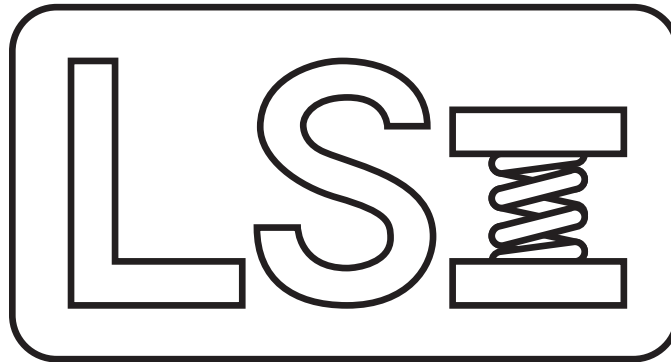
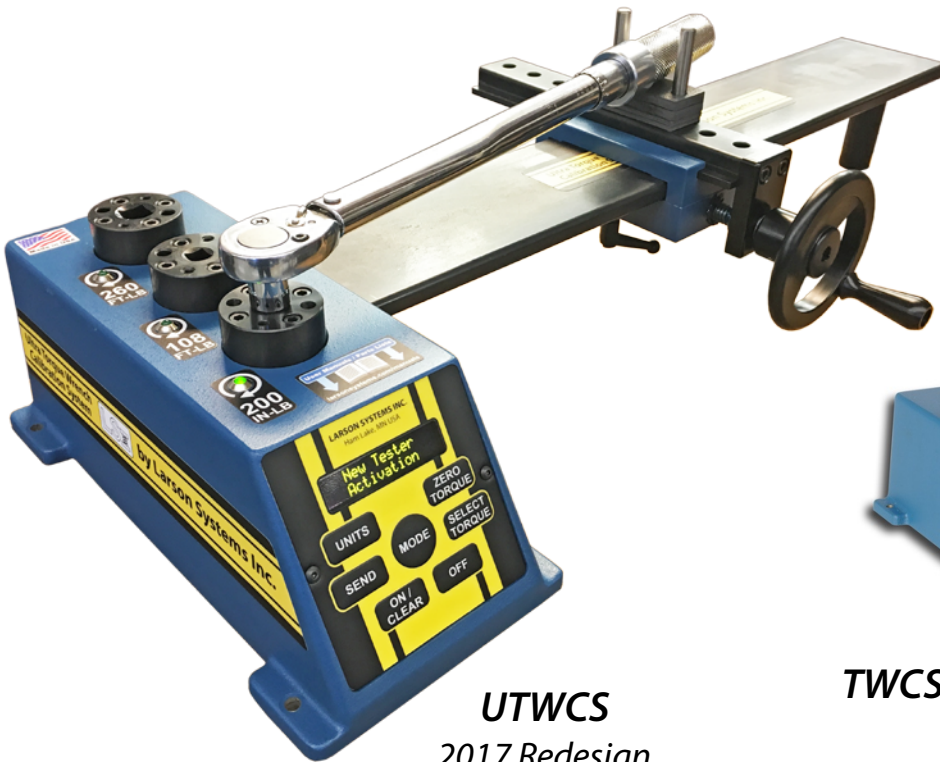


Larson Systems Inc.



Torque Wrench Calibration Systems

*User Manual for
TWCS, STWCS, and UTWCS*



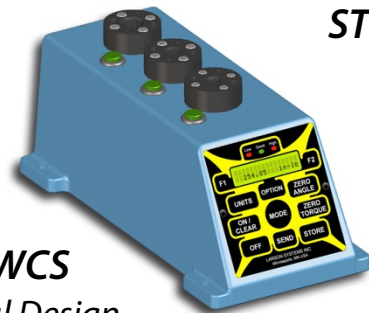
UTWCS
2017 Redesign
Pictured with Easy
Loader Attachment



TWCS



STWCS



UTWCS
Original Design

About This Manual

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

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1 INTRODUCTION



STWCS shown with optional Easy Loader Attachment

The Torque Wrench Calibration System is a **high-precision machine** designed to measure and verify the calibration of hand torque tools. Considered one of the most flexible and user-friendly calibration systems available, LSI's TWCS is offered in three models: a Standard model (TWCS), Super model (STWCS), and an Ultra model (UTWCS). The TWCS model operates with **one load cell** on a single unit. Select from five available torque capacities. The STWCS features **interchangeable smart torque cartridges**. Switch load cells easily when a different torque capacity is needed and enjoy the convenience! For flexibility without changing out cartridges, the UTWCS allows **up to three stationary load cells** to test hand torque tools of different capacities all on the same unit. Instantly change torque capacities with the push of a button! Available torque cartridge capacities range from 3 in-lbs to 260 ft-lbs depending on model. In all models, the load cells are protected during use by mechanical and software stops to safeguard from overload damage. Each model includes three test modes: **Manual** for needle-indicating tools, **Peak** for dial indicating or digital tools, and **First Peak** for click-type torque tools. Unique to the industry, the STWCS and UTWCS both feature an on-screen **Calibration Assistant** program to guide the user through the calibration steps and print a certificate compliant with ISO 6789 standards. Connect to any parallel printer with the RS232 cable and adapter - a timesaving plus for the management of calibration verification and ensuring torque tools are operating within the specified guidelines. The STWCS and UTWCS also include a built-in computer that can access calibration, linearization, and an 1,800-test point data logger. To allow for portability and ease of use, a rechargeable battery with an eight-hour capacity is standard on the STWCS and UTWCS and is optional on the TWCS. An A/C adapter provides auxiliary power and recharges the battery. LSI's TWCS model series is equipped for measuring in **English and Metric units**, including the Newton.



25 pin RS232 Interface

120V AC Adapter / Battery Recharger

1.1 Standard TWCS Features

- **Three Test Modes:** Accommodates calibration for all types and classes of torque tools (needle-indicating, dial/digital indicating, or click-type)
- **Fourth Mode for Shunt Calibration Verification:** Easily validate calibration accuracy of tester
- **Accuracy Better Than $\pm 0.4\%$:** (10-100% of full scale)
- **Push Button Zeroing:** Zero out torque reading before each new test
- **Backlit LED Display:** Easily and comfortably view test results
- **Digital Calibration:** No tools required to calibrate from control panel
- **NIST Traceable Calibration:** In compliance with ISO 6789:2003(E)
- **Clockwise / Counterclockwise Operation:** Test in either direction
- **Vertical / Horizontal Mounting:** Horizontal mounting is standard; vertical mounting possible without the Easy Loader Assembly installed
- **Single Torque Capacity:** Available in 100, 200, 500 in-lb, 108 & 260 ft-lbs with a 1/4", 3/8", or 1/2" drive (an adapter kit is available)
- **Operates in Both English and Metric Unit Measurements:** in-oz, in-lb, ft-lb, kg-mm, kg-cm, kg-m, dN-m, N-mm, and N-M units
- **Rugged Cast-Aluminum Housing:** Heavy-duty and durable for use in any workspace
- **12-Month Warranty:** Guaranteed satisfaction
- **Optional Features:** RS232 (printing) capability and portable operation with NiCad rechargeable battery are both available as factory options



1.1.1 TWCS Torque Specifications

TWCS – Torque Specifications			
Capacity	Resolution	Capacity	Resolution
100 in-lb	0.02 in-lb	108 ft-lb	0.02 ft-lb
8 ft-lb	0.002 ft-lb	1,300 in-lb	0.2 in-lb
115 kg-cm	0.02kg-cm	1,500 kg-cm	0.2 kg-cm
1.15 kg-M	0.0002 kg-M	15 kg-M	0.002 kg-M
11 N-M	0.002 N-M	145 N-M	0.02 N-M
200 in-lb	0.05 in-lb	260 ft-lb	0.05 ft-lb
16 ft-lb	0.005 ft-lb	3,100 in-lb	0.5 in-lb
230 kg-cm	0.05 kg-cm	3,570 kg-cm	0.5 kg-cm
2.3 kg-M	0.0005 kg-M	35 kg-M	0.005 kg-M
22 N-M	0.005 N-M	350 N-M	0.05 N-M
500 in-lb	0.1 in-lb	Accuracy is better than $\pm 0.4\%$ of reading from 10-100% full scale	
40 ft-lb	0.01 ft-lb		
580 kg-cm	0.1 kg-cm		
5.8 kg-M	0.001 kg-M		
60 N-M	0.01 N-M		

1.2 Super TWCS (STWCS) Features

- All TWCS Standard Features, plus Electronics Upgrade
- Accuracy Better Than $\pm 0.2\%$: (10-100% of full scale)
- Separate Function for Shunt Calibration Verification: Validate calibration accuracy with confidence in seconds
- Built-in Data Logger: Store up to 1,800 test points internally
- Interchangeable Torque Cartridge Capability: Order additional Smart Torque Cartridges that can be swapped out easily – 3, 25, 100, 200, & 500 in-lb, 108 & 260 ft-lb capacities available (STWCS only)
- User Programmable Force Filter: Allows for increased accuracy of readings
- Calibration Assistant: Follow torque tool calibration steps with LED screen instructions and print a calibration certificate ready for signature (“Easy Cal Report”)
- English / Metric Units: Same as TWCS except STWCS offers g-mm, not dN-m
- Printer Compatible: Connect to any parallel printer using the RS232 cable and adapter
- Rechargeable NiCad Battery: Go cordless for up to eight hours of continuous operation



1.2.1 STWCS Torque Specifications

See Section 1.3.1 below.

1.3 Ultra TWCS (UTWCS) Features

- All Standard STWCS Features: except interchangeable cartridges
- Three Stationary Load Cells on Single Tester: No cartridges to change
- Switch Between Load Cells in Seconds: Push a button and switch between 200 in-lb, 108 or 260 ft-lb capacities instantly
- Custom Configure Load Cells: Special order one, two, or three load cells - 25, 100, 200 & 500 in-lb, 108 & 260 ft-lb torque capacities available as a factory option



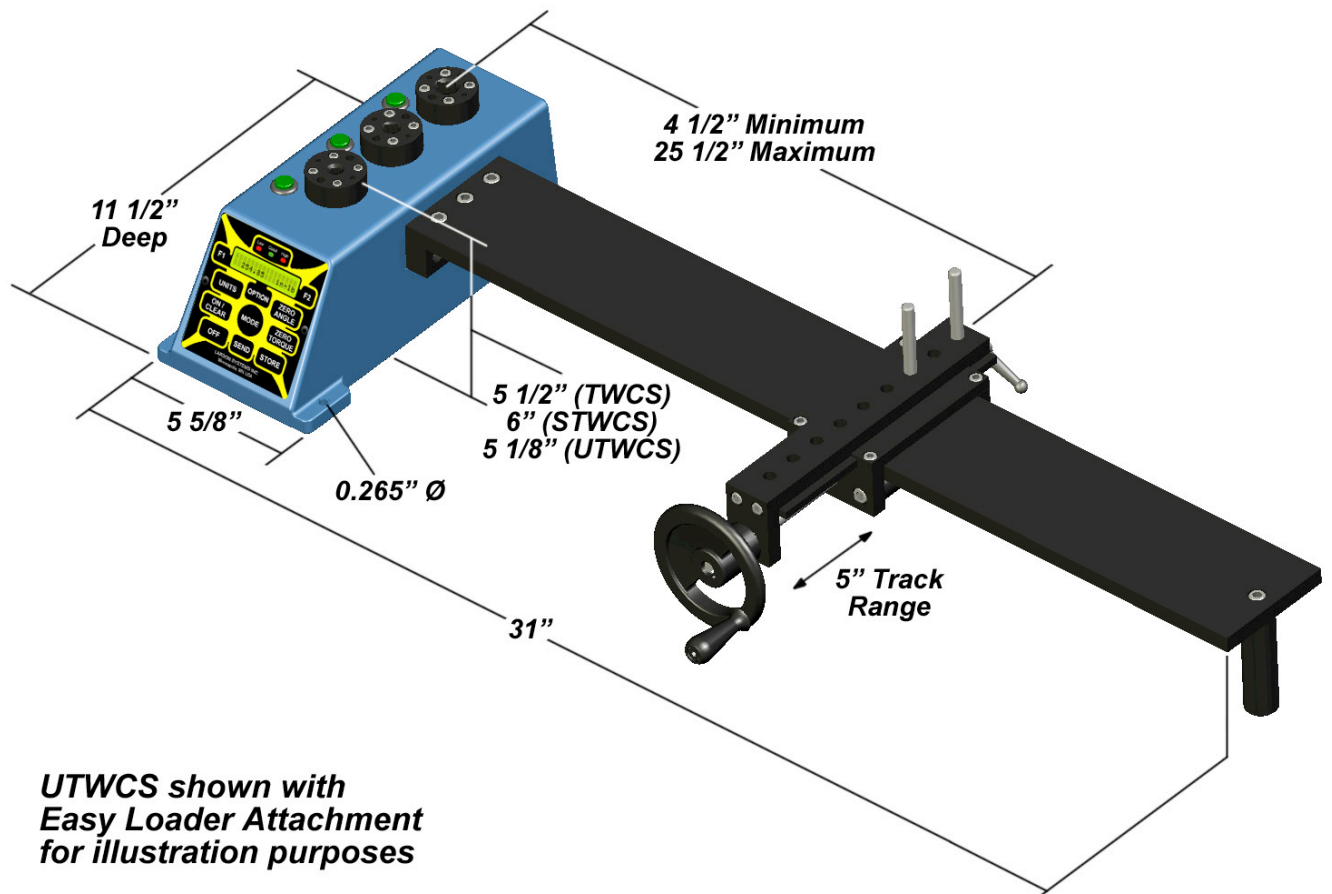
1.3.1 STWCS / UTWCS Torque Specifications

STWCS / UTWCS Torque Specifications					
Capacity	Resolution	Capacity	Resolution	Capacity	Resolution
3 in-lb*	0.0002 in-lb	200 in-lb	0.02 in-lb	260 ft-lb	0.02 ft-lb
0.25 ft-lb*	0.00002 ft-lb	16 ft-lb	0.002 ft-lb	3100 in-lb	0.2 in-lb
3 kg-cm*	0.0002 kg-cm	230 kg-cm	0.02 kg-cm	3570 kg-cm	0.2 kg-cm
0.03 kg-M*	0.000002 kg-M	2.3 kg-M	0.0002 kg-M	35 kg-M	0.002 kg-M
0.34 N-M*	0.00002 N-M	22 N-M	0.002 N-M	350 N-M	0.02 N-M
25 in-lb	0.002 in-lb	500 in-lb	0.05 in-lb	Accuracy is better Than $\pm 0.2\%$ of reading From 10-100% full scale	
2 ft-lb	0.0002 ft-lb	40 ft-lb	0.005 ft-lb		
29 kg-cm	0.002 kg-cm	580 kg-cm	0.05 kg-cm		
0.29 kg-M	0.00002 kg-M	5.8 kg-M	0.0005 kg-M		
2.8 N-M	0.0002 N-M	60 N-M	0.005 N-M		
100 in-lb	0.01 in-lb	108 ft-lb	0.01 ft-lb	*Load Cell Capacity not available for use with UTWCS	
8 ft-lb	0.001 ft-lb	1300 in-lb	0.1 in-lb		
115 kg-cm	0.01 kg-cm	1500 kg-cm	0.1 kg-cm		
1.15 kg-M	0.0001 kg-M	15 kg-M	0.001 kg-M		
11 N-M	0.001 N-M	145 N-M	0.01 N-M		

1.4 Optional Equipment

- **Easy Loader Attachment:** Easily mount any single arm torque wrench and test it the same way every time, regardless of who the operator is (factory option)
- **Power Tool Adapter Kit:** Test powered torque tools such as power screwdrivers with complete confidence and safety – includes adapters for 1/4", 1/2", and 3/8" drives
- **Drive Adapters:** Test a variety of torque tools with 1/4", 3/8", 1/2", or 3/4" adapters
- **Inkjet Printer:** Produce calibration certificates ready for signature on STWCS or UTWCS (includes RS232 interface cable and adapter)
- **RS232 to Parallel Printer Cable/Adaptor:** Send data to any 8.5" x 11" or 4" parallel printer and generate a customized report depending on series model
- **Smart Torque Cartridges:** Available for STWCS only in 3, 25, 100, 200, & 500 in-lb, 108 & 260 ft-lbs

1.5 Tester Dimensions



Installation of the Easy Loader Attachment will vary for each model.

