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1-800-750-6842



# LTT

## *Operating Instructions*

Version 1.0  
June 13, 2007



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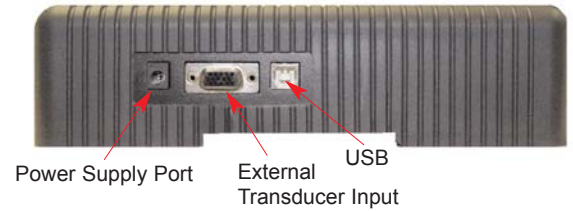
## Features

- ❑ Accuracy +/- 0.5% of reading from 20% to 100% of full scale.  
Accuracy +/- 1% of reading from 10% to 20% of full scale.
- ❑ Recommended for all hand screwdrivers, wrenches or power tools.
- ❑ Provides “EZ-Plug & Play” with Mountz Transducers. Features “ARCII” technology, an instant auto-recognition system of the transducer connected to the LTT.
- ❑ Selection of six operating modes: (Track, Peak, First Peak, Audit, Torque + Angle, and Tool Test).
- ❑ Seven units of torque measurements: (ozf.in, lbf.in, lbf.ft, cN.m, N.m, kgf.m, kgf.cm).
- ❑ Two units of force measurements: (lbf and kN)
- ❑ Features built-in Tool Tests operation.
- ❑ Includes three PC Windows based software programs:
  - Mountz Torque Meter Interface Program-** for sensor calibrations, meter calibration and tool tests.
  - Torque Meter Bootloader** - for updating the LTT operating systems.
  - Mountz Statistics Calculator** - for SPC, CP & CPK calculations.
- ❑ “Flash” memory allows upgrades to be done by the user in the field & internet through the USB port.
- ❑ Five low-pass filter selections (3000, 2000, 1500, 500 and 200 Hz).
- ❑ Easy to use menu structure, a six-digit display and connect to an external transducer.
- ❑ Real Time Clock for time stamping of readings.
- ❑ USB interface to download readings to PC.
- ❑ High Capacity Li-Ion Batteries for long life (30 hrs with standard transducers and 16 hrs with brushless rotary).
- ❑ Can connect to most mv/v transducers and can store calibration data for up to 50 non smart torque & force sensors.
- ❑ The 5VDC capability allows unit to be used with a Brushless Rotary Transducer for testing pulse tools and high RPM tools.
- ❑ Torque and Angle readings are displayed simultaneously and supports up to 8000 RPM.
- ❑ Stores a total of 2500 data points.
- ❑ Real time graph of torque vs. time using associated PC Windows software.
- ❑ Features a Buzzer and Go / No Go LEDs that illuminate when high or low setting is achieved.
- ❑ Display Accuracy is better than +/- 0.0625 of reading.

## External Connections

### USB

The computer connection is USB. There is no setup required. This allows for data to be downloaded to a PC. The PC will require a USB I/O.



### External Transducer Input

The transducer connector is a high density D-Sub connector with 15 pins. The pin description is shown below:

Pin Number	Function	Description
1	Analog Ground	
2	Brushless Signal	Output from Brushless Transducer + /- 5V
3	Multiplexer	Used for the Multiplexer
4	Sensor Direct	Used to detect transducers
5	Digital Ground	
6	Excitation Voltage +	5V or 16 volts depending on bridge or brush-less transducer
7	Bridge Signal -	Negative output from bridge transducer
8	Multiplexer	Used for the Multiplexer
9	Angle Lead	TTL output from angle detector in angle transducer
10	Sensor Drive	Used to detect transducers
11	Bridge Signal +	Positive output from bridge transducer
12	Shield	
13	Angle Trail	TTL output for angle lags Angle Lead by 90 degrees
14	+5 Volt Angle Supply	
15	Data for "Smart" Transducer	Proprietary ARCII protocol for smart transducers from Mountz

## User Interface



### Display Screen

Displays the menu structures, torque readings, operating mode, torque units.

### Function Keys

Functions will be identified on the display screen.

### Go and No Go LEDs

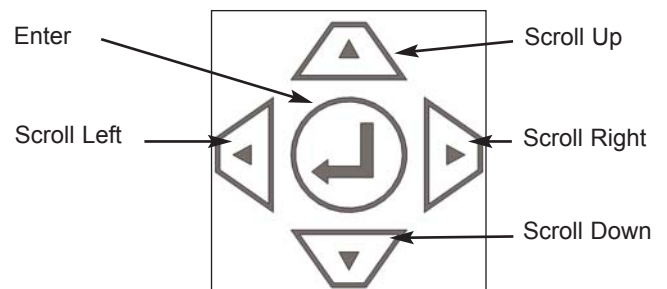
Used to monitor lower and upper torque limits and receive a visual warning.

### Internal Transducer

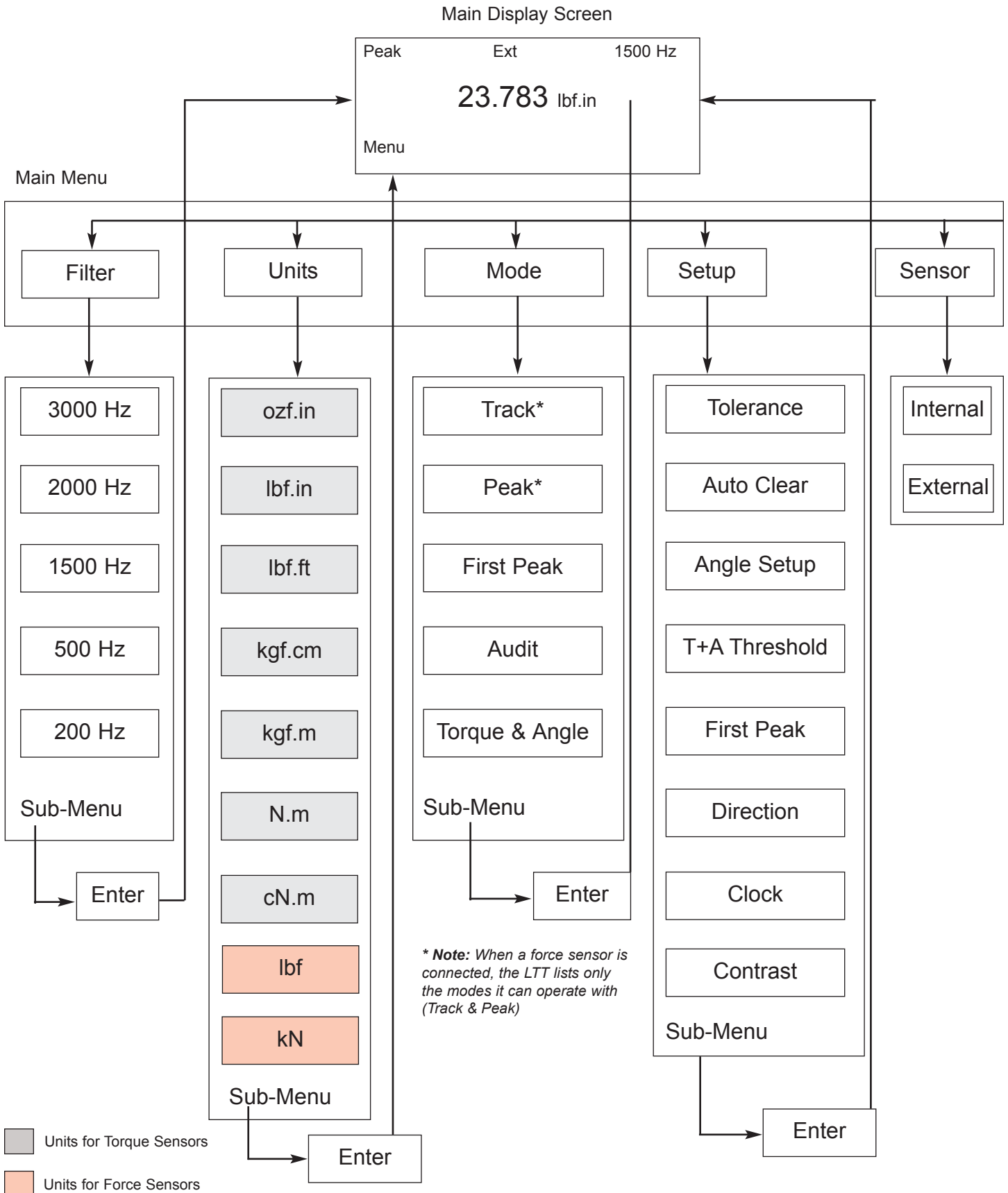
Built-in transducer

### "Scroll and Enter Keys"

Used to toggle through the different menu structures.



