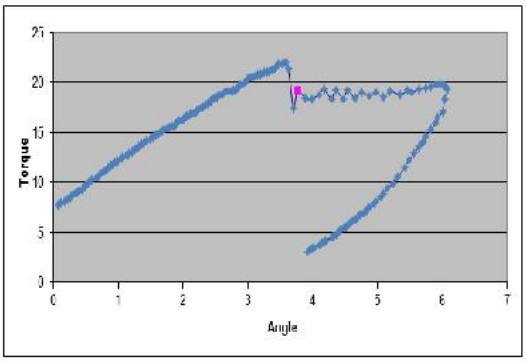
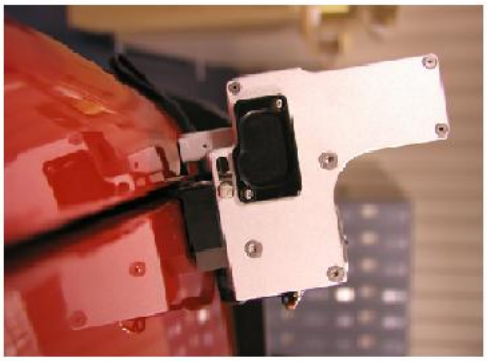
TranSend II - 600 Measurement Training Manual





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Introduction

The model 600 data collector and TranSend II software are intended to provide a cost effective solution to data collection and torque applications requiring portability.

TranSend II

- Maintains setups and data in a Microsoft SQL 2008 R2 Express database
- Data and setups are transferred between the PC and the 600 via a USB cable
  - Operator is notified of changes to setups when connecting the 600
- Harvested data can be viewed in DAR or exported to Excel or other programs
- Gage Suite Editor has three default gage suites: Torque, LMI and Digital
  - Gage suites can be edited and new gages configured
  - Torque uses include:
    - Residual algorithms for auditing assembled products
    - Set torque measurement for hand assembly applications
- Optional characteristic descriptors can be used to:
  - Inform operators about aspects of data collection
  - Marry characteristics in the database to track critical measurements

The model 600 data collector

- Available 600 models:
  - Torque/serial
  - LMI/Digital/Serial
  - Digital
- One gigabyte of memory
- Powered by rechargeable lithium battery (not by the PC)
- Supports color graphic images to help operators during data collection
- Reaudit capability
- Operators can view:
  - Control charts, histograms, statistics and review data
  - Torque curves
    - These may be captured individually or set to save automatically for out of spec, exceptions or all torque events

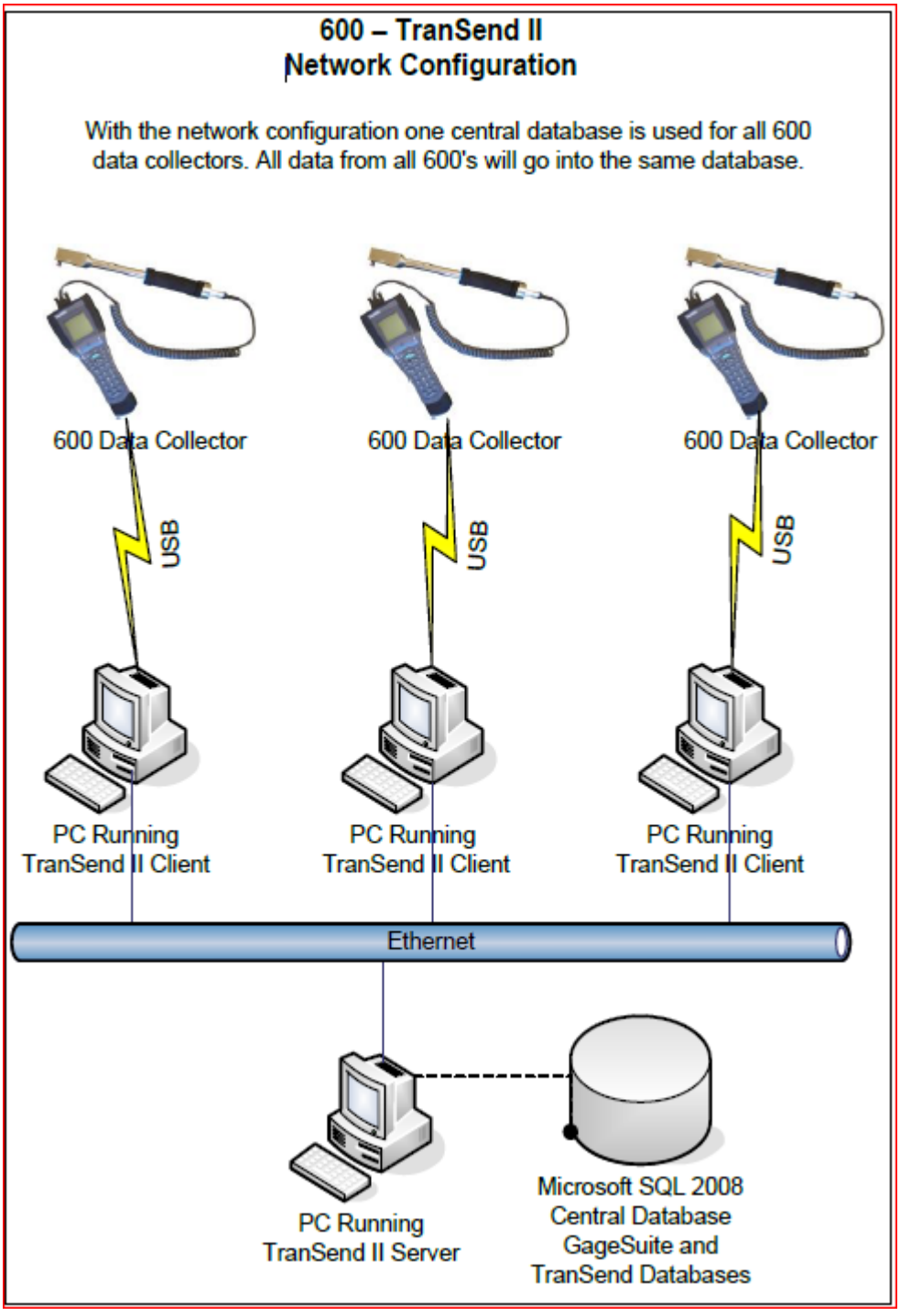
Reporting options

- CSV format which can be opened in Excel.
- DAR v. 3.5.0.1 and later for SPC analysis
- Future release: Web-based Business Intelligence exception and audit completion reports