2 GETTING STARTED

2.1 Unpacking

Your new TWCS model from LSI is shipped completely assembled. Once the shipping container is opened, this User Manual is easily found with instructions to READ FIRST. The TWCS testing unit and Easy Loader (if ordered) is bolted to the bottom of the shipping container. Use care when removing from the packaging and protective poly bag to avoid any damage. Other items ordered may be in their own carton(s) also bolted to the bottom or inside of the shipping container. If possible, leave any cartons intact inside the container and store for use later on. Occasionally, an item may be secured to the arm of the Easy Loader if ordered.

2.2 Items Shipped

Locate the following items inside the shipping container:

- TWCS testing unit
- Power adapter / Battery charger
- Three 8 ½" X 11" white envelopes:
 - 1 – User Manual
 - 2 – Packing List
 - 3 – Signed Calibration Report
- Optional equipment ordered
 - If the Easy Loader Attachment was ordered, it will be assembled and already connected to the testing unit (the pins that align the torque tool handle on the Easy Loader and the small actuator wheel are in a small box with the power adapter).
- Interchangeable torque cartridges (STWCS only)
 - Extra cartridges (if ordered) will be inside the shipping container in separate packaging and fastened to the bottom or inside of the container. Within its packaging will be the cartridge(s) attached by screws to a wood frame. The wood frame makes it easy to safely package and ship back to LSI for recalibration and also provides a convenient holder for the cartridge when not in use.
- Printer or larger equipment shipped separately

Check over the packing list and make sure all items listed were received. Keep items not needed right away in a safe place. The TWCS unit may now be plugged into an 110V power outlet using the adapter. Allow the battery to charge for eight hours before operating on its own. (Note: The STWCS and UTWCS both have the battery installed as a standard feature for portable use, an option on the TWCS.)

2.3 Installation

In choosing a location for the unit, a dry, non-humid, non-condensing environment, kept at room temperature 20° C ± 5° C (68° F ± 9° F) is suggested. This should be a location that also provides protection from debris or falling objects. Keep in mind accessibility to a printer and power outlet depending on your model's capabilities. When a relatively permanent location has been chosen, fasten securely to a flat, vibration-free surface using the mounting holes on the core unit. If vertical mounting is desired, the front panel will need to be unscrewed and carefully turned for upright reading of the display. There are wires attached to the circuit board on the back of the panel that need to stay in place. Screw the panel in place once turned. Then, mount vertically to a flat, vibration-free surface making sure the unit is level and perpendicularly positioned.

While mounting is not required with the Easy Loader assembly installed, securing the core unit is recommended to achieve consistent results. The core unit must be mounted horizontally in this case. When using the TWCS at different locations for operation on its battery (if applicable), continue to fasten it securely to a stable surface.

2.4 Using the Manual

2.4.1 Determine Model Being Used

TWCS: The software and instructions for this model are very different from the STWCS or UTWCS and are covered separately starting at section 3.

STWCS or UTWCS: While these models each possess different features, they do have identical control panels and the same underlying software. The two models are covered together starting at section 4 with any differences in procedure noted.

2.4.2 General Startup

Turn on the testing unit by pressing **[ON / CLEAR]**. Commands referring to the keypad will be shown in brackets **[]** throughout the manual. It is recommended to begin by getting to know the TWCS starting with its control panel and go to the section that pertains to the correct model. Familiarize yourself with how the buttons work. Then follow the procedure set forth in the section of the manual that is applicable.

2.4.3 STWCS / UTWCS Users

Immediate torque tool testing may be done right from the initial screen that displays after the machine is turned on without any further setup using the TWCS Calibration Test Procedure in section 3.3. Torque readings will display and can be stored for manual recording or printing. Press **[STORE]** to save and **[SEND]** to print. When performing torque tool tests in this way, the display does not guide the user through the test point adjustments and the results are printed as a list of readings that are not in a report or certificate format. Use the worksheet found in section 4.8 or 4.9 to record the data in an organized report format. Make copies of blank worksheets to keep on hand.

To perform torque tool testing to result in a concise calibration report summary or certificate, follow the Quick start procedure explained below or follow the instructions in section (4.7). Both describe data input procedures and torque tool testing that begins in the User Setup and Cal Certificate menus and allows creation of a customized report or certificate (Easy Cal Report).

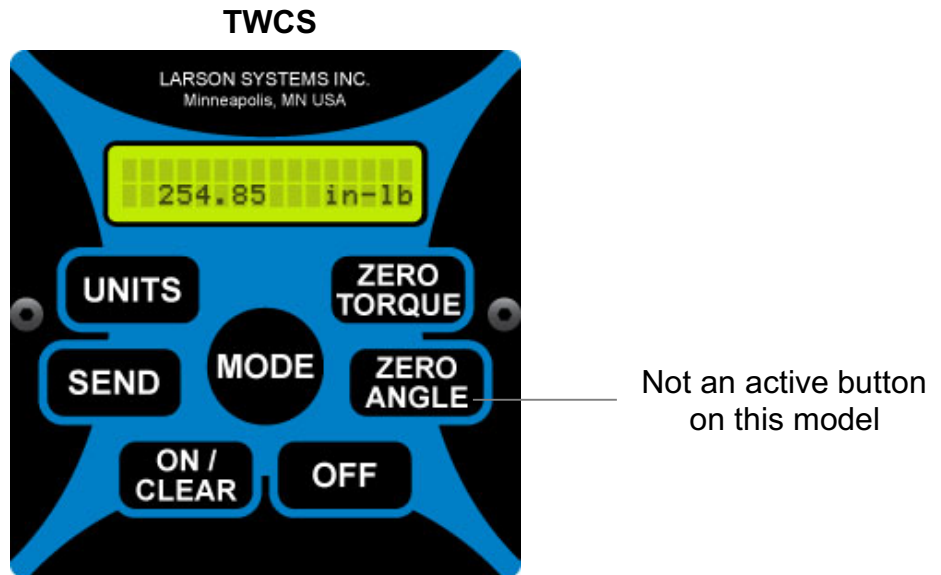
The STWCS and UTWCS user will find a Quick Start to Torque Tool Testing in section 4.5 for their unit that may be followed to get to the actual torque tool testing and print a calibration report or certificate without reading the entire manual. Although the Option Menu section (4.6) contains valuable information about menu navigation and functions, it is primarily designed to be informative rather than directional. Either choose to take the time to absorb all features and functions or start immediately with the Quick start instructions that refer to other sections of the manual as you go for direction.

Because the instructions for using the TWCS are less involved, a Quick Start section is not included for that model.

3 TWCS USER GUIDE

3.1 The Control Panel

Current Software PN 050-1000-0010-00M, Version 6.0 – 6.8.



Features Blue Splash Faceplate

[UNITS]

Use to choose unit of measurement between in-oz, in-lb, ft-lb, kg-mm, kg-cm, kg-M, dN-m, N-mm, and N-M. Must correspond to the unit convention of the tool being tested.

[MODE]

Use to select the test mode that applies to the tool being tested. The three modes available are: **Manual** for needle-indicating instruments, **Peak** for dial indicating or digital, and **First Peak** for click-type tools.

There is also a fourth mode, **Shunt**, for checking the calibration of the TWCS.

[ZERO TORQUE]

Zero out current torque reading before starting a new test.

[ZERO ANGLE]

Not an active button on this model.

[OFF]

Turns the TWCS off.

[ON / CLEAR]

Turns the TWCS on and resets Peak and First Peak modes.

[SEND]

Use when a printout of current reading displayed is needed and TWCS is equipped with RS232 capability. If not connected to a printer or not RS232 capable, "RS232 NOT READY" appears on the LED screen.

When connected for printing and **[SEND]** is pressed, the printout shows the single reading on the display (with a minus sign if performed counterclockwise) and the unit measurement used. A series of test point measurements can then be printed one at a time on the same page if desired for documentation.

3.2 Test Modes

Determine the test mode appropriate for the tool being tested. Choose between Manual, Peak, or First Peak modes. Select by pressing **[MODE]** on the control panel after turning on the machine. If unsure which test mode to use, refer to the chart in section 4.10 and the worksheets provided in section 4.8 and 4.9. Make extra copies of these worksheets ahead of time and keep on hand for future use. Keep in mind all readings for a single tool and series of test point measurements must be performed in the same mode.

3.2.1 Manual

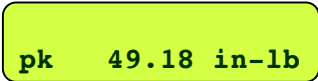
Manual mode is used with needle-indicating torque tools. When the force applied increases, the display dynamically updates to reflect the torque measurement. When the force decreases, the reading on the display will recede. Manually record the reading taken at the appropriate point during the test on the worksheet provided in section 4.8 or 4.9. If RS232 capable with a printer connected, **[SEND]** will forward the reading to be printed. In this way, a series of readings may be printed as each measurement is taken. Example of display when in Manual mode:



49.18 in-lb

3.2.2 Peak

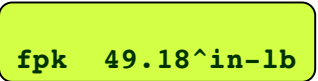
Peak mode is used with dial-indicating or digital torque tools. As the force applied to the tool increases, the display dynamically adjusts to reflect the torque measurement. If the torque subsides, the display locks at the highest reading captured. If a greater force is subsequently applied, the display will continue to adjust to a torque measurement that exceeds the previous reading but will not adjust to a lesser reading. Press **[SEND]** to print the reading displayed (if RS232 capable) or record manually using the worksheet provided in section 4.8 or 4.9. Press **[ON / CLEAR]** to reset Peak mode and begin a new measurement. **[ZERO TORQUE]** will zero out the last reading. Example of display when in Peak mode:



pk 49.18 in-lb

3.2.3 First Peak

First Peak mode is used with click-type torque tools. Again, the displayed reading dynamically adjusts to reflect the torque applied as it increases. But, when the torque decreases for an instant, the display stops at the highest reading and will no longer adjust. Press **[SEND]** to print the reading displayed (if RS232 capable) or record manually using the worksheet provided in section 4.8 or 4.9. Press **[ON / CLEAR]** to reset First Peak mode and begin a new measurement. As in Peak mode, **[ZERO TORQUE]** will zero out the last display reading. Example of display in First Peak mode:



fpk 49.18^in-lb

3.2.4 Shunt Calibration

This mode does not apply to the calibration of a torque tool, but to the calibration of the TWCS unit. The number displayed in this mode must equal or be relatively close to the number under Shunt Value shown “as left” on the Calibration Report received from LSI with your unit. Call LSI if numbers do not match. Example of display when checking the calibration of TWCS in Shunt mode:



shn 177.35 in-lb

3.3 TWCS Calibration Test Procedure

3.3.1 Prerequisites

A TWCS properly installed for testing torque instruments must be used. The torque cartridge capacity must be greater than the highest capacity torque tool that will be tested on it. If it is not, there is danger of overloading the torque cartridge.

3.3.2 Connect the Printer

If the TWCS is RS232 capable (optional) with a 25-pin connector on the back of unit, printing may be done on a parallel printer. Use an LSI RS232 interface cable to parallel adapter to enable this function. After connecting the cables, turn on the TWCS and printer.



3.3.3 Pre-Calibration Worksheet

Use the Calibration Data Template and/or Pre-Calibration Worksheet found in section 4.8 and 4.9, respectively, to determine classification options for torque tool testing, record test point data, and provide certification documentation. Keep copies of these forms on hand for future use. Refer to the chart in section 4.10 for information on Tool Types and Classes to complete the worksheets and select the correct test mode and acceptable tolerance. Use the information collected on the forms to complete the torque tool testing process and perform the correct number of test points and record the measurements of each. When determining tool type and class, look for how the tool adjusts. For example, does it operate with a graduated measurement scale or is it adjusted using a digital display?

3.3.4 Unit Selection

Press **[UNITS]** until the desired unit of measurement is displayed. Choose from in-oz, in-lb, ft-lb, N-m, dN-m, N-mm, kg-m, kg-cm, and kg-mm. The unit convention must match that of the torque tool.

3.3.5 Select Test Mode

Press **[MODE]** to select Manual, Peak, or First Peak mode. Refer to the Pre-Calibration worksheet and Tool Types and Classes chart in this manual for assistance. See section 3.2 for information on each test mode and its respective display data.

3.3.6 Exercise Torque Tool

Before actual testing, type 2 tools must be exercised at full capacity at least five times. The torque tool must turn in the direction being tested, and torque indication must be triggered (i.e., click-type wrenches must “click” five times). If the tool being tested is used both clockwise and counterclockwise, also test it both ways and be sure to note.

