points. The Rate tolerance is also separate from the test point tolerances. Free Length/Solid Height mode allows you to define a force for both Free Length and Solid height and allows for two testing points between the two. The same tolerance will be applied to both test point and the rate. The Rate is calculated between the two middle testing points. The Force Preload mode allows you to specify a force for the tester to move to and then to deflect a certain amount of length from where the force was found. Those are the only two points to the Force Preload test.

As stated above each of the testing modes has at least two points to specify. You can use the Test Point arrows and text box in the ST window itself, there is no need to use the Test Point arrows and text box on the Test Specifications window. The ST setup window is fully self contained.

Two point and Multi point modes allow testing in either compression or extension mode. Free Length/Solid Height and Force Preload only allow for compression testing.

There are four sets of units to select from, one Standard (inch/pound) and three metric (Newtons, grams, or kilograms force with millimeters length).

You should know what version code your tester is running. Code versions were broken into three categories; version up to 12.0, version 12.1 to 12.5, and version 12.6 and later. If you do not know for sure what version your tester is running a system of trial and error with the three selections should let you find out what group of version you are running.

By entering any force and count in the Preset space the ST will perform a Preset operation before the tester performs the actual testing commands.

Depending on what type of test you are performing the Length/Height specification section will reformat and relabel itself to prompt you to enter the specification you wish.

For Force At Length tests the first number you will enter is the testing length. You can then enter the nominal force value and percentage tolerance or you can enter the upper and lower force limits. For Length At Force tests you will enter a testing force and the nominal length and tolerance or upper and lower length limits. For Two Point tests the Rate is calculated automatically and cannot be changed. For Multi point tests the Rate is calculated automatically but you can

change it to whatever you want.

The Free Length/Solid Height is performed in compression mode only. You will first be prompted to provide a force that will be used to find the free length. This should be something small, between 0.1 and 0.5 lb. You will then enter specification for 2 Force At Length points. Finally you will enter a force to be used for Solid Height. This should be a force that is less than full scale and is enough to completely compress the part but not enough to damage the part. The Rate is automatically calculated from the two Force At Length points but you can change it to whatever you want.

The Force Preload test consists of two points. First you will enter a force to load the spring to. Then you will enter a deflection for the length; this is an amount of length to move from where the force was found. It is an incremental move. The result will be the difference between the final force and the preload force; this is an incremental result. There is no rate to calculate or enter.

3.2.1.1.23 *Larson DHT/FDHT/CDHT/ECT*

This command is used to receive information from any of the Larson DHT line of testers except for the Super DHT, it has its own command. The FDHT only sends out Force. The other DHT testers can send out both Force and Length data. You can optionally enter a nominal value and tolerance for the data you want to receive. If the tolerance value is left as a zero no condition (Bad Low, Good, Bad High) is generated. If the Nominal value is left a zero no resultant tolerance is calculated. The serial port the tester is connected to must be selected here.

When receiving the first piece of information from either tester the "Wait for DHT "Send" Button Press" option must be set. This will force the UTM to wait until the operator has sent information from the tester.

If both Force and Length information is to be received two separate Larson DHT/CDHT commands (test points) must be set up. The first command must have the option "Wait for DHT 'Send' Button Press" set. The second DHT/CDHT command must have the option "Use Previously Sent Data" set. This will allow the second command to use the same information that the first command used.

First Command

Second Command

3.2.1.1.24 Larson TWCS

The Larson TWCS only sends torque. You can set a nominal torque and tolerance for the reading. The tolerance can be specified as a percentage or as whole units. A zero in the tolerance specification results in not Bad Hi/Satisfactory/ Bad Low results being calculated. A zero for the nominal specification results in no resultant tolerance being calculated. You must select what serial port the TWCS is connected to.
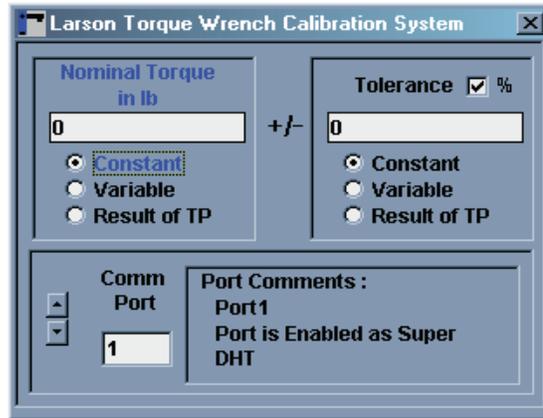
3.2.1.1.25 Larson Super TWCS

The Larson Super TWCS is similar to the Larson TWCS in that is only sends Torque data. However, the Super TWCS can test in three different modes ; Manual, Peak, and First Peak. These mode are useful for testing the different types of torque wrenches. You can optionally specify a nominal and tolerance value for the torque data being received. A zero in the tolerance specification results in not Bad Hi/Satisfactory/Bad Low results being calculated. A zero for the nominal specification results in no resultant tolerance being calculated. You must specify what serial port the Super TWCS is connected to.
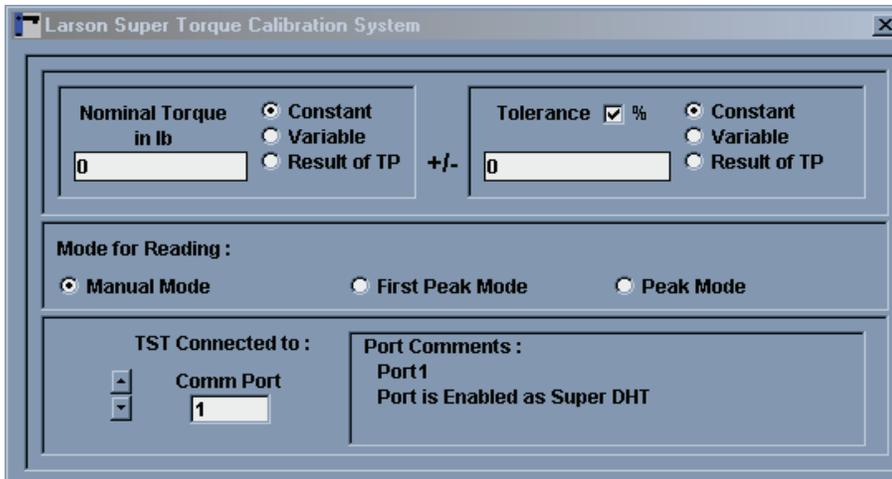
3.2.1.1.26 End Test

This command can end a testing sequence prior to the last test point. It can be used in conjunction with the If .. Then Go To and Go To test points to provide for conditional testing and conditional ending of the test.

3.2.2 Specification Options


```
Testing Options                                                      [X]

  [ OK ]
 _____
 ┌─Programming Mode──────────────────────┐  ┌─After each test the UT displays (option 1)─┐
 │ (•) UT Batch Mode (only UT Commands Available)│  │ (•) Last Tp (default)                      │
 │ ( ) ST Batch Mode (only ST Command Available) │  │ ( ) Test Count (and Sort Status if enabled)│
 │ ( ) Interactive Mode (All Ccommands Available)│  │ ( ) Tp Number : [    ]                     │
 ┌─Length Units─┐┌─Force Units──────┐┌─UT Max. Length─┐ ┌─Return to starting position after test (option 2)─┐
 │ (•) in.      ││ (•) lb ( ) gm ( ) oz││              │ │ (•) Enabled, return to starting position (default)│
 │ ( ) mm       ││ ( ) N  ( ) kg      ││ [11]   in.   │ │ ( ) Disabled, stop at last testpoint              │
 └──────────────┘└───────────────────┘└──────────────┘
 ┌─Torsionsal Units for Larson TST and TWCS──┐     OPTIONS 3, 4 AND 6 ARE AVAILABLE FOR UT VERSIONS
 │ (•) in lb ( ) gm mm ( ) oz in ( ) Kg cm ( ) Kg m│         30.77 AND ABOVE ONLY
 │ ( ) N mm ( ) Kg mm ( ) ft lb ( ) N M      │  ┌─Platform return on Error 4, Overload (option 3)─┐
 └───────────────────────────────────────────┘  │ ( ) Enabled, Platform returns to start position on a│
 ┌─Angle Units for Larson TST─┐┌─UT Load Cell─┐ │      Load Cell Overload                          │
 │ (•) Degrees (deg)          ││              │ │ (•) Disabled, Platform stops immediately on a Load Cell│
 │ ( ) Revolutions (rev)      ││ [66]    lb   │ │      Overload                                    │
 └────────────────────────────┘└──────────────┘ ┌─Stop Test on First Bad Testpoint (option 4)─┐
 ┌─Spring Type (UT Tester)─┐┌─Offsets (UT Tester)─┐ │ ( ) Enabled, stop testing on first bad conditional result│
 │ ( ) Compression         ││ Length : [0.0000] in.│ │ (•) Disabled, finish entire test            │
 │ (•) Extension           ││ Force :  [0.000]  lb │ └─Use Previous Results (option 6)─────────────┐
 │     [✓] Synchronize Length│└────────────────────┘ │     Enabled, any successive absolute F@L or L@F│
 │         Offset with UT  │                         │ ( ) tests that have identical targets will not be│
 └─────────────────────────┘                         │     resampled, the results from the previous testpoint│
 ┌─Verify Tester Download─────────────────┐          │     will be used.                            │
 │     Enabled, UTM downloads test to tester in UT batch│ (•) Disabled, all testpoints are tested normally│
 │ ( ) mode then reloads and verifies the test was │   └──────────────────────────────────────────┘
 │     downloaded correctly                │
 │ (•) Disabled, UTM downloads test but does not reload│
 └─────────────────────────────────────────┘
 ┌─Working Limits (UT Tester, Version 30.79 or above)─┐
 │ High Limit (in) [            ]                     │
 │ Low Limit (in)  [            ]                     │
 └───────────────────────────────────────────────────┘
```

3.2.2.1 Programming Mode

Open the Specifications Options by clicking on the Specifications menu and choosing Options. From here you can change testing units or UT tester force and length maximums and select different UT options.

There are three Programming Modes: Interactive, UT Batch, and ST Batch. In the UT Batch programming mode only the UT commands can be used. If any other commands are selected the Programming Mode will automatically be set to Interactive. You can revert back to UT Batch mode by removing the Interactive Mode command and selecting UT Batch from here.

When performing a test in UT Batch mode all of the test points will be downloaded to a UT at once. A user will then start the UT manually (consult the UT users manual for this operation). When the UT is finished testing all of the test points the results will be uploaded to the UTM and ready for viewing.

When performing an Interactive test each test point will be performed one at a time. If there are UT commands in the test each test will be performed one at a time. The test point will be downloaded, the UTM will AUTOMATICALLY initiate the UT test, the result will be uploaded to the UTM and the UTM will proceed to with the next test point.

The ST Batch mode is similar to the UT Batch mode except that the ST/MST command is used. The ST/MST command will open a second setup window and from the second window you can program up to 10 ST test points. If any other commands are chosen while in ST Batch mode, the mode will be switch to Interactive Mode.

3.2.2.2 Units

By changing the force and length units the UT force and length maximums will change to reflect the chosen units. The Torsional and Angle units are used for the TST and the TWCS commands.

3.2.2.3 Spring Type

Select what type of parts to test, compression or extension. If you select Extension you can select to synchronize the

Length Offset with the UT. In newer version of the UT tester (control software 30.79 or higher) the Extension Initialization Offset can be set by the operator. The Extension Initialization Offset is entered into the Length Offset. If you use the UTM to download an extension test to a UT, it may change the Length Offset. Use the Synchronize Option to avoid changing the Length Offset. When using the Synchronize option the UT must be in Extension mode to begin downloading the Extension test.

3.2.2.4 Verify Download Option
The Verify Download option is necessary for some older UT testers. For these older tester it is necessary to confirm that the download was correct so this option will force the UT to confirm the download was correct by uploading the test information back to the UTM. This is done automatically, transparent to the user.

3.2.2.5 Working Limits
If your UT tester is running code version 30.80 or higher you have the ability to set Working Limits. Working limits define a height range where the platform can be. If the platform tries to move outside these limits at any time the platform will stop and an error will be generated. Consult your UT Users Manual (060-1000-0029-00) for further information about Working Limits.

3.2.2.6 UT Option 1
After each test on a UT is performed information is displayed. With Option 1 you can control what exactly is displayed, the results of the test just performed, test counts only, or the results from a certain test point.

3.2.2.7 UT Option 2
When Option 2 is disabled the platform will return to the place it was before the test started. If Option 2 is enabled, wherever the platform came to rest at after the last test point is where the platform stays.

3.2.2.8 UT Options 3, 4, and 6
Options 3, 4, and 6 are available for UT testers running code version 30.77 or above.

3.2.2.8.1 UT Option 3
Option 3 will force the UT to return to platform to its starting position if the tester overloads during a test. This option is useful in an automation environment where parts are automatically moved onto and off of the testing platform.

3.2.2.8.2 UT Option 4
Option 4 is used to end a testing sequence early if any conditional test returns a Bad condition. This option is useful if the testing sequence is extensive and only Good test results are acceptable. Why continue testing a part if it is determined to be bad early on?

3.2.2.8.3 UT Option 6
Option 6 is used to apply multiple condition on a single force/length result. For each test point a single condition is applied. By setting multiple, consecutive test points to the same force/length position but with different conditions you can test one set of force/length readings to multiple conditions. If Option 6 is disabled the UT will try to move to each force/length position. Each test point will then go through a positioning routine and take force/length readings for each point. All of this takes time. If Option 6 is enabled the UT will catch these identical, consecutive test points and will not go through the motion/reading routines but will copy the force/length results of the first test point into the identical points and apply the different conditions to that copy. By eliminating the motion/reading parts, noticeable amounts of time will be saved.

3.2.3 Sorting
The UT testers are equipped to give out sorting signals in a stand-alone fashion. Sorting is enabled for UT Batch Mode only. It is disabled for ST and Interactive mode.

To do this a sorting table must be entered. To see the sorting table select the Specifications menu item and the choose Sorting.

Sorting is based on a three way sort. A part can be sorted to the left, to the right, or straight down. 5 and 7 way sorts can be achieved by stacking 3 way sorters on top of each other providing 2 or 3 to the right, 2 or 3 to the left and one straight down. Each left or right sort is controlled by a moving Flap. Each Flap is controlled by one output from the UT. These Flap signals do not necessarily have to go to a 3, 5, or 7 way sorter but are available to any external device, such as an automation PLC. It is also not necessary for these signals to go outside of the tester; the sort result is displayed

on the tester itself after a test. This is useful for hand sorting. The Sort Table setup screen is designed around the 3, 5, and 7 way sorter situation but again, the Flap signals can be use for anything.