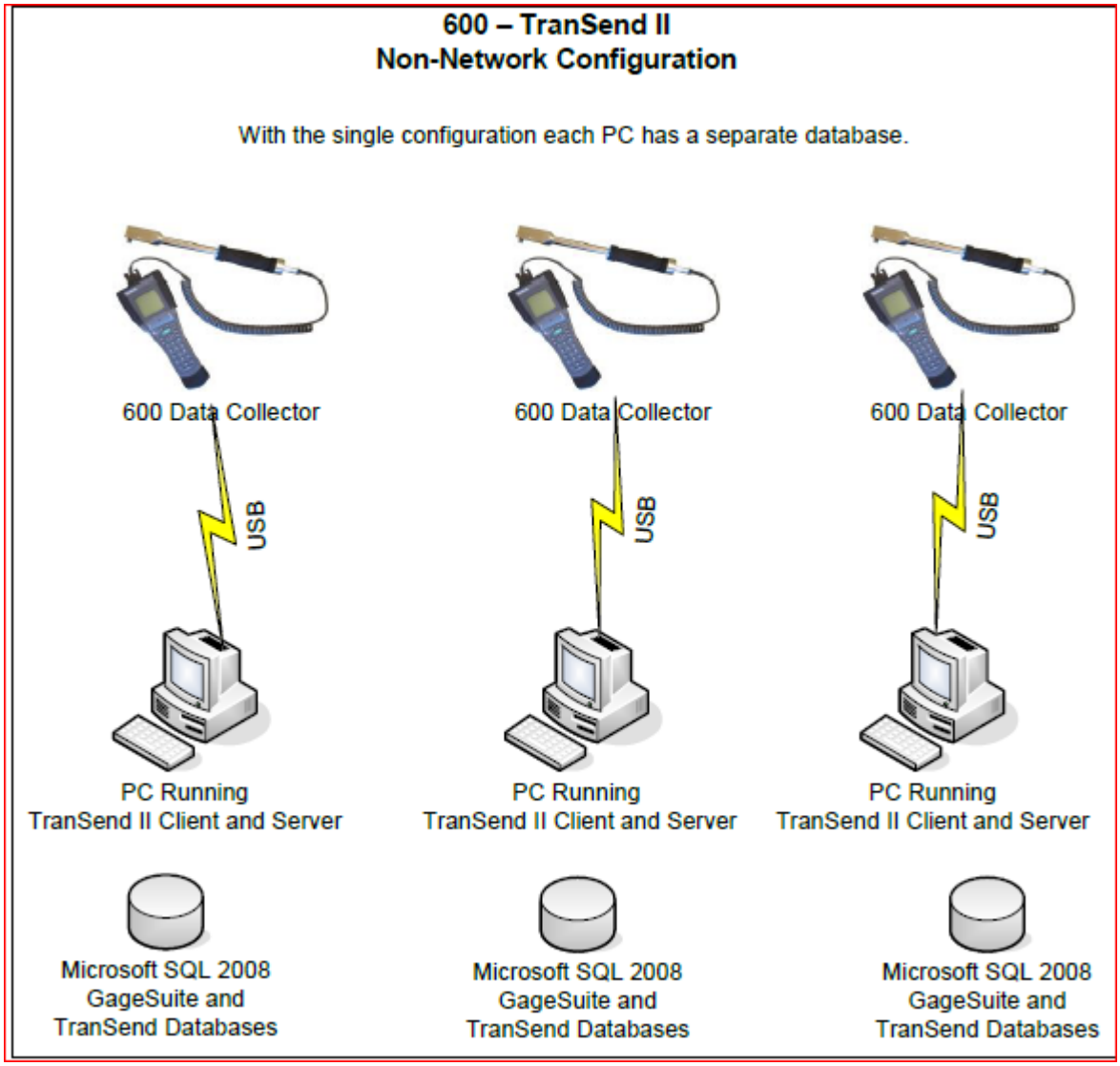
DM600 –TranSend II Configurations

The 600 Handheld Data Collector along with TranSend II can be installed either in a **network** or a **non-network** configuration. The figures below show both options:

Network Configuration



Non Network Configuration



Note: With the non-networked configuration the 600s are tied to their database. If a 600 is moved to a different PC (with a different database) an error message will be displayed saying that the unit does not belong to this database. You will have to reinitialize the collector if you want to use it on the new computer.

TranSend II and Data Collector Training Goals

The goal is to understand how all the components work together to create setups, collect data and upload it to the TranSend II database.

TranSend II Objectives:

Demonstrate an understanding of:

1) Gage Suites
    a. Create a gage suite with aliases and their uses
2) Setup Editor
    a. Configure Setup Editor preferences
    b. Create labels and assign them to a setup
    c. Create characteristics with alarms and assign them to a setup
    d. Assign aliases to characteristics
    e. Select images and assign them to characteristics
    f. Add characteristic descriptors and assign them to characteristics
    g. Create a setup group and assign setups to the group
3) Demonstrate understanding of information transfer between TranSend II and the 600 so that:
    a. Setup Groups are sent to the collector
    b. Gage suites are sent to the collector
    c. Data is harvested from the collector

600 Objectives:

Demonstrate understanding of:

1) Menus and keystrokes
2) Preference settings for efficient battery use
3) How to select a gage suite to master and test the gages
4) About screen information and options
5) Select a setup, respond to prompts and collect data
6) View analysis charts and torque curves
7) Reaudit