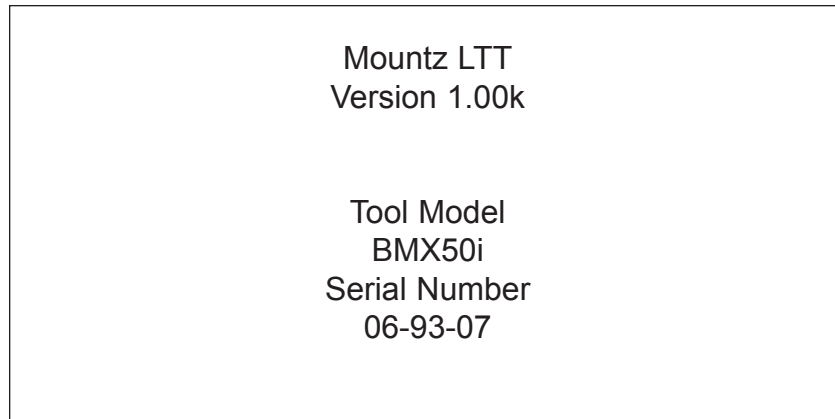
# Quick Menu Structure



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## Screen Display

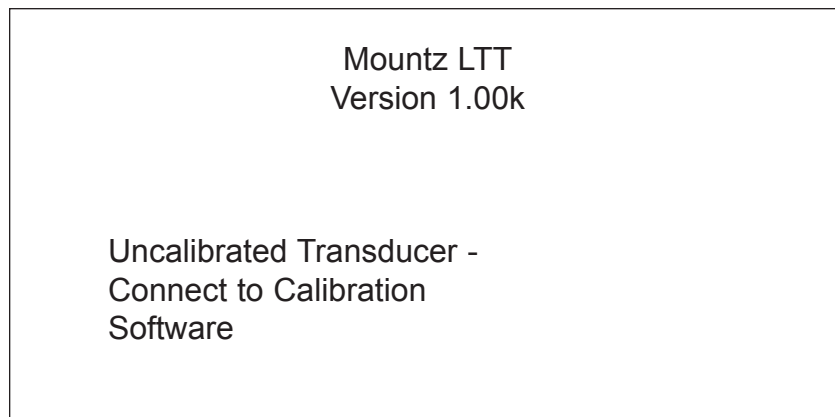
When the Torque Analyzer is turned on and it is connected to a Mountz "Smart" Torque Transducer with ARCII technology it will display a Screen similar to that below for 5 seconds and then go into Reading Mode. This will also happen if a "Smart" transducer is disconnected and another smart transducer is connected. It will automatically detect if the sensor is a torque or force sensor.



**Note:**

When disconnecting a smart transducer and connecting another, the operator must unplug the cable from the LTT unit.

If an un-calibrated torque transducer or force sensor is connected then the Analyzer will display a screen as below.



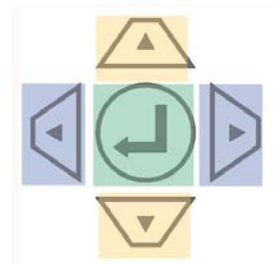
**Note:**

The LTT supports Non-Smart torque transducers & force sensors as well as Non-Mountz transducers. Non-smart transducers can be detected and can be calibrated in the "internal" memory. The LTT will offer 2 choices. It offers to calibrate or choose from a list of transducers stored in the internal memory.

# Menu Selections

Pressing the "Menu" Key will present the following Screen:

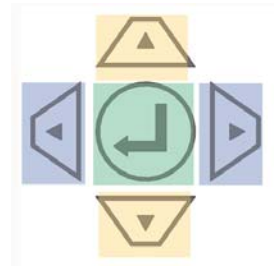
1. Use the **Scroll Up or Down** key to toggle through: Filter, Units, Mode, Setup & Sensor.
2. Press **Enter** key to select a choice.



Filter
Units
Mode
Setup
Main

## Selecting Filters

1. Select Filter by highlighting and pressing **Enter**.
2. Use the **Scroll Up or Down** key to toggle through the Filter options.
3. Press **Enter** key to select a Filter Setting.



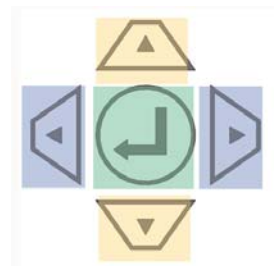
Filter	3000 Hz
	2000 Hz
Units	1500 Hz
	500 Hz
Mode	200 Hz
Setup	
Main	



**Note:**  
Not applicable for Force & Load Sensors.

## Selecting Units

1. Select Units by highlighting and pressing **Enter**.
2. Use the **Scroll Up or Down** key to toggle through the Unit options.
3. Press **Enter** key to select a Unit.



	<i>For Torque Sensors</i>	<i>For Force Sensors</i>
Filter	lbf.in	lbf
	lbf.ft	kN
Units	ozf.in	
	kgf.cm	
Mode	kgf.m	
Setup	N.m	
Main	Cancel	



**Note:**  
When a torque sensor is connected, the LTT lists only torque units. Also, cN.m is also available but you must scroll down.

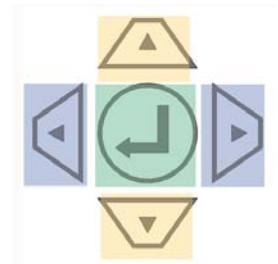
When a force sensor is connected, the LTT lists only force units.

## Menu Selections

### Selecting Mode Options

1. Select Mode by highlighting and pressing **Enter**.
2. Use the **Scroll Up or Down** key to toggle through the Mode options.
3. Press **Enter** key to select a Mode Setting.
4. The Main (or reading screen) will display the value of the selected Mode.

	<i>For Torque Sensors</i>	<i>For Force Sensors</i>
Filter	Track	Track
Units	Peak	Peak
Mode	First Peak	
Setup	Audit	
	Torque + Angle	
Main	Cancel	



**Note:**

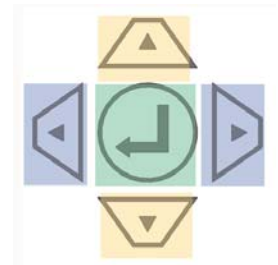
When a torque sensor is connected, the LTT lists only modes it can operate with.

When a force sensor is connected, the LTT lists only modes it can operate with.

### Selecting Setup

1. Select Setup by highlighting and pressing **Enter**.
2. Use the **Scroll Up or Down** key to toggle through the Setup options.
3. Press **Enter** key to select a Setup Setting.

Filter	Tolerance
Units	Auto Clear
Mode	Angle Setup
Setup	T+A Threshold
	First Peak
	Direction
Main	



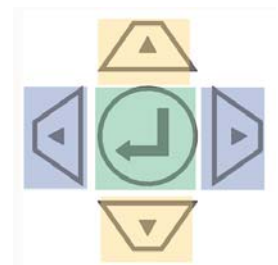
**Note:**

Clock & Contrast is also available but you must scroll down.

### Selecting Sensor

1. Select Sensor by highlighting and pressing **Enter**.
2. Use the **Scroll Up or Down** key to toggle through the Sensor options.
3. Press **Enter** key to select a Setup Setting.

Units	
Mode	
Setup	
Sensor	Internal
	External
Main	



**Note:**

Selecting between the built-in transducer of the unit or external transducer that's plugged in.

## Mode Selections

### Track

With a torque sensor, this mode constantly tracks increasing or decreasing torque variations. Use this mode to monitor varying torque on motors and machinery. Also for calibration and testing of dial torque products (small wrenches or dial screwdrivers).

Also used for force & load applications with a force sensor.

Track	INT	1500 Hz
<b>+00.000</b> lbf.in		
Menu	Tool Tests	

### Peak

With a torque sensor, the display retains the highest torque applied. Use this mode during calibration or testing of any hand type torque wrench (dial, beam, and screwdriver), as well as power tools.

Also used for force & load applications with a force sensor.

Peak	INT	1500 Hz
<b>+ 25.010</b> lbf.in		
Menu	Tool Tests	

### First Peak

The display holds the first detected torque peak applied. Before any torque is applied, the display show dashes in the torque value area. Once peak is detected, the display will show the torque value. If a second peak is detected then it will be displayed in the lower right (in small reverse video).

This function is primarily used for testing and calibrating click type mechanical torque wrenches. The LTT captures the point where the wrench clicks. This peak may be used for operator training on correct use of the wrench. Always apply torque smoothly to avoid false first peak readings. See page 12 for setting up First Peak.

Not applicable for Force & Load Sensors.

FPK	EXT	3000 Hz
----- lbf.in		
Menu	Tool Tests	

FPK	EXT	3000 Hz
<b>5.4373</b> lbf.in		
Menu	Tool Tests	+7.6261

### Audit

This mode is used to determine "first movement" or what is commonly known as "break-away" torque to determine the actual torque on the joint. An angle enabled transducer is required to operate in this mode. See page 10 for setting up Angle Threshold.

Not applicable for Force & Load Sensors.

Audit	INT	1500 Hz
<b>10.510</b> lbf.in		
Menu	Tool Tests	0.00

### Torque + Angle

This allows an operator to set up an initial torque and follow up with a rotation to a specified angle and display the final torque.

The LTT can collect Torque and Angle data if the unit is connected to a transducer that includes the angle function. It is a "Real Time" angle function that can capture Torque and Angle up to 8000 RPM. See page 11 for setting up Torque + Angle.

Not applicable for Force & Load Sensors.

T+A	EXT	3000 Hz
<b>9.9985</b> lbf.in    10 deg		
Menu	Tool Tests	

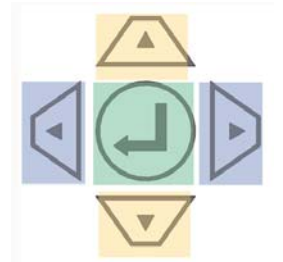
# Setup Selections

## Tolerance

The Tolerance parameters control the Go and No-Go signal response (see Go / No Go Signal section). The user sets a lower and upper torque thresholds to get a visual and audible warning signals when these limits are reached or breached during operation. This function is primarily used for safety and quality control.