The sorting table is limited to 50 lines. Each line can be either a condition line or it can be an Open Flap line. The end of the table is signified by a blank line. If there is a blank line in the middle of a table, the bottom half will never be used for sorting operations. When the UT uses the Sort Table it starts from line one and searches each line until either a true condition is met or until it sees the end of the table. Once a true condition is met the UT stops searching the Sort Table and continues with normal testing.
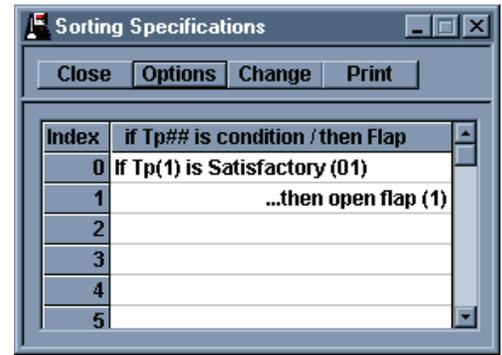
Multiple condition can be put in consecutive lines to form an AND type condition structure. In this case all of the condition lines must be true for the Open Flap line to be started. Multiple flap signals can be generated from one Open Flap line if so desired.

To set up a line either double click a line in the table or click once on the line to select it and click the Change button. This will bring up the Change Sort window. From here you can set a condition on a single test point or set the line to open a Flap. If multiple Flaps are desired the Flap Combination button must be selected. Once you have set up either the condition or the Flap Output click the OK button to return to the Sort Table.
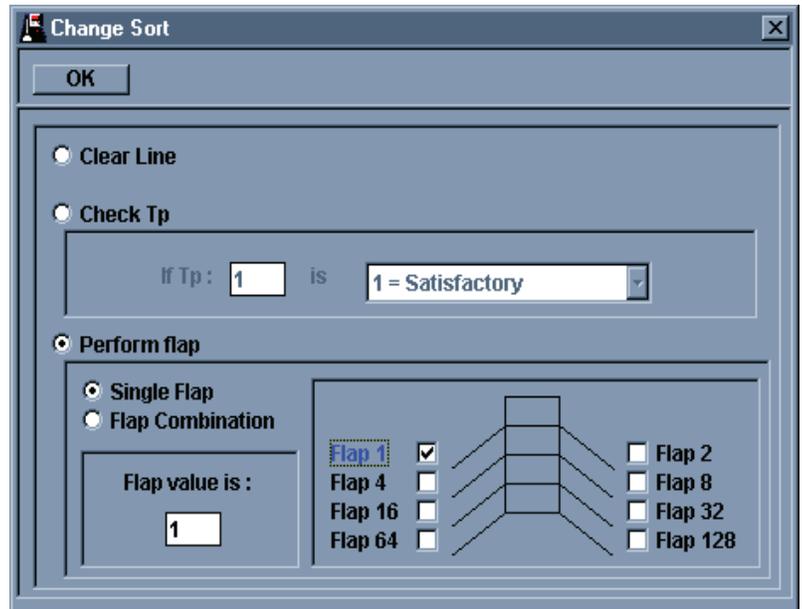
There are 3 options for sorting. To see these options click the Options buttons from the Sort Table window.

Option 101 specifies what Flap to open if no conditions are found to be true. By default no Flap will be opened. You have to option of opening any Flap if no conditions are true.

Option 102 controls an ejection, or sweep, signal. An air cylinder can be mounted on a UT that will automatically push a part off of the testing platform. The sweep signal to start the air cylinder is generated after the testing is finished an when the platform returns to its starting position. This is to make sure the part is not under pressure when the air cylinder starts moving. With Option 102 enabled this signal is generated. If Option 102 is disabled this signal is not generated.
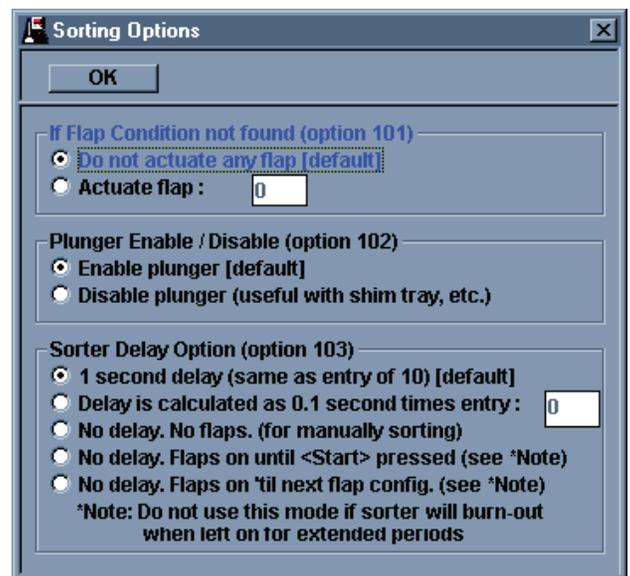
Option 103 controls the duration of the Flap signals. By default the duration is 1 second. You can increase or decrease this delay. You can also use this option do disable the Flap signals and just let the sort result be displayed on the UT display, this is useful for manual sorting. The Flap signals can also be made to stay on until either the next test is started or until the next Flap signal is generated. These two types of actions should be used with care. Having the Flap signals on too long may damage the external equipment if the equipment is recommended for only short term use.

3.2.4 Global Comments

If there are any comments or notes you wish to attach to the overall test sequence you can enter then in the Specification Comments. To view these comments select the menu item Specifications then select Comments. Any text you enter here will be on the specification printout. Once you open the Global Comments window you will have a Cut/Copy/Past

button appear in the button bar. With these buttons you can easily retrieve you comments from other applications, like a word processor. When you finish entering your comments click OK.

3.2.5 Saving the test.
Once you have finished entering in all of your test specifications you should save the test. To do this either click the save button in the button bar (the button with an arrow pointing to a floppy disk) or select the Save item from the File menu item. From the Save As window you can select what directory to place the test and create a test name.

If you try to alter a test that was loaded from a disk you will receive a warning about that file being altered was loaded from memory. If you do wish to alter the file you will have to clear out the file name and any results that are currently in the UTM's memory. The specifications will remain. When you finish altering the specifications you can overwrite an existing specification file. If the specification file has results associated with it the results may become unusable. Be careful about overwriting specification files!

3.3 Options
3.3.1 File Options.
When you go to save results that have been collected there are two ways to save them, either in a Larson Systems standard or in a dBaseIII format. To select what format select the menu item Options and then select File Defaults.
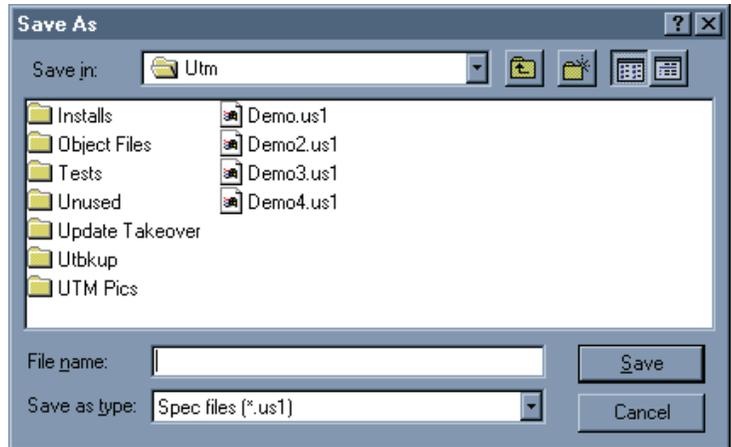
The Larson Systems standard is an ASCII text, comma delineated text file able to be read from any text file viewer (Note Pad, Word Pad, Microsoft Word, etc.). This file can also be easily read into Microsoft Excel if you wish further analysis beyond the UTM capabilities.

If you have a dBase program and wish to view the results in that use the File Options to set up how the numerical results are formatted in the result file.

3.3.2 Result Options

These sets of options control how results are displayed on the monitor and on a printout. To change these options from the Options menu item select Results.

The UTM has two ways of viewing results, either individually or in a Lot. When viewing individual results you can see the
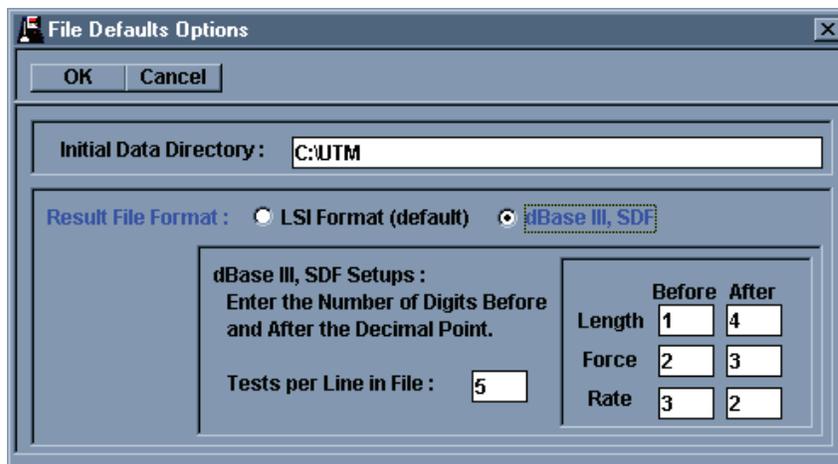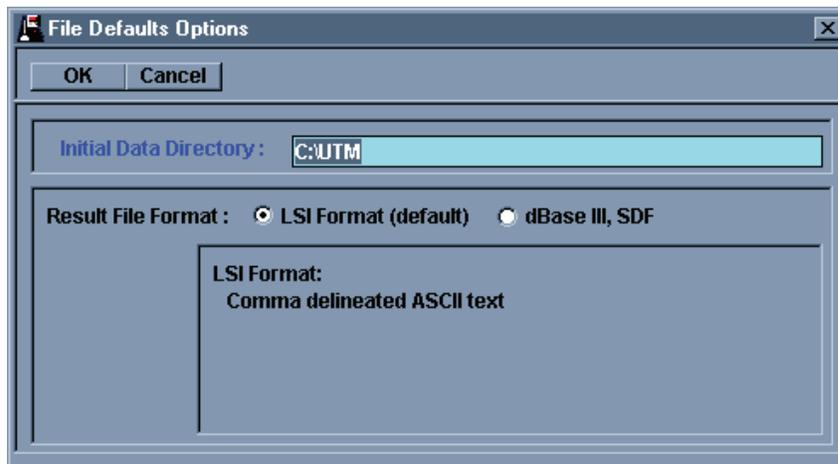
results of every test point for every test. When viewing by Lot a number of consecutive tests are grouped together and the average for each test point is displayed. The UTM is capable of loading multiple result files. With this feature you can see many hours, days, or months of tests at one time. When viewing results by Lot all of the result files loaded into memory are grouped together. This means that if the number of results per result files is not even, a Lot results may include individual results from different result files.
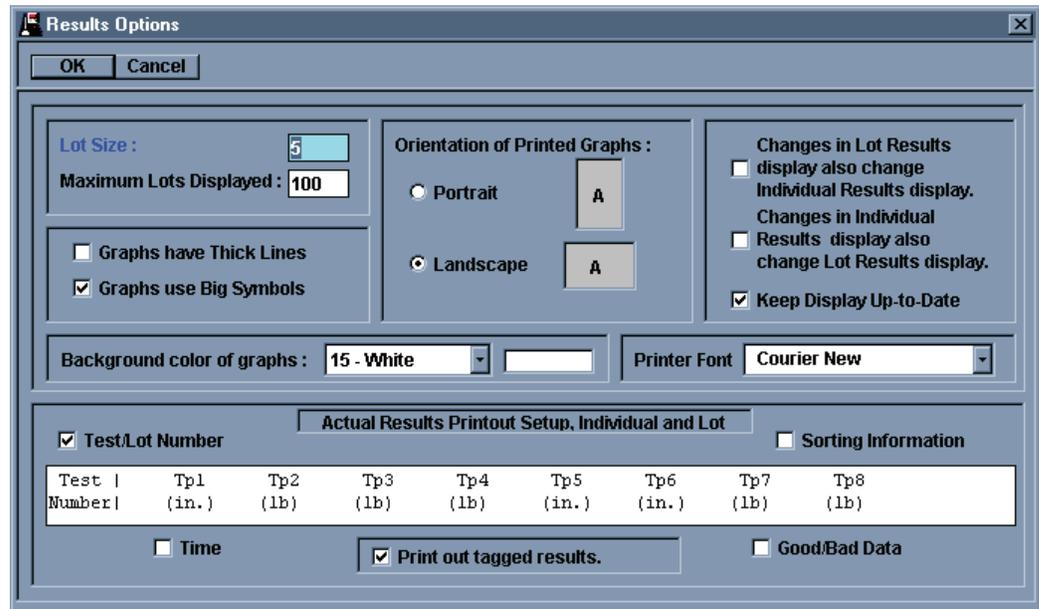
From the Result Options you can control how many individual tests are grouped into a Lot by changing the Lot Size option. The other options below Lot size controls how many Lots are displayed on the various graphical Lot results.

For all of the graphical results the data is represented by points on a graph connected by lines. The points and lines have two sizes, large or small. Use the Thick Lines and Big Symbols options to choose the line and point sizes.

You can use the Printer Orientation option here to specify how the graphs are printed out, either Portrait or Landscape. This orientation is separate from the orientation for text data printout. Text data orientation is controlled from the Printer Setup, which is under the File menu.

The background color of the graphs can be controlled from here. If you have a preference for graph colors you can change and preview each color from here. To save toner or ink in your printer it is better to set the background to white, this way no toner or ink will be used for the background.

With the "Changes in Lot Results display also change Individual Results Display" enabled anytime you view different lot results the Individual Results display will change to reflect the first individual results in the group of Lot data.

With the "Changes in Individual Results display also change Lot Results display" option enabled, changing the Individual Results to different tests will cause the Lot Results display or any graphical Lot Results to change so that the last lot displayed is the Lot that the Individual Results display is in, i.e. if the Lot Size is 5 and the Individual Results display is showing the result for test 13, Lot 3 is displayed in the Lot Results displayed and the graphs show Lots 1 to 3.

With the "Keep Display Up-to-Date" option enabled any new results sent to the UTM will automatically be displayed in the Results display and in any graphs that are displayed. This new data will be displayed in the Individual Actual display and the last Lot will be displayed in the Lot Actual data.

With the Results Printout Setup section you can select what else besides results is printed out for each test. By removing certain features you can increase the number of test points per line up to a maximum of 8 results. Tagged results are results that a user had determined should not belong in any of the statistical or graphical calculations. From here you have to option to display the tagged results or not.

When you have selected all of the options you want click on the OK button to close the window.