Questions for Torque Data Collection

1. What wrench sizes and uses will you employ on your audit routes?

2. Are fasteners audited as they are installed, or afterwards?

3. Where do you get your spec limits?

4. How often do the limits change (update, edited, reviewed)?

5. What are the critical torque measurements that you need to audit or collect data on?

6. What labels do you think you'll need (non-data information)?

7. Do you need to evaluate your joint variation (stiction)?

8. How do you organize your audit plans?

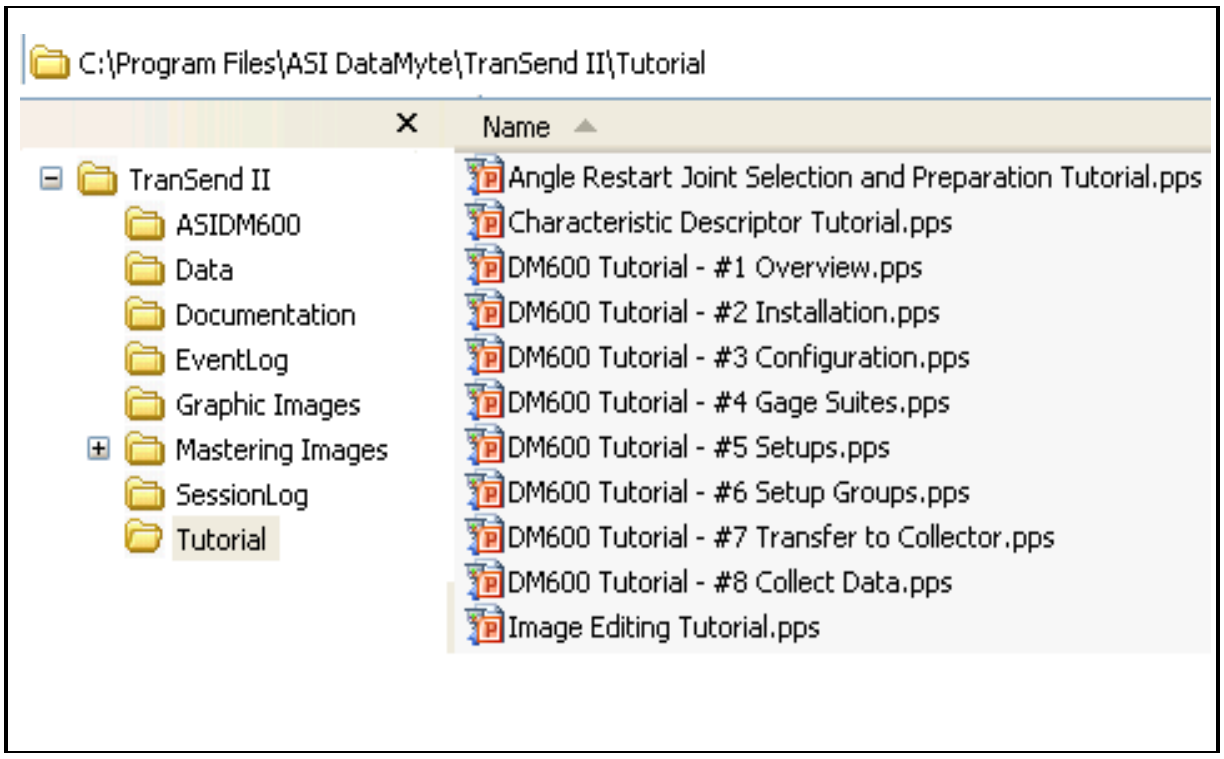
9. How do you store all the readings that are being taken?

10. How do you determine that all critical torque readings have been taken and that they have been taken on time?

11. What reports do you need to provide and how often?

TranSend II and 600 Tutorials

TranSend II has several tutorials, which are located in the TranSend II directory in the Tutorial directory.

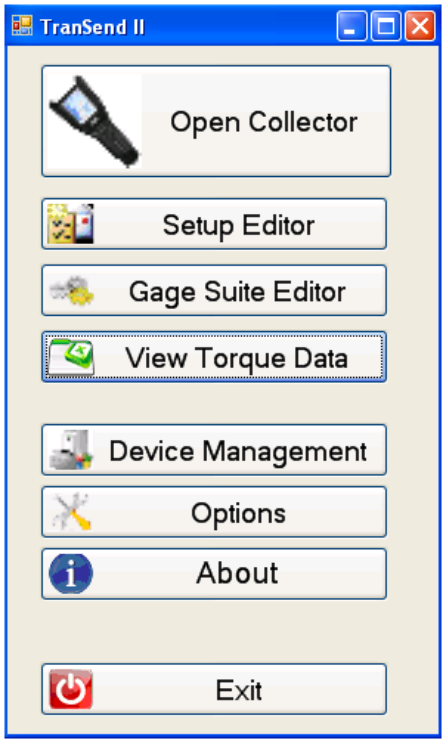


TranSend II Menu Tour

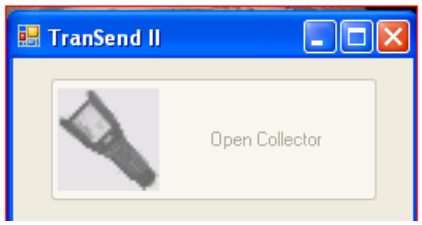
We will take a preliminary look at the menus in TranSend II.

1. Click the **Windows Start** button and select:
   All Programs /ASI DataMyte / TranSend II / TranSend II

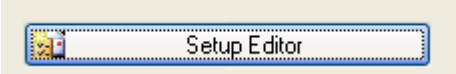
The TranSend II main screen appears.



2. Note the Open Collector image. It is grayed out because there is no collector attached. When a 600 is attached, this interface is used to share information between the collector and the TranSend II database.