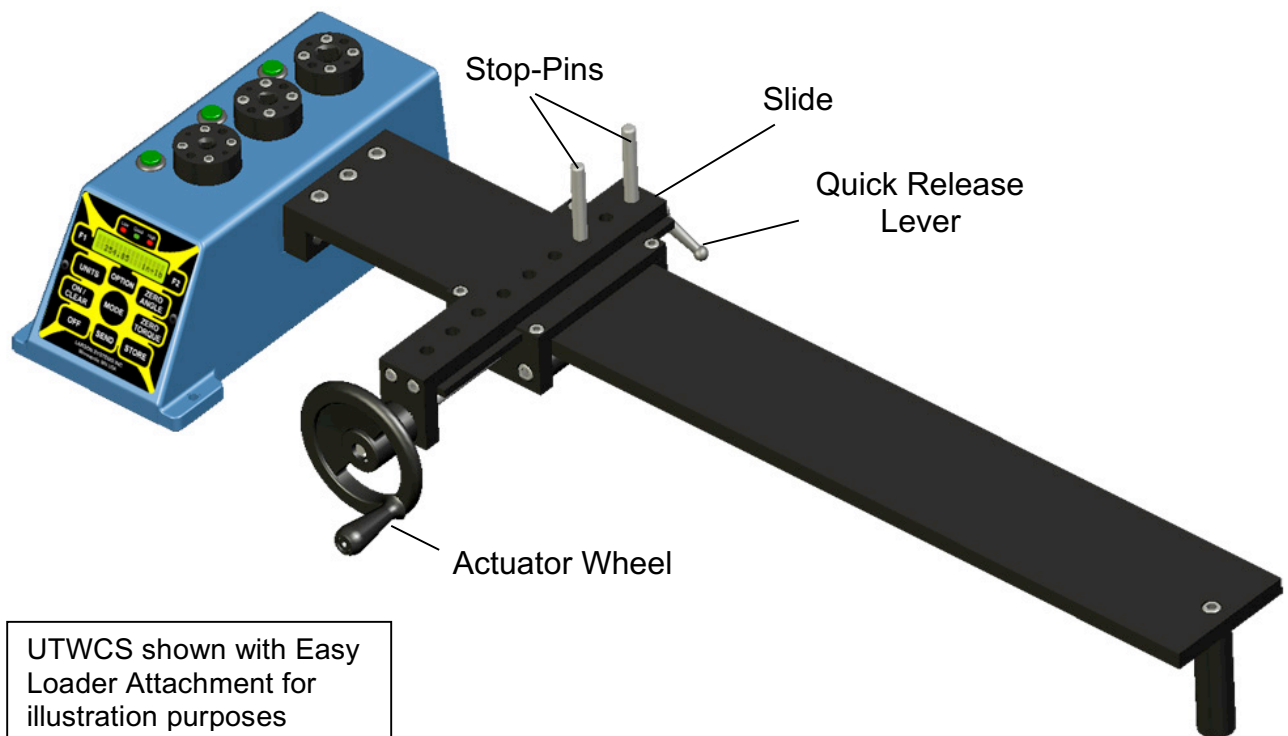
3.3.7 Zero Out Torque

Press **[ZERO TORQUE]** to clear the last torque reading before each new test.

3.3.8 Mount Torque Tool

Without Easy Loader Attachment installed: Adjust the torque tool to the test point mark to be measured and place the torque tool onto the TWCS. Its position should be level to the tester and centered. Make sure the display reads zero before testing.

With the Easy Loader Attachment installed: Adjust the tool to the test point mark to be measured and load the torque tool onto the TWCS with the arm of the wrench extending parallel to the Easy Loader Attachment. Loosen the quick-release lever and adjust the slide so the wrench handle is supported in the middle. Adjust the actuator wheel to give the maximum amount of travel in the direction of the test. Insert the stop-pins so the wrench is contained on both sides, and tighten the quick-release lever to hold the slide in place. The stop-pins should be on either side of the wrench handle such that when the tool reaches its click point, the stop-pins meet as close as possible in the middle of the handle. This center point on the tool handle is identified by a line or marking. The length of some torque tools will change after adjusting to the next test point mark and will require adjustment of the slide on the Easy Loader for proper positioning.



3.3.9 Test Torque Tool

Refer to the Force Application diagrams in section 5, Technique for Good Measurement, for recommended position and movement to use when testing. Record the test point reading, press **[ON / CLEAR]** and then **[ZERO TORQUE]**. Repeat the steps from 3.3.7 to 3.3.9 for the required number of times determined necessary for each test point. Do not record test point measurements that were not performed in accordance with recommended procedures – simply redo the test.

Note: As stated earlier, if the tool being tested is used both clockwise and counter-clockwise, it should be tested both ways. The calibration can be different in each direction depending on usage. Make sure documentation of calibration testing shows CW or CCW for the testing direction.

3.3.10 Print Test Point Data

At any time, when a test point measurement is displayed, the data can be sent to an attached printer (if RS232 capable) by pressing **[SEND]**. The reading displayed will be printed on one line along with the unit measurement. A single reading or series of individual readings may be printed to kept as a record for that tool.

3.3.11 Calibration Documentation

Using the Calibration Data Template in section 4.7, pass or fail for the torque tool tested can be documented. At the + 4% or 6% line, calculate what that would be for the test point in each column. On the next two lines for each column, fill in the high and low measurements taken. On the next line, calculate – 4% or 6% for the test point in each column. The high and low measurements should fall between the + and – numbers. If so, “Pass” or “OK” can be written in the appropriate columns. If not, write in “Fail.” The Calibration Data Template for the tool, should be filled out with a copy of the Calibration Report for the unit used for testing attached, or other supporting information and test point measurements taken.

4 STWCS / UTWCS USER GUIDE

4.1 The Control Panel

Current Software PN 050-1000-0005-00J, Version 4.22.



Features Yellow Splash Faceplate

[F1] [F2]

Make selections from LED display; enter data or navigate screen fields.

[UNITS]

Use to choose unit of measurement between in-oz, in-lb, ft-lb, g-mm, kg-mm, kg-cm, kg-M, N-mm, and N-M. Must correspond to the unit convention of the torque tool being tested.

Unit measurements not being used may be edited out of this menu through the User Setup menu. See section 4.6.5 (User Setup) and 4.6.5.4 (Units).

Performs reverse direction of [F1] when using Option menus.

[OPTION]

Initiates display menu system for entering settings and selecting functions. See Section 4.6 for more information.

[ZERO ANGLE]

Performs reverse direction of [F2] when using Option menus. (Angle function is not active.)

[ZERO TORQUE]

Zero out current torque reading before starting a new measurement.

[STORE]

Store up to 2,000 test points with built-in data log. The data can be later sent to a printer or computer via RS232 cable interface.

[SEND]

RS232 output can be enabled to send test point data to a printer.

Also used to back out of menu levels in the Option menus.

[OFF]

Turns the STWCS or UTWCS off.

[ON /CLEAR]

Turns the STWCS or UTWCS on and acts as an “enter” or “save settings” button in the Option menus. Also resets the Peak or First Peak mode.

Note: Lights at top of control panel are not functional on STWCS or UTWCS equipment.

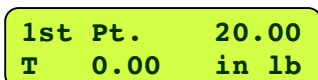
4.2 Test Modes

Determine the test mode appropriate for the tool being tested. Select the test mode by pressing **[MODE]** until desired mode is displayed. Each of the test modes and how they work are described below with display screens referenced. Mode can be selected and used at the initial screen after the machine is turned on, or in the Cal Certificate menu when Start is selected. (See section 4.6.1). If unsure what mode should be used for testing a particular torque tool, a tool classification chart is located in section 4.10. This chart is used in conjunction with the worksheets before it. Keep in mind that all readings for a single tool and series of test point measurements must be performed in the same mode.


4.2.1 Manual

Manual mode is used with needle-indicating torque tools. As the force applied to the tool increases, the display dynamically adjusts to reflect the amount of torque measured. When the force applied recedes, the reading will adjust downward. Because of the continual reading adjustment, the actual reading must be stored during the application of torque force. Press **[ZERO TORQUE]** between readings and remember to change the test point mark on the tool being tested when the test point changes. After all readings are stored for each test point, a report will be generated as output to a printer if specified to do so. Otherwise, press **[SEND]** to forward to the printer.

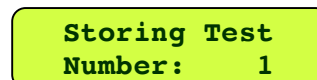
When in Manual mode from Cal Certificate menu and Start is selected, the LED screen will look like the first example below with the top line flashing between “1st Pt. 20.00” and “Test 1/05.” The “T” in the bottom left corner means the unit is in Manual mode. A reading is now ready to be taken for the first test point, at the 20 in-lb mark of tool capacity, and will be test number 1 of 5 to be taken. The second screen shows a test reading; pressing **[STORE]** as described above results in the third LED screen below stating the test number being stored.



1st Pt. 20.00
T 0.00 in lb

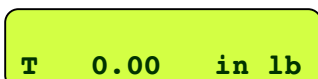


Test 1/05
T 49.85 in lb



Storing Test
Number: 1

Screen displayed when in Manual mode from initial screen and beginning testing after machine is turned on:



T 0.00 in lb

This screen does not show at what point the series of test point measurements is, but the display when storing the reading works the same. Readings stored here may be printed using **[SEND]** but will not be in a Calibration Report/Certificate format. Stored readings will not need to be cleared for each tool tested. The data logger will accept up to 1,800 test point readings when stored this way.

4.2.2 Peak

Peak mode is used with dial-indicating or digital torque tools. As the force applied to the tool increases, the display dynamically adjusts to reflect the torque measurement. If the force subsides, the display locks at the highest torque reading captured. If a greater force is subsequently applied, the measurement displayed will adjust to a torque measurement that exceeds the previous reading but will not adjust to a lesser reading. Press **[STORE]** to save reading. To reset the Peak mode display, press **[ON / CLEAR]**, then **[ZERO TORQUE]** to begin a new test point measurement.

After the specified number of test points has been stored, a calibration report will automatically print if specified to do so in the User Setup menu. Otherwise, press **[SEND]** to manually print.

When in Peak mode starting at the Cal Certificate menu and Start is selected, the LED screen will look like the first example below. The screen indicates reading 1 of 5 is ready to be taken at the 20 in-lb test point mark and the unit is in Peak mode. The reading will be viewable until stored following the directions above, then the second screen below appears stating which number of test is being stored.

1/05, 20.00
P 0.00 in lb

Storing Test
Number: 1

Screen display when in Peak mode from initial screen and beginning testing after machine is turned on:

P 0.00 in lb

This screen does not show at what point the series of test point measurements is, but the display when storing a reading works the same as above. Readings stored may be printed but will not be in a Calibration Report/Certificate format. Store up to 1,800 test point readings with the built-in data logger.

4.2.3 First Peak

First Peak is used with click-type torque tools. Much like Peak mode, First Peak dynamically adjusts the display to reflect the torque applied. When beginning at the Cal Certificate menu and Start is selected, as force is applied to the tool being tested and increases, the display moves through the first series of screens below. If the torque decreases for an instant, the display stops at the highest-read torque and indicates the test is finished. The reading can no longer be adjusted. Press **[STORE]** to save. To reset the First Peak mode display, press **[ON / CLEAR]**, then **[ZERO TORQUE]** to begin testing again. After the specified number of test points has been stored, a calibration report will automatically print if specified or press **[SEND]** to manually print.

1/05, 50.00
Pr 0.00 in lb

1/05, 50.00
Pm 24.40 in lb

1/05, 50.00
Pf 48.98 in lb

Screens displayed when in First Peak mode from initial screen and beginning testing after machine is turned on:

Ready
Pr 0.00 in lb

Measuring
Pm 24.40 in lb

Finished
Pf 48.98 in lb

The screens do not show at what point the series of test point measurements is, but the display when storing a reading works the same as above. Readings stored may be printed but will not be in a Calibration Report/Certificate format. Store up to 1,800 test point readings with the built-in data logger.

4.3 STWCS: Interchangeable Torque Cartridges

4.3.1 Lock / Test Position

An interchangeable cartridge with a collar around the top of the cylinder marked “Lock” in one direction and “Test” in the other should be turned to the locked position when not in use. A collar with the lock feature is standard on the lowest capacity load cell cartridges (3 in-lb, 25 in-lb) as they are extremely sensitive and may be easily damaged.

4.3.2 Changing Cartridges

Smart Torque Cartridges may be changed with the unit turned off or while in Option mode. There are four screws around the top of the cylinder of the cartridge that must be removed. After removing the screws, lift the entire cylinder that houses the load cell out, unplugging it from the STWCS. Take the new cartridge and set it inside the STWCS with the connector lined up from the bottom of cartridge to the inside of unit. Using gentle pressure, plug the cartridge in. The mounting holes on the outside of the cylinder should match up to the unit and screws used to secure the cartridge. Exit the Option mode or turn the STWCS on to begin testing.

4.3.3 Storing

Store any cartridge not in use in a safe place and left in the locked position (if applicable). The wood frame received with the extra cartridge(s) can serve as a holder to store the cartridge(s). Do not store a cartridge lying on its top or side. If shipping a cartridge back to LSI, screw it to the wood frame securely and turn to the locked position (if applicable) before packaging.



4.4 UTWCS: Load Cell Operation

4.4.1 Turn on the UTWCS

When the UTWCS is turned on, the LED will cycle through screens regarding the manufacturer, serial number, etc. and finally will show the load cell information with its capacity for the first location only. The corresponding button by that load cell will light up. This is the cell currently in use. Each time the machine is turned on it will default to the cell in the first position.

4.4.2 Switch Load Cells

To test with one of the other load cells, just push the corresponding button for that cell. The LED will indicate a switch is taking place and will note when the changeover is complete. In addition, the button pushed will light up next to the cell chosen. This process takes a few seconds. Switching between the cells is that simple. There is no information to enter into the UTWCS software regarding the load cells. That has been done at the factory. The machine will always know which load cell capacity is in use and will adjust the calibration each time the load cell is switched.

4.5 Quick Start to Torque Tool Testing

This section of the User Manual is designed to fast track the user to performing torque tool calibration testing resulting in a customized **Calibration Report or Certificate**. To start torque tool testing right away without generating a specific report, just turn the machine on and follow the TWCS instructions in section 3.3. If preferred, read through the manual and use the Calibration Assistant procedure for torque tool testing starting at section 4.7.

4.5.1 Turn on STWCS / UTWCS

Press **[ON / CLEAR]** to start. The LED display cycles through various screens listing manufacturer, serial number, load cell data or torque cartridge information, current testing mode, etc. until it stops at a blank test screen. However, it is not yet ready for torque tool calibration testing. Refer to the beginning of section 4.6 for helpful guidance in navigating the Option menus referenced in this section.

4.5.2 User Setup

Complete the User Setup process described in section 4.6.5. Press **[OPTION]** until the User Setup menu shown is displayed. Enter printing parameters, time and date, company information, backlight timer preference, direction of test, and other settings. Enter each item as instructed up to section 4.6.6.

4.5.3 Cal Check

This verifies the shunt calibration of the STWCS / UTWCS and is a procedure that should be done regularly, whether daily or before each use according to your company policy. Press **[OPTION]** to find this menu and follow the instructions in section 4.6.4.

4.5.4 Calibration Assistant

Go to section 4.7 - Calibration Assistant and follow the instructions. This leads through the entire calibration procedure, including any setup and preparation, the actual testing of the torque tool, and printing out a customized calibration certificate (“Easy Cal Report”).

4.5.5 Going Forward

Please read through entire User Manual. There is detailed information regarding other functions, care and maintenance, techniques for achieving reliable readings, etc. Please contact LSI with any questions.

4.6 The Option Menus

Press **[OPTION]** on the control panel to display the first of several Option menus. Scroll through each menu by continuing to press **[OPTION]**. General information about each of these menus is described in order of appearance in this section. Navigate the Option menus using the following commands:

[OPTION] starts the main menu and is used to scroll through the menu items

[MODE] scrolls in reverse through the menu items

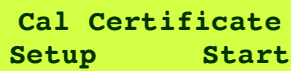
[F1] and **[F2]** are used to make selections and also to navigate and enter data

[SEND] backs out of menu levels to the main menu

[UNITS] does the reverse of **[F1]** when entering numbers or letters in a field

[ZERO ANGLE] does the reverse of **[F2]** when entering numbers or letters in a field

4.6.1 Cal Certificate: Setup / Start



Cal Certificate
Setup Start

Setup

Press **[F1]** to begin entering test point calibration specifications. Enter each setting desired using **[F1]** and **[F2]**. Press **[OPTION]** to advance to the next setting. Enter new settings each time another type or class of tool is being tested. The settings are described in detail starting at section 4.7.8 - Setup Calibration Procedure. When all calibration settings have been entered, press **[SEND]** to save setup and continue, or press **[OPTION]** to scroll through the items again.