3.3.3 Setup Ports

For any external device that is connected to your computer you have to define that port in the UTM and enable it before you can get information from that device. To define the port, open the Setup Ports from the Option menu item. The UTM can handle up to 10 serial ports. If your computer does not have that many ports and you try to enable one that does not exist the UTM will generate a warning.

Use the Up/Down arrows or the text box to select the different ports. For each port you can give a short description in the Port Comments box. Each of the different Larson devices listed in the Device Type list will change the protocols to a preset setting. These preset setting are unalterable. If you are using a device that is not from Larson Systems you will have to use the Other device type and set the various protocols setting to the appropriate settings. Check with your device manual for the correct protocol settings.

Once all of the ports are set click the OK button to finish setting the ports and close the window. If a warning is displayed that the port cannot be used it is usually because another device already has control of the serial port or the serial port does not exist in your computer. If you have problems like this consult your I.T. department or computer supplier.
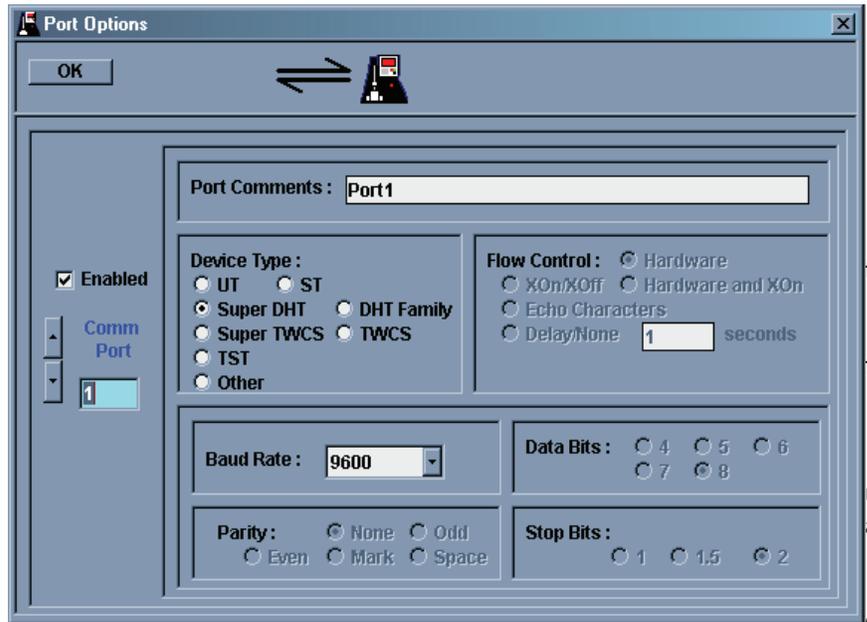
3.3.4 Data Exchange

The UTM is capable of sending information directly to other programs by using either Dynamic Data Exchange or by a process of Keystroke Imitation called Send Keys. It is also capable of receiving test setup commands using DDE. Select what type of communication you will be using to send information from the Communication Type selections.

3.3.4.1 Transfer Setup

Once you have gone through a DDE setup you can save that setup for future reference. You can select saved setups using the dropdown list. The UTM will remember the last Transfer Setup selected. If no Transfer Setups have been added the UTM will remember each individual Data Exchange Setup settings. The UTM has the ability to dynamically receive test information from another program. This ability must be enabled here. If this ability is enabled and not corresponding program is running the DDE link will fail and error messages will be generated.

3.3.4.2 Communication Type

Here you can select what communication method is used to send results out. When selecting DDE you will have the ability to load a test from a spreadsheet also.

3.3.4.3 Action Performed

From here you can select what action will be performed with the action button on the bottom of the setup window. Send Results will cause result data to be sent to the spread sheet. Send Test will cause the current Test Specifications to be sent to the spread sheet. Send Demo Test will cause a demo test to be sent to the spreadsheet. The demo test will show how a test can be set up in a spreadsheet for loading later. Load Test will cause a test to be loaded from the spreadsheet. This is only available when using DDE communication type. Alter Macros will cause the Macro Definition window to open. When using either communication method, it is necessary to tell the spreadsheet when to change the selected cell and what cell to be the selected cell. This is done by setting Pre- and Post-Amble Macros. Pre-Amble macros will be send before the result data. Post-Amble Macros will be sent after the results data. Macros are comprised of keystrokes such Left, Right, Tab, or Enter. Alpha-Numeric keystrokes can also be added. For each piece of result data (Test Number, Data, Time, etc) you can enter a different Macro.

3.3.4.4 Spread Sheet Program Setup

When sending data to a spreadsheet the UTM will first look to see if the spreadsheet is running. If it is not, the UTM will try to start it. The Spread Sheet Program contains the full path to your spreadsheet. It is a drop down list that will contain previous program paths that have been added. If there are no paths that can be used you can create a new path by clicking on the Browse button below the Sheet Name text box. This will allow you to select a new spreadsheet program and path. The UTM also
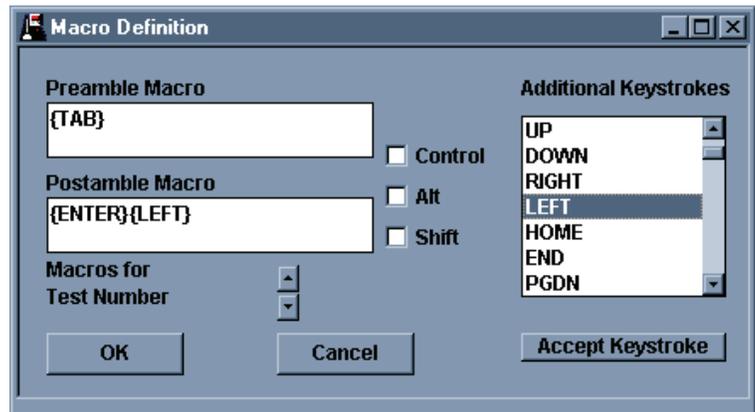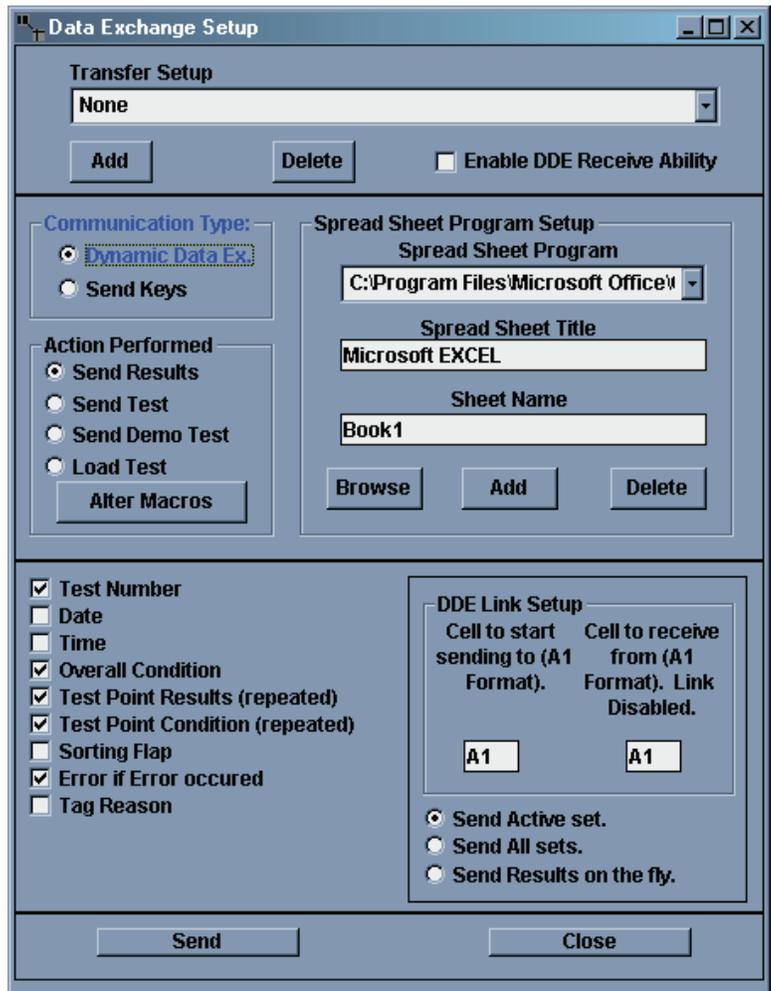
need to know the title of the spread sheet. The title is usually the program name and can be found on the very top of the program window. The typical title for Excel is "Microsoft Excel." The UTM will also need to know what sheet the data will be sent to. In Excel the sheet names are typically on the bottom of the sheet in a tab-type list.

Once you have entered the Spread Sheet Program and path, the Spread Sheet Title and the Sheet Name you can save these three items by clicking on the Add button. This will result in a new item in the Spread Sheet Program drop down list. You can use the Delete button to remove these three pieces of information for the setup that is shown. You can use the Spread Sheet Program drop down list to select different setups to use or delete.

3.3.4.5 Result Data Check List
You can pick and choose what Result Data to be sent by checking or un-checking the individual result types.

3.3.4.6 DDE Link Setup
DDE can be used to send Result data to a spreadsheet and also to dynamically load test information. The cell where result information is sent to is set in the "Cell to start sending to" text box. It should be formatted in "A1" format (Columns represent by a letter and rows represented by numbers). When using DDE to load test data dynamically the UTM will look at one spreadsheet cell and will look for a change in the data in that cell. The cell that is used is defined in the "Cell to receive from" text box. Again, it uses "A1" formatting.

The UTM can hold multiple sets of results in memory at once. When the results are sent to a spreadsheet either the Active Set or All Sets can be sent by selecting the setting . Result data can also be sent as it comes in, or "On The Fly"

3.3.4.7 Action Buttons
The left button will begin either a result Send or a test Load when clicked. Use the close button to exit Data Exchange Setup.

3.3.4.8 Using DDE to dynamically program a test.
The UTM is capable of bi-directional communication with a spread sheet by using Dynamic Data Exchange. Within the UTM Data Exchange setup the user can select a cell in the spreadsheet will be used for DDE dynamic test loading. This link to this cell will try to be established when the UTM is first started, when the Data Exchange option is opened, when the communication type is changed from Send Keys to DDE, and when the Receive From text box is changed. The label above the Receive From text box in the DDE Link section will reflect the status of the link.

Once this link has been established it is possible for the spreadsheet to program a UTM test. The commands that the spreadsheet has available to send to UTM are listed below with an explanation and the proper syntax. To send a command to UTM simply enter the command in the proper syntax into the cell.   The UTM will change the text in the cell to the text "OK" when it is finished processing the command sent over. Commands are separated from the data with a "|" (the "pipe" character). The "|" is needed even if the command to be sent does not have data.

3.3.4.8.1 Available Commands
1) Test Point
   This command allows the user to select what test point will receive information. The syntax is "TP|x" where x is a number from 1 to 99.
2) Memory Clear
   This command will clear all specifications and results. The syntax is "MR0|"
3) Specified Length
   This command will change the specified length for the selected test point. Some commands use the specified length entries for other things than a length measurements. For instance, the Rate command uses the length and force entries for the first and second test point used in the rate calculation. The syntax is "SL|x.xx" where x.xx is a length value. A decimal point is not necessary.
4) Specified Force
   This command will change the specified force for the selected test point. Some commands use the specified force entry for other things than a force measurement. For instance, the Rate command uses the force and length entries for the first and second test points used in the rate calculation. The syntax is "SF|x.xx" where x.xx is a force value.
   A decimal point is not necessary.
5) Specified Tolerance

This command will change the specified tolerance for the selected test point. The syntax in "ST|x.x". The decimal point is not necessary.

6) Specified Speed

This command will change the specified speed for the test point. The syntax in "SS|x.x". The decimal point is not necessary.

7) Specified Incremental or Absolute Test

This command will change the measuring convention to either incremental or absolute for the specified test point. The syntax is "SI|I" for incremental or "SI|A" for absolute.

8) Specified Miscellaneous

This command will change the miscellaneous entry for the selected test point. Command like Rate use the miscellaneous entry to store information. The syntax in "SM|x.x". The decimal point is not necessary.

9) Specified Comments

This command will change the comments for the selected test point. The syntax is "SO|xxx". The data for this command is strictly text although number can be entered.

10) Specified Part Number

This command will change the Part Number for the entire test. The syntax in "SP|xxx". The data for this command is strictly text although number can be entered.

11) Specified Command

This command will change the command for the test point (F@L, L@F, etc). The syntax in "SC|x" where x is a letter that represents a command. The list and explanation for the letters are in section 3.3.4.8.2.

12) Specified Length and Force Units

This command will specify Length and Force units for the test. The syntax is "MU|XY" where X is the representation for Length units and Y is the representation for Force units. The length units available are "I" for inches and "M" for millimeters. The force units are "L" for lbs., "N" for Newtons, "G" for grams, "K" for kilograms, and "O" for ounces.

13) Testing Direction

This command will set the testing direction to either Compression or Extension Testing. The syntax is "GE|X" where X will be either "C" for compression testing or "E" for extension testing.

14) Length Offset

This command will set the Length Offset for the test. The syntax is "GL|x.x" where x.x is the Length offset desired.

15) Force Offset

This command will set the Force Offset for the test. The syntax is "GF|x.x" where x.x is the Force Offset desired.

16) Synchronize Extension Length Offset

This command will set the Synchronize option for Extension Tests. The syntax is "GS|x" where "x" is either 0 for no synchronization or 1 to synchronize.

17) Download Test to Tester

This command will make the UTM download the programmed test to a UT. If there is one UT com port defined in the UTM the test will be download through that com port. If there are more than one UT com ports defined this command will allow you to select which port will be used. The syntax is "DNLD|x" where x is the com port that will be used if more than one com port is defined as a UT port.

18) Load a Test from the Hard Drive

This command will make the UT load a test from the hard drive. The drive specified can be either a local drive on the computer or it can be a mapped network drive. The syntax is "LOAD|xxxx" where xxxx is a proper path and filename for an existing UTM specification file. The proper path and filename should be in the form "DRIVE LETTER:\ FOLDER\SUBFOLDER\FILENAME.us1". An example would be "C:\Customer_X\Part_B\Build_2\Test_1.us1"

3.3.4.8.2 UT Commands available for Specified Commands

The UTM has 25 commands available for programming. Only 9 can be use to program a UT Batch Mode test. A UT Batch Mode test is a type of test that, once downloaded, requires no interaction with the UTM program. The other type of testing is called Interactive Mode. This mode required direct interaction with the UTM to complete the test. In order to use Excel with the minimum amount of interaction with the UTM only UT Batch Mode tests should be used.

The following list will explain what data is needed for the Specified Command and also what other command the test point can except. All of the specification command are not necessary, such as testing speed or tolerances, and will be listed as optional.