### Selecting Tolerance

1. Press the **"Menu"** Button.
2. Use the **Scroll Down** key and select Setup by highlighting and pressing **Enter**.
3. Use the **Scroll Up or Down** key to toggle through the Setup options.
4. Press **Enter** key to select a setup setting for **Tolerance**.



Filter	Tolerance
Units	Auto Clear
Mode	Angle Setup
Setup	T+A Threshold
	First Peak
	Direction

1. Press the **Right** or **Left** key to toggle between High and Low Tolerance..
2. Use the **Scroll Up or Down** key to change the tolerance settings .
3. Press **Enter** key once setting is complete.
4. Press **Main** button to return to main display screen.

Tolerance Setting	
Low: _0.000	lbf.in
High: 84.950	lbf.in
Main	

## Clear

This function controls the method of clearing the display of torque readings.

### Auto Clear

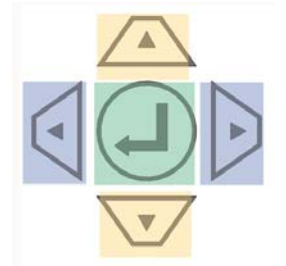
When Auto Clear is selected, the torque values, during operation, will automatically be cleared from the display. The user can set the time threshold to control how long the values should be displayed before clearing.

### Manual Clear

When Manual Clear is selected, the torque values during operation will indefinitely be displayed until the user presses the Clear key.

## Selecting Clear

1. Press the **"Menu"** Button.
2. Use the **Scroll Down** key and select Setup by highlighting and pressing **Enter**.
3. Use the **Scroll Up or Down** key to toggle through the Setup options.
4. Press **Enter** key to select a setup setting for **Auto Clear**.



Filter	Tolerance
Units	Auto Clear
Mode	Angle Setup
Setup	T+A Threshold
	First Peak
	Direction

1. Use the **Scroll Up or Down** key to toggle between Manual or Auto Clear.
2. Press the **Scroll Left or Right** key to move down to the Time selection
3. For Auto Clear, use the **Scroll Up or Down** key to toggle between the selection of time between 1- 5 seconds.
4. Press **Enter** key once setting is complete.
5. Press **Main** button to return to main display screen.

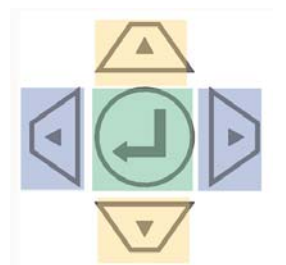
Auto Clear Setting
Mode: Auto
Time (seconds): 2
Main

## Angle Setup

This menu item contains 2 selections. The first selection is the Angle Threshold for Audit Mode. The default is 2 degrees but it can be set from 1 to 5 degrees. The second selection is Angle Polarity. Angle Polarity is used when you find that the Angle is giving a negative sign when the Torque applied is Clockwise. This may be needed to compensate for some transducers that have the wrong polarity for Angle.

## Selecting Angle Setup

1. Press the **"Menu"** Button.
2. Use the **Scroll Down** key and select Setup by highlighting and pressing **Enter**.
3. Use the **Scroll Up or Down** key to toggle through the Setup options.
4. Press **Enter** key to select a setup setting for **Angle Setup**.



Filter	Tolerance
Units	Auto Clear
Mode	Angle Setup
Setup	T+A Threshold
	First Peak
	Direction

1. Use the **Scroll Left or Right** key to toggle between Angle Threshold and Angle Polarity.
2. Use the **Scroll Up or Down** key to toggle through the degree values (0.25-5) for Angle Threshold. It move at increments of 0.25
3. Use the **Scroll Up or Down** key to toggle Angle Polarity options: Normal or Reverse
4. Press **Enter** key once setting is complete.
5. Press **Main** button to return to main display screen.

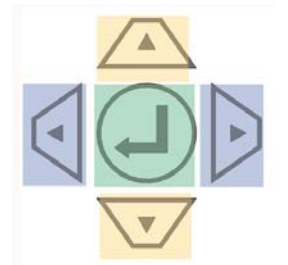
Angle Setup
Angle Threshold: 2 deg
Angle Polarity: Normal
Main

## Torque + Angle

This allows an operator to set up an initial torque and follow up with a rotation to a specified angle and display the final torque.

### Selecting Torque + Angle

1. Press the **"Menu"** Button.
2. Use the **Scroll Down** key and select Setup by highlighting and pressing **Enter**.
3. Use the **Scroll Up or Down** key to toggle through the Setup options.
4. Press **Enter** key to select a setup setting for **Torque + Angle**.



Filter	Tolerance
Units	Auto Clear
Mode	Angle Setup
Setup	T+A Threshold
	First Peak
	Direction

1. Press the **Right or Left** key to toggle between the three settings: Angle, Torque Allow Ratchet
  2. Use the **Scroll Up or Down** key to set Angle (increments of 0.25)
  3. Use the **Scroll Up or Down** key to set Torque (increments of 0.5)
  4. Use the **Scroll Up or Down** key to set "Yes" or "No" for allowing ratchet\*.
  5. Press **Enter** key once setting is complete.
  6. Press **Main** button to return to main display screen.
- \* Note - "Yes" allows for ratcheting the wrench back without accumulating angle.

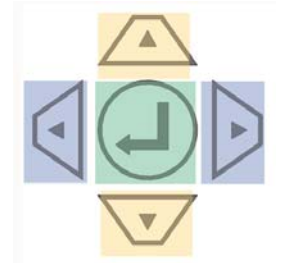
Torque+Angle Thresh
Angle: 2.00 deg
Torque: 50.000 lbf.in
Allow Ratchet: No
Main

## First Peak

The display holds the first detected torque peak applied. Before any torque is applied, the display show dashes in the torque value area. Once peak is detected, the display will show the torque value. If a second peak is detected then it will be displayed in the lower right (in small reverse video).

### Selecting First Peak

1. Press the **"Menu"** Button.
2. Use the **Scroll Down** key and select Setup by highlighting and pressing **Enter**.
3. Use the **Scroll Up or Down** key to toggle through the Setup options.
4. Press **Enter** key to select a setup setting for **First Peak**.



Filter	Tolerance
Units	Auto Clear
Mode	Angle Setup
Setup	T+A Threshold
	First Peak
	Direction

1. Use the **Scroll Up or Down** key to toggle through the sensitivity settings: (Low, Medium & High)
2. Press the **Right** or **Left** key to move down to the Min Peak setting location
3. Use the **Scroll Up or Down** to set the Minimum Peak
4. Press **Enter** key once setting is complete.
5. Press **Main** button to return to main display screen.

First Peak Setup	
Sensitivity:	Low
Min Peak:	5.0089 Lbf.in
Main	



#### Note:

First Peak Sensitivity

This feature is provided for click wrenches. It is not relevant for Mountz Break-over or Cam-over products such as MMTB, TB, TBIH, MTBN, TSN, TSP, and TSC.

High sensitivity will clearly display the "double" peak produced by a click wrench. Low sensitivity will reduce "false peaks" caused by operator hesitation.

For most click wrenches try using Medium sensitivity. This works for many types of click wrenches such as the Mountz Titan and DM wrenches. Click wrenches differ in how quickly they move from a first peak (click) to a second peak (over torque). Some experimentation, with sensitivity, may be required in order to get repeatable results.

## Direction

Allows an operator to set the direction for capturing the torque readings: (Clockwise, Counter Clockwise and Both directions).



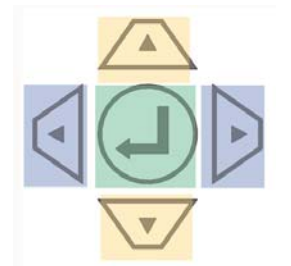
### Note:

When performing a dead weight calibration, the direction should be set for both directions.

## Selecting Direction

1. Press the **"Menu"** Button .
2. Use the **Scroll Down** key and select Setup by highlighting and pressing **Enter**.
3. Use the **Scroll Up or Down** key to toggle through the Setup options.
4. Press **Enter** key to select a setup setting for **Direction**.

Filter	Tolerance
Units	Auto Clear
Mode	Angle Setup
Setup	T+A Threshold
	First Peak
	Direction

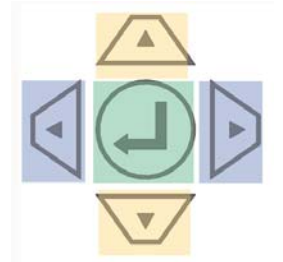


1. Use the **Scroll Up or Down** key to toggle through the direction settings:  
(Both, CW, CCW)
2. Press **Enter** key once setting is complete.
3. Press **Main** button to return to main display screen.

Direction Setting
Direction: BOTH
Main

## Selecting Clock

1. Press the **"Menu"** Button.
2. Use the **Scroll Down** key and select Setup by highlighting and pressing **Enter**.
3. Use the **Scroll Up or Down** key to toggle through the Setup options.
4. Press **Enter** key to select a setup setting for **Clock**.



Filter	Auto Clear
Units	Angle Setup
Mode	T+A Threshold
Setup	First Peak
	Direction
	Clock

1. Use the **Scroll Up or Down** key to toggle through the digits for the date and time.
2. Use the **Right and Left** key to move through the time and date sections.
3. Press **Enter** key once setting is complete.
4. Press **Main** button to return to main display screen.