Start

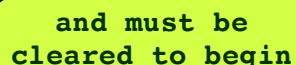
Select **Start [F2]** to begin the tool testing procedure. Press **[ZERO TORQUE]** to clear out any prior reading. Then, test the torque tool. (See Section 5 -Technique for Good Measurement). If the test was not performed correctly, press **[ZERO TORQUE]** or **[ON / CLEAR]** to start over. When satisfied with the reading, press **[STORE]** to record. Follow the steps outlined in sections 4.7.12 - 4.7.14 and repeat this testing procedure the number of times specified for each test point.

If, in the middle of the testing procedure a button is pushed to take the machine out of testing mode before all tests are completed, press **[ON / CLEAR]** to return to and continue testing. If attempting to scroll back to continue the testing procedure by pressing **[OPTION]**, the display will read **Abort** in place of **Start** at the Cal Certificate menu. Press **[ON / CLEAR]** to continue testing or **Abort [F2]** to quit.

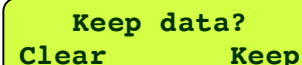
Note: If **Start** is selected and memory is being used, the display will stream as shown below. From the last screen, choose **[F1]** to clear all test points stored in memory or **[F2]** to keep all data in storage. When done with data stored, clear memory to start a new series of test points.



Store Memory is
being used



and must be
cleared to begin



Keep data?
Clear Keep

4.6.2 Option: Store / EndPrint

Option
Store EndPrint

Store

From this selection, view stored test point data, clear a single test point from memory, or clear all test points from memory. Scroll through test points using [F1] or [F2]. To select a test point as in the first example below, press [OPTION]. The display will read like the second example below. Press [F1] to clear that test point or press [OPTION] again and the third example below will be displayed. Here, press [F1] to clear all test points from memory or [OPTION] to return to the test point reading. Unless [F1] is used to clear any test points, they will be saved.

10 n/a deg
- 15.16 in+

Clear Mem 10
Now

Clear All Memory
Now

EndPrint

This selection ends the printout in progress and prints out the statistical summary.

4.6.3 Option: Offset / Power

Option
Offset Power

Tor. Off.(in lb)
nxt 000.00 +

Offset

A torque offset may be entered using this selection [F1]. This means when [ZERO TORQUE] is pressed, the torque displayed will adjust to the offset specified as opposed to zero. To do this, press [OPTION] until display reads **Tor. Off.** Advance the cursor in the field underlined above using [F1] or [UNITS] to backspace. Change the values using [F2] or [ZERO ANGLE]. When finished, press [ON / CLEAR] to accept and exit or [SEND] to return to the previous menu. The angle offset is not active for TWCS models and should be ignored.

Power

This option has only two choices. They are **Stay On** [F1] or **Off** [F2].

4.6.4 Option: Cal check

Option
Cal Check

Select Shunt
Load Cell Panel

S -172.96 in lb
T -172.96 in lb

Cal Check

Use this function to check the shunt calibration number. This can be done as often as daily or before each use. It is recommended to follow your company policy for determining frequency of calibration verification. When **Cal Check** is selected using [F1], the options displayed are **Load Cell** or **Panel**. Press [F1] to choose **Load Cell** and two numbers will display following instruction cues. The numbers should be negative and match or be relatively close to each other as shown in the third LED example above. The top number is the shunt calibration reading established at the factory during calibration and recorded in memory. To exit when finished comparing the numbers, press [ON / CLEAR]. If the numbers do not closely match, call LSI.

4.6.5 Option: User Setup

Option
User Setup

Enter Passcode
or press Option

User Setup

To enter the main **User Setup** menu press **[F1]**. The display will ask for a pass code or press **[OPTION]** to continue to the next Option menu. To enter pass code, press **[UNITS]**, **[SEND]**, and **[F1]** in sequence.

There are several submenus for entering printing parameters, time and date, company information, backlight timer preference, direction of testing, etc. Press **[OPTION]** to move to each menu.

4.6.5.1 User Setup: RS232 / Power

User Setup
RS232 Power

RS232

By selecting **RS232 [F1]**, the communication can be set up to send raw data or a report to equipment such as a data logger or printer. The following is a list of data format options to be defined within the RS232 menu before data can be sent and printed. Next to each item in the first column are the choices available. Use **[F1]** or **[F2]** to select or scroll to the choice desired. Press **[OPTION]** to move to the next item once selection or input has been made.

Output Format:	Report	Data
Print Report:	Yes	No
Print Out Format:	Standard	Full Stats
Printer Format:	Print Heading	No Heading
Printer Format:	Print Summary	No Summary
Printer ch, width	80, Single	80, Double
Printer Protocol*	Hardware, None, Delay .01 sec, Delay .025 sec, Delay .05 sec	
Printer Baud Rate*	9600, 19200, 1200, 2400, 4800	
Paper Type	Plain Paper	Roll Feed
Lines per Page	[F1] advance to next digit [F2] increment digit	
Dbl Wdth On/Off	OkI – 1F/1E, Epson – OE/14, Other	
Define Dbl Wdth	On Str	Off Str
	[F1] advance to next digit [F2] increment digit	
Define in	Decimal	Hex
	[F1] advance to next digit [F2] increment digit	

*Factory setup for Printer Protocol is Hardware; for Printer Baud Rate, 9600.

When finished, press **[ON / CLEAR]** to accept.

Power Time-out
next 00:00 +

Power

Select **Power [F2]** to set or turn off the timer for auto shut-off feature. The timer is displayed in HH:MM format and starts each time a button is pressed. When the machine is idle for the time set, it will turn off automatically. To set the timer, move the cursor **[F1]** to the field to be modified (underlined in LED example above) and use **[F2]** to change each value. Enter 99:99 to turn off the Power Time-out feature. When finished, press **[SEND]** to save and return to the previous menu. Press **[OPTION]** to move to the next User Setup menu.

4.6.5.2 User Setup: Dampening / Date and Time

User Setup
Dampening Date

Peak Dampening
- None +

Dampening

Press **[F1]** to choose **Dampening**. This feature is used to provide varied levels of noise reduction or dampening that may contribute to false readings when testing. Dampening averages the force measurements to eliminate the noise in the display caused by vibration. Because the dampening feature slows the measurement process it is recommended the dampening be set at the minimum level necessary to achieve a stable, readable display. Use **[F1]** or **[F2]** to select between None, Low, Medium, and High. Press **[SEND]** to save and return to the menu where **Date** may be selected.

User Setup
Dampening Date

Date Format
- MM/DD/YY +

MM:DD:YY
Next 02 01 07 +

Date

Choose **Date [F2]** from the first menu above and the next menu shown will appear. Scroll through the three format choices using **[F1]** or **[F2]**. Press **[OPTION]** to select when the desired format is displayed. Enter the correct date using **[F1]** to advance cursor to the next digit field and **[F2]** to increase digit value. When finished, press **[OPTION]** to advance to the **Time** setting menu.

Time Format
- 12 Hour a/pm +

Time Format
- 24 Hour +

View the two format choices above using **[F1]** or **[F2]**. Press **[OPTION]** to select the format displayed. Enter the current time in the corresponding screen shown below in the underlined fields. Use **[F1]** to advance to next digit field and **[F2]** to increase digit value.

HH:MM a/pm
next 12:19 p +

HH:MM
next 12:19 +

Press **[OPTION]** to review the Date and Time entries or **[SEND]** to save and return to the previous menu. Press **[OPTION]** to continue to next menu item.

4.6.5.3 User Setup: Company / City

User Setup
Company City

Company Name 1/4
next _____ +

City Name 1/4
next _____ +

Company/City

Choose **[F1]** to enter your **Company** name, **[F2]** to enter your **City**. In the corresponding screens above where underlined, enter the first letter or digit in field using **[F2]** or **[ZERO ANGLE]**. Advance to next character using **[F1]** or go back a field using **[UNITS]** to edit. There are eight characters on each of four possible screen lines. Advance to the next line if needed

using [OPTION]. Review the entries using [OPTION] or when done press [SEND] to save and return to the previous menu. Press [OPTION] to continue to next item.

4.6.5.4 User Setup: Backlight / Units

User Setup
Backlight Units

Light Time-out
Next 00:00 +

Sleeping, press
a key to wake up

Backlight

Choose **Backlight [F1]** to enter Backlight Time-out setting in HH:MM format. Advance between the digit fields underlined above using [F1] and [UNITS]. Adjust digit values using [F2] and [ZERO ANGLE]. When finished, press [SEND] to save and return to the previous menu. If tester is not used for the amount of time entered, it will go to sleep. The display will read like the third LED sample above, except the backlight will be dark. Enter 99:99 to turn off Backlight Time-out feature.

Units

Choose **Units [F2]** to remove any unit measurements that will not be needed from the [UNITS] selection menu.

Units Used
- in lb used +

Units Used
-No in lb units+

Scroll through unit measurements using [OPTION]. Units listed will show as used if included as a menu selection. See first display example above. When removed – [F1], units will be listed as not available as in the next display example. If a unit has been removed, it may be added back at any time through this User Setup menu by pressing + [F2] when unit needed is displayed. When done, press [SEND] to save and return to the previous menu. Press [OPTION] to continue to next User Setup menu item.

4.6.5.5 User Setup: 1st Peak / Filter

1st Peak

Choose [F1] to enter First Peak Drop value. This value is used in the calibration testing of click-type torque tools. Enter the desired value in the fields shown underlined above using [F1] and [F2]. Press [SEND] to save and return to the previous menu. Press [OPTION] to continue to next menu item.

User Setup
1st Peak Filter

First Peak Drop
nxt 50x0.020000+

When testing a click-type torque tool the force applied increases over time; however, just before the “click,” the force applied decreases and a reading is measured. This point between the highest force applied and the measurement read is the **First Peak Drop**. The value shown in the second LED example above compensates for the reduced force just before the reading. The value of 50 is the default fixed at the factory and has been found to be the most reliable for achieving accurate results. If the tester is capturing the force too late, the first peak drop may need to be set at a smaller value.

User Setup
1st Peak Filter

Filtering
- None +

Display Filter
- Yes +

Filter

Filtering is the first submenu under **Filter [F2]**. Using [F1] or [F2] choose between None, Low, Medium, High, User #1, User #2, User #3, and User #4. Once the desired selection is displayed, press [OPTION]. Toggle between **Yes** and **No** using [F1] or [F2] to display filter. Press [OPTION] to select. The next four submenus are accessed using the [OPTION] key after each. The directions follow on the next page along with filtering information.

Dampening (Kd)

Enter % value using [F1] and [F2]

Dampen Min (M) Enter % value using [F1] and [F2]
Decay Rate (C) Enter % value using [F1] and [F2]
Recovery (R) Enter value using [F1] and [F2]

To review entries made under **Filtering** press [OPTION]. Press [SEND] to save and return to the previous menu. Press [OPTION] to continue to next User Setup menu item.

During normal operation, the display shows some number of discrete force values every second. These values can be thought of as the value being displayed and the next value to be displayed. When the two values are subtracted from each other, the result is an error. Filtering works by multiplying this error by a percentage and then adding that partial error to the displayed value and displaying that as the new value. The percentage that the error is multiplied by is **Kd**. **Kd** changes over time. While the force is stable, **Kd** decreases from the **Kd** entered in the User Setup menu to the **Dampen Min (M)** value at a rate defined by the **Decay Rate (C)**. The **Recovery (R)** value is used to increase **Kd** when the force starts to change based on duration and amount of change. The **Kd** value will be shown as it changes over time when **Display Filter** is chosen.

4.6.5.6 User Setup: +/- Rule

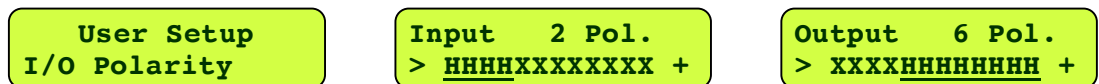


+ / - Rule

Choose **+/- Rule** using [F1]. Go to **+/- Torque Rule** using [OPTION]. (Angle Rule not active on this model.) Select **CW Positive** or **CCW Positive** using [F1] or [F2]. CW = Clockwise, CCW = Counterclockwise. This corresponds to the direction the tool is being tested on the unit and displays the readings taken in the direction selected as positive numbers. This setting may need to be changed frequently.

When performing tests to result in a Calibration Certificate for signature, it is important that the readings are positive numbers. If performing the test in Clockwise direction, choose CW Positive - Counterclockwise, CCW positive. If negative readings are recorded, the Calibration Certificate will always produce a FAIL test for the torque tool. When done, press [SEND] to return to the previous menu. Press [SEND] again to return to the **User Setup** main menu.

4.6.5.7 User Setup: I / O Polarity



I / O Polarity

The **I / O Polarity** menu accesses a setup feature for users who need to use the external inputs and outputs on the tester with certain auxiliary equipment. To select, press [F1] and the second display example shown above appears. Press [F1] to advance through the "H" fields underlined. Press [F2] to change any "H" to "L". These 4 fields represent polarities of 2, 3, 4 and 5, respectively, from left to right and define the active voltage level for those polarities as high or low. Press [OPTION] to advance to the third display example shown above. This screen operates the same: Press [F1] to advance through the "H" fields underlined and press [F2] to change any "H" to "L". These eight fields represent polarities of 6, 7, 8, 9, 10, 11, 12 and 13 from left to right.

This menu feature is not commonly used. Users wanting to use this feature should contact LSI for further instruction.

4.6.5.8 User Setup: Cal. Info

Cal. Info

User Setup
Cal. Info

Use this menu to enter calibration information. This will store the name of the company that performed the last calibration of the tester, the calibrating company's phone number, when calibration was done, and when the tester is due for its next calibration. A new tester will show Larson Systems Inc information.

The display screens below show the 10 data entry screens available for tester calibration information. There are eight fields or characters that may be entered on each screen in the underlined areas as shown. Navigate to each character field by pressing [F1] and backup using [UNITS]. Press [F2] to advance through and make selections from the alphabet in lower case, characters, numerals, spaces, and the alphabet in upper case. To navigate through selections in reverse, press [ZERO ANGLE]. Once finished with a single screen, advance to the next screen by pressing [OPTION]. To go back to a screen, press [MODE].

The first four screens are used to enter the name of the calibrating company:

Calibrated by 1 next Larson S + Calibrated by 2 next ystems I + Calibrated by 3 next nc. + Calibrated by 4 next _____ +

The next four represent the calibrating company's phone number.

Phone Number 1/4 next 763-780- + Phone Number 2/4 next 2131 + Phone Number 3/4 next _____ + Phone Number 4/4 next _____ +
Date Calibrated nxt 04 17 07 + Calibration Due nxt 04 17 08 +

The last two screens are for the date calibrated and the date recalibration is due.