3.3.4.8.2.1 UT Batch Mode commands.

1) Force at Length

This command is represented by the letter "L". Testing length is defined in Specified Length, optional nominal Force is defined in Specified Force, optional tolerances are defined in Specified Tolerance, and optional testing speed is

defined in Specified Speed. This test can also be done in either Absolute or Incremental convention, optional and defaulted to Absolute.

2) Length at Force

This command is represented by the letter "F". Testing force is defined in Specified Force, optional nominal length is defined in Specified Length, optional tolerances are defined in Specified Tolerance and optional testing speed is defined in Testing Speed. This test can also be done in either Absolute or Incremental convention, optional and defaulted to Absolute.

3) Preset

This command is represented by the letter "P". This can accept either a Specified Length or a Specified Force to preset to but cannot accept both. The number of presets to perform is defined in Specified Miscellaneous. Optional testing speed is defined in Specified Speed. This test can be done in either Absolute or Incremental convention, optional and defaulted to Absolute.

4) Free Length

This command is represented by the letter "E" and can only be used for compression tests. Optional nominal length is defined in Specified Length, optional tolerance is defined in Specified Tolerance, and optional testing speed is defined in Specified Speed. This test can only be performed in Absolute convention.

5) Peak Force

This command is represented by the letter "K". Testing length is defined in Specified Length. Optional nominal force is defined in Specified Force, optional tolerance is defined in Specified Tolerance, testing speed is defined in Specified Speed. This test can only be performed in Absolute convention.

6) Rate

This command is represented by the letter "R". The first test point is defined in Specified Length, the second test point is defined in Specified Force, optional nominal rate is defined in Specified Miscellaneous, optional tolerance is defined in Specified Tolerance.

7) Pause

This command is represented by the letter "A". This command accepts no other specification.

8) Delay

This command is represented by the letter "D". Delay time is specified in Specified Miscellaneous and is in the form MMSS.S. Seconds of delay are defined in the tens, ones, and tenths position and minutes of display are in the hundreds and thousands position. Example, a Specified Miscellaneous of 1025.5 would be 10 minutes and 25.5 seconds of delay.

9) Initial Tension

This command is represented by the letter "I" and can only be used for extension tests. Deflection length is defined in Specified Length, optional Nominal tension is defined in Specified Force, optional tolerance is defined in Specified Tolerance, optional testing speed is defined in Specified Speed. This test can only be performed in Absolute convention.

3.3.4.8.2.2 Interactive Mode Commands

The remaining 16 command are for Interactive Mode testing. Most of the specification for Interactive mode testing can be given as constants, variables, or results from other test points. For these specifications the specified number will be preceded by either a "C" for a constant number, a "V" for a variable name, or an "R" for the results of a test point.

The following list will explain the interactive tests and what each specification is used for.

1) If-Then-Goto Statement.

This command is represented by the letter "H". This command will compare two items and will either proceed to the next test point if the comparison is false or will go to the specified test point if the comparison is true. The format of the logic is : If X a Y then goto test point Z. "X" is stored in the Specified Speed and can be defined as a constant, a variable, or a result. An example of the syntax would be "SS|C1" which represents a constant of 1. "a" represents the comparison and is stored in the Specified Length. Greater than (>) is a 0, Less than (<) is a 1, Equal to (=) is a 2, does not equal (<>) is a 3, Greater than or equal to (>=) is a 4, and Less than or equal to (<=) is a 5. An example of the syntax would be "SL|1" which would be Less than. "Y" is stored in Specified Force and is similar to "X". "Z" is stored in Specified Miscellaneous and is also similar to "X"

2) Goto Test Point.

This command is represented by the letter "G". This command will force the program to proceed to the specified test point. The specified test point can be given as a constant, a variable, or a test point result. The test point to go to is in the Specified Miscellaneous. An example of the syntax would be "SM|VA" which represents a variable called A.

3) Calculate Variable

This command is represented by the letter "C". This command can perform a mathematical operation using constants, variables and results from other test points. The calculation is stored in the Specified Length. An example syntax would be "SL|A = A+2*#2".

4) Variable Tolerance

This command is represented by the letter "V". This command will generate Bad Low/Good/Bad High conditions based on the specification. The result that will have a tolerance applied to it is stored in Specified Speed and can be specified as a constant, a variable, or a test point result. An example of the syntax is "SS|R1" which represents result of test point 1. The nominal value that the result will be compared to is stored in Specified Length. It also can be specified as a constant, a variable, or a test point result. An example of this syntax is "SLA" which represents a variable called A. The tolerance that will be applied to the result is stored in Specified Tolerance and can be specified as a constant, a variable, or a test point result. An example of the syntax is "ST|c12" which represents constant 12. The tolerance can be expressed as a percentage (X%) or in whole units (+/- X). This is also stored in Specified Tolerance and is represented as the case of the letters "C", "V" or "R". Small case letters represent whole units (+/- X) and upper case letters represent percentage (X%). The previous example would then be +/- constant 12 units.

5) Set Variable

This command is represented by the letter "X". This command will set a variable to the specified data. The variable name is stored in the Specified Speed and is preceded by a "V". An example of the syntax would be "SS|VAVar" which would access a variable called AVar. The data that the variable will be set to is stored in the Specified Length and can be a constant, a variable, or a results of a test point. An example of the syntax would be "SL|R3" which represents the result of test point 3.

6) Read Keyboard

This command is represented by the letter "B". This command will allow the user to input either a number or text through the keyboard. If a number is entered a nominal value and a tolerance can be applied to it. Units can also be supplied for the entered result. A user defined message can be shown to the user to prompt them to enter data. The Numeric or Text entry option and the user defined prompt are stored in the Spec Miscellaneous. The syntax is "SM|Yprompt" where "Y" is either an "N" for a numeric entry or a "T" for a text entry. "prompt" is the user supplied prompt. The nominal value for a numeric entry is stored in the Specified Length. The nominal value can be either a constant, a variable, or the result of a test point. An example of the syntax is "SL|C3.2" which represents a constant of 3.2. The tolerance applied to the entered number is stored in the Specified Tolerance and can be either a constant, a variable, or the results of a test point. An example of the syntax is "ST|VAVar" which represents a variable named AVar. The tolerance can be expressed as a percentage (X%) or in whole units (+/- X). This is also stored in Specified Tolerance and is represented as the case of the letters "C", "V" or "R". Lower case letters represent whole units (+/-X) and upper case letters represent percentage (X%). The units that are applied to a numeric results are represented in the Specified Force. The syntax is "SF|X" where "X" is either an "L" for Length Units, an "F" for force units, an "N" for no units or an "Oxxxx" for other units and the "xxxx" is a user supplied unit.

7) Read Serial Port

This command is represented by the letter "Y". This command will allow the UTM to get information from a device through RS232. A nominal value and tolerance can be entered and units can be applied to the reading. The delineation for the incoming RS232 data can be set along with what serial port is used. The nominal value is set in Specified Length and can be either a constant, a variable, or the result of a test point. An example syntax is "SL|C2.3" and represents a constant 2.3. The tolerance is stored in the Specified Tolerance and can also be a constant, a variable, or the result of a test point. The tolerance can also be stated as a percent or as whole units. Percentages are represented by a upper case "C", "V", or "R" and whole units are represented by lower case "c", "v", or "r". An example syntax is "ST|r2" which represents the results of test point 2 and in whole units. The units assigned to the result is stored in Specified Force and is represented by either an "L" length units, an "F" for force units, an "N" for no units, or an "Oxxxx" for other units and the "xxxx" is the user supplied units. An example of the syntax is "SF|L" which represents length units. The com port to use is stored in the Specified Speed and has the syntax "SS|X" where "X" is the com port number to be used and is between 1 an 10. The delineation used is stored in the Specified Miscellaneous and has the syntax "SM|xx" where xx represents the delineation. The delineations that can be used are a "C" for a comma, an "S" for a space character, a "T" for a tab character, an "e" for a semicolon, an "a" for a carriage return, a "D" for a decimal point, an "lx.x" (lower case "L") for a delay of x.x seconds, or an "Fx" for fixed fields of x characters.

8) Test Point Comments

This command is represented by the letter "M". This command will display a user defined comment. This command can be set to be displayed until the next test point is finished or until the operator acknowledges the comment. The comment is set in Specified Length and has the syntax "SL|comment" where "comment" is the user defined comment. The continue or wait selection is in Specified Speed and the syntax is "SS|X" where X will be either a "1" to wait for the user to acknowledge or a "0" to continue the test.

9) Sorter Output

This command is represented by the letter "S". This command will force the connected UT tester to generate a sorting signal for a defined amount of time expressed in seconds. The sorting signal to be forced is in the Specified Speed and the syntax is "SS|x" where X is a number between 0 and 31. The defined amount of time is in Specified Length and can be either a constant, a variable, or the results of a test point. An example of the syntax is "SL|C5.2" which represents a constant value of 5.2 seconds.

10) Timer Functions

This command is represented by the letter "T". This command allow various functions to be done to the timer. If a specific time is being set or waited for it is in Specified Length and can be either a constant, a variable, or the result of a test point. An example of the syntax is "SL|VTimeVar" which represents a variable called TimeVar. The action of the timer is specified in Specified Speed and has the syntax "SS|x" where x will be either "s" for set timer, "S" for start timer, "o" for stop timer, or "W" for wait until timer is. The direction of the timer is set in Specified Force and has the syntax "SF|y" where "y" is either "U" for counting up or "D" for counting down.

11) Larson TST

This command is represented by the letter "W". This command allows communication to a Larson Torsion Spring Tester. This command must specify the com port the TST is connected to, a reading from the TST to read, and whether the test point waits for new data or uses previously sent data. A nominal value and a tolerance are optional. The com port used is stored in Specified Miscellaneous and the syntax in "SM|X" where "X" is a number between 1 and 10 representing the com port the TST is connected to. What to measure is stored in Specified Speed and the syntax is "SS|z" where "z" is a letter that represents what to measure. "z" can be one of the following:

"A" for manual mode length,
"B" for manual mode force,
"C" for peak mode length,
"D" for peak mode force,
"N" for two point with rate first point length,
"O" for two point with rate first point force,
"P" for two point with rate second point length,
"Q" for two point with rate second point force,
"R" for two point with rate mode rate,
"S" for first peak length, or
"T" for first peak force.

Whether to wait for new data or used previously sent data is stored in Specified Absolute/Incremental and has the syntax "SI|x" where x is "I" to wait for new data or "A" to use previously sent data. The optional nominal value is stored in Specified Length. It can be given as a constant, a variable, or the result of a test point. An example syntax is "SL|C12.3" which represents a constant value of 12.3. The optional tolerance is stored in Specified Tolerance and can also be represented by a constant, a variable, or the results of a test point. It can also be specified in percentage or as whole units. An example of the syntax is "ST|r4" which represents a tolerance of +/- the result of test point 4 and is in whole units. The "r" in the example represents the results of a test point and the case of the character, lower in the example, represents whole units. An upper case "R" would have represented a percentage.

12) Larson Super DHT

This command is represented by the letter "U". This command allows communication to a Larson Super DHT Tester. This command must specify the com port the Super DHT is connected to, a reading from the Super DHT to read, and whether the test point waits for new data from the tester or uses previously sent data. A nominal value and a tolerance are optional. The com port used is stored in Specified Miscellaneous and the syntax is "SM|X" where "X" is a number between 1 and 10 representing the com port the Super DHT is connected to. What to measure is stored in Specified Speed and the syntax is "SS|z" where "z' is a letter that represents what to measure. "z" can be one of the following :

"A" for manual mode length,
"B" for manual mode force,
"C" for peak mode length,

"D" for peak mode force,
"E" for contact mode free length,
"F" for contact mode first point length,
"G" for contact mode first point force,
"H" for contact mode second point length,
"I" for contact mode second point force,
"J" for contact mode third point length,
"K" for contact mode third point force,
"L" for contact mode fourth point length,
"M" for contact mode fourth point force,
"N" for two point with rate first point length,
"O" for two point with rate first point force,
"P" for two point with rate second point length,
"Q" for two point with rate second point force,
"R" for two point with rate rate,
"S" for first peak mode length, or
"T" for first peak mode force.

Whether to wait for new data or used previously sent data is stored in Specified Absolute/Incremental and has the syntax "SI|x" where x is "I" to wait for new data or "A" to use previously sent data. The optional nominal value is stored in Specified Length. It can be given as a constant, a variable, or the result of a test point. An example syntax is "SL|C12.3" which represents a constant value of 12.3. The optional tolerance is stored in Specified Tolerance and can also be represented by a constant, a variable, or the result of a test point. It can also be specified in percentage or as whole units. An example of the syntax is "ST|r4" which represents a tolerance of +/- the result of test point 4 and is in whole units. The lower case "r" in the example represents tolerance in whole units. An upper case "R" would have represented a percentage.

13) Larson ST/MST

This command is currently not set up to be programmed through Spreadsheet DDE.

14) Larson DHT/CDHT

This command is represented by the letter "N". This command allows communication with a Larson DHT or a CDHT tester through RS232. The comm. Port that this command will use is specified in Specified Speed and has the syntax "SS|x" where "x" is a number between 1 and 10 representing the comm. Port that will be used. An optional nominal value can be defined and is specified in the Specified Length. It can be specified as a constant, a variable, or the result of another test point. An example of the syntax is "SL|C1.23" which represents a constant value of 1.23. An optional tolerance can also be entered. The tolerance is specified in the Specified Tolerance and can be specified as a constant, a variable, or the result of a test point. It can also be specified as a percent-age or a whole number. And example of the syntax is "ST|R3" which represents the result of test point 4 used as a percentage. The upper case "R" is for percentage where a lower case "r" would have represented a whole number. Newer DHTs can also send out Length data. This command can also read the length from these testers. The value to read is specified in the Specified Miscellaneous and has the syntax "SM|x" where "x" is either a 1 for Force readings or a 0 for Length readings. The Specified Force also needs to be set to specify what to read and has the Syntax "SF|x" where "x" is either "F" for force readings or "L" for length readings. Since the new testers can send out two pieces of data this command can be used to read both first and second pieces of data by having one command wait for new data and the other use the previous data. To specify the command to wait for new data the Specified Absolute/Incremental setting is set to a 1, the syntax is "SI|I" (letter i's). To specify the com-mand to use the previous data use the syntax "SI|A"

15) Larson TWCS

This command is represented by the letter "O". This command allow communication with a Larson Torque Wrench Calibration System through RS232.. The serial port that is to be used is specified in Specified Speed and has the syntax "SS|x" where "x" is a number between 1 and 10 that represents the com port that the TWCS is connected to. An option nominal force can be specified and is specified in Specified Length. It can be specified as a constant, a variable, or the result of a test point. An example of the syntax is "SL|C12" and represents a constant value of 12. An optional tolerance is specified in the Specified Tolerance and the syntax is similar to the nominal value entry. The tolerance can be specified as either a percentage or a whole number. The case of the letters "C", "V", or "R" in the syntax represents how the tolerance is defined. An upper case "C", "V", or "R" represents a percentage number, a lower case "c", "v", or "r" represents a whole number.