Clock Setting
2:57 PM
11/15/05
Main



### Note:

Must toggle through the "hour digits" to change from AM to PM.

## Transducer Calibration Reminder

Six months from the date of the transducer's calibration a message will appear on the screen informing the operator it has been six months since the date of calibration. At this point the operator can pull the Transducer out of service or decide to continue to use it. The LTT will display a reminder every time the unit is powered up or switched to that expired Transducer.

## ARCII (Auto Recognition Chip)

The LTT provides "EZ-Plug & Play" with Mountz Transducers that feature "ARCII" technology, an instant auto-recognition system of the transducer connected to the LTT. When an ARCII Transducer is connected to the LTT it automatically recognizes the transducer and displays the Model and Serial Number of the connected transducer on the LTT.

The information stored in the ARCII chips contains:

- ❑ The Model of Transducer
- ❑ The Serial Number of the Transducer
- ❑ True Calibration Information
- ❑ Date of Calibration

## Power On & Battery Operation

There is no switch to turn on the LTT unit. Just press a key and the unit will power on. When the unit has not been used for a designated time frame it will enter a "Sleep Mode". The unit features a processor that checks to see if a key pressed while it is in the Sleep Mode. There is no significant drain on the batteries.

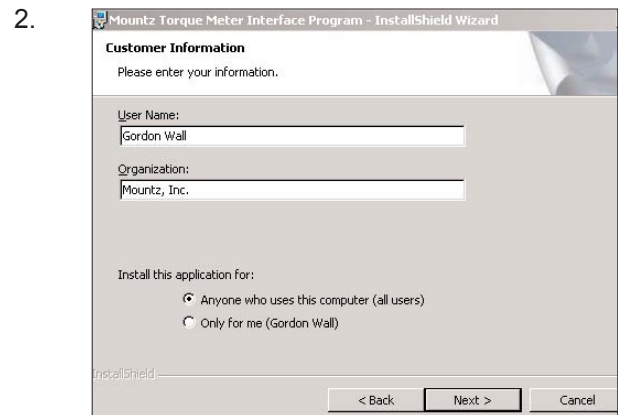
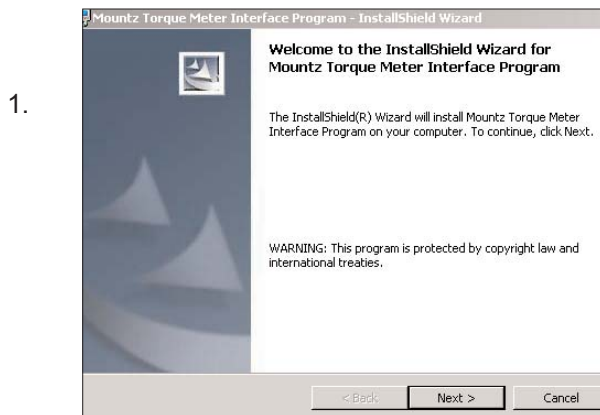
The LTT can be shut-off by holding the **Enter** key for 7 seconds.

The LTT is powered using the high capacity Li-Ion batteries for a long battery life. The battery pack should last up to 30 hours with normal use and 16 hours with a brushless transducer with a maximum charge. The battery icon is always on the display. It is filled in completely when fully charged and shows white space as the battery depletes.

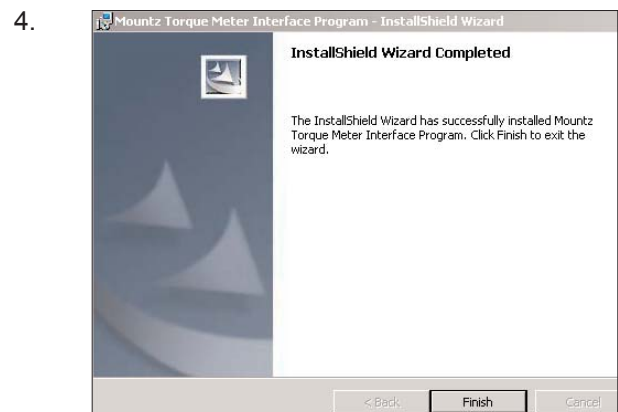
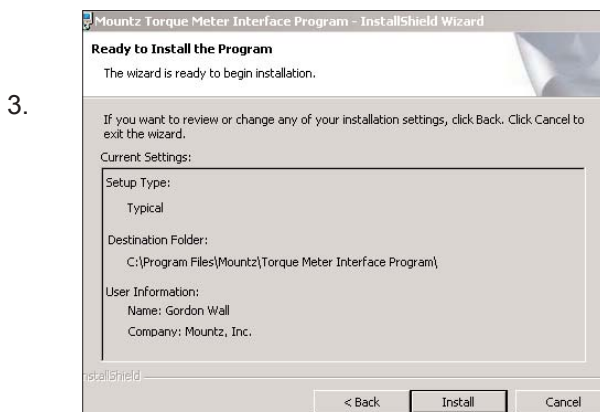
## Installation of LTT "Mountz Torque Meter Interface Software"

The interface software allows the operator to conduct Tool Tests, Sensor Calibration and Meter calibration.

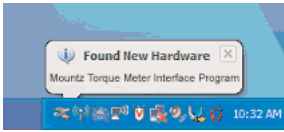
1. Put the disk in and the Installation will start automatically. Click the Next Button to begin installation
2. Enter the required information and click Next Button.



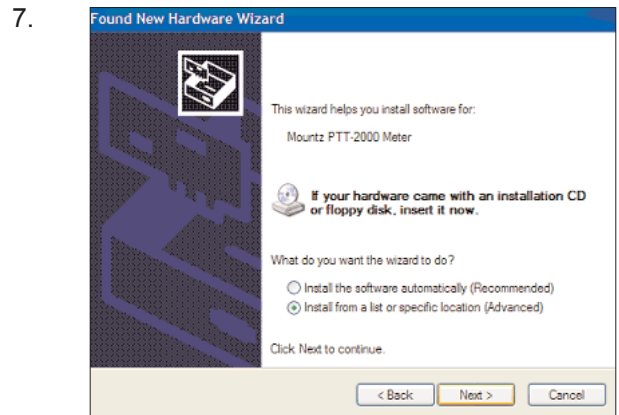
3. Click install.
4. After the installation is successful just click Finish.



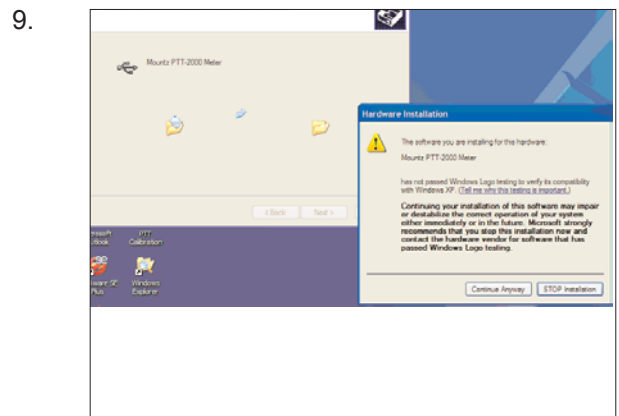
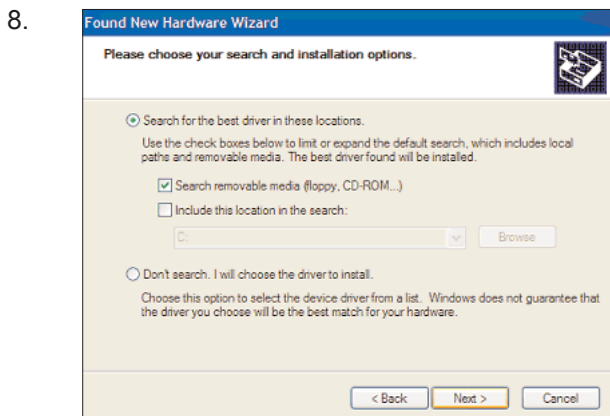
- After installation of the LTT Interface Program turn on the LTT unit. Connect the USB cable to the LTT. and connect the other end to the computer. The computer detects the device in the lower right side of the screen.



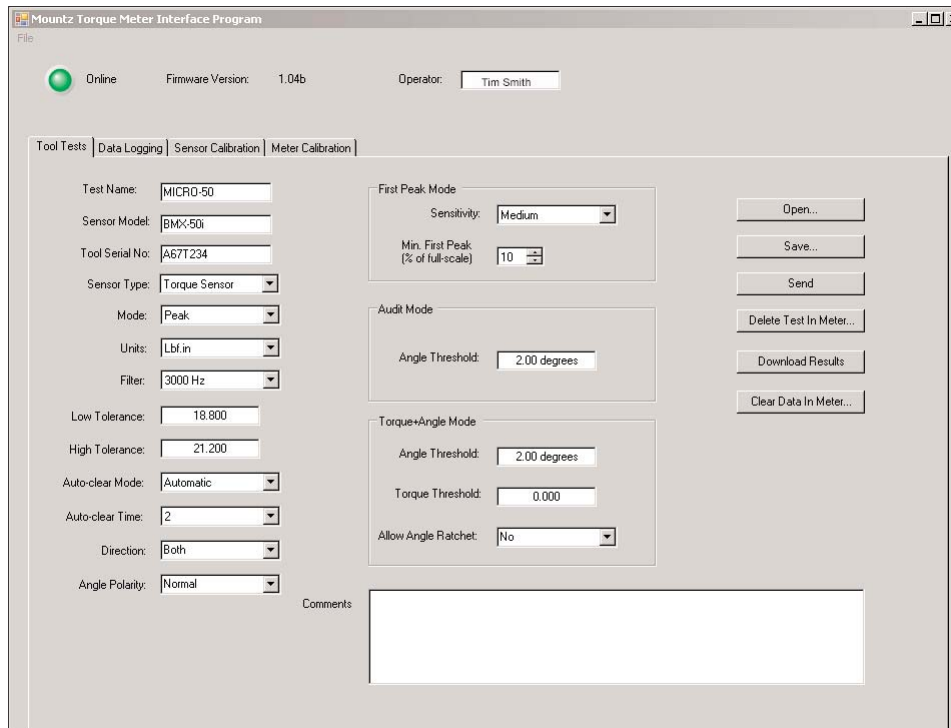
- Shortly after the LTT is detected the following screen will appear. Do not allow Windows to search for software. Click "No, not this time".
- The CD should still be inserted from the installation, but if not insert it. Click "Install from a list or specific location" and click Next Button.