This information will appear on the Report of Calibration certificate generated for a torque tool being tested.

4.6.6 Option: Diagnostic

This function allows user to troubleshoot the tester and print out reports that may be helpful in diagnosing a problem. Press [F1] to choose. Move through each diagnostic category by pressing [OPTION].

Option
Diagnostic

4.6.6.1 View Batt Volts

Choose to view the battery volts using [F1] or [F2]. The best operating voltage is 6.2 to 7.0 volts. Press [OPTION] to continue.

View Batt Volts
- Yes +

View Batt Volts
- No +

4.6.6.2 Keypad Check

Perf Keypad Chk
Now

Press Clear to
exit Keypad Chk

Press any key

Press [F1] to check the keypad. The next screen above will flash and stop at "Press any key." Check the keys by pressing each one and leave [ON / CLEAR] till last to exit. As each key is

pressed the display should show its name – if not, the keypad is not functioning properly. After exiting, press **[OPTION]** to go to next diagnostic menu.

4.6.6.3 Screen Check

Press **[F1]** to check the LED screen. The next screen above will flash and the LED cursor will start to cycle through each of the fields. When satisfied that each field is operating correctly, press **[ON / CLEAR]** to exit, and then **[OPTION]** to go to next diagnostic menu.

Perf Screen Chck
Now

Press Clear to
exit Screen Chck

4.6.6.4 Output Diag Test

Using **[F1]**, scroll through the numbers 1,2,3, or 4 and make selection. **[F2]** toggles between on and off. Press **[OPTION]** to go to next diagnostic menu. The standard tester does not include the outputs affected by these selections.

Output Diag Test
nxt 1 off tgl

4.6.6.5 RS232 Protocols

No selection needed. Information only listing the fixed protocols set at the factory.

RS232 Protocols
9600, Hardware

4.6.6.6 RS232 – Report On

No selection needed. Information only.

RS232-Report On
Heading Summary

4.6.6.7 Check RS232 Port

Perf RS232 Check
Now

Trying to send
info with RS232

RS232 Port Sent
info OK

Press **[F1]** to check the RS232 Port connection. If printer is not connected, a loop back device may be attached to perform the check. When the check is performed, “Greetings User” will appear on the display. If connected to a printer and the RS232 port checks out, a printout is generated. “Greetings user. The RS232 port is working OK. Have a nice day.”

4.6.6.8 Display Processor Data

No selection needed. Information only.

16MHz processor
with 64Kb RAM

4.6.6.9 Display Load Cell Data

Using **[F1]** and **[F2]** scroll through the 16 possible locations for any Load Cell

SMC1 200.01b
- SN 11093-04 +

SMC1 200.01b
- SN 11093-04 +

assigned to the tester and also show the attached cell. When the display shows SMC“X,” it is showing the connected cell’s location in memory.

4.6.6.10 Print Cell Info

On STWCS, up to 16 load cells can be assigned to a tester in locations numbered from 1 to 16. Data about each load cell can be printed individually **[F1]** or collectively **[F2]**.

Print Cell Info
One All

4.6.6.11 Print All E2 Mem

Choosing **[F1]** will print out specifications currently saved in memory from User Setup and Calibration Setup menus.

Print All E2 Mem
Now

4.6.7 Option: Calib Menus

Calib Menus

Set by LSI or authorized calibration house or personnel.
Accessed by pass code.

Option
Calib Menus

4.6.8 Option: Factory Setup

Factory Setup

Used only by LSI.

Option
Factory Setup

4.7 Calibration Assistant

4.7.1 User Setup Menu

If preferences and information have already been entered following the directions in section 4.6.5, continue to the next step in section 4.7.2. Otherwise, press **[OPTION]** to scroll to the User Setup menu and follow the directions under Option Menus in section 4.6.5. Press **[F1]** to begin. Enter each item as instructed up to section 4.6.6. Then return to the test procedure that follows at section 4.7.2.

4.7.2 Test Procedure

The steps that follow represent the procedure recommended for testing torque wrenches per ISO standard 6789:2003(E). Section 4 of this standard highlights accuracy testing. Obtaining a copy for reference is suggested.

4.7.3 Prerequisites

An STWCS or UTWCS for testing torque instruments must be used. The torque cartridge capacity must be greater than the highest capacity torque tool that will be tested on it. If it is not, there is danger of overloading the torque cartridge. To run the calibration procedure and generate a calibration printout, a printer must be connected.

4.7.4 Connect the Printer

Printing can be done on any printer with a parallel port. However, an LSI RS232 interface cable to Parallel Adapter (025-0000-0458-00) must be used. Turn on printer and STWCS/UTWCS after connecting the cables.



4.7.5 Pre-Calibration Worksheet

Make copies of the worksheets found in sections 4.8 or 4.9 of this manual to keep on hand for future use. Fill out either worksheet to prepare for each series of test point measurements by selecting parameters for the particular tool being tested and to customize the resulting Calibration Report. Doing so ahead of time will make entering the data into the machine much faster and easier. When determining tool type and class, look for how the tool adjusts. For example, does it operate with a graduated measurement scale or is it adjusted using a digital display?

4.7.6 Select Unit Type

Press **[UNITS]** and choose from in-lb, ft-lb, in-oz, kg-cm, kg-M, kg-mm, g-mm, N-mm, or N-M. The unit convention must match that of the torque tool.

4.7.7 **Direction for Testing: +/- Rule**

In order to generate positive results for Certificate purposes, the direction of the test needs to be selected. Choose CW (clockwise) or CCW (counterclockwise) under the User Setup menu. See section 4.6.5.6 (+/- Rule).

4.7.8 **Setup Calibration Procedure**

Press **[OPTION]** then **[F1]** for the setup function. (See section 4.6.1) Use the Pre-Calibration Worksheet completed to enter the settings that follow:

4.7.8.1 **Torque Tool Capacity**

Enter the full capacity of the torque tool under **Wrench Cap** using **[F1]** and **[F2]**. When finished, press **[OPTION]** for the next setting. The following commands are used to navigate:

[F1] = Go to next space

[F2] = Increase digit

[UNITS] = Backspace

[ZERO ANGLE] = Decrease digit

[OPTION] = Next setting

[MODE] = Previous setting

4.7.8.2 **Number of Measuring Points**

Select the number of measuring points using **[F1]** or **[F2]** (choices range from 1 - 10). The number should be a minimum of 3. The point of measurement will then be automatically calculated for you. This is the mark the tool should be adjusted to for testing.

For example, if the tool has a capacity of 200 in-lb and 4 measuring points is selected, the marks to measure will be divided evenly at: 50 in-lb, 100 in-lb, 150 in-lb, and 200 in-lb. Press **[OPTION]** to continue.

4.7.8.3 **Verify Measuring Points**

Verify that the measuring points are at the desired values. The First Point, Second Point, and Third Point settings, etc., will display by pressing **[OPTION]** for each and may be adjusted by choosing a different number of measuring points. When finished, press **[OPTION]** to continue.

4.7.8.4 **Tests Per Point**

Select the number of tests (repetitions) per measuring point using **[F1]** or **[F2]**. Choices range from 1 to 10 and should normally be entered as 5 or 10, depending on the type and class of the torque tool as determined in the tool classification section on the Pre-Calibration Worksheet used. When finished, press **[OPTION]** to continue.

4.7.8.5 **Tolerance**

Enter the tolerance percentage of the tests to be performed using **[F1]** and **[F2]**. This number should be 4% or 6%, depending on the type and class of your torque tool. A chart of tool types and classes with tolerances is shown under section 4.10 of this manual. This is the tolerance for deviation from an exact reading. When finished, press **[OPTION]** to continue.

4.7.8.6 **Calibration Interval**

Enter the calibration interval (in months) using **[F1]** and **[F2]**. This is the length of time between calibrations that the torque tool is deemed within its specifications and good. The suggested interval is 12 months but may vary with frequency of use and quality of the torque tool.

To scroll through and review the setup parameters entered, press **[OPTION]**. When finished, press **[SEND]** to save setup and return to the **Cal Certificate** menu to start torque tool testing or press **[ON / CLEAR]** to save and exit out of the menu program.

4.7.9 Start Calibration Procedure

Once the Cal Certificate Setup menu is completed, testing can begin on the torque tool. At the **Cal Certificate** menu select **Start [F2]**. It is recommended that a few preliminary tests be done to warm up the tester and promote consistent results. Be sure to clear out any readings captured before starting the calibration procedure.

Stored memory may need to be cleared to begin testing. The LED screen will prompt clearing memory if needed. Follow the instructions displayed and make the selection to **Clear [F1]** or **Keep [F2]** data. **Clear [F1]** must be selected to start a new set of tests.

4.7.10 Select Test Mode

Use **[MODE]** to select from the three available test modes. Choose between **Manual Mode**, **Peak Mode**, and **First Peak Mode**, depending on the type and class of the torque tool. Refer to the Pre-Calibration Worksheet for this information. The test modes and how they work are described in section 4.2.

4.7.11 Exercise Torque Tool

Before testing, type 2 tools must be exercised at full capacity at least five times. The torque tool must turn in the direction being tested, and torque indication must be triggered (i.e., click-type wrenches must “click” five times).

4.7.12 Zero Torque

Always press **[ZERO TORQUE]** to clear the last torque reading before each new test.

4.7.13 Mount Torque Tool

Without Easy Loader attachment installed: Adjust the torque tool to the test point being measured and place the torque tool onto the STWCS or UTWCS. Then, go to section 4.7.14. When the required number of measurements is completed for a test point, adjust the tool to the next test point setting or mark.

With the Easy Loader Attachment installed: Adjust the tool to the appropriate test point mark and place onto the STWCS / UTWCS with the arm of the wrench extending parallel to the Easy Loader Attachment. Loosen the quick-release lever and adjust the slide so the wrench handle is supported in the middle. Then adjust the actuator wheel to give the maximum amount of travel in the direction of the test. Insert the stop-pins so the wrench is contained on both sides, and tighten the quick release lever to hold the slide in place. The stop-pins should be located on either side of the wrench handle such that when the tool reaches its “click point” the stop-pins meet as close as possible in the middle of the handle of the torque tool. This center point on the tool handle is identified by a line or marking. The length of a wrench may change when changing test point marks and will require readjusting the slide to the center mark of the handle. See diagram of Easy Loader in section 3.3.8.

4.7.14 Test Torque Tool

Refer to the Force Application diagrams in section 5 Technique for Good Measurement for the correct ways to test single arm torque tools. Using the Easy Loader attachment, turn the actuator wheel so the wrench is moved in desired direction for testing. To start test over, press **[ON / CLEAR]**. If satisfied that the test was performed correctly, press

[STORE]. Repeat steps 4.7.11 – 4.7.13 the number times required for the test points that was specified in the setup procedure. Remember to adjust the tool to the correct mark for each test point. (See section 4.6.1 - Cal Certificate for additional test procedure information.)

Note: To achieve reliable results consistently, there are controlling factors to be considered and adjusted if needed. The actual performance of each test is key and requires consistent movement of the torque wrench by the user. For this reason, the Easy Loader Attachment is recommended so testing is consistent no matter who the operator is. There are also software settings regarding filtering and dampening that may contribute to the quality of the test results. See section 5 - Technique for Good Measurement.

4.7.15 Print Calibration Certificate

Upon completion of the last test point when all readings specified have been taken, the STWCS / UTWCS can automatically generate a printed calibration certificate. All readings must be within the specified tolerances to conform to ISO 6789:1992 (E).

Your Company Name
Anytown, USA
Report of Calibration

Wrench Type : _____ Serial # : _____
Temperature : _____ Humidity : _____
Performed By : _____
Final Approval : _____
Date : 08/06/07
Time : 04:01:23 pm
Recalibration Date : 08/05/08
Calibration Interval : 12 months

Certified Calibration Equipment Used :
Device : Larson Systems Inc. Super Torque Wrench Calibration System
Device Serial Number : 1234567890
Torque Cartridge : 200.00 in lb
Cart. Serial Number : 200-1
Calibrated By : Your Company Name
Phone Number : 888-555-1212
Date Calibrated : 05/09/07
Recalibration Date : 05/09/08

Testing Procedure :
Wrench Capacity : 200.00 in lb
Number of Measuring Points : 3
Number of Tests per Point : 5
Wrench Tolerance : 4 %
Testing Performed in : First Peak Mode

This is to certify that the torque assembly tool accompanied by this document has been calibrated to Standards traceable to the National Institute of Standards (N.I.S.T.). Calibration performed in accordance to ISO 6789:2003(E).

Calibration Data :

Measuring Points	40.00 (in lb)	120.00 (in lb)	200.00 (in lb)
Test			
1	36.46	122.48	198.34
2	36.96	120.36	197.34
3	36.08	118.00	198.46
4	37.10	117.28	201.48
5	37.24	118.60	200.98
+ 4% High	41.60	124.80	208.00
Low	37.24	122.48	201.48
- 4%	36.08	117.28	197.34
In Tol.	38.40 FAIL	115.20 OK	192.00 OK

4.8 Calibration Data Template

REPORT OF CALIBRATION

Name and Location: _____
 Wrench Type: _____
 Serial Number: _____
 Performed By: _____

Date: _____ Time: _____
 Temperature: _____ Humidity _____
 Recalibration Date: _____
 Calibration Interval: _____ Months

Wrench Capacity: _____
 Number of Measuring Points: _____
 Number of Test Per Point: _____
 Wrench Tolerance: _____

Testing Mode: Manual Peak First Peak (Circle One)

Counter Clockwise Torque (CCW): _____ Clockwise Torque (CW): _____

Measuring Points				
Units				
Test				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
+ 4% or 6%				
High				
Low				
- 4% or 6%				
OK / FAIL				

This is to certify that the torque assembly tool accompanied by this document has been calibrated to Standards traceable to the National Institute of Standards (N.I.S.T.). Calibration performed in accordance to ISO 6789:2003(E).