16) Larson Super TWCS

The Larson STWCS is set up similar to the Larson SDHT, #12. The difference is in the Specified Speed setting, what data to read. The STWCS can send only Manual Force, "B", Peak Force, "D", or First Peak Force, "T".

17) <u>End Test</u>

This command is represented by the letter "J" and has no other specifications. This command is used to end the testing sequence before the end of the sequence is encountered.

3.3.5 Miscellaneous

From the Miscellaneous item under the Options menu item there are 5 other option you can set.

First, you can have results sent automatically to a printer as they come in. This can be specified for each port separately.

Second, you can specify what is printed on the first two lines of the printouts, typically it is your company name and city.

Third, you can specify what is displayed in the title bar of the UTM program itself. This may be comments about what devices are connected to the UTM.

Fourth is how many lines per page will be printed out. You can increase or decrease this as you like. Decreasing this number will leave white space on the bottom of some of the longer printouts.

Lastly is how many standard deviations will be used for control limits. This number is typically 3 but can be set to anything from 1 to 9.

Click OK when you are finished specifying these options.

3.3.6 Excel Template

The UTM 3.12 shipped with a UTM template that mimics many of the features the UTM has. This template does contain macros and Excel may ask you if you want these macro enables. Larson does hope you consider us a trusted source for the macros. The macros are coded in the Visual Basic Script language.

These macros are not protected. They are open to inspection and alteration. Larson Systems will hold no liability if these macros are altered. It is advisable that at least one copy is saved in a secure location as a backup.

When you choose the Launch Excel Macro from the Options menu the UTM will try to start Microsoft Excel. If the UTM cannot find the Excel.exe program it will ask you to find it. The UTM will try to start Excel with the UTM Template. If the UTM cannot find the "UTM Template.xls" program you will have to find it. It should have been installed in the same directory as the UTM program itself.
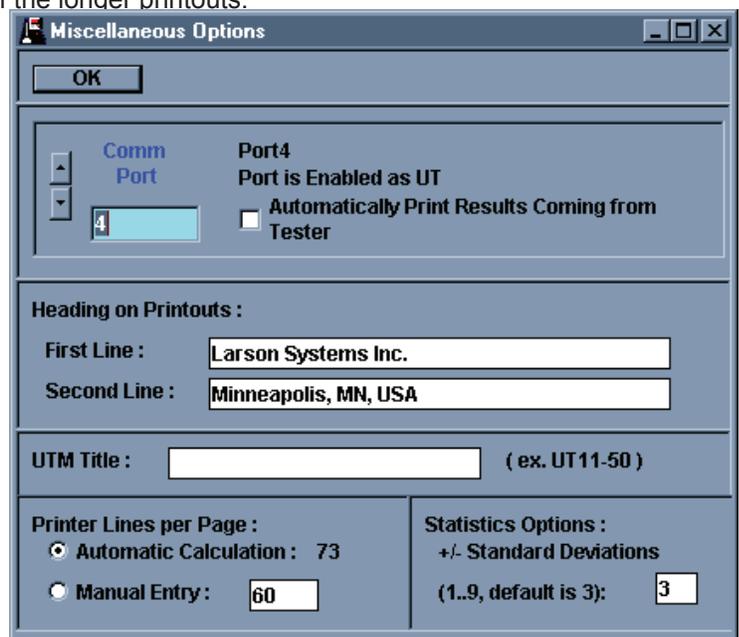
The UTM Template will load data from any UTM result file. The corresponding Specification file must be present in the same directory for various features to work. The Template will automatically calculate statistics and can create similar graphics as the UTM.

If you want features that the UTM does not have you can alter the UTM Template to create them.

3.3.7 Demos
The UTM comes with 6 interactive demos. These demos are here to help explain various features of the UTM. To start any of the demos select the Options menu item, highlight the Run Demo item and another list will be presented next to the main Option list. Select one of these 6 demos and it will start.

The demos consist of an explanation window that will feature comments and explanations. From this window you can use the Next and Back window to scroll through the entire demo. Most of the demos will load a Demo program and results that should be in the same directory as the UTM program. If the UTM cannot find these files the demos will not work properly. As the demos proceed they will open various result windows and graphics and explain what they are.

It is suggested that you take a few minutes and got through each demo.

3.3.8 About
When you choose the About selection from the Option menu a small window will open up and will give the UTM revision number and Larson Systems address and phone number. If you have any questions about how the UTM works please feel free to call us.

3.4 Reading Tester Specs
Reading tester specs allows you to load specification from your UT or ST tester. This is useful if you have made slight modifications to your test after you have downloaded it to your tester.

There are two ways to read the tester. The first is to use the Read button in the button bar (the button with an arrow pointing away from a UT). The second is to use the Read Tester Spec item under the File menu.

This will load all of the specification from the tester including the testers maximum length and force, current units, settings for Options 1 and 2, and sort table.

3.5 Getting Results

3.5.1 Batch Mode

If you are in UT or ST Batch mode, before you can get results you must first download the program to the tester. To do this either click the download button in the button bar (the button with an arrow pointing to the UT) or select the Send item form the File menu item.

Once the test program is loaded into the tester it can begin to test parts. When the test finishes it will send the data to the UTM. If the Up-To-Date option is turned on (see Result Options, section 3.3.2) the Actual Results, Individual and Statistics, Individual windows will be shown and updated with the new data.
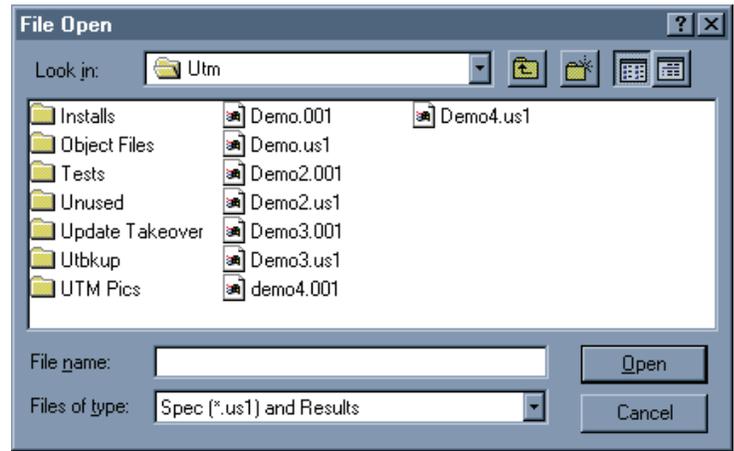
After you have tested all the parts you want press the Mode button on the tester. This will signal the end of a Set. When you save the results each Set will be saved in its own file. Multiple sets can be in the UTM's memory at one time. The Set number of the currently display results is at the bottom of the Actual Results, Individual window along with the currently displayed test number. You can use the Up/Down arrows or the text boxes to move between test and sets.

Before you save results you have to ability of Tagging tests. When you Tag a test you remove it from the statistics and graphics. You can give a reason in a comment box as to why you tagged the test. To Tag a test use the Up/Down arrow for the Set and Test Points in the Actual Results, Individual window and find the test you want removed. In the upper part of the Actual Results window is a button labeled Tag. Click this button and the Tag Reason comment window appears. Type in the reason why this test was tagged and press OK. That test is now removed from all statistics and graphics.

If you have Tagged a test but want it back into consideration click the UnTag button. This will remove the Tag Reason and let the test be part of the statistics and graphics.

Once the Set is save to disk tests cannot be Tagged or UnTagged.

When you have tagged or untagged all the tests you want, save the results. To do this either click the Save Button on the button bar (the button with an arrow pointing to a floppy disk) or select Save from the File menu.

3.5.2 Interactive Mode.

After you have programmed in an interactive test you can start the test one of three ways: by starting one full test, start stepping through the program, or by starting a continuous loop.

When no test is being conducted the button with the red stop light will be highlighted with a bright blue background. When you click one of the other buttons it will become highlighted with the bright blue background and the red light will have the normal background.

The green stoplight is used to start one full test. The test sequence will go through all of the test points and display the results when it is finished.
To step though the test click on the button with the footprints in it. This will force one and only one test point to be tested. When that test point is finished the test will pause and you will be prompted to press the Step button again to test the

next test point. When all tests points are finished the results will be displayed.

The button with the two blue arrows pointing to each other represents a continuous loop. When one test sequence is finished the results are displayed and another test is automatically started. You must press the red stop light to break the continuous loop.

Once the results are gathered you have the option of tagging or untagging tests from the Actual Results, Individual window.

When you have tagged or untagged all the tests desired save the data. Once the data is saved the Set ends and no more tagging or untagging is allowed. Saving data is the only way to end a Set in Interactive mode.

3.5.3 Saving Results
To save data to the disk either press the save button in the button bar (the button with an arrow pointing to a floppy disk) or select Save from the File menu when results are in the UTM's memory.

Results are saved with the same file name as the specifications but with numerical extensions. The extensions start with .001 and will continue to .999. The UTM will try to save the results with the lowest number. It will fill in holes in the numerical sequence if there are any, i.e. if a directory contains the files Part.001 and Part.003 and new data is save to the Part file it will be save with the name Part.002. From the File Open window you can sort all of the files in the direc- tory by either name or date modified. If you sort by date modified you will be able to see if such a hole has been filled.

3.5.4 Loading Results
When data has been saved to a disk it can then be retrieved. To load data either click on the File Open button in the button bar (the button with an arrow pointing away from a disk) or use the Open command from the File menu. You can load multiple result files at one time. If files with different names are selected only one of those names are used to load the files. The UTM cannot load different files into its memory. The File Open window will accept multiple, disconnected selections.

When you load data you will be asked where new data should be located. Your choices are to save new data in new sets and new files, continue to add new data to an existing set creating an increasing larger file, or to defer the question until new data is gathered. This set of choices can also be changed at any time after results are brought into memory by selecting the Save Options item under the File Menu.

3.5.5 Clearing Results
To remove all results from memory but retain the test select Clear Results from the Results menu. If there are no results in memory the Clear Results item is not shown in the Results menu.
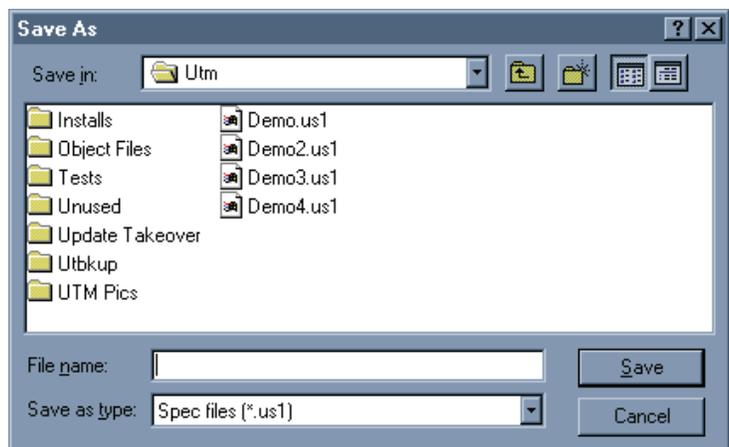
3.6 Viewing Results

Once results have been brought into the UTM, either by loading results or performing tests, different types of data can be viewed.

3.6.1 Individual Actual Results

With Individual results you can view every test point result for every test. You can view the Actual data by selecting Actual Data from the Individual item under the Results menu item. This window will display all the test point results for one test. You can maneuver from test to test by using either the Up/Down arrow or text box for Test Points. You can use the Test Point arrows to maneuver between Sets or you can use the Up/Down arrows and text box for Sets on the very bottom of the Actual Data window.
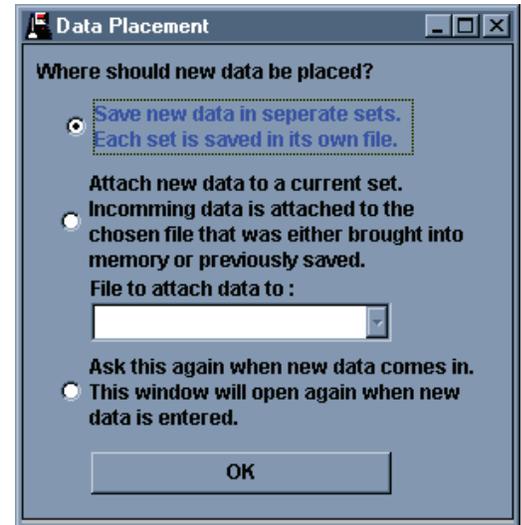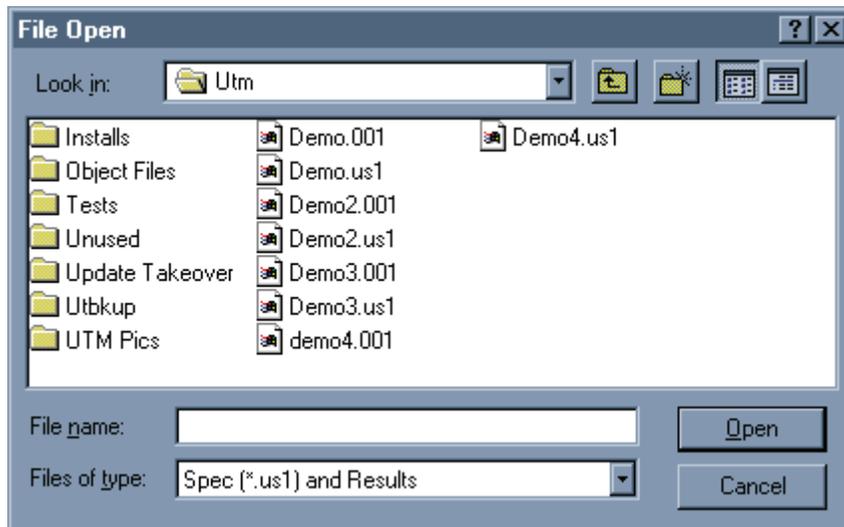
3.6.2 Individual Statistics

Statistics show how the Set of data has behaved. It contains the mean, range, standard deviation, CP, CpK, and other things. To view this window select Statistics from the Individual item under the Results menu item. The statistics displayed are for current Set selected from the Individual Results window.

3.6.3 F Vs L Graph

If you have UT test points in either UT Batch or Interactive Mode you can view a F Vs L graph. Only certain UT commands will generate both force and length data. Only from these certain commands can data be entered into a F Vs L graph. To view this graph select F Vs L Graph from the Individuals item under the Results menu.