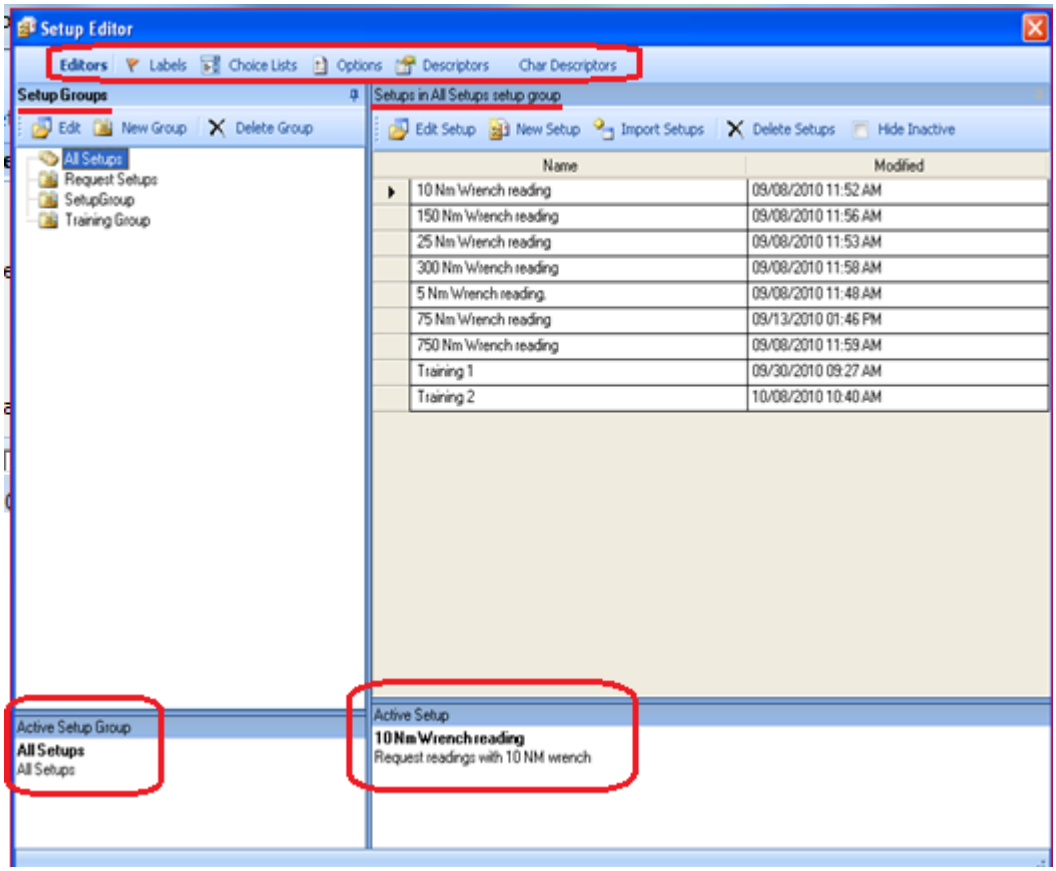


3. Select Setup Editor



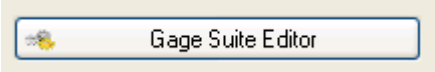
The Setup Editor is used to create setups and their components (characteristics, labels, choice lists, etc.). Note the following:

- Editors:
  - Labels
  - Choice Lists
  - Options
  - Descriptors
  - Char Descriptors
- 4 Panes:
  - Setup Groups
  - Setups (in the selected Setup Group)
  - Active Setup Group
  - Active Setup



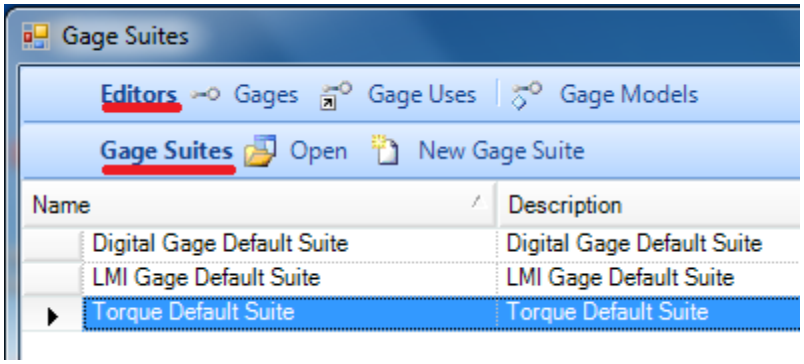
Close Setup Editor using the red X.

4. Select Gage Suite Editor. Gage Suites are sets of gage instructions for the 600.



Note the following:

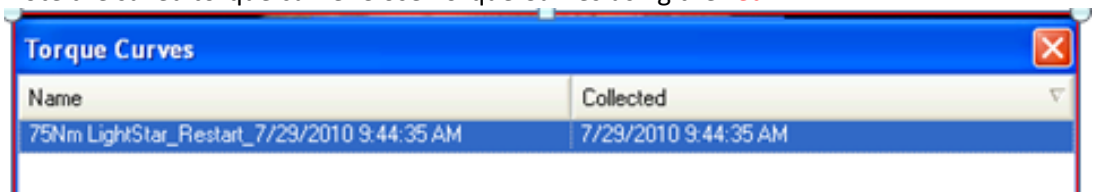
- Editors: Gages, Gage Uses, Gage Models
- Gage Suites: Open, New Gage Suite
- List of gage suites
    - **The default suites will most likely be all you need**



Close the Gage Suite Editor using the red X.

5. Select View Torque Data.

Note the saved torque curve. Close Torque Curves using the red X.

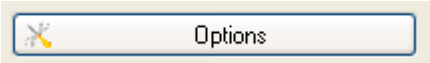


6. Note Device Management. It is grayed out if the 600 is not attached to the PC.

If the 600 is attached selecting Device Management will show this Update Firmware message. This will usually need to be done when updating TranSend II software.

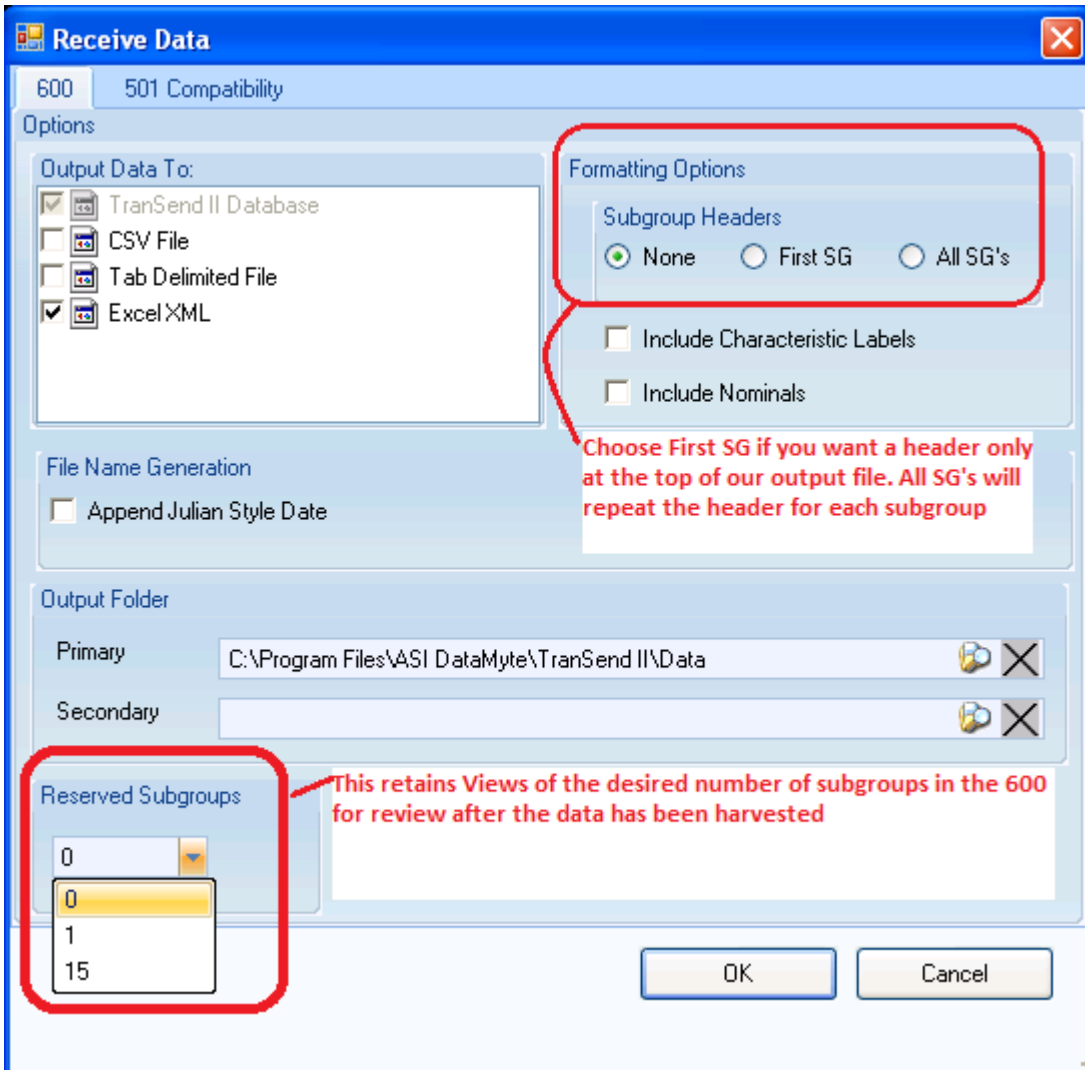
Note: Once firmware is updated, reinitialize the collector.