Final Approval: _____

4.9 Torque Tool Pre-Calibration Worksheet

1 Units		
in-oz	g-mm	kg-M
in-lb	kg-mm	N-mm
ft-lb	kg-cm	N-M

2 + / - Rule
 CCW _____ CW _____

3 Capacity _____

4 Measuring Points
 Number of Measuring Points: _____ %

1 _____ %	1 _____ %	1 _____ %	1 _____ %
2 _____	2 _____	2 _____	2 _____
3 _____	3 _____	3 _____	3 _____
4 _____	4 _____	4 _____	4 _____
5 _____	5 _____	5 _____	5 _____
6 _____	6 _____	6 _____	6 _____
7 _____	7 _____	7 _____	7 _____
8 _____	8 _____	8 _____	8 _____
9 _____	9 _____	9 _____	9 _____
10 _____	10 _____	10 _____	10 _____

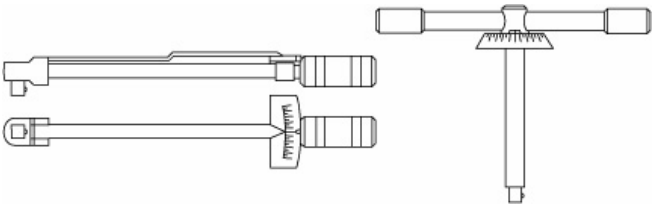
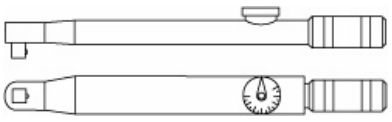
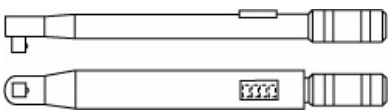
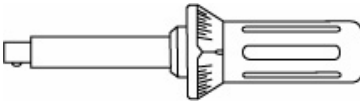
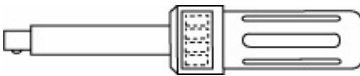

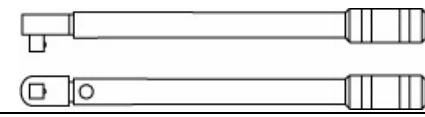
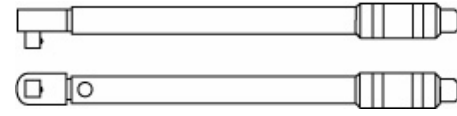


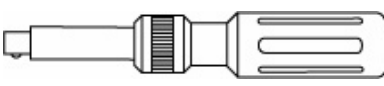
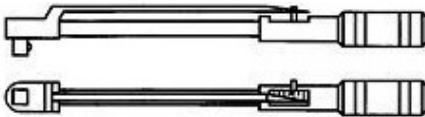
5 Tool Classification				
	Class	Mode	Test/Point	Your Tool
Type I	A	Manual	5	
	B	Peak	5	
	C	Peak	5	
	D	Peak	5	
	E	Peak	5	
Type II	A	First Peak	5	
	B	First Peak	5	
	C	First Peak	10	
	D	First Peak	5	
	E	First Peak	5	
	F	First Peak	10	
	G	First Peak	5	

6 Tolerance _____ %

7 Calibration Interval
 _____ months

Notes

4.10 Tool Types and Classes

Indicating Torque Tools (Type I)	<p>Class A Wrench: torsion or flexion bar Tolerance: $\pm 6\%$</p>	
	<p>Class B Wrench: rigid housing, with scale or dial or display Tolerance: $\pm 4\%$</p>	
	<p>Class C Wrench: rigid housing and electronic measurement Tolerance: $\pm 4\%$</p>	
	<p>Class D Screwdriver: with scale or dial or display Tolerance: $\pm 6\%$</p>	
	<p>Class E Screwdriver: with electronic measurement Tolerance: $\pm 4\%$</p>	
Setting Torque Tools (Type II)	<p>Class A Wrench: adjustable, graduated or with display Tolerance: $\pm 4\%$</p>	
	<p>Class B – Nominal value Wrench: fixed adjustment Tolerance: $\pm 4\%$</p>	
	<p>Class C Wrench: adjustable, non-graduated Tolerance: $\pm 4\%$</p>	
	<p>Class D Screwdriver: adjustable, graduated Tolerance: $\pm 6\%$</p>	
	<p>Class E – Nominal value Screwdriver; fixed adjustment Tolerance: $\pm 6\%$</p>	
	<p>Class F Screwdriver: adjustable, non-graduated Tolerance: $\pm 6\%$</p>	
	<p>Class G Wrench flexion bar: adjustable, graduated Tolerance: $\pm 6\%$</p>	

5 UTWCS (2017 REDESIGN) GUIDE

5.1 The Control Panel

Current Software PN 050-1000-0063-00T, Version 1.17

[Pic of New Front Panel]

[UNITS]

Use to choose unit of measurement between in-lb, N-mm, g-mm, Kg-mm, in-oz, ft-lb, N-M, kg-M, and kg-cm. Reverses selection in setup menus.

[ZERO TORQUE]

Zero out the current torque reading before starting a new measurement. Advances through selections in setup menus.

[SEND]

Sends the current Torque reading out the Printer port. See section 5.5.2 for further information about ports. Reverses through settings in the Setup menus.

[MODE]

Advances through the measurement mode: Manual Mode, Peak Mode, First Peak Mode, Shunt Mode, and Setup Mode

[SELECT TORQUE]

For UTWCS models, selects which of the installed Torque Cells is active. Advances through the settings in the Setup menus.

[ON/CLEAR]

Turns on the tester when powered off.

[OFF]

Hold this button down for 3 seconds to turn the unit off.

5.2 Test Modes

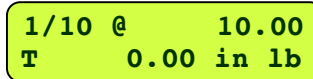
Determine the test mode appropriate for the tool being tested. Select the test mode by pressing **[MODE]** until desired mode is displayed. Each of the test modes and how they work are described below with display screens referenced. Mode can be selected and used at the initial screen after the machine is turned on, or in the Cal Certificate menu when Start is selected. (See section 4.6.1). If unsure what mode should be used for testing a particular torque tool, a tool classification chart is located in section 4.10. This chart is used in conjunction with the worksheets before it. Keep in mind that all readings for a single tool and series of test point measurements must be performed in the same mode.

5.2.1 *Manual*

Manual mode is used with needle-indicating torque tools. As the force applied to the tool increases, the display dynamically adjusts to reflect the amount of torque measured. When the force applied recedes, the reading will adjust downward. Because of the continual reading adjustment, the actual reading must be stored during the application of torque force. Press **[ZERO TORQUE]** between readings and remember to change the test point mark on the tool being tested when the test point changes. After all readings are stored for each test point, a report will be generated as output to a printer if specified to do so. Otherwise, press **[SEND]** to store the current data for the report.

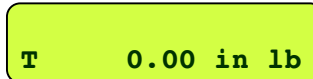
When in Manual mode from Cal Certificate menu and Start is selected, the LED screen will look like the first example below with the top line flashing between “1st Pt. 20.00” and

“Test 1/05.” The “T” in the bottom left corner means the unit is in Manual mode. A reading is now ready to be taken for the first test point, at the 20 in-lb mark of tool capacity, and will be test number 1 of 5 to be taken. The second screen shows a test reading; pressing **[STORE]** as described above results in the third LED screen below stating the test number being stored.



1/10 @ 10.00
T 0.00 in lb

Screen displayed when in Manual mode from initial screen and beginning testing after machine is turned on:



T 0.00 in lb

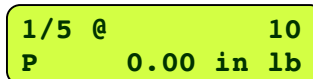
This screen does not show at what point the series of test point measurements is, but the display when storing the reading works the same. Readings stored here may be printed using **[SEND]** but will not be in a Calibration Report/Certificate format. Stored readings will not need to be cleared for each tool tested

5.2.2 Peak

Peak mode is used with dial-indicating or digital torque tools. As the force applied to the tool increases, the display dynamically adjusts to reflect the torque measurement. If the force subsides, the display locks at the highest torque reading captured. If a greater force is subsequently applied, the measurement displayed will adjust to a torque measurement that exceeds the previous reading but will not adjust to a lesser reading. Press **[SEND]** to save reading. To reset the Peak mode display, press **[ON / CLEAR]**, then **[ZERO TORQUE]** to begin a new test point measurement.

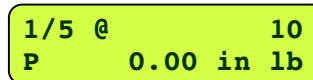
After the specified number of test points has been stored, a calibration report will automatically print if specified to do so in the User Setup menu. Otherwise, press **[SEND]** to manually print.

When in Peak mode starting at the Cal Certificate menu and Start is selected, the LED screen will look like the first example below. The screen indicates reading 1 of 5 is ready to be taken at the 20 in-lb test point mark and the unit is in Peak mode. The reading will be viewable until stored following the directions above, then the second screen below appears stating which number of test is being stored.



1/5 @ 10
P 0.00 in lb

Screen display when in Peak mode from initial screen and beginning testing after machine is turned on:



1/5 @ 10
P 0.00 in lb

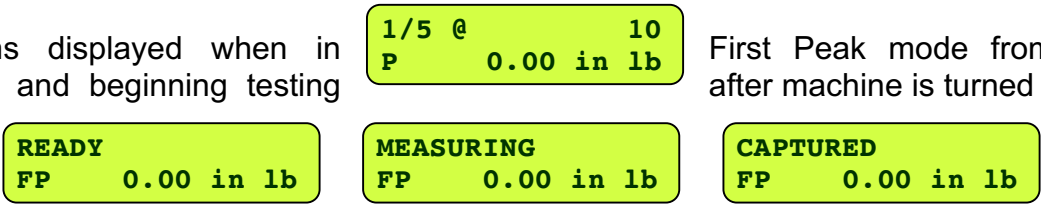
This screen does not show at what point the series of test point measurements is, but the display when storing a reading works the same as above. Readings stored may be printed but will not be in a Calibration Report/Certificate format.

5.2.3 First Peak

First Peak is used with click-type torque tools. Much like Peak mode, First Peak dynamically adjusts the display to reflect the torque applied. When beginning at the Cal Certificate menu and Start is selected, as force is applied to the tool being tested and increases, the display moves through the first series of screens below. If the torque

decreases for an instant, the display stops at the highest-read torque and indicates the test is finished. The reading can no longer be adjusted. Press **[SEND]** to save. To reset the First Peak mode display, press **[ON / CLEAR]**, then **[ZERO TORQUE]** to begin testing again. After the specified number of test points has been stored, a calibration report will automatically print if specified or press **[SEND]** to manually print.

Screens displayed when in screen and beginning testing



First Peak mode from initial after machine is turned on:

These three screens will switch out with the above screen when gathering data for the calibration report.

The screens do not show at what point the series of test point measurements is, but the display when storing a reading works the same as above. Readings stored may be printed but will not be in a Calibration Report/Certificate format. Store up to 1,800 test point readings with the built-in data logger.

5.3 UTWCS: Load Cell Operation

5.3.1 Turn on the UTWCS

When the UTWCS is turned on, the LED will cycle through screens regarding the manufacturer, serial number, etc. and finally will show the load cell information with its capacity for the first location only. The corresponding light by that load cell will light up. This is the cell currently in use. Each time the machine is turned on it will default to the cell in the first position.

5.3.2 Switch Load Cells

To test with one of the other load cells, push the **[SELECT TORQUE]** button. The tester will switch to the next torque cell in line. The LED will indicate a switch is taking place and will note when the changeover is complete. This process takes a few seconds. Switching between the cells is that simple. There is no information to enter into the UTWCS software regarding the load cells. That has been done at the factory. The machine will always know which load cell capacity is in use and will adjust the calibration each time the load cell is switched.

5.4 Quick Start to Torque Tool Testing

This section of the User Manual is designed to fast track the user to performing torque tool calibration testing resulting in a customized **Calibration Report or Certificate**. To start torque tool testing right away without generating a specific report, just turn the machine on and follow the TWCS instructions in section 3.3. If preferred, read through the manual and use the Calibration Assistant procedure for torque tool testing starting at section 4.7.

5.4.1 Turn on UTWCS

Press **[ON / CLEAR]** to start. The LED display cycles through various screens listing manufacturer, serial number, load cell data or torque cartridge information, current testing mode, etc. until it stops at a blank test screen. However, it is not yet ready for torque tool calibration testing. Refer to the beginning of section 4.6 for helpful guidance in navigating the Option menus referenced in this section.

5.4.2 Setup

Complete the Setup Mode process described in section 5.5. Press **[MODE]** until the Setup menu shown is displayed. Enter Console Port, Printer Port, Serial Port Baud Rate, and First Peak Parameters.

5.4.3 Cal Check

This verifies the shunt calibration of the UTWCS and is a procedure that should be done regularly, whether daily or before each use according to your company policy. Press **[MODE]** to until the Shunt Mode appears.

5.4.4 Calibration Assistant

Go to section 5.7 - Calibration Assistant and follow the instructions. This leads through the entire calibration procedure, including any setup and preparation, the actual testing of the torque tool, and printing out a customized calibration certificate (“Easy Cal Report”).

5.4.5 Going Forward

Please read through entire User Manual. There is detailed information regarding other functions, care and maintenance, techniques for achieving reliable readings, etc. Please contact LSI with any questions.

5.5 Setup Mode

Press the **[MODE]** button until the Setup Mode menu is displayed. Scroll through each menu by pressing the **[SEND]** button or the **[SELECT TORQUE]** button to scroll through the various settings. Press the **[UNITS]** button or the **[ZERO TORQUE]** button to change the value of the setting or to enter the First Peak Parameters sub-menu. Press the **[ON/CLEAR]** button to back out of the First Peak Parameters sub-menu and return to the main Setup Mode menus.

[MODE] Moves between testing modes and exits out of the Setup Menu

[SELECT TORQUE] Scroll through the settings in the Setup Menu

[SEND] Scrolls backwards through the settings in the Setup Menu

[ZERO TORQUE] Advances the selection in the currently displayed setting.

[UNITS] Advances backwards through the selections in the currently displayed setting.

[ON/CLEAR] Backs out of the First Peak Parameters sub-menu

5.5.1 Calibration Certificate: Start

Press the **[MODE]** button to get to the Setup Menu.

**Calibration Cert
Start**

Start

Press the **[ZERO TORQUE]** button to begin the tool testing procedure. Press the **[MODE]** button to select the testing mode needed to test the tool. Then, test the torque too. (See Section 6 – Technique for Good Measurement). If the test was not performed correctly, press **[ZERO TORQUE]** or **[ON / CLEAR]** to start over. When satisfied with the reading, press **[SEND]** to record. Follow the steps outlined in sections 5.6.8 and repeat this testing procedure the number of times specified for each test point.

This will clear out all previously collected data.

Stop

Use this option to stop gathering data for the Calibration Report before all the data has been collected

Transfer

Use this button to either print a calibration report or send out the data that has already been collected. Use the **[UNITS]** button to Print a report, use the **[ZERO TORQUE]** to send the data only.

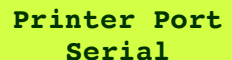
A yellow rectangular button with rounded corners. The text "Transfer Data?" is at the top. Below it, "Print" is on the left and "Send" is on the right.

5.5.2 Console Port / Printer Port

The UTWCS tester has two physical communication ports and two logical ports. The physical communication ports are the Serial RS-232 port and a USB port. A driver is needed to be installed on the PC in order to use it. The driver will create a Virtual COM port when the tester is connected to a computer. This will allow data to be transferred to the PC to any program that uses serial ports for communication.

The logical ports are a Printer port and a Console port. The Printer port is where data is sent when the Send button is pressed and not in the Calibration Certificate mode. This is strictly an output port. The Console Port is a bi-directional port used to interact with the tester. Once connected correctly send the question mark (?) to the tester to view the available commands.

Each of the logical ports can be associated to either physical port. Both logical ports can be associated to a single physical port. This association is set up in the Setup Mode.

A yellow rectangular button with rounded corners. The text "Console Port" is on the top line and "USB" is on the bottom line.A yellow rectangular button with rounded corners. The text "Console Port" is on the top line and "Serial" is on the bottom line.A yellow rectangular button with rounded corners. The text "Printer Port" is on the top line and "USB" is on the bottom line.A yellow rectangular button with rounded corners. The text "Printer Port" is on the top line and "Serial" is on the bottom line.