This graph plots Force Vs Length for each of the test points that have the necessary force and length data. They are plotted in the order they were defined in. If a part is supposed to have hysteresis it will be shown in this graph. Hysteresis is where spring rate of a part is different from increasing force to decreasing force.

Test Point Results, Individual — Condition: Good

Tp	Result	Tolerance	Condition
1	1.5744 (in.)	0.28 (%)	Satisfactory
2	38.965 (lb)	1.52 (%)	Satisfactory
3	48.730 (lb)	1.23 (%)	Satisfactory
4	58.398 (lb)	1.20 (%)	Satisfactory
5	37.231 (lb)	2.29 (%)	Satisfactory
6	13.818 (lb)	5.00 (%)	Satisfactory
7	147.3379 (lb/in.)	-0.43 (%)	Satisfactory
8	147.7841 (lb/in.)	0.55 (%)	Satisfactory

Test Number 75 Enter of 75
Test Date: Fri., Aug 18, 1995 12:35:13 PM

Set Number 1 Enter of 1
Set Name: Demo.001
File Date: Fri., Jun 22, 2001 12:37:44 PM

By clicking on the Options button on the F Vs L graph you can change how the graph looks. First you can zoom into or out of a plot. To do this, change the minimum and maximum scale values.

The UTM generates a default Graph Title. You have the option of changing this title. It will appear on any printouts.

Test Point Statistics, Individual

| Tp	Mean	Range: Low	Range: High	Range: High - Low	Standard Deviation	Standard Dev Pop	-3 Sigma	+3 Sigma	CP	CpK	PP
1	1.5685 (in.)	1.5433 (in.)	1.5894 (in.)	0.0461 (in.)	0.01342 (in.)	0.01333 (in.)	1.52819 (in.)	1.60872 (in.)	3.3728	3.3344	3.3955
2	38.084 (lb)	34.326 (lb)	41.480 (lb)	7.153 (lb)	2.01139 (lb)	1.99794 (lb)	32.0498 (lb)	44.1182 (lb)	0.6011	0.5516	0.6051
3	47.841 (lb)	44.067 (lb)	51.270 (lb)	7.202 (lb)	2.00170 (lb)	1.98831 (lb)	41.8364 (lb)	53.8466 (lb)	0.6268	0.5777	0.6311
4	57.512 (lb)	53.760 (lb)	61.035 (lb)	7.275 (lb)	2.00123 (lb)	1.98784 (lb)	51.5080 (lb)	63.5154 (lb)	0.9064	0.8737	0.9125
5	36.347 (lb)	32.642 (lb)	39.648 (lb)	7.007 (lb)	1.99817 (lb)	1.98480 (lb)	30.3525 (lb)	42.3415 (lb)	0.4505	0.4419	0.4536
6	12.979 (lb)	9.531 (lb)	15.869 (lb)	6.338 (lb)	1.88133 (lb)	1.86875 (lb)	7.3348 (lb)	18.6228 (lb)	0.1991	0.1670	0.2005
7	147.2762 (lb/in.)	144.7843 (lb/in.)	149.7936 (lb/in.)	5.0093 (lb/in.)	0.99101 (lb/in.)	0.98438 (lb/in.)	144.30312 (lb/in.)	150.24919 (lb/in.)	5.1911	4.9573	5.2261
8	147.7395 (lb/in.)	144.9992 (lb/in.)	149.4550 (lb/in.)	4.4558 (lb/in.)	1.02413 (lb/in.)	1.01728 (lb/in.)	144.66713 (lb/in.)	150.81189 (lb/in.)	4.4346	4.1863	4.4644

Total Tests: 75 = 100%   Good Tests: 37 = 49.3%   Bad Tests: 38 = 50.7%

You can change how many lines are displayed on the graph, both for the length and force axis.

The graph can either be connected lines without specification limits or unconnected dots that represent the result data, the upper and lower specification limits for each point.

Click on any point in the graph to display a small information window that will display the actual value, the values of any specification, mean, or control line, and the condition of the point. Click anywhere else on the graph to remove this information box.

3.6.4 Individual Test Point Graph.

The Individual Graph will display the results of one test point across all of the tests in a Set. This will show how that one test point varies over the Set. To view this graph select Individual Test Point Graph from the Individuals item under the Result menu.

Below the graph is the Zoom In and Zoom Out buttons and a scroll bar. When you Zoom In to a graph you are changing the maximum number of tests that are displayed in the x-axis to roughly half of what is currently is. Once you have zoomed into the graph you can use the scroll bar to change the minimum x-axis value thereby changing to a different group of tests being displayed. The Zoom In button will work until there are only two points being displayed. You can then use the Zoom Out button to display more tests on the graph. The Zoom Out button will stop working once all the tests are being displayed on the Graph.

To change what test point results are being viewed select a different test point from the Test Specification window. To change what Set is being view select a different Set from the Actual Results, Individual window.

To change other parts of the graph click the Option button in the graph window. The first option in the Option window is the maximum number of labels. Changing this changed the number of ticks on the x-axis. This will put more or fewer

Force vs Length Graph Options

OK   Update

☐ Manually set Minimum and Maximum Scale Values

61.6455   max.

Force (lb)

9.4359   min.

min.   Length (in.)   max.

1.3182   1.6502

☐ Use Custom Graph Title

Graph Title :

Force vs Length Graph of Test Number 75, Set 1, C:\UTM\Demo.001

☐ Display Lower and Upper Control Limits if Available

Number of Force Ticks :   5

Number of Length Ticks :   10

○ Force, Length Scatter Plot with Control Limits
◉ Force, Length Line Graph without Control Limits

Graph, Individual Test F vs L

Close   Print   Options

Force vs Length Graph of Test Number 75, Set 1, C:\UTM\Demo.001

Length (in.)

◆ Result: Good

labels on the graph. If there are too many labels on the graph you will not be able to distinguish between them.

Vertical lines can be extended from each tick mark on the x-axis. To show these, check the Vertical Lines check box.

Specification lines, the mean line and +/- 3 Sigma control lines can also be displayed by checking the appropriate option. You can zoom into the y-axis by changing the maximum and minimum limits in this window.

You can also change the graph title from the UTM generated default. This title will appear on the printout.

When you change any option you can click Update to apply these changed options to the graph and leave the Option window open. When you click OK the changes are applied and the Option window is closed.

Click on any point in the graph to display a small information window that will display the actual value, the values of any specification, mean, or control line, and the condition of the point. Click anywhere else on the graph to remove this information box.

3.6.5 Lot Actual Results

A Lot of data is a predetermined number of individual tests that are grouped together. The result of this grouping is a mean value for all of the individual test points in the group. The number of tests in a lot is controlled from the Results item under the Options menu (Section 3.3.2). The Lot Size can be changed at any time since the resultant means are based on the Individual results, and these cannot be changed once they are in the UTM (they can, however, be Tagged if the set has not been saved or was not retrieved from memory).

To see the Actual Data, Lot select Actual Data from the Lot item under the Results menu. This will bring up the Actual Data, Lot window. From here you can view the mean data from the lot grouping. The grouping will start with the first result from the first set and continue to the last result of the last set. If the number of results in a set is not a multiple of the Lot size then results from one set will be combined with the results from a different set. If the number of results in all of the sets is a multiple of the Lot size no Set overlapping will occur.

3.6.6 Lot Statistics

The statistics for the Lot data consist of the same statistic categories as the Individual Statistics. To see these statistics
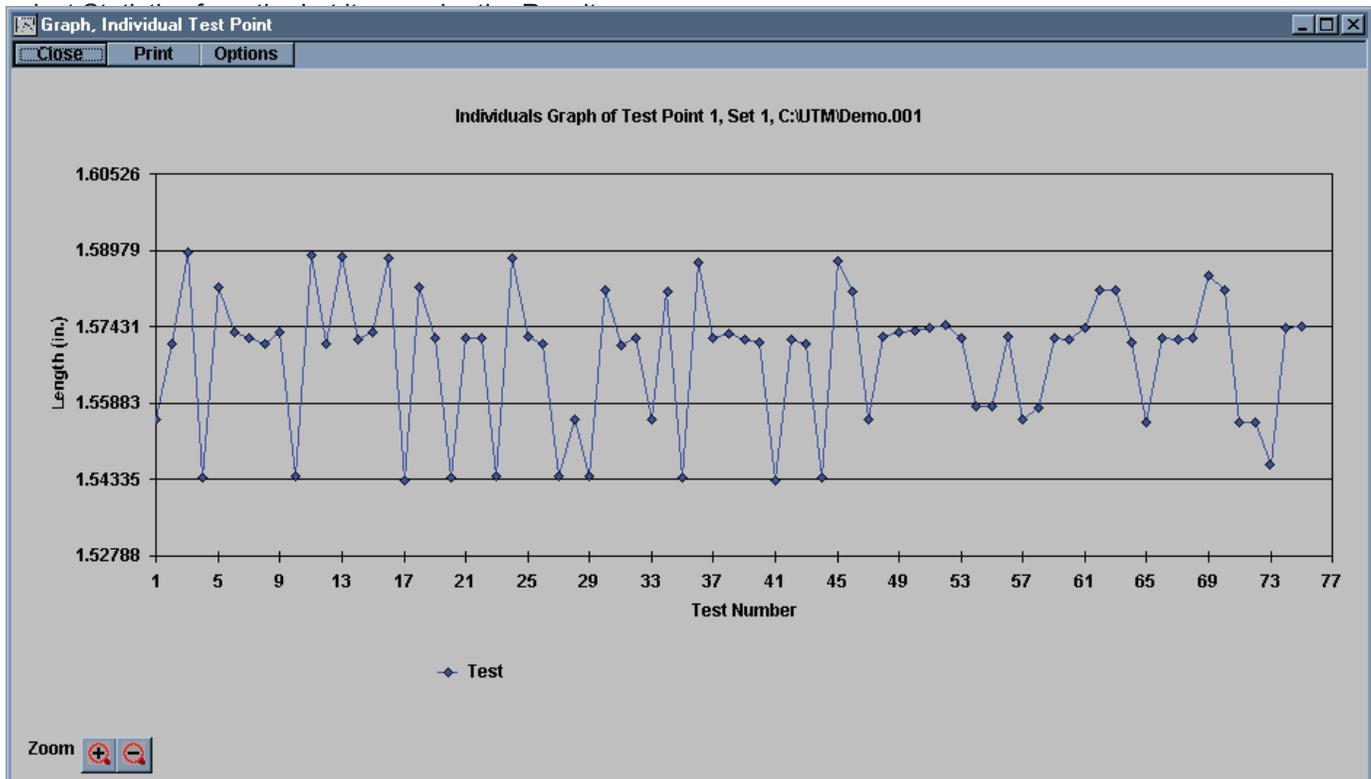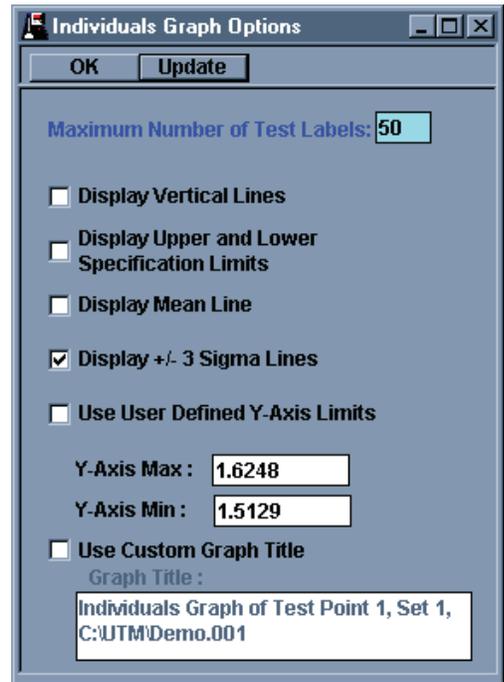
3.6.7 Histogram

The Histogram applies only to Lot data. It shows the distribution of all the data based on the minimum and maximum reading. The number of categories is controlled from an option within the Option window for the Histogram. The Histogram graph also shows a normal line that shows if the data is evenly distributed or if it is loaded to one side of another.

To view the Histogram, select the Histogram item from the Lot selection under the Results menu.

To change other parts of the Histogram click the Options button from the graph window..

Maximum Number of Frequency Labels Displayed controls the y-axis labels, these show how many tests fall into a specific range of values.

Number of Bars controls how many ranges of values between the minimum and maximum values there are, these are displayed on the x-axis.

Test Point Results, Lot

Close Print Condition : Bad

Tp	Result	Tolerance	Condition
1	1.5610 (in.)	-0.57 (%)	Satisfactory
2	36.948 (lb)	-3.74 (%)	Satisfactory
3	46.729 (lb)	-2.93 (%)	Satisfactory
4	56.426 (lb)	-2.22 (%)	Satisfactory
5	35.229 (lb)	-3.21 (%)	Satisfactory
6	11.939 (lb)	-9.28 (%)	Bad Low
7	146.8976 (lb/in.)	-0.73 (%)	Satisfactory
8	148.1183 (lb/in.)	0.78 (%)	Satisfactory

First Lot Used: 1 Last Lot Starts at Set: 1, Test: 71

Lot Number 15 Enter of 15

You have to option change the default title for the histogram. This title will appear on the printout.

Click OK when you are finished changing the options.

Test Point Statistics, Lot

Close Print

Tp	Mean	Range: Low	Range: High	Range: High - Low	Standard Deviation	Standard Dev Pop	-3 Sigma	+3 Sigma	CP	CpK	PP
1	1.5685 (in.)	1.5593 (in.)	1.5787 (in.)	0.0194 (in.)	0.00558 (in.)	0.00539 (in.)	1.55171 (in.)	1.58519 (in.)	8.1118	8.0194	8.3966
2	38.084 (lb)	36.733 (lb)	39.697 (lb)	2.964 (lb)	0.84201 (lb)	0.81346 (lb)	35.5580 (lb)	40.6100 (lb)	1.4359	1.3177	1.4863
3	47.841 (lb)	46.523 (lb)	49.473 (lb)	2.949 (lb)	0.83691 (lb)	0.80853 (lb)	45.3308 (lb)	50.3522 (lb)	1.4993	1.3817	1.5519
4	57.512 (lb)	56.221 (lb)	59.170 (lb)	2.949 (lb)	0.83632 (lb)	0.80796 (lb)	55.0028 (lb)	60.0207 (lb)	2.1690	2.0906	2.2451
5	36.347 (lb)	35.010 (lb)	37.930 (lb)	2.920 (lb)	0.83441 (lb)	0.80612 (lb)	33.8438 (lb)	38.8503 (lb)	1.0789	1.0583	1.1168
6	12.979 (lb)	11.703 (lb)	14.404 (lb)	2.701 (lb)	0.77422 (lb)	0.74796 (lb)	10.6562 (lb)	15.3015 (lb)	0.4839	0.4058	0.5009
7	147.2762 (lb/in.)	146.8271 (lb/in.)	148.1691 (lb/in.)	1.3421 (lb/in.)	0.37606 (lb/in.)	0.36331 (lb/in.)	146.14796 (lb/in.)	148.40434 (lb/in.)	13.6798	13.0636	14.1599
8	147.7395 (lb/in.)	147.0786 (lb/in.)	148.1925 (lb/in.)	1.1139 (lb/in.)	0.32829 (lb/in.)	0.31716 (lb/in.)	146.75463 (lb/in.)	148.72438 (lb/in.)	13.8340	13.0594	14.3195

Total Lots: 15 = 100% Good Lots: 12 = 80.0% Bad Lots: 3 = 20.0%

3.6.8 X-Bar Graph

An X-Bar graph is similar to the Individual Test Point but uses the Lot data. To view the X-Bar graph select X-Bar Graph from the Lot item under the Results Menu.