7. Select Options.



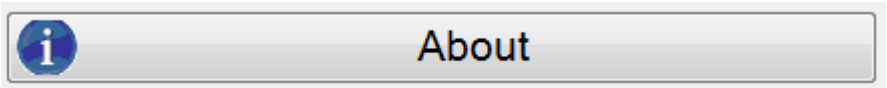
and note the following options:

- Output Data To
- Formatting Options
- Append Julian Style Date option
- Output Folders
- Reserved subgroups



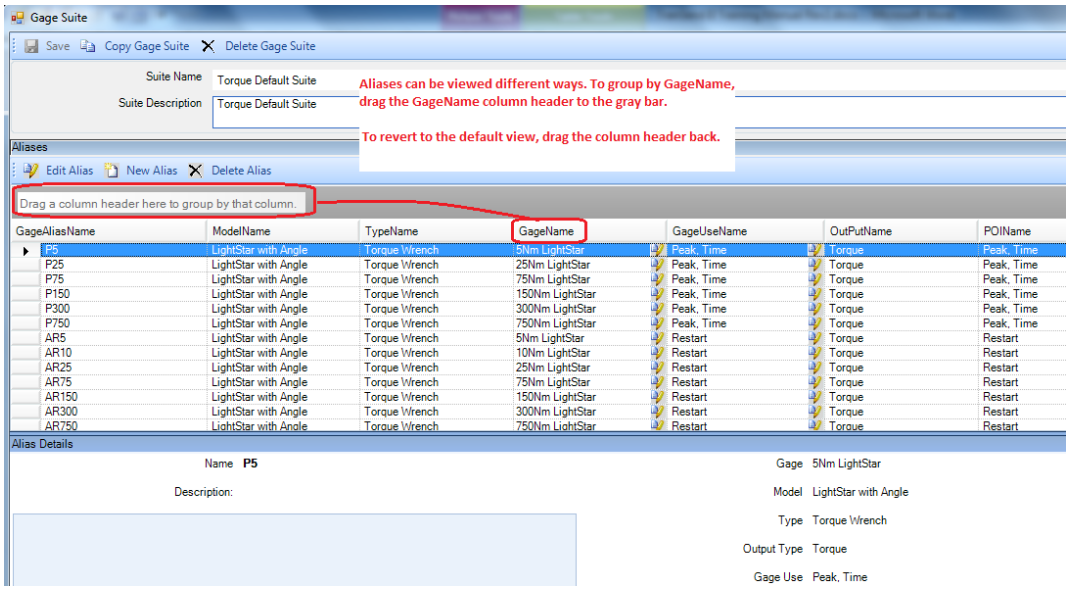
Click Cancel when done.

8. Select About. This shows what version of TranSend II you have and other information.



Gage Suite Review

1. Open the Gage Suite Editor. Open the Torque Default Suite. View the Aliases and note the alias details Model, Type, Gage, Use etc.) An alias is assigned in the source field in a setup.



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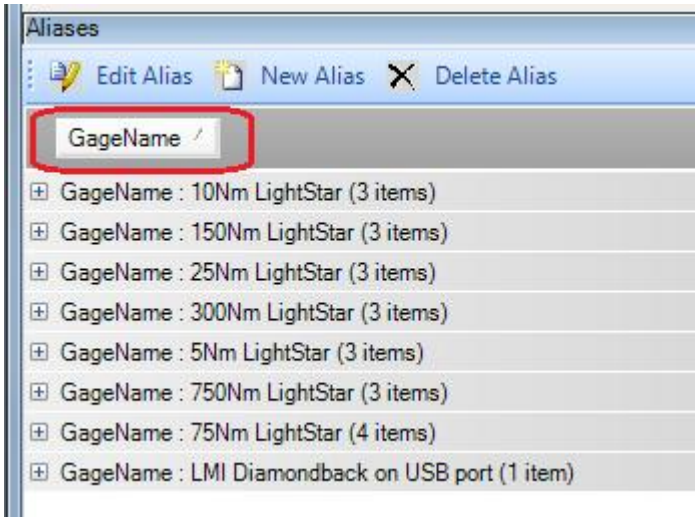
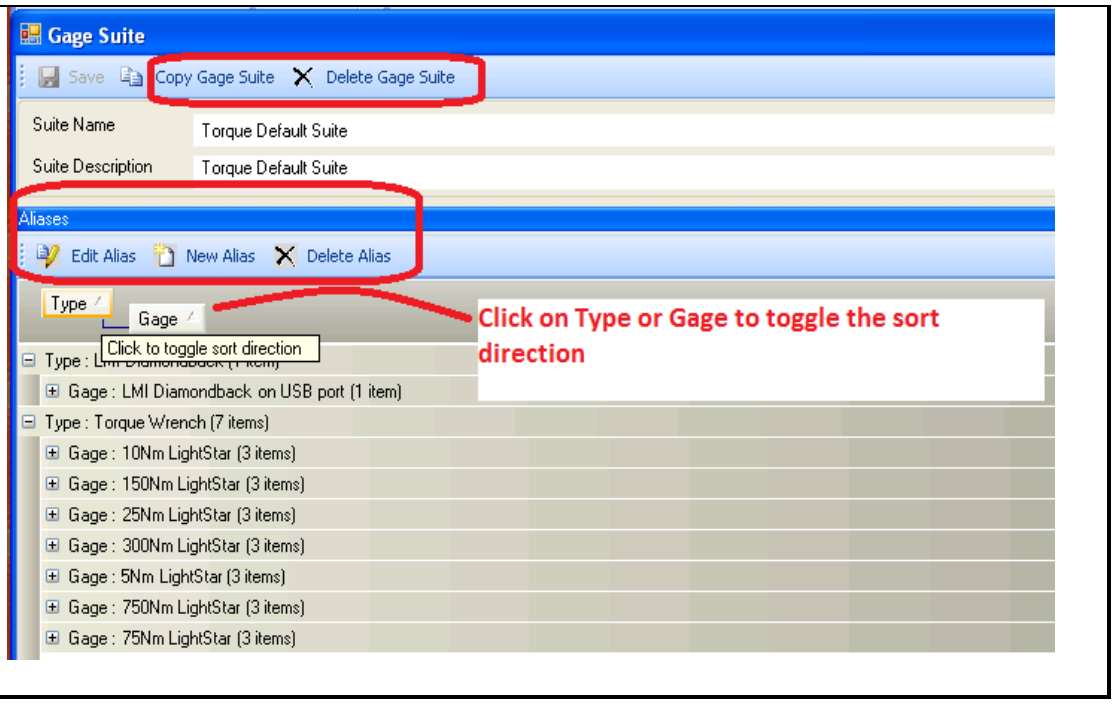
2. To view aliases grouped by GageName, drag the GageName column header to the gray bar.