Use the **[SEND]** or **[SELECT TORQUE]** to switch to the setting. Use the **[UNITS]** or **[ZERO TORQUE]** button to change the setting between USB and Serial selections.

5.5.3 Serial Rate

This setting select the Baud Rate that the Serial port uses. The selections are 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.

Use the **[UNITS]** or **[ZERO TORQUE]** button to change the setting.

5.5.4 First Peak Parameters

Press the **[UNITS]** or **[ZERO TORQUE]** buttons to enter the First Peak Parameters sub-menu. Press the **[SEND]** or **[SELECT TORQUE]** button to switch between the First Peak Parameters.

First Peak
Parameters

5.5.4.1 FP Threshold

This setting determines how far away from zero the torque reading has to be before the tester begins measuring torque looking for a peak. Adjust this setting higher if the First Peak is found prematurely due to excess noise on the Torque display. Adjust this setting higher so that the lowest torque being measured can be measured.

FP Threshold
1.00 in lb

Use the **[UNITS]** button to decrease the value or the **[ZERO TORQUE]** button to increase the value.

5.5.4.2 FP Drop Value

Use this setting to determine how much the torque value has to drop to define the measurement has fallen enough to make the First Peak determination. Increase the value if the First Peak is found prematurely due to noise, Decrease the value if the First Peak is not found at all. Percentage is based on torque cell capacity.

FP Drop Value
-1.0%

Use the **[UNITS]** button to decrease the value or the **[ZERO TORQUE]** button to increase the value.

Press the **[ON/CLEAR]** button to back out of this sub-menu.

5.6 Calibration Assistant

5.6.1 Setup Menu

If preferences and information have already been entered following the directions in section 5.5, continue to the next step in section 5.6.2. Otherwise, press **[MODE]** to scroll to the Setup Mode and follow the directions under Setup Menus in section 5.5. Press **[F1]** to begin. Enter each item as instructed up to section 5.5. Then return to the test procedure that follows at section 5.6.2

5.6.2 Test Procedure

The steps that follow represent the procedure recommended for testing torque wrenches per ISO standard 6789:2003(E). Section 4 of this standard highlights accuracy testing. Obtaining a copy for reference is suggested.

5.6.3 Prerequisites

A UTWCS for testing torque instruments must be used.

A PC with either a USB port or an RS-232 port will be necessary to set up the testing method. The torque cartridge capacity must be greater than the highest capacity torque tool that will be tested on it. If it is not, there is danger of overloading the torque cartridge. A Printer will need to be connected to print a report OR the tester will need to be connected to a PC to capture the Report output or the testing data.

5.6.4 Connect to Printer

Any printer with a Serial interface can be used.

Printers with a Parallel port can be used, however LSI's Serial to Parallel Adapter cable must be used between the tester's Serial port and the printer. The part number is 025-0000-0458-01.

Set the Printer port to Serial in the Setup Mode settings (see section 5.5.2)

5.6.5 Connect to PC

The USB driver for the UTWCS tester is available on the UTWCS page of LSI's website, www.LarsonSystems.com. Install the driver before connecting the tester to the PC. Refer to the Installation Overview for help in installing the driver and connection the tester to the computer.

Set the Console Port to USB in the Setup Mode settings (see section 5.5.2). This will be necessary to program the calibration assistant.

Optionally set the Printer Port to USB also if you will use the PC to capture the report output.

Serial Port protocols on the PC will be 8 data bits, 1 stop, no parity, no flow control and either 115200 baud or 128K baud (depending on the PC program).

Sending a Carriage Return [CR] to the tester will result in a response of:

Invalid – ||

This will signify that the connection between the tester and the PC is working properly.

5.6.6 Pre-Calibration Worksheet

Make copies of the worksheets found in sections 5.8 or 5.9 of this manual to keep on hand for future use. Fill out either worksheet to prepare for each series of test point measurements by selecting parameters for the particular tool being tested and to customize the resulting Calibration Report. Doing so ahead of time will make entering the data into the machine much faster and easier. When determining tool type and class, look for how the tool adjusts. For example, does it operate with a graduated measurement scale or is it adjusted using a digital display?

5.6.7 Select Unit Type

Press [UNITS] and choose from in-lb, ft-lb, in-oz, kg-cm, kg-M, kg-mm, g-mm, N-mm, or N-M. The unit convention must match that of the torque tool.

5.6.8 Setup Calibration Procedure

Connect the tester to a PC. Refer to section 5.6.5 to do so. Type in the question mark {?} and press the Enter key to see the available commands.

```

USB-Com12
File Edit Options Send Receive Window Help
? - Commands Help
hello - Tester Identification
echo - Set Echo Control, 'echo=y' y is 1 or 0
drp - Print current data
drpp - Send current data to printer port
print - Print Setup Summary
printp - Send Setup Summary to Printer
testp - Test Serial Port Baud Rates
calcert - Show the TWCS Calibration Certificate Setup menu

```

Enter the command calcert and press the Enter key.

```

USB-Com12
File Edit Options Send Receive Window Help
*****
*** Torque Wrench Calibration Menu ***
*****
Current Setup :
Wrench Capacity : 9999999.0 (in lb)
Number of Measure Points : 5
Measure Points :
          Point [ 0 ] : 9999999.0 (in lb)
          Point [ 1 ] : 9999999.0 (in lb)
          Point [ 2 ] : 9999999.0 (in lb)
          Point [ 3 ] : 9999999.0 (in lb)
          Point [ 4 ] : 9999999.0 (in lb)
Number of Tests per Measure Point : 5
Tolerance : 4.0 %
Calibration Interval : 12 months
*****
setup Setup Cal Cert
print Print Cal Cert
start Start gathering data
stop Stop gathering data
exit Exit the menu
Enter command:

```

Enter the command setup and press the Enter key.

```

setup Setup Cal Cert
print Print Cal Cert
start Start gathering data
stop Stop gathering data
exit Exit the menu
Enter command: setup
Please enter the Wrench Capacity (in lb) [9999999.00000] 100

```

Begin entering in the data requested. The data is as follows:

- 1) Wrench Capacity
- 2) Number of measuring points, 1 to 10.
- 3) A value for each measuring point
- 4) The number of tests for each measuring point
- 5) To Tolerance, in percentage, for each reading, 1 to 99%
- 6) Calibration interval, in months.

```
Please enter the Wrench Capacity (in lb) [100.00000] 100
Value entered = 100.000

Please enter the number of measuring points (1-10) [5] 5
Value entered = 5

Please enter the Measurement for point 1 [20.00000] 20
Value entered = 20.000

Please enter the Measurement for point 2 [40.00000] 40
Value entered = 40.000

Please enter the Measurement for point 3 [60.00000] 60
Value entered = 60.000

Please enter the Measurement for point 4 [80.00000] 80
Value entered = 80.000

Please enter the Measurement for point 5 [100.00000] 100
Value entered = 100.000

Please enter the number of Tests per Measure Point (1-10) [5] 5
Value entered = 5

Please enter Measuring Tolerance (1-99 %) [4.00000] 4
Value entered = 4.000

Please enter the Calibration Interval in Months (1-240) [12] 6
```

Enter the command exit and press the Enter key to exit the calcert setup.

5.6.9 Start Calibration Procedure

Once the Calibration Certificate Setup is completed, testing can begin on the torque tool. Press **[MODE]** to access the Setup Mode, then press **[ZERO TORQUE]** to Start the procedure. A message will appear that says to hit **[SEND]** to record data.

5.6.10 Select Test Mode

Press **[MODE]** to select from the three available test modes. Choose between **Manual Mode**, **Peak Mode**, and **First Peak Mode** depending on the type and class of the torque tool. Refer to the Pre-Calibration worksheet for this information. The test modes and how they work are described in section 5.2

5.6.11 Exercise Torque Tool

Before testing, type 2 tools must be exercised at full capacity at least five times. The torque tool must turn in the direction being tested, and torque indication must be triggered (i.e., click-type wrenches must “click” five times).

5.6.12 Zero Torque

Always press [**ZERO TORQUE**] to clear the last torque reading before each new test.

5.6.13 Mount Torque Tool

Without Easy Loader attachment installed: Adjust the torque tool to the test point being measured and place the torque tool onto the STWCS or UTWCS. Then, go to section 4.7.14. When the required number of measurements is completed for a test point, adjust the tool to the next test point setting or mark.

With the Easy Loader Attachment installed: Adjust the tool to the appropriate test point mark and place onto the STWCS / UTWCS with the arm of the wrench extending parallel to the Easy Loader Attachment. Loosen the quick-release lever and adjust the slide so the wrench handle is supported in the middle. Then adjust the actuator wheel to give the maximum amount of travel in the direction of the test. Insert the stop-pins so the wrench is contained on both sides, and tighten the quick release lever to hold the slide in place. The stop-pins should be located on either side of the wrench handle such that when the tool reaches its “click point” the stop-pins meet as close as possible in the middle of the handle of the torque tool. This center point on the tool handle is identified by a line or marking. The length of a wrench may change when changing test point marks and will require readjusting the slide to the center mark of the handle. See diagram of Easy Loader in section 3.3.8.

5.6.14 Test Torque Tool

Refer to the Force Application diagrams in section 6 Technique for Good Measurement for the correct ways to test single arm torque tools. Using the Easy Loader attachment, turn the actuator wheel so the wrench is moved in desired direction for testing. To start test over, press [**ON / CLEAR**]. If satisfied that the test was performed correctly, press [**SEND**]. Repeat steps 5.6.11 – 5.6.13 the number times required for the test points that was specified in the setup procedure. Remember to adjust the tool to the correct mark for each test point. (See section 5.6.1 - Cal Certificate for additional test procedure information.)

Note: To achieve reliable results consistently, there are controlling factors to be considered and adjusted if needed. The actual performance of each test is key and requires consistent movement of the torque wrench by the user. For this reason, the Easy Loader Attachment is recommended so testing is consistent no matter who the operator is. There are also software settings regarding filtering and dampening that may contribute to the quality of the test results. See section 6 - Technique for Good Measurement.

5.6.15 Print Calibration Certificate

Upon completion of the last test point when all readings specified have been take, the UTWCS can automatically generate a printed calibration certificate. All readings must be within the specified tolerances to conform to ISO 6789:2003{E}.

Report of Calibration

Wrench Type : _____ Serial # : _____

Temperature : _____ Humidity : _____

Performed By : _____ Final Approval : _____

Date : 3/25/2017, Time 3:43 PM

Recalibration Date : 3/25/2018, Calibration Interval : 12 months

Certified Calibration Equipment Used :

Device : Larson Systems Inc. UTWCS Serial # : 5555555555
 Torque Cartridge : 200.00 in lb Serial # : 123456-12
 Date Calibrated : 3/20/2017 Recalibration Date : 3/20/2018

Testing Procedure

Wrench Capacity : 100.00 in lb # of Measuring Points : 5
 Wrench Tolerance : 4 % # of Tests Per Point : 5
 Testing Performed In : Peak Mode

This is to certify that the torque assembly tool accompanied by this document
 Has been calibrated to Standards traceable to the Nation Institute of
 Standards (N.I.S.T). Calibration performed in accordance to ISO 6789:2003(E)

Calibration Data :

Measuring Points	20.00 (in lb)	40.00 (in lb)	60.00 (in lb)	80.00 (in lb)	100.00 (in lb)
Test					
1	20.12	39.62	60.08	88.46	99.96
2	20.42	40.28	59.76	79.32	100.44
3	19.44	39.18	60.78	80.00	100.68
4	19.82	40.08	59.12	79.72	99.90
5	20.46	40.06	58.94	79.34	99.86
+ 4% High	20.80	41.60	62.40	83.20	104.00
Low	20.46	40.28	68.78	80.46	100.68
- 4%	19.44	39.18	58.94	79.32	99.86
In Tol.	19.20	38.40	57.60	76.80	96.00
	PASS	PASS	PASS	PASS	PASS

5.7 Calibration Data Template

REPORT OF CALIBRATION

Name and Location: _____
 Wrench Type: _____
 Serial Number: _____
 Performed By: _____

Date: _____ Time: _____
 Temperature: _____ Humidity _____
 Recalibration Date: _____
 Calibration Interval: _____ Months

Wrench Capacity: _____
 Number of Measuring Points: _____
 Number of Test Per Point: _____
 Wrench Tolerance: _____

Testing Mode: Manual Peak First Peak (Circle One)

Counter Clockwise Torque (CCW): _____ Clockwise Torque (CW): _____

Measuring Points				
Units				
Test				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
+ 4% or 6%				
High				
Low				
- 4% or 6%				
OK / FAIL				

This is to certify that the torque assembly tool accompanied by this document has been calibrated to Standards traceable to the National Institute of Standards (N.I.S.T.). Calibration performed in accordance to ISO 6789:2003(E).