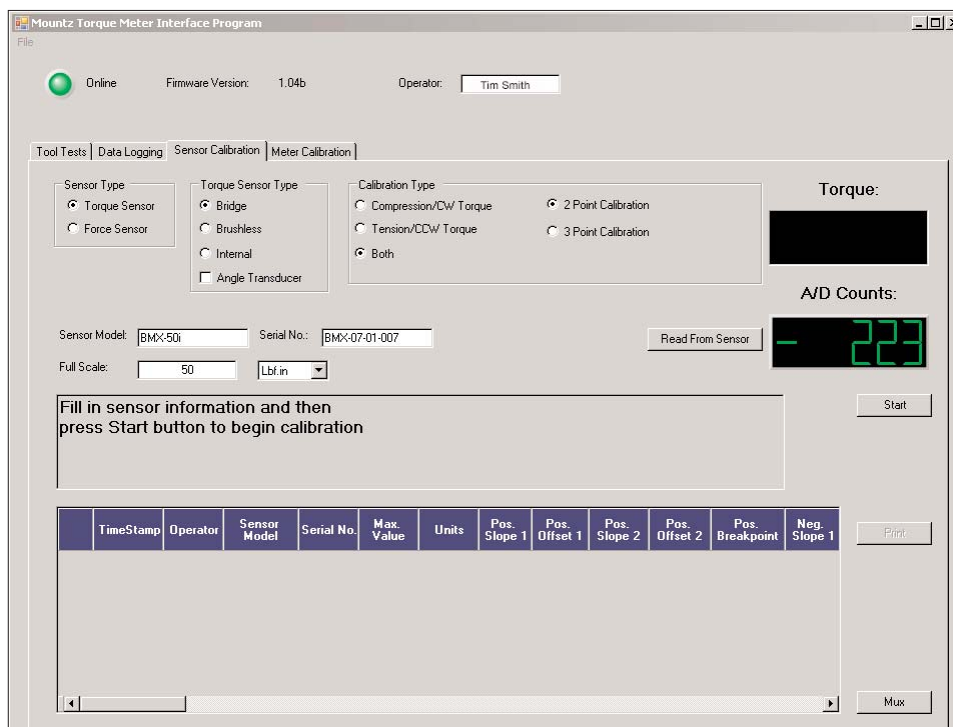
- Check the "Search removable media" box and click Next Button.
- The USB drivers will begin to be installed. If a pop up window appears that the product has not passed the Windows Logo Testing, just click "Continue Anyway". Mountz has tested the product with both the Home version and Professional version of XP. You will not get this message if you are installing under Windows 2000.



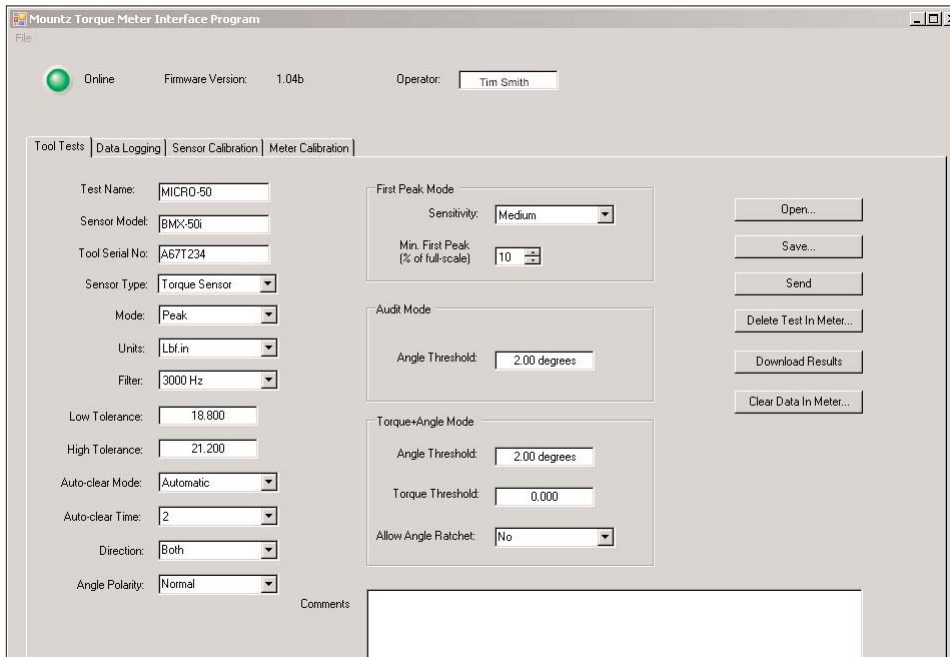
10. The initial screen will appear. The "Online" LED should be green. For most users the only Tab that will be used is the "Tool Tests". The other Tabs are used for Transducer and Meter calibrations, which should only be done by a certified calibration lab. Image below is "Tool Tests" screen.



11. Image below is "Sensor Calibration" screen. This can be used for both torque, force and load sensors.



12. The Tool Test Screen is below.



The Tool Test mode contains the follow fields:

- |                    |  |
|--------------------|--|
| A. Test Name       | L. Direction                                   |
| B. Sensor Model    | M. Angle Polarity                              |
| C. Tool Serial No. | N. Comments                                    |
| D: Sensor Type     | O. Operator                                    |
| E. Mode            | P. First Peak Sensitivity                      |
| F. Units           | Q. Minimum First Peak (% of full scale)        |
| G. Filter          | R. Audit Mode (Angle Threshold)                |
| H. Low Tolerance   | S. Torque and Angle Mode (Angle Threshold)     |
| I. High Tolerance  | T. Torque and Angle Mode (Torque Threshold)    |
| J. Auto-Clear Mode | U. Torque and Angle Mode (Allow Angle Ratchet) |
| K. Auto-Clear Time | V. Comments                                    |

## Tool Test Operation

All tool tests must be entered using the PC Windows based Calibration Program. Once this is done the tests can be accessed using the "Tool Test" soft key on the LTT.

Entering data for the Tool Test is done using the PC Windows based Calibration Program. See the Screen above. Select the "Tool Tests" tab. Enter the relevant information on this screen such as the Test Name, which is the name by which the test will be identified on the LTT. Then enter all required information on the screen because once the tool test is activated on the LTT no changes can be made with the units, tolerances or other information. There is a field for comments to include user specific information. The transducer being used for the Tool Test must be identified. This is done to prevent a test being run on a transducer with an inappropriate range.

When entering the "Sensor Model" this must match exactly with the sensor identification that was used to identify the transducer when it was calibrated. If you are not sure about how the transducer is identified, unplug the transducer from the LTT unit and plug it back in.

**Note** - the Sensor Model identification appears on the LTT screen during the initialization.

There are various control buttons to perform operations with this program, these include:

**Save** - Saves the Tool Test Setups on the PC so it can be used to run further tests in the future.

**Open** - Opens previously saved Tool Test Setups.

**Send** - Send a Tool Test to the LTT. It can store up to 40 tests. The unit can store up to 2500 total readings.

**Delete Test in Meter** - Deletes this specific test from the LTT. The operator will be asked for confirmation before the action takes place.

**Download Results** - Retrieves the results of a tool test after it has been run. It will offer a change to add further notes to the test at this point. The results will be saved in the PC in C:\Program Files\Mountz\Torque Meter Interface Program\Tool Test Results\Operator Folder where the "Operator Folder" will be the name of the Operator entered in the upper portion of the Tool Test Screen. The results are stored in a .csv file which can be opened in Excel or using a text editor program, such a Notepad. The file name will be the name given to the tool followed by the date and the time at which to test was started. If you use this function often you probably will want to create a shortcut to this folder on your desktop

**Clear Data in Meter** - Clears all of the test data in the LTT meter. Make sure to Download the Results before clicking this button. The operator will be asked for confirmation before the action takes place.