To change what test point is being viewed select a different test point from the Test Specifications window.

Below the graph are Zoom In and Zoom Out buttons. Use these buttons to decrease or increase the number of lots displayed in the graph. Once you have zoomed in use the scroll bar to shift to different groups of lots. You can zoom into the graph until two points are shown and you can zoom out only until all of the lots are displayed.

To change other parts of the graph click the Option button to see other options you can change. Since the R-Chart is closely related to the X-Bar graph, options for the R-Chart are within this Option window. They can only be accessed if the R-Chart is being viewed.
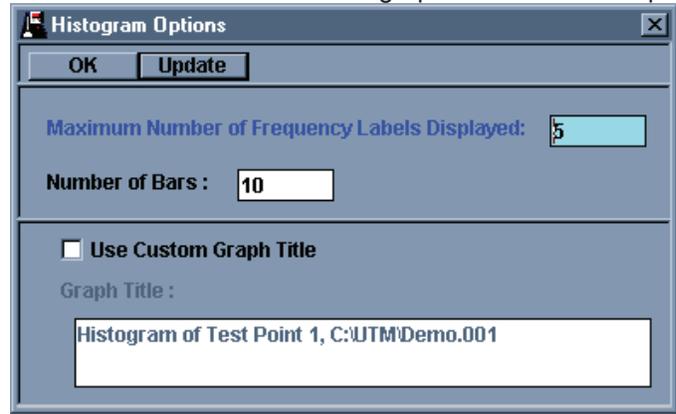
There are three options that are for both X-Bar Graphs and R-Charts. You can have vertical lines on both, display control limits on both, and synchronize them to each other. Control limits are based on an Estimated 3 Sigma formula. When you synchronize the X-Bar and R graphs they become the same width, same height, and the X-Bar graph is shown above the R-Chart. From this view each point in the X-Bar graph lines up with its corresponding point in the R-Chart.

For the X-Bar graph you can also see the Specification limits and an X-Double Bar line, the mean of all the means plotted.
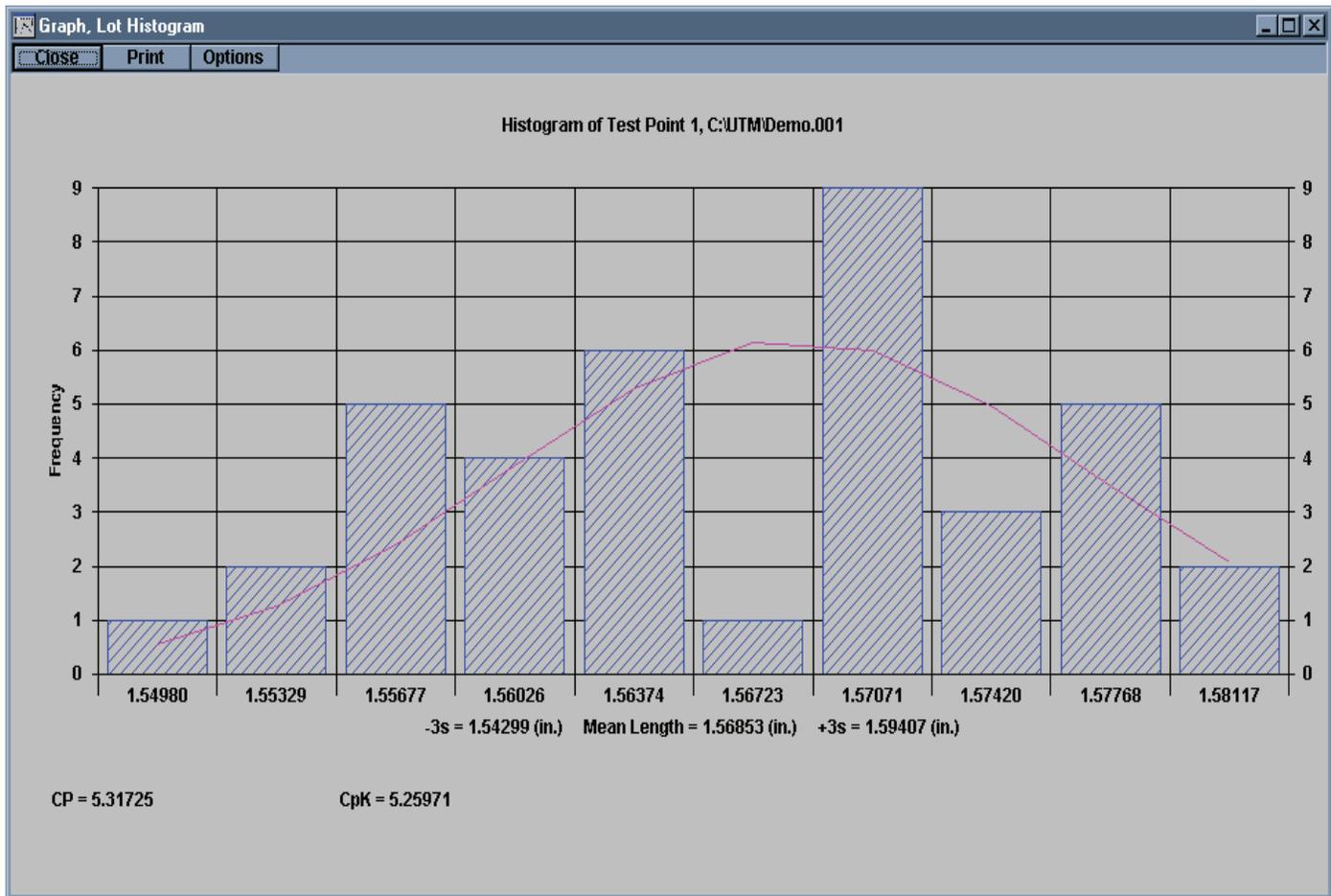
You can zoom into the y-axis by specifying maximum and minimum limits and change the default graph title by specifying a new title. This title will appear on the print out.

Click Update to view the changed options without closing the Options window or click OK to enable the changes and close the Options window.

Click on any point in the graph to display a small information window that will display the actual value, the values of any specification, mean, or control line, and the condition of the point. Click anywhere else on the graph to remove this information box.

3.6.9 Range Graph (R-Chart)

A Range graph displays the range of values within one lot; this shows how variable the data is within the lot. To view the Range Graph select R Chart from the Lot item under the Results menu.

X-Bar and Range Options

OK   Update

Maximum Number of Lot Labels: 20

☐ Display Vertical Lines   ☐ Synchronize X-Bar and Range Graphs
☑ Display Upper and Lower Control Limits on X-Bar and Range Graphs

X-Bar Graph Only Options :

☑ Display Upper and Lower Specification Limits
☐ Display X Double Bar Line (dashed line)
☐ Use User Defined Y-Axis Limits

Y-Axis Max : 1.7229
Y-Axis Min : 1.4199

☐ Use Custom Graph Title
Graph Title :
X-Bar Graph of Test Point 1, C:\UTM\Demo.001

Range Graph Only Options :

☑ Display Range Mean Line (dashed line)

☐ Use User Defined Y-Axis Limits

Y-Axis Max : 0.1150
Y-Axis Min : 0.0000

☐ Use Custom Graph Title
Graph Title :
Range Graph of Test Point 1, C:\UTM\Demo.001

Below the Graph itself are a Zoom In and a Zoom out button. With these buttons you can reduce the number of lots displayed on the graph, this will allow you to view a section of the graph in more detail. Once you Zoom in a scroll bar will appear to allow you to move between sections of the graph. You can Zoom In until only two points are displayed and you can Zoom Out only until all points are displayed.

To view the control options for the R-Chart click on the Options button above the graph.

Because the X-Bar and R-Chart graph are closely related three options are shared with the X-Bar graph. Vertical lines are display from each tick mark on the x-axis, which represents each lot. Control lines can be viewed with the data. Control lines are based on an Estimated 3 Sigma formula. The X-Bar and R-Chart graphs can be synchronized. This means that the graphs become the same width and height and are horizontally aligned with each other. The X-Bar graph is displayed above the R-Chart. When one is moved or resized the other is similarly moved and resized.

There are three options that pertain only to the R-Chart. The Range Mean line shows the average of all the Ranges. You can zoom into the y-axis by changing the y-axis minimum and maximum. You can also change the default R-Chart title. This title appears on the printout.

When you are finished changing any of the options click Update to view the changes without closing the Options window or OK to enable the changes and close the Options window.
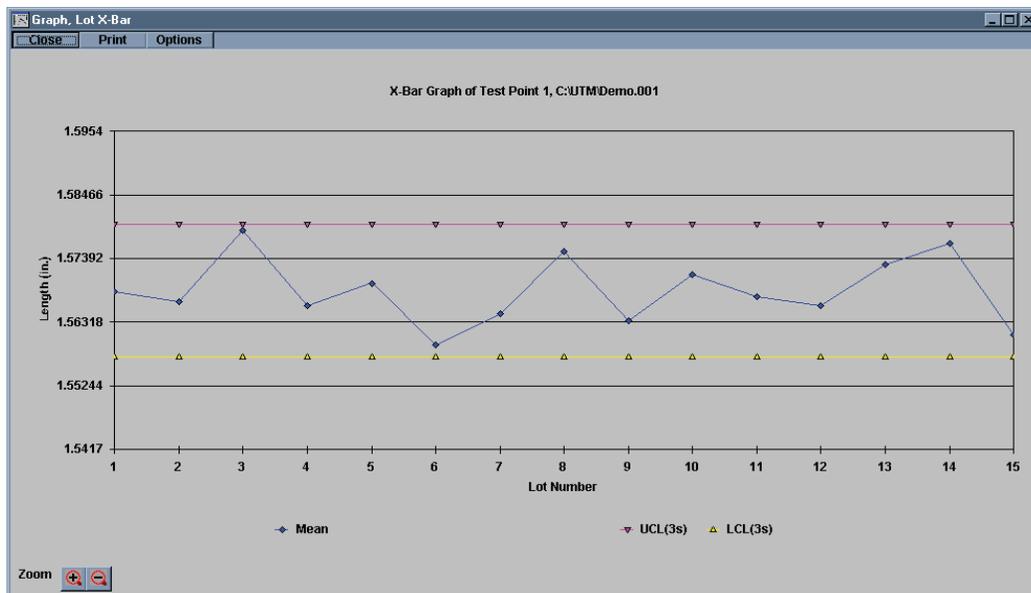

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Click on any point in the graph to display a small information window that will display the actual value, the values of any specification, mean, or control line, and the condition of the point. Click anywhere else on the graph to remove this information box.

3.6.10 Moving Average Graph.

The Moving Average Graph shows trends over a group of lots by averaging together a certain number of Lots then moving one Lot down and averaging together another group. Example, it the moving size is 5 Lots 1 to 5 are averaged and plotted for location 5, then Lots 2 to 6 are averaged and plotted for Lot 6, 3 to 7 for 7, 4 to 8 for 8, and so on. This method tends to dampen out one time spikes in the readings.

To view the options available for the Moving Average Graph click on the Options button above the graph. Vertical lines can be shown from each of the tick marks on the x-axis, the Lot Number line. Control limits can be view

X-Bar and Range Options

OK   Update

Maximum Number of Lot Labels: 20

☐ Display Vertical Lines   ☐ Synchronize X-Bar and Range Graphs
☑ Display Upper and Lower Control Limits on X-Bar and Range Graphs

X-Bar Graph Only Options :

☑ Display Upper and Lower Specification Limits
☐ Display X Double Bar Line (dashed line)
☐ Use User Defined Y-Axis Limits

Y-Axis Max : 1.7229
Y-Axis Min : 1.4199

☐ Use Custom Graph Title
Graph Title :
X-Bar Graph of Test Point 1, C:\UTM\Demo.001

Range Graph Only Options :

☑ Display Range Mean Line (dashed line)

☐ Use User Defined Y-Axis Limits

Y-Axis Max : 0.1150
Y-Axis Min : 0.0000

☐ Use Custom Graph Title
Graph Title :
Range Graph of Test Point 1, C:\UTM\Demo.001

with the plot. Control limits come from an Estimated 3 sigma formula like the X-Bar and R-Chart. A Mean line can be shown on the plot. The Mean line is the average of all the points plotted. The y-axis can be zoomed into by changing the y-axis minimum and maximum. The default graph title can also be changed. This title appears on the printout. The Moving Group size can be changed from here. This controls how many Lots are grouped together for each point plotted.
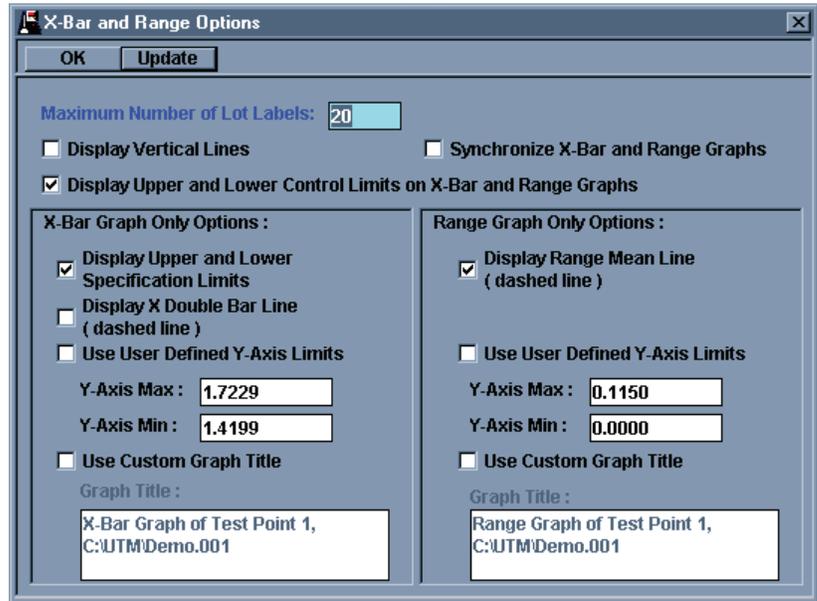
When you have finished changing any of the options click the Update button to see the changes to the graph without closing the Options window or click OK to enable the changes and close the Option window.