5.8 Torque Tool Pre-Calibration Worksheet

1 Units		
in-oz	g-mm	kg-M
in-lb	kg-mm	N-mm
ft-lb	kg-cm	N-M

3 + / - Rule
 CCW _____ CW _____

3 Capacity _____

5 Measuring Points
 Number of Measuring Points: _____ %

1 _____ %	1 _____ %	1 _____ %	1 _____ %
2 _____	2 _____	2 _____	2 _____
3 _____	3 _____	3 _____	3 _____
4 _____	4 _____	4 _____	4 _____
5 _____	5 _____	5 _____	5 _____
6 _____	6 _____	6 _____	6 _____
7 _____	7 _____	7 _____	7 _____
8 _____	8 _____	8 _____	8 _____
9 _____	9 _____	9 _____	9 _____
10 _____	10 _____	10 _____	10 _____

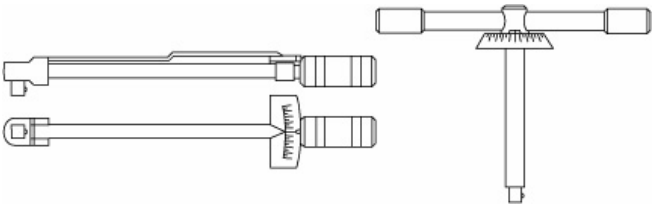
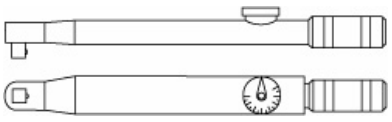
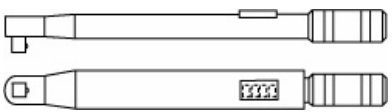
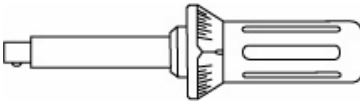
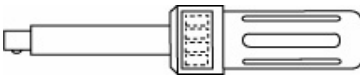

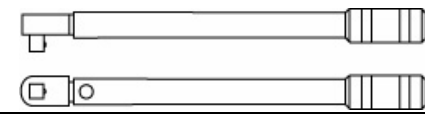
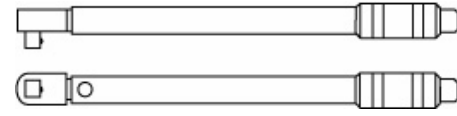
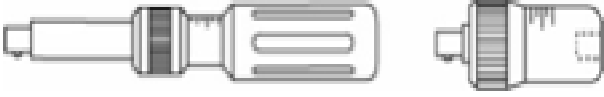

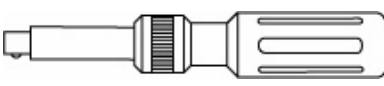
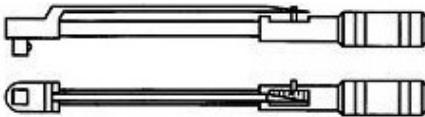
5 Tool Classification				
	Class	Mode	Test/Point	Your Tool
Type I	A	Manual	5	
	B	Peak	5	
	C	Peak	5	
	D	Peak	5	
	E	Peak	5	
Type II	A	First Peak	5	
	B	First Peak	5	
	C	First Peak	10	
	D	First Peak	5	
	E	First Peak	5	
	F	First Peak	10	
	G	First Peak	5	

6 Tolerance _____ %

7 Calibration Interval
 _____ months

Notes

5.9 Tool Types and Classes

Indicating Torque Tools (Type I)	Class A Wrench: torsion or flexion bar Tolerance: $\pm 6\%$	
	Class B Wrench: rigid housing, with scale or dial or display Tolerance: $\pm 4\%$	
	Class C Wrench: rigid housing and electronic measurement Tolerance: $\pm 4\%$	
	Class D Screwdriver: with scale or dial or display Tolerance: $\pm 6\%$	
	Class E Screwdriver: with electronic measurement Tolerance: $\pm 4\%$	
Setting Torque Tools (Type II)	Class A Wrench: adjustable, graduated or with display Tolerance: $\pm 4\%$	
	Class B – Nominal value Wrench: fixed adjustment Tolerance: $\pm 4\%$	
	Class C Wrench: adjustable, non-graduated Tolerance: $\pm 4\%$	
	Class D Screwdriver: adjustable, graduated Tolerance: $\pm 6\%$	
	Class E – Nominal value Screwdriver; fixed adjustment Tolerance: $\pm 6\%$	
	Class F Screwdriver: adjustable, non-graduated Tolerance: $\pm 6\%$	
	Class G Wrench flexion bar: adjustable, graduated Tolerance: $\pm 6\%$	

6 TECHNIQUE FOR GOOD MEASUREMENT

Following a few simple guidelines will go a long way to achieve the best possible readings. Continuously practicing these guidelines will result in time saved and take the stress out of torque tool calibration. Although these practices are mentioned previously in the manual, this section is designed to further explain their importance and serve as a reminder.

6.1 The Environment

Choose a location that is free of vibration and kept at room temperature. Humidity can affect readings too – a dry, non-condensing environment is best. If intending to generate a report instantly, proximity to a power outlet and printer is recommended for convenience.

6.2 Proper Installation

Securely fastening the unit to a flat, vibration-free surface is highly recommended using the mounting holes on the base. Keep the machine itself as motionless as possible to help produce reliable results without continually retesting to validate. If mounting the unit vertically, a perpendicularly level and vibration free surface is best. See section 2.3 for mounting information.

6.3 Preparation

Warm up the machine by doing a few preliminary tests to get started. Also, exercise the tool being tested, if required. See section 4.7.11.

6.4 Using Worksheets Provided

Fill out one or both of the worksheets found in Section 4.8 and 4.9 depending on your needs. For TWCS users, this will keep testing done in an organized manner, with tool information and data all in one place and also provide a report format for certification. For STWCS or UTWCS users, the worksheet makes it easy to enter the correct parameters for the tool being tested into the Cal Certificate Setup menu prior to testing and assists in creating a customized report.

6.5 Torque Tool Calibration

To achieve optimum results, proper tool placement on the torque tool tester and using consistent motion is very important. Pressure that is exerted from motion outside of the Force Application Diagram on the following page will likely contribute to inaccurate readings. It may be helpful to practice technique using a torque tool already deemed in compliance with ISO standards. The movement must be smooth, steady and centered. It should not be jerky, leveraged, or done too quickly.

6.6 Easy Loader Attachment

Available as a factory option, the Easy Loader Attachment is recommended to help achieve the best readings possible for single arm torque tools, especially if different people are performing the calibration tests. The Easy Loader ensures a slow, steady movement is carried out for every test. Keep in mind that the location of the stop pins in relation to the handle of the tool should be as close as possible to the center mark on the handle at the point reading is taken or the point of the “click.”

6.7 Force Application Diagrams

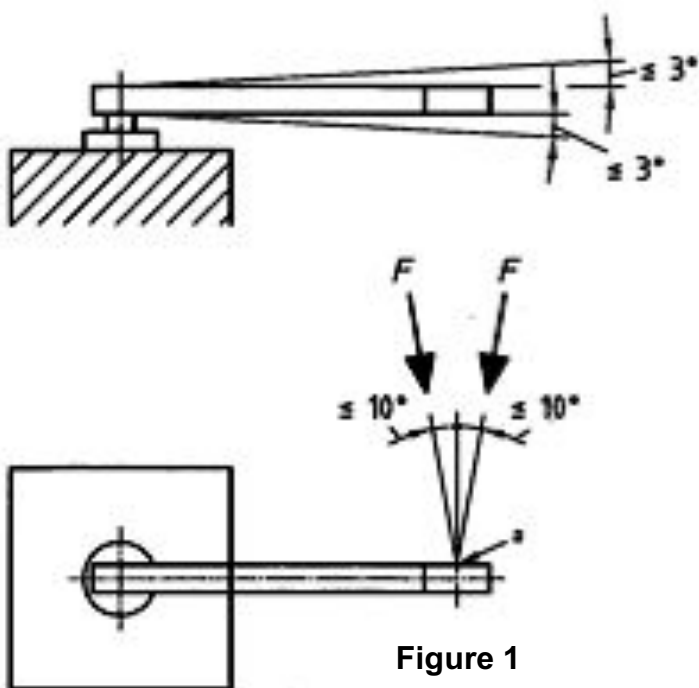


Figure 1

Figure 1 Illustrates proper movement when testing a wrench in a horizontal mount position.

Figure 2 Illustrates proper movement when testing a screwdriver.

Figure 3 Illustrates proper movement when testing a wrench when device is vertically mounted.

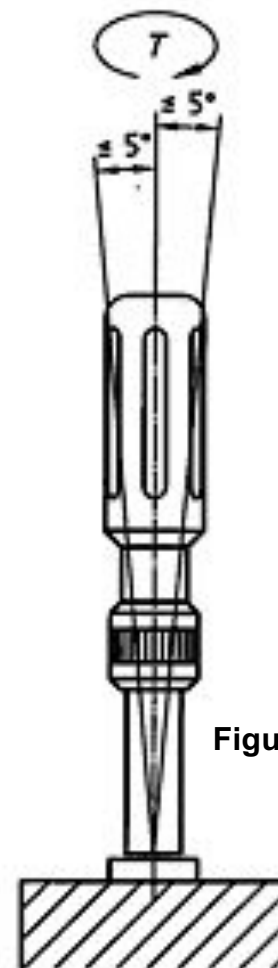


Figure 2

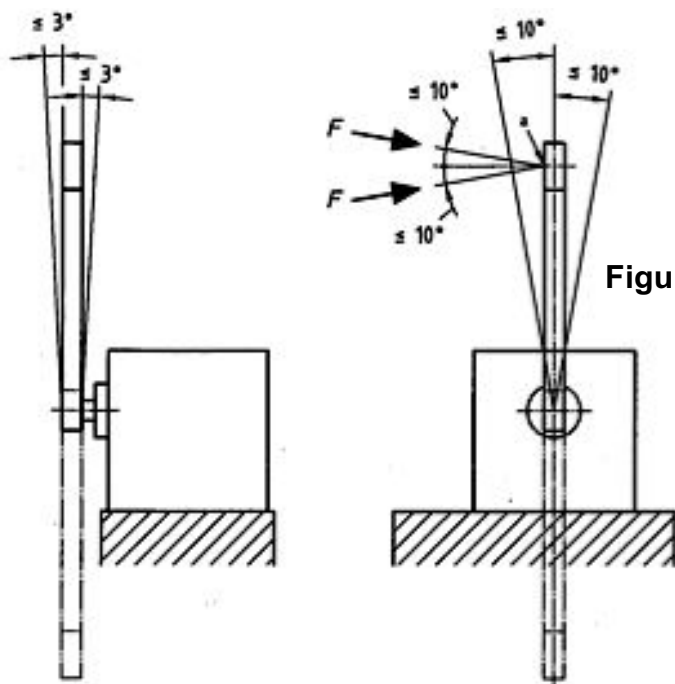


Figure 3

6.8 Dampening and Filtering Settings

If unable to use the STWCS / UTWCS in an environment conducive to consistent readings, dampening and filtering settings may be used to compensate. Not applicable to the TWCS.

6.9 Verify Calibration

Make sure the machine is not out of calibration. The **TWCS** calibration can be verified in the Shunt Test Mode. See Section 3.2.4. Calibration verification of a/an **STWCS / UTWCS** can be done in the Option Menu under Cal Check. See section 4.6.4 for instructions.

7 TROUBLESHOOTING AND ERROR CODES

<p>Error 4 Past Full Scale! Load cell is being stressed beyond capacity. Release from testing. Damage may occur.</p>	<p>Error 75: Device Not Enabled [SEND] pressed without a printer or PC in operation as the output device. Use RS232.</p>
<p>Error 39 Printer Error External device time-out. Data sent to printer port when time-out condition occurred.</p>	<p>Error 80 Keybrd Not Working A power-up check indicates that the keyboard is stuck. Call LSI.</p>
<p>Error 40 Send PC Error External device time-out. Data sent to PC port when time-out condition occurred.</p>	<p>Error 81: Manual A/D Not Working A power-up check indicates the Manual Mode A/D is not working. Call LSI.</p>
<p>Error 60 Storage Maxed [STORE] pressed when maximum number of tests allowed has already been stored.</p>	<p>Error 83: Specs used with stored data Spec changes not allowed when specs are currently being used by stored test data. Choose [OPTION] > Store. Then press [F1] to clear data stored to proceed.</p>
<p>Er62: Manual Only Print or Clear Tried to store test while <u>not</u> in Manual Mode. Only allowed to store tests done in the same mode.</p>	<p>Error 84: Specs used with print-out Spec changes not allowed when specs are currently assigned to data being printed. Choose [OPTION] > EndPrint to stop printing then proceed.</p>
<p>Er63: Peak Only Send to end set Tried to store test while <u>not</u> in Peak Mode. Even though first test done in Peak Mode, only stores multiple tests done in one mode.</p>	<p>Err85: Must use in lb units Units were changed during test cycle and [STORE] pressed. Test cycle must be completed using same unit of measure.</p>
<p>Er65: Manual Only Optn/F2 end form Tried to send data while <u>not</u> in Manual Mode. Even though first test was done in Manual Mode, only allows tests sent in same mode. Choose [OPTION] > EndPrint, then proceed.</p>	<p>Err86: Must use in lb units Units were changed during test cycle and [SEND] pressed. Test cycle must be completed using the same unit of measure.</p>
<p>Er66: Peak Only Optn/F2 end form Tried to send data while not in Peak Mode. Even though first test was done in Peak Mode, only allows tests sent in same mode. Choose [OPTION] > EndPrint, then proceed.</p>	<p>Er87 Computer asked for stored result data, but none has been stored.</p>
<p>Er67 Cert Info Must Clear User pressed [STORE] after changing mode. Clear stored data to continue.</p>	<p>Er88 Computer asked DHT to send present contact test when none is available.</p>
<p>Error 70 key n/a User pressed key not available in mode being used.</p>	<p>Error 89 Must be at least 1 Min. A display sleep time entered of less than one minute.</p>
<p>Err 71: Must be in Manual Mode [ZERO ANGLE] pressed while in Peak Mode. Must be in Manual Mode to zero length.</p>	<p>Err 92 Call LSI Initialize? No Power-up check indicates that E2 prom memory has a fault. Press [F2] and call LSI.</p>
<p>Error 72: Not available this model User pressed the [ZERO ANGLE] when model does not include a length scale.</p>	

Problem not listed? Call LSI toll free at 1-877-780-2131 or locally at 763-780-2131. The Diagnostics Option menu may be helpful if printing or display problems occur. See section 4.6.6.

8 CARE AND MAINTENANCE

8.1 General

The TWCS is a low-maintenance tester with very few moving parts. A little oil should be applied from time to time to the screw on the Easy Loader actuator arm. This will ensure that the movements are smooth and will prolong the life of the ACME screw. Keep oils and other liquids away from and off of the electronics portion of the tester. If liquid or oil should contact the device, wipe it off with a soft cloth or paper towel. Never apply any cleaner or solvent directly to the electronics faceplate; a mild plastic cleaner applied to a wipe may be used. Take measures to protect the TWCS from debris or falling objects; the load cell contains sensitive electronics and can be severely damaged by such forces.

8.2 Calibration Verification and Calibration Options

Follow your company policy for frequency of calibration verification, or use the following guidelines to assure the accuracy of the tester. LSI has made the verification of calibration accuracy on its testers easily checked on a daily or more frequent basis, if necessary. It is recommended that the calibration be verified at least daily (when used daily) or before each use. To complete the verification on an STWCS or UTWCS, follow the instructions in section 4.6.4 of this manual under Option: Cal Check. Directions for verifying the calibration of a TWCS are found in section 3.2.4. If the unit does not pass verification, it must be taken out of service.

Contact LSI to schedule recalibration service. The tester may be sent back to LSI in its original packaging with a usual turnaround time of less than one week. Larson Systems also offers onsite calibration. Onsite service can be scheduled for multiple locations in an area for economy when possible. Or, if preferred, calibration may be scheduled with an outside calibration lab.

8.3 Packaging for Shipment to LSI

8.3.1 *Individual torque cartridge(s)*

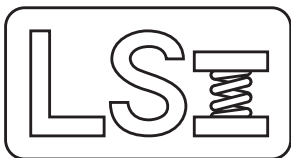
Fasten securely to the wood frame with the collar placed in the Lock position. The collar with lock feature is standard on the lower capacity load cells as these units are extremely sensitive and could be easily damaged. Call LSI to obtain a wood frame if needed.

8.3.2 *Control Panels / Circuit Boards*

While the control panel and circuit board assembly may be removed, it is recommended that the entire core unit be shipped. If necessary to disconnect the panel, unscrew the control panel from the unit and slowly pull forward. Behind the panel is the circuit board assembly. Carefully unplug the wiring from the circuit board. When the circuit board is re-installed, it is important that the correct plugs from the unit be attached back to their corresponding plugs on the circuit board. If reconnected incorrectly, the entire circuit board will be shorted out.

8.3.3 *Packaging Entire Testing Unit*

Please call LSI to obtain packaging and instructions if the original crate/carton was not retained and there is not comparable packaging available at your location.



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