The screenshot displays the 'Tool Tests' configuration window of the Torque Meter Interface Program. At the top, it shows the system status: 'Online' with a green indicator, 'Firmware Version: 1.04b', and 'Operator: Tim Smith'. Below this are four tabs: 'Tool Tests' (selected), 'Data Logging', 'Sensor Calibration', and 'Meter Calibration'. The main configuration area is divided into several sections:

- Test Name:** Load 1
- Sensor Model:** Force-100kN
- Tool Serial No.:** A2378
- Sensor Type:** Force Sensor
- Mode:** Peak
- Units:** kN
- Filter:** 3000 Hz
- Low Tolerance:** 49.000
- High Tolerance:** 52.000
- Auto-clear Mode:** Manual
- Auto-clear Time:** 1
- Direction:** Both
- Angle Polarity:** Normal

On the right side, there are several control buttons: 'Open...', 'Save...', 'Send', 'Delete Test In Meter...', 'Download Results', and 'Clear Data In Meter...'. The configuration area also includes three sub-sections:

- First Peak Mode:** Sensitivity: Low; Min. First Peak (% of full-scale): 10
- Audit Mode:** Angle Threshold: 2.00 degrees
- Torque+Angle Mode:** Angle Threshold: 2.00 degrees; Torque Threshold: 0.000; Allow Angle Ratchet: No

At the bottom, there is a 'Comments' field with a large text area for input.

The Tool Test also supports Load Cells in Peak mode. See the screen shot below as an example of a Tool Test using a Load Cell.

Connectors for connecting the LTT to Load Cells are available from Mountz. These are pre-wired and have available pin connections for the load cells.

Connector	Mountz Part Number
For 2mV/V Load Cells	072008
For 4 mV/V Load Cells	072009

Mountz Torque Meter Interface Program

File

Online Firmware Version: 1.04b Operator: Tim Smith

Tool Tests | Data Logging | Sensor Calibration | Meter Calibration

Test Name: Load 1

Sensor Model: Force-100kN

Tool Serial No: A2378

Sensor Type: Force Sensor

Mode: Peak

Units: kN

Filter: 3000 Hz

Low Tolerance: 49.000

High Tolerance: 52.000

Auto-clear Mode: Manual

Auto-clear Time: 1

Direction: Both

Angle Polarity: Normal

First Peak Mode

Sensitivity: Low

Min. First Peak (% of full-scale): 10

Audit Mode

Angle Threshold: 2.00 degrees

Torque+Angle Mode

Angle Threshold: 2.00 degrees

Torque Threshold: 0.000

Allow Angle Ratchet: No

Open...

Save...

Send

Delete Test In Meter...

Download Results

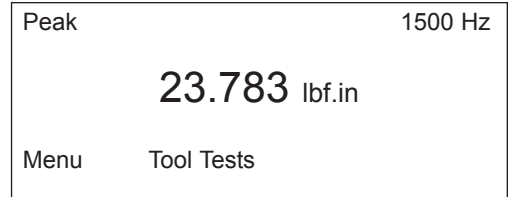
Clear Data In Meter...

Comments

## Using the Tool Tests on the LTT

Once 1 or more tool tests are sent to the LTT meter the operator can press the "Tool Test" soft key on the LTT and following Menu choices will appear:

- Select
- Quick Test
- Start
- Stop
- Clear Memory



Choose the function desired, from the menu list, by using the **Up /Down** keys and use **Enter** key to finalize the selection highlighted in reverse video.

**Select** is used to select the desired test from a list of tests that have been downloaded. When an operator selects this he/she will view an introduction for 3 seconds that provide directions, and then this will display:

- Choose Tool Test from List of available tests.
- Use **Up /Down** keys to toggle between tests.
- Use **Enter** to select test.

After the short introduction the operator will see the tool tests displayed and can select the desired test.

**Quick Test:** By selecting Quick Test the operator can run a quick test using the currently selected parameters of the meter such as Mode, Units, and Tolerance etc. After selecting Quick Test, Press the Enter key. The test starts immediately and the operator can start collecting data. Once the operator collected the number of reading desired then press the Tool Test "soft" button that now reads Quick Test. Then the operator can select Stop to end the test.

When the operator connects to the Interface Program and click on Download Results, the Quick Test data is downloaded. The file name will be Quick Test with associated Date and Time. If the operator performs several different Quick Tests he/she will have different Time and/or Date files for each test.

**Start** begins collecting test data. The tool name will be followed by a colon and then the number of data points collected.

**Stop** ends the test. This is required as some users may want to collect 10 data or others may want to collect 25 points or more.

**Clear Memory** deletes all test data in the LTT. The operator will be asked for confirmation before the action takes place. This function should only be used if the readings have been downloaded to the PC or test data is invalid for some reason.

Once all desired tests are run the operator can return to the PC to download all Tool Tests stored in the LTT. During a particular test download the operator will be given the opportunity to add further notes to the file stored on the PC.

There is an optional Excel Add-In included on the LTT CD to perform statistical analysis on the data from the tool test. It is located in the folder Optional Excel Statistics Add-In. Follow the instructions in the readme file, in this folder, to use this Add-In.

*An example of a Tool Test Result file (image - right)*

	A	B	C	D	E	F	G	H	I
1	Test Name:	TSC45-A							
2	Test Time:	01-01-00 00:00:80							
3	Sensor Serial No.:	05-06-013							
4	Starting Datapoint:	1							
5	# of Datapoints:	15							
6	Comments:								
7									
8		34.737							
9		34.298							
10		34.794							
11		34.585							
12		34.155							
13		34.337							
14		34.346							
15		34.308							
16		34.810							
17		34.585							
18		34.716							
19		34.444							
20		34.117							
21		34.508							
22		34.335							
23									
24									
25									

## Transducer Calibration

Transducer Calibration should only be performed by an operator with the necessary calibration wheels or arm and weight sets or by a calibration lab. Mountz offers calibration services to perform this function.

LTT calibrations are done in conjunction with a PC Windows based Calibration Program. The program is easy to use and guides the user through the calibration steps.

Once the program is started and connected to the LTT meter, a button **"Start"** is provided to start the calibration. All the needed information must be entered in the appropriate text boxes. This includes information such as the Sensor Model, Serial Number, the Full Scale torque value, the units of calibration and the transducer type (Bridge or Brushless). Once all required information is entered, the Start button is clicked, and its function changes to "Continue" as shown in figure below and procedural information will be given in the large text box. A 2-point calibration should work well in all but exceptional circumstances.

Once the calibration is complete the calibration data will be stored in a Mountz "Smart" transducer using the ARCII protocol. For non-smart transducers calibration data will be stored in the LTT internal memory. A sophisticated error correction algorithm assures that the data written to and retrieved from memory is always correct.

Once the calibration is complete, Torque Values will be displayed in the Torque Window allowing for verification of calibration data points.

The screenshot displays the 'Mountz Torque Meter Interface Program' window. At the top, it shows 'Online' status, 'Firmware Version: 1.04b', and 'Operator: Tim Smith'. The 'Sensor Calibration' tab is selected, showing various configuration options:

- Test Name: MICRO-50
- Sensor Model: BMX-50i
- Tool Serial No: A67T234
- Sensor Type: Torque Sensor
- Mode: Peak
- Units: Lbf.in
- Filter: 3000 Hz
- Low Tolerance: 18.800
- High Tolerance: 21.200
- Auto-clear Mode: Automatic
- Auto-clear Time: 2
- Direction: Both
- Angle Polarity: Normal

Additional settings include:

- First Peak Mode: Sensitivity: Medium, Min. First Peak (% of full-scale): 10
- Audit Mode: Angle Threshold: 2.00 degrees
- Torque+Angle Mode: Angle Threshold: 2.00 degrees, Torque Threshold: 0.000, Allow Angle Ratchet: No

Buttons on the right include: Open..., Save..., Send, Delete Test In Meter..., Download Results, and Clear Data In Meter... A large text box for 'Comments' is located at the bottom.

## Note for Force & Load Sensors

When performing a Load Cell Calibration, if choosing a 2 point calibration, load at 10% and 100%. If performing a 3 point calibration and load at 10%, 50% and 100%.

The calibration program will guide you through the calibration by text in the information box. By selection in the Calibration Type you can select Compression Only, Tension Only or Both if the Load cell supports this. Type in the appropriate Full Scale value and select the units desired.

Mountz Torque Meter Interface Program

File

Online Firmware Version: XXX Operator: Homer Simpson

Tool Tests | Data Logging | **Sensor Calibration** | Meter Calibration

Sensor Type  
 Torque Sensor  
 Force Sensor

Torque Sensor Type  
 Bridge  
 Brushless  
 Internal  
 Angle Transducer

Calibration Type  
 Compression/DCW Torque  
 Tension/DCW Torque  
 Both

2 Point Calibration  
 3 Point Calibration

Torque: [Black Box]

A/D Counts: [Black Box with Green + and 0]

Sensor Model: Force-100iN Serial No.: SMT-108

Full Scale: 100 kN

Read From Sensor

Start

Fill in sensor information and then press Start button to begin calibration

TimeStamp	Operator	Sensor Model	Serial No.	Max. Value	Units	Pos. Slope 1	Pos. Offset 1	Pos. Slope 2	Pos. Offset 2	Pos. Breakpoint	Neg. Slope 1

Print

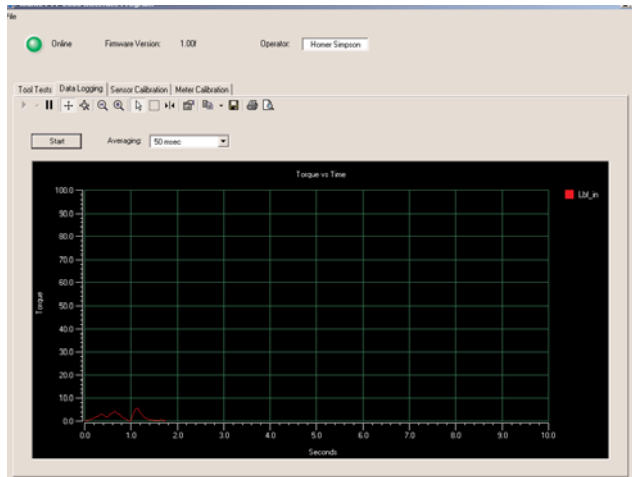
## Meter Calibration

This procedure is used to calibrate the gain of the LTT to a high degree of accuracy. This allows all LTT to exhibit the same accuracy with a Mountz "Smart" transducer as the meter that was used to perform the calibration.