Click on any point in the graph to display a small information window that will display the actual value, the values of any specification, mean, or control line, and the condition of the point. Click anywhere else on the graph to remove this information box.

3.7 Printing Results

Every result and graph window has a print button. Click on any Print button to print out the contents of the particular window. The text based printouts are the Test Specifications, the Sorting Table, Individual Actual Results, Individual Statistics, Lot Actual, and Lot Statistics. The graph printouts are the Individual Test Point Graph, the F Vs L graph, the

Range Graph of Test Point 1, C:\UTM\Demo.001
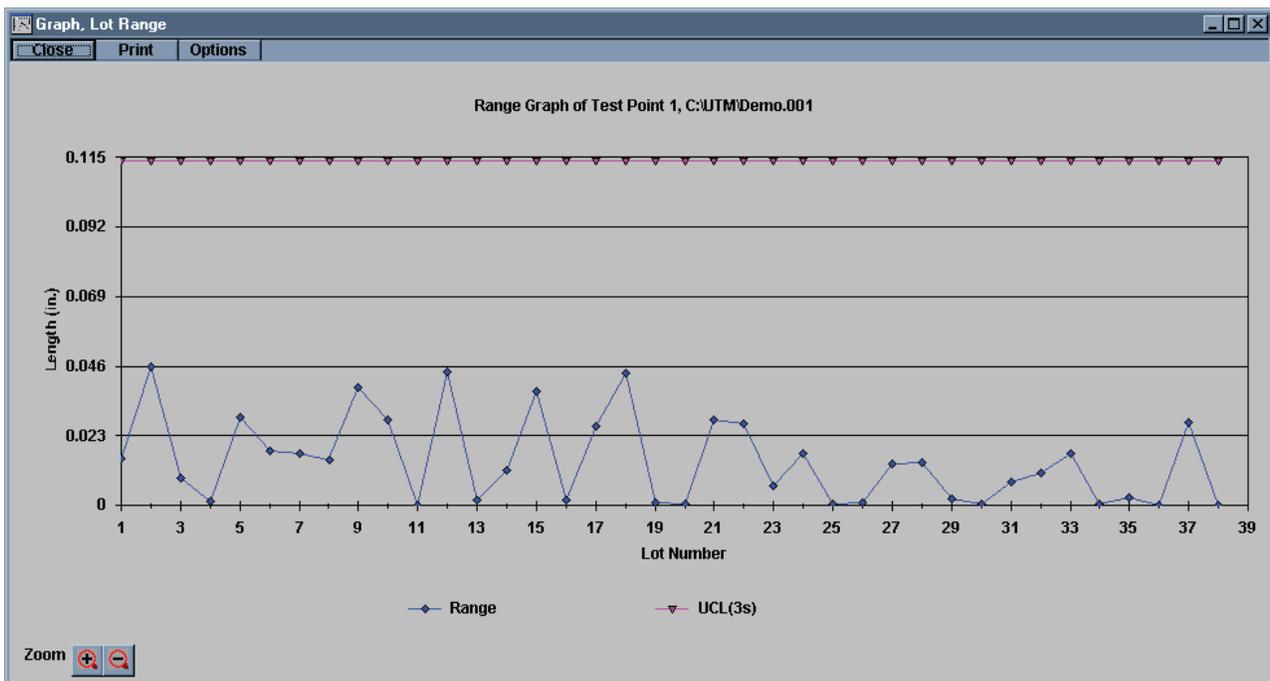
X-Bar graph, the R-Chart, the Histogram, and the Moving Average Graph.

The UTM also has an Overall Print button. It is the button with a printer symbol in it in the button bar. This button will cause every open window to print. It is a quick way to print out a combination of windows. The UTM has the ability to create predefined combinations of windows. See section 3.8.3, window layouts.

3.8 Other Features
3.8.1 Merging Files
If you have a group of results files that you would like to be stored as one large file instead of multiple small files the UTM has a utility that can merge multiple files into one large file. To start this utility click Merge File under the File menu.

To start you can pick what drive and directory your files are in. When you highlight a specification file from the Specifications Files list any result files will be listed in the Result Files list. From the Result Files list you can select all of the files you want merged into one. The Result Files list allows multiple and disconnected selections. Once you have selected all of the files to merge together you must select what name to call the merged files. In order to open the merged files you must retain the same name but you can change the numerical extension. You can choose an existing file from the Destination File list or create a new extension from the Destination File text box. When you have selected a destination file you can merge the files together. To

Moving Average Options

OK   Update

☐ Display Vertical Lines
☑ Display Upper and Lower Control Limits
☐ Display Moving Average Mean Line (dashed line)
☐ Use User Defined Y-Axis Limits
   Y-Axis Max : 1.5908
   Y-Axis Min : 1.5466
5   Moving Group Size
☐ Use Custom Graph Title
Graph Title :
Moving Average Graph of Test Point 1, C:\UTM\Demo.001

Graph, Lot Moving Average

Close   Print   Options

Moving Average Graph of Test Point 1, C:\UTM\Demo.001

◆ Mean   ▽ UCL(+3s)   ▽ LCL(-3s)

merge the files and stay in the Merge Results File utility click the Merge & Stay button. To merge the files and exit the utility click Merge & Close. To exit the utility click Cancel.
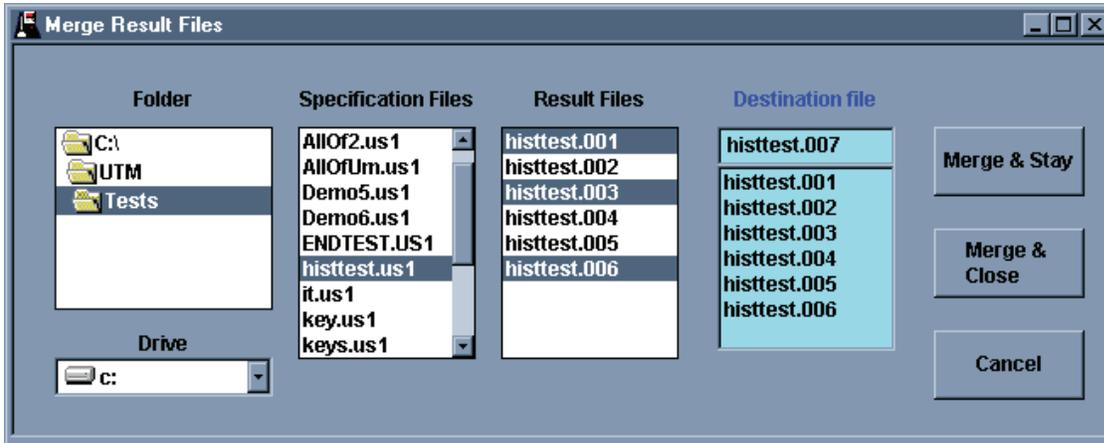
3.8.2 Back Up and Restore UT Memory

If you use the UT Memory Save/Retrieve feature the UTM can now read all of the memory location in the UT and download and save all of those specifications onto you computer. The UTM can also restore a UT memory from specification files it has on your computer. The Back Up utility is time consuming; it can take anywhere from 10 to 30 minutes depending on how full your UT memory is.

To Back Up your UT select Back Up UT from the File Menu. You will be asked to select a directory to place the UT memory. The directory must exist to select it; you cannot create the directory from the directory selection. Once you select the directory click OK. To exit the utility without backing up the UT click Cancel. When you click OK to continue you will be asked to verify the directory you want the UT memory in. Any information in that directory may be overwritten with new information. Tests that are in the directory but not in the UT will remain in the directory, i.e. if the directory has a test from memory location 5 but there is no test currently in location 5 that test will remain in the directory on the computer, if you restore from that directory the UT memory 5 will be filled.
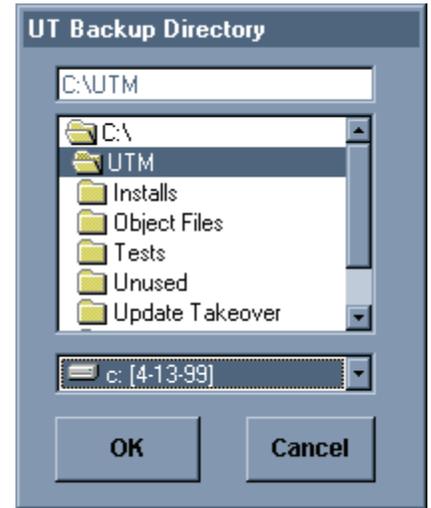
To Restore the UT memory select Restore UT Memory from the File menu. You will be prompted to select a directory that contains the tests you want restored to the UT. Once you have selected the directory click OK to continue. Click Cancel to abort the restore. Once you have clicked OK you will be asked to verify that the directory you selected is the directory you want. Click OK to continue. The Restore can be time consuming depending on how many tests are stored in the directory. It is possible for the restore to take up to 30 minutes to restore all 300 possible tests. The fewer the stored tests the faster the restore will proceed.

3.8.3 Window Layouts

With Window Layouts you can select a predefined combination of result windows to be displayed and you can also define where each window appears. The UTM ships with 5 layouts already in memory. The default layout is Free Form. Free Form enforces no layouts. Windows are brought up in no specific place and in no particular combination. The only windows that are automatically shown are the Individual Actual Results and Individual Statistics. These windows are automatically brought up in Free Form when the first results of the first set are gathered (by UT/ST test or Interactive test start).

3.8.3.1 Selecting a Layout

To select any Window Layout click the Layout Button from the button bar, it is the button with the generic graphs on it; it is also the farthest button to the right in the button bar. You will be prompted to select a layout from the Setup Name drop-down list. To start the layout click OK, to abort the layout click Cancel. When you click OK and there are results in memory the windows selected in the layout will open and be placed in their predetermined locations. If no results are in memory the result windows will not be displayed.

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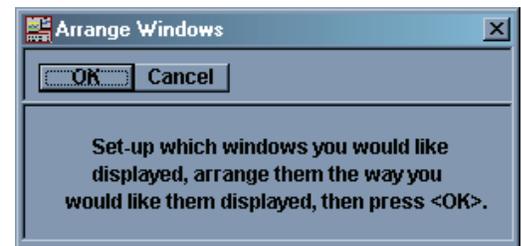
3.8.3.2 Creating/Modifying/Deleting a Layout

To create a layout select the Define Layout from the Edit Custom Layout item under the Window Menu. You can select an existing layout or create a new one. To create a new layout click the Add New Layout button. You will be prompted to give a name to this layout. Click OK to continue the creation.

If you no longer use a layout you can remove it from the list. First select the layout you want removed from the Layout name dropdown list. Next click the Remove Old Layout button. You will be prompted to confirm the removal of the layout. To finish the removal click OK. To leave the layout in the list click Cancel.

Once you have created a new layout or selected an existing layout you can choose what windows are opened for the layout. Do this by checking the boxes next to the window name in the Window used in current Layout list.
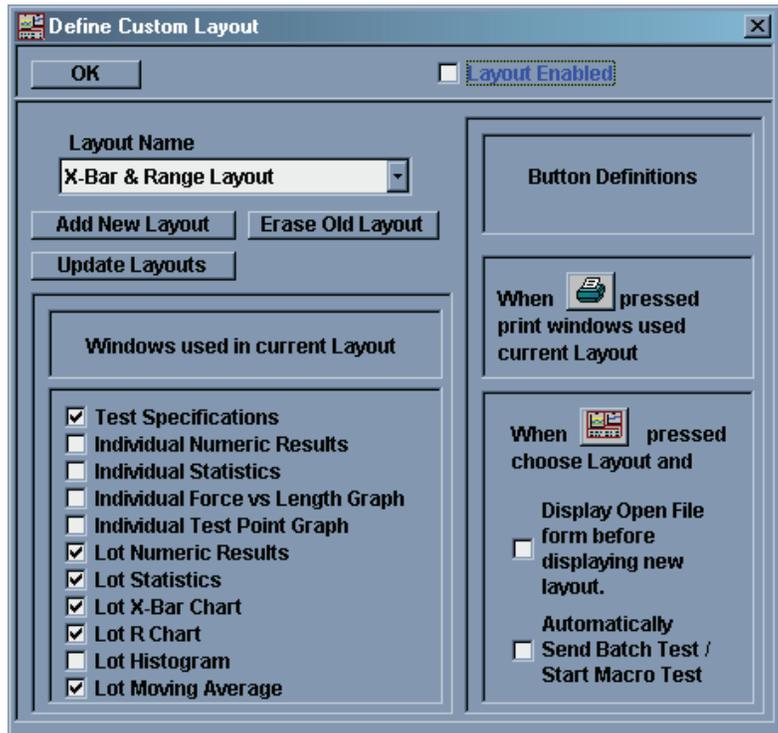
3.8.3.3 Layout Options

There are two options associated with each layout. If they are enabled they are processed each time the Layout button from the button bar is clicked. The first is the option to open the File Open window. If this option is enabled the File Open window is opened when a new layout is selected.

The second option is to automatically send batch test or start an Interactive test. If a test is loaded into memory, either by creating it or loading it from memory, the test will be sent to a tester if it is a UT or ST Batch test or the Interactive test will be started.

3.8.3.4 Screen Positioning

Once you have a layout defined you can determine where each window will appear and save that window placement. You will first have to load results in memory in order to see the result windows. Do this by either creating and running a test or loading results from memory.

When results are in memory bring up the layout by clicking on the Layout button from the button bar (the far right button with the graphic symbols in it) and selecting a layout from the list. The windows in the layout will open up either in a default position if it is a new layout or their previously determined position if it is an existing layout. Position and size the windows as you want them

When the windows are in the position you want then click the Arrange Windows item from the Edit Custom Layouts under the Windows menu. You will be prompted to arrange the windows the way you want them. Click OK to save the window placement or Cancel to abort the placement. If you choose to abort the layout is still saved, the existing placements are simply not changed.

3.8.3.5 Reverting to Free Form

You can revert to Free Form layout one of two ways. The first is to click on the Layout label next to the Layout button in the button bar. The second is to click the Layout button and open the Choose Layout prompt. Below the drop down list is a Free Form check box. Check this box and the drop down list is disabled and becomes grayed out. Click OK and the Free Form layout is enabled.

No windows are closed, repositioned, or resized when you revert to the Free Form layout.