Click the arrow next to GageName to sort in different directions.
Note the toolbar buttons for Gage Suite and Aliases.
Close the Torque Default Suite when finished. Note: This resets the columns.
**Note: you can drag the column heads back to the data to reset the columns as well.*

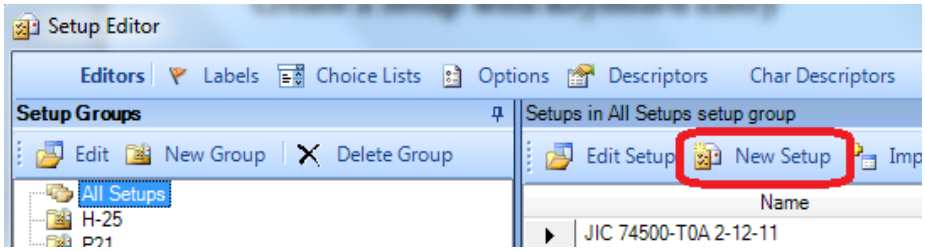

Gage Suite
Save
Copy Gage Suite
Delete Gage Suite
Suite Name
Torque Default Suite
Suite Description
Torque Default Suite
Aliases
Edit Alias
New Alias
Delete Alias
Type
Gage
Click to toggle sort direction
Click on Type or Gage to toggle the sort direction
Gage : LMI Diamondback on USB port (1 item)
Type : Torque Wrench (7 items)
Gage : 10Nm LightStar (3 items)
Gage : 150Nm LightStar (3 items)
Gage : 25Nm LightStar (3 items)
Gage : 300Nm LightStar (3 items)
Gage : 5Nm LightStar (3 items)
Gage : 750Nm LightStar (3 items)
Gage : 75Nm LightStar (3 items)

Create a Simple Setup, Upload, Collect, Download

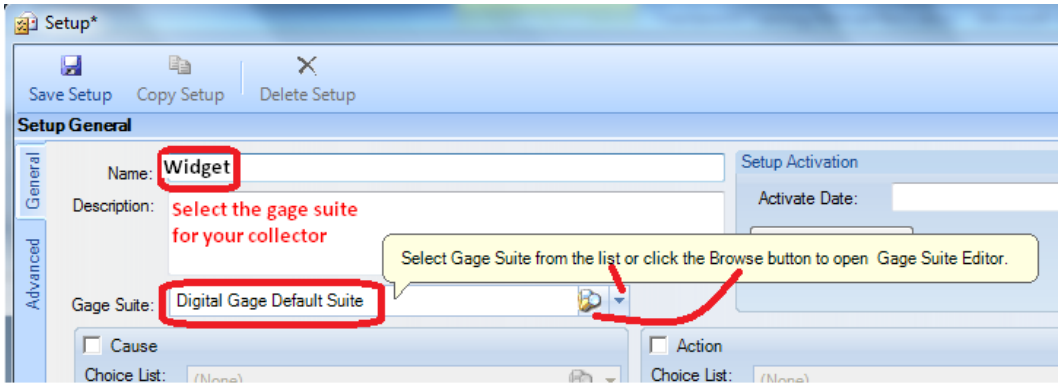
We will create a simple setup, upload it to the 600, collect data and download it to TranSend II.

1. At the main TranSend II menu, select Setup Editor.

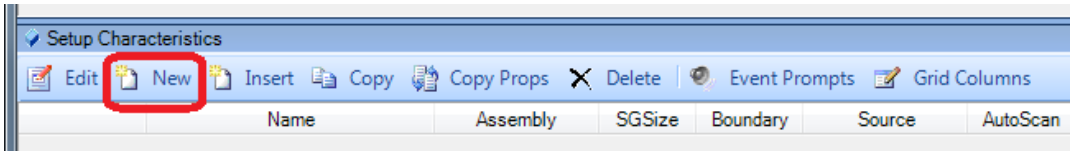
2. Click New Setup.