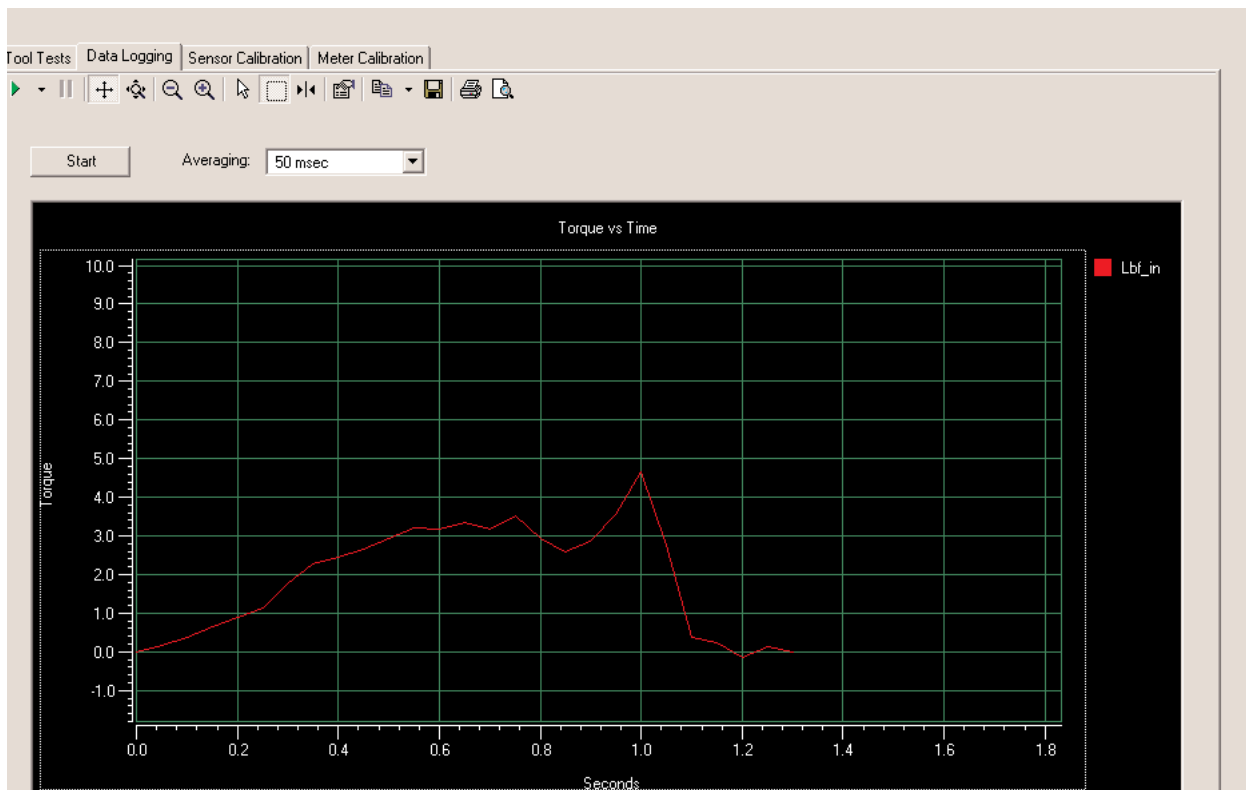
The LTT Calibration requires special equipment. This equipment is available from Mountz for those that require it as an optional item.

## Data Logging

This program is used for graphing the data. This feature can be utilized to evaluate and confirm torque specifications in both production or R & D environments.



When the graph first appears you can enlarge it by clicking on the Zoom-Box, which is the square box made up of dashed lines just to the right of the big arrow. Then drag the cursor to surround the small graph and the view will expand the graph as shown

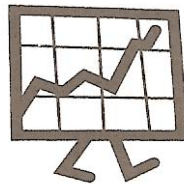


The LTT interface program contains a Tab for Data Logging. The actual plot on the Screen is Torque vs. Time. If you have an Angle enabled transducer the Torque and Angle data will be collected in a .csv file. The data collection begins when you click the "Start" button and ends when you click the same button which changes to "Stop" after the data collection begins. The data is collected is available in:

The results will be saved in the PC in C:\Program Files\Mountz\ Torque Meter Interface Program \Tool Test Results\Operator Folder where the "Operator Folder" will be the name of the Operator entered in the upper portion of the Tool Test Screen. " If you use this function frequently you probably will want to create a shortcut to this folder.

The .csv file can be opened using Excel. You can use Excel to plot this data in a variety of formats or by using other Windows based tools of your choice. There is also an Excel Spreadsheet with a Macro as an example of Plotting Torque and Angle. This is available on the LTT CD in the folder Excel Macro for Torque and Angle. Open this Excel file, highlight the Torque and Angle data, click the Graphing Icon that is on the spreadsheet, the Torque and Angle will be plotted for you. If you have your own Torque and Angle data you can just replace the example data with your own, highlight it and click the Graphing Icon to plot it.

Angle	Torque
6	3.64
21	3.62
36	3.63
137	4.34
153	3.99
167	4.05
182	4.23
196	4.30
211	4.13
225	3.74
240	3.99
254	4.32
269	4.52
283	4.31
298	4.01
313	4.18
327	4.38
342	4.23
356	3.95
371	3.74
385	3.99
400	4.13
414	4.15
429	4.19
444	4.13
458	3.88
473	3.90
488	4.09
503	4.01
517	3.77
532	3.79
547	4.31
561	4.26
576	4.22
591	4.05
605	3.91
620	3.86



This Spreadsheet gives an example of Plotting Torque and Angle Values. Simply highlight the cells containing the values of Angle and Torque and click on the Graphing Icon above.

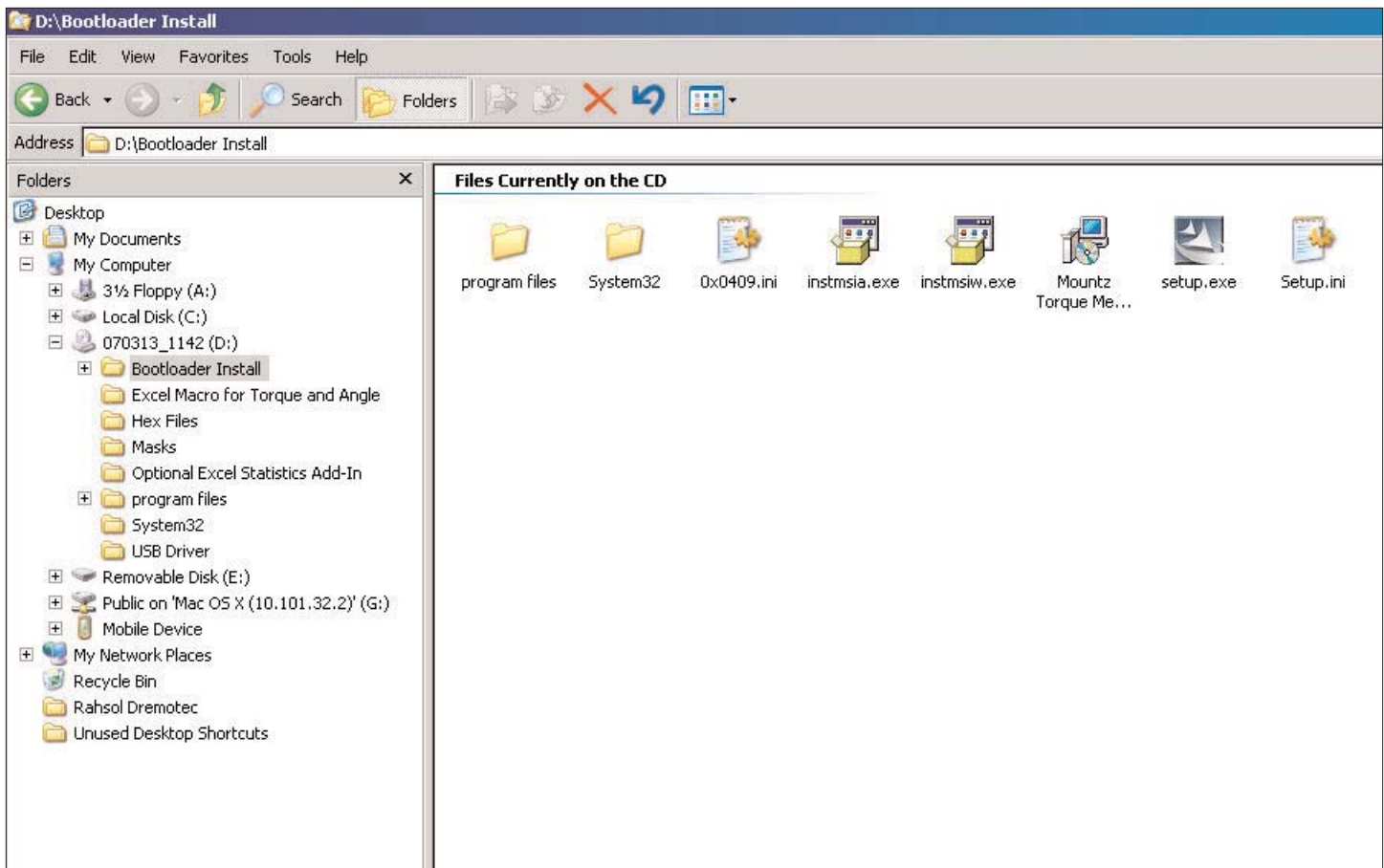
If you have collected Torque and Angle values, using the LTT Data Logging Program, you can use this Template to Plot Torque and Angle. Simply substitute your own values for those on the left.