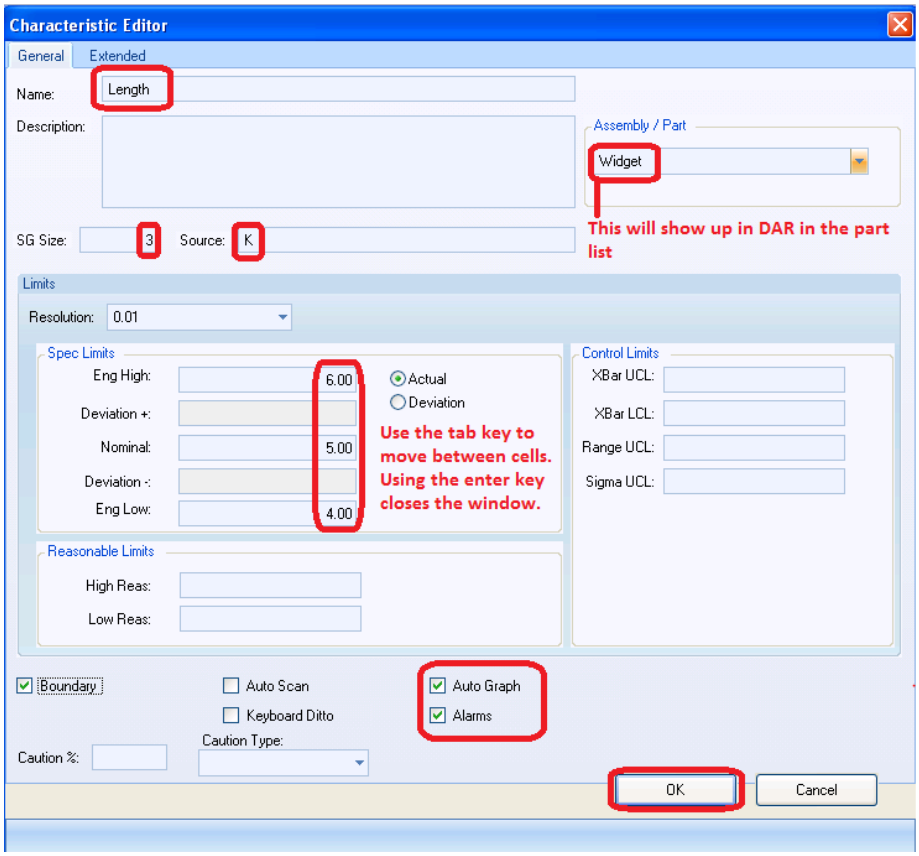
3. Name the setup Widget. Select the Default Gage Suite for your collector. **Note: You can open the gage suite to view it by clicking the Browse button. Save the setup.**



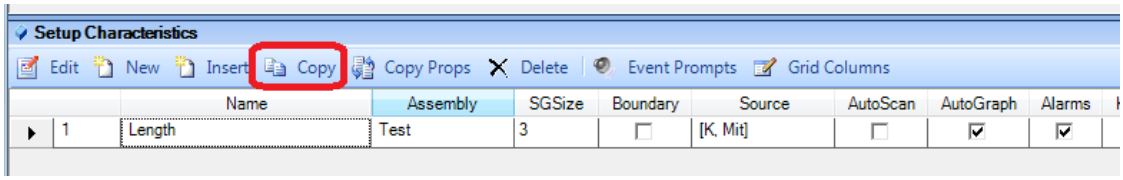
4. At the bottom, note Setup Characteristics. Select New.



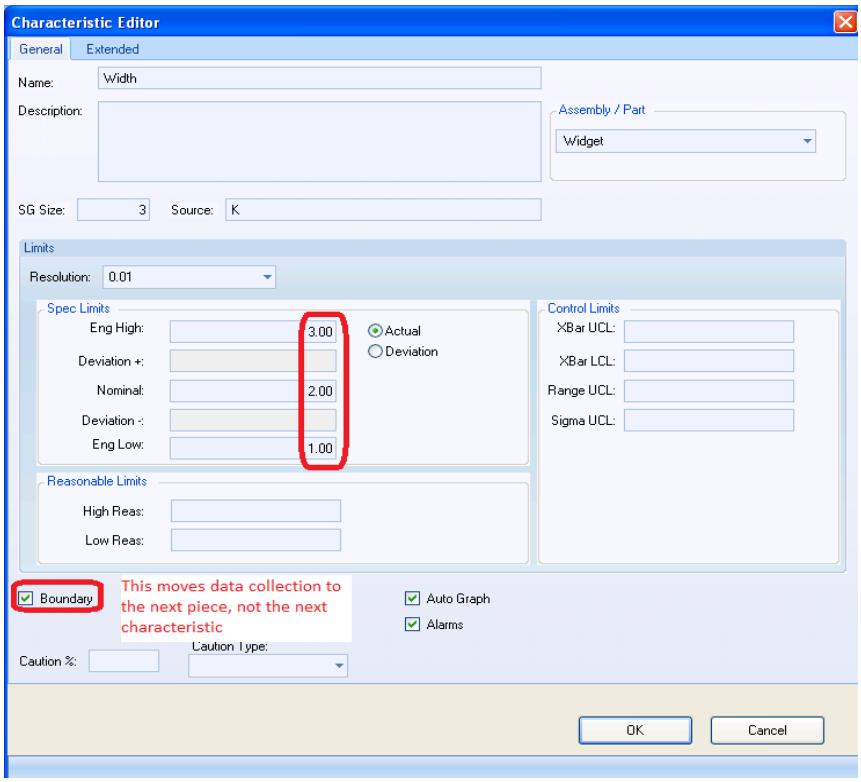
5. Type in the characteristic information as shown. Review the notes. Click OK.



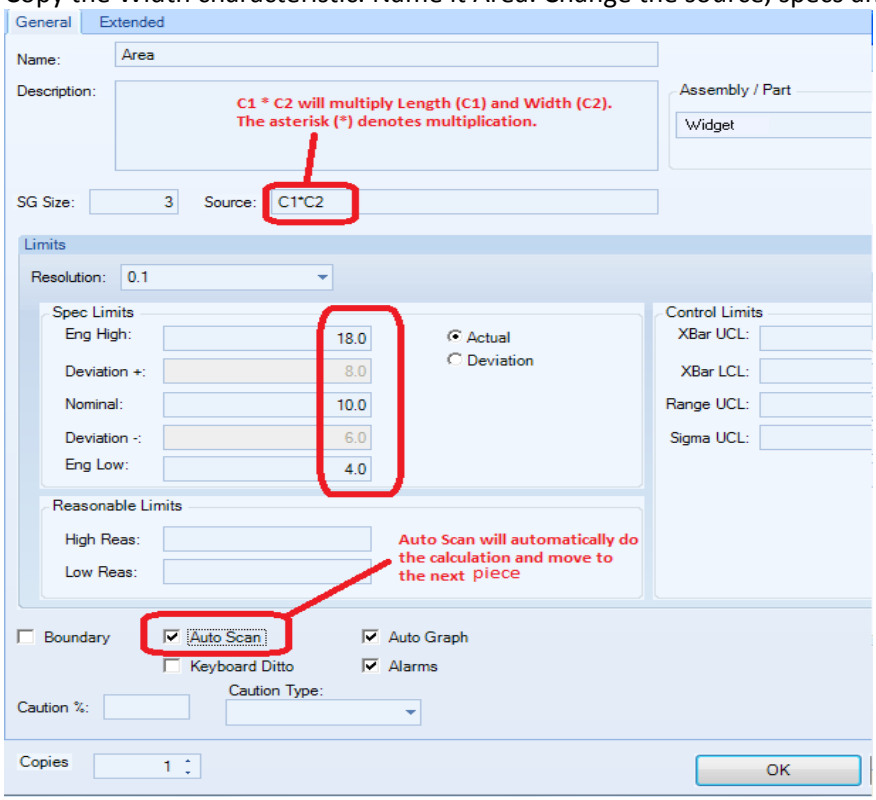
6. Select the Length characteristic. Click Copy.