The data is collected is available in:  
 C:\Program Files\Mountz\LTT Interface Program\Streaming Data Files\"operator name"  
 Where the "operator name" is the operator entered on the Data Logging Tab. If you use this function often you probably will want to create a shortcut to this folder on your desktop.

## Torque Meter Bootloader

When there are software updates to the LTT, it would available on the Mountz Web site. The Torque Meter Bootloader allows the operator to easily update the LTT unit.

This program is used to update the code in the LTT unit. This program does not automatically install as the Interface Program does. The following assumes the operator has the supplied CD in the D: drive. Locate the Bootloader Install folder on your computer as shown below



Open the Bootloader Install Folder and run the Setup.exe file by right clicking on it and choosing "Open". The Installation Program will automatically put a "Torque Meter Bootloader" Icon on your desktop

---

When the operator runs the program he/she will see a window as shown below. Connect the USB cable to the LTT and the computer and turn on the LTT unit. Click the button "Start boot loader on device". Both LED's on the LTT will turn on and the screen will indicate the LTT is in bootloader mode.

To update the firmware click the "Boot load HEX file to device.." button. Locate the HEX file update. It will be in the Hex Files folder. The file is named Mountz App.hex. This is the current application so there is no need to update but if the operator chooses he/she can reload it to see how this feature works. The process will take about 6 minutes as there is quite a lot of code in the product. The status will be shown in the LTT Boot Loader window as the process takes place. The operator can not run any other Windows Programs while this operation is taking place.



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## Bar Code Reader (Accessory Item)

The Bar Code Reader is an optional accessory for the LTT. It is designed for users that want the ability to scan Bar Codes on Tools and start Tool Tests automatically. This option reduces set-up time for users with a large number of Tool Tests stored in the LTT. The Bar Code Reader is powered by the LTT so no additional power source is required. This feature is designed to use a specific bar code reader, which is modified to operate with the LTT.

Model: Bar Code Reader  
Item # 072997

### Operation with a Bar Code Reader

The Bar Code Reader is connected, using the supplied cable, to the access port on the right hand side of the LTT analyzer.

This feature is designed to be a supplement to the Tool Tests used with the Analyzer. The user must enter a Test Name, the Sensor Model Required, and a Tool Serial Number.

1. The Test Name can be anything but is recommended to keep it short due to limited space on the Analyzer Display.
2. The Sensor Model is the transducer required for the test, it must be entered exactly as displayed on the Analyzer Display when it is connected or it will not be recognized as the correct Sensor.
3. The Tool Serial Number is entered as an alpha numeric value. This value is printed below the bar code, which would be affixed to the Tool being tested.

Shown on next page is an example Tool Test Screen. After entering the required data the Test would be sent to the Analyzer using the Send button on the right hand side of the screen. The Tool Test should also be saved on the PC for future reference.



File

Online      Firmware Version: 1.04b      Operator:

Tool Tests | Data Logging | Sensor Calibration | Meter Calibration

Test Name:

Sensor Model:

Tool Serial No:

Sensor Type:

Mode:

Units:

Filter:

Low Tolerance:

High Tolerance:

Auto-clear Mode:

Auto-clear Time:

Direction:

Angle Polarity:

First Peak Mode

Sensitivity:

Min. First Peak (% of full-scale)

Audit Mode

Angle Threshold:

Torque+Angle Mode

Angle Threshold:

Torque Threshold:

Allow Angle Ratchet:

Open...  
Save...  
Send  
Delete Test In Meter...  
Download Results  
Clear Data In Meter...

Comments

Once the Tool Test or Tool Tests are loaded into the analyzer, the Tool Test can be selected by scanning the bar code rather than selecting the test using the menu on the Analyzer. Press the Tool Test "Soft" key (the middle key below the display) once and then press Enter. You will hear 3 short beeps and the bar code reader will be activated. This activation sequence is required as powering the reader at all times would significantly shorten the battery life. Once the bar code reader is activated pull the trigger while aiming the laser beam at the Tool bar code. After the bar code is read the appropriate Tool Test is automatically started. If the bar code scanned does not match any of the Serial Numbers in the Tool Tests, the Analyzer will display "No Tool Test Defined for xxx". After collecting the required number of readings, press the Tool Test "Soft" key to stop the test

### Using the Bar Code Reader with Multiplexer

The Bar Code Reader can be used in conjunction with the optional 4-Port Multiplexer. For users that have multiple Tool Tests and using several torque transducers, the Bar Code Reader and the Multiplexer are the ideal package for torque testing. This combination provides a flexible, time saving solution that reduces the potential for operator error. A more complete description of the Multiplexer and its features are provided on page 30.

#### *Example of using the Bar Code Reader and Multiplexer.*

The user enters a Tool Test that includes one of the Transducers connected to the Multiplexer. In addition they enter the Serial Number of the Tool to be tested. This Serial Number is bar coded on the Tool to be tested. This Tool Test is downloaded to the Analyzer. Now when the Bar Code of the Tool is scanned the Analyzer automatically selects the correct transducer by using the Multiplexer and starts the appropriate Tool Test.

---

## Multiplexer (Accessory Item)

The Multiplexer is an optional accessory for the LTT. It allows users to connect 1-4 transducers to the Torque Analyzer simultaneously. The device eliminates the need to plug and unplug transducers. The LTT powers the Multiplexer so no additional power source is required.



**Note:** When calibrating Transducers, perform this operation with the Transducer connected directly to the LTT and not connected through the Multiplexer.



Model: Multiplexer  
Item # 072998

### Operation with the Multiplexer (Mux)

When the Analyzer is connected to the Multiplexer and powered on it reviews the Multiplexer (Mux) to determine what transducers are connected and downloads the identity and calibration data for each of the attached transducers.

The "Soft" key on the right hand side will indicate the currently selected Mux port such as Mux 1, Mux 2 etc. In addition, an LED on the right side of the transducer connection to the Mux will light-up indicating which transducer is currently selected.

#### Selecting Transducer Manually

1. Press the Mux "Soft" key and it will provide a list of currently connected Transducers.
2. The user can scroll through the list transducers and press Enter to select a model.

#### Selecting a Transducer Automatically

An automatic transducer selection is available.

1. A Tool Test is entered that includes one of the transducers connected to the Mux and this Tool Test is sent to the Analyzer.
2. Now when the Tool Test is selected on the LTT, the analyzer automatically connects to the required Transducer using the Mux. This reduces operator error of accidentally selecting the wrong transducer for a tool test.

The Multiplexer can be used with the optional Bar Code Reader. For users that have multiple Tool Tests and using several torque transducers, the Bar Code Reader and the Multiplexer are the ideal package for torque testing. This combination provides a flexible, time saving solution that reduces the potential for operator error. A more complete description of the Multiplexer and its features are provided on page 28.

Example of using the Bar Code Reader and Multiplexer.

The user enters a Tool Test that includes one of the Transducers connected to the Mux. In addition they enter the Serial Number of the Tool to be tested. This Serial Number is bar coded on the Tool to be tested. This Tool Test is downloaded to the Analyzer. Now when the Bar Code of the Tool is scanned the Analyzer automatically selects the correct transducer by using the Mux and starts the appropriate Tool Test.

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## Force & Load Sensors

The LTT models can be used with Force & Load sensors.

### **Using LTT as a Force Measurement Meter**

The LTT recognizes standard or ARCII equipped force sensors (load cells). The active modes of operation for force are TRACK & PEAK. Descriptions of these modes are found in this manual (see page 8).

ARCII equipped sensors incorporate a small chip that allows for automatic sensor recognition (see page 14). This feature identifies the sensor, all calibration data and a calibration date reminder. This chip can be added to the connection cable to enable the features of the ARCII technology.

The SET UP mode allows users to define how the LTT operates, including setting of the Clock. Three modes that are irrelevant to Force are Angle, T+A Threshold and First Peak (these are Torque Only selections).

The LTT only supports 2 units of measure when connected to a force or lead sensor. Those units are kN or Lbf.

Force sensors can be used in 3 directions. Clockwise (Compression), Counter Clockwise (Tension) or Both can be selected in the Setup mode. (See page 13) for setting direction.

The included software program Mountz Torquemeter Interface Program (MTIP) has functions for Tool Tests, Data Logging, Sensor and Meter Calibration. For calibration of Force sensors, select the sensor type Force.

For Tool Test you can define a type of parameter criteria, including tolerance settings for a specific function. (See page 18 for setting up Tool tests). For questions related to Force use, please study the manual or you can call a Mountz representative for assistance.