7. Name it Width and change the specs as shown. Click OK.

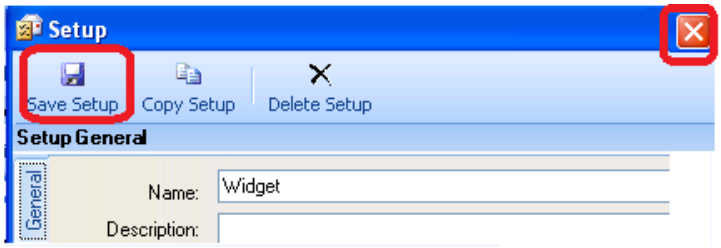


8. Copy the Width characteristic. Name it Area. Change the source, specs and check Auto Scan..

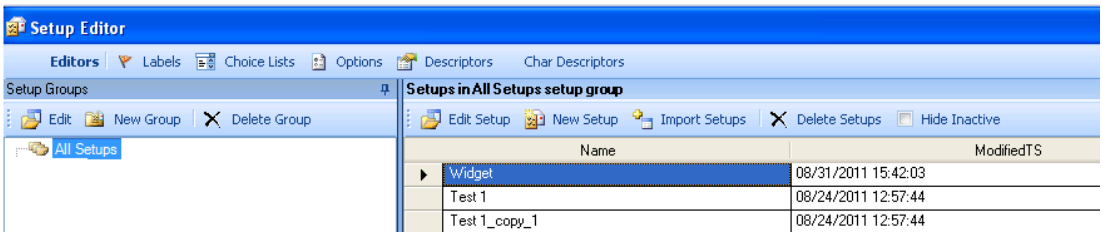


Click OK

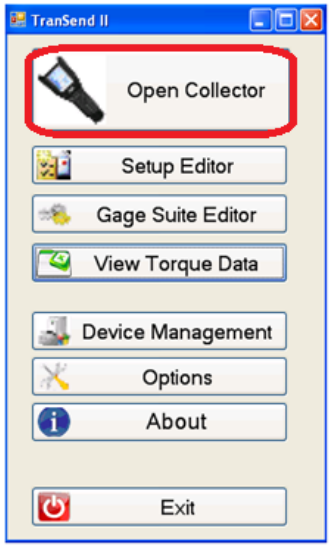
9. Click Save Setup. Then close the setup.



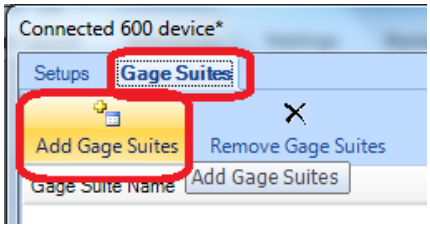
10. Note your setup on the list. Close Setup Editor.



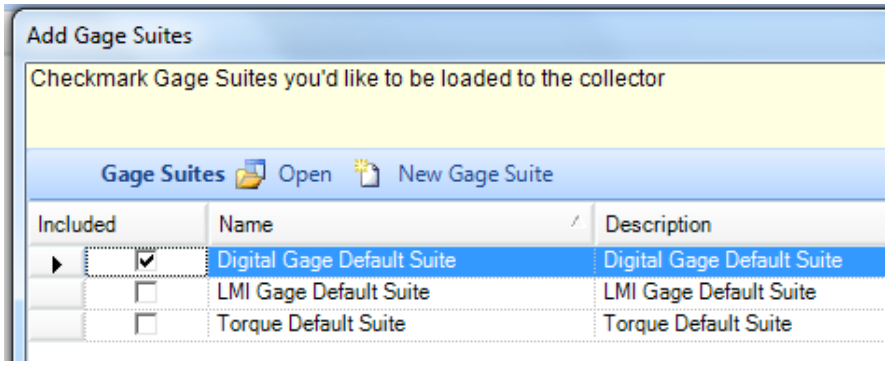
11. **Connect the 600 to the PC and turn it on.** Once it is at the main menu, click Open Collector on TranSend II.



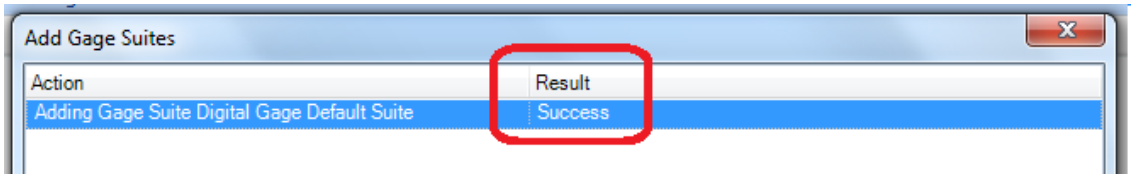
12. **Click on the Gage Suites tab. Click Add Gage Suites.**



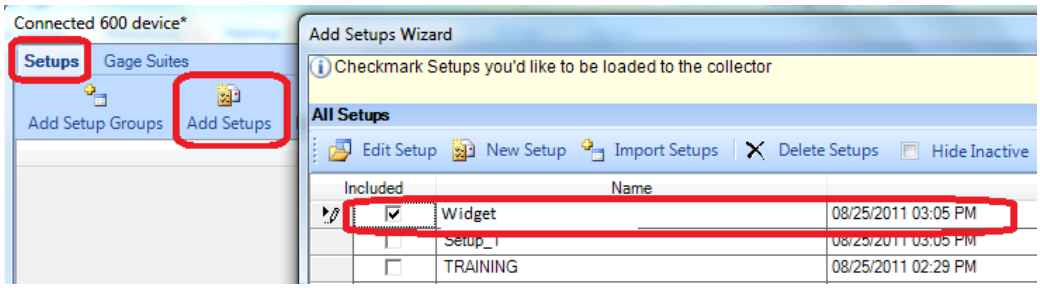
13. **Check the Digital Gage Suite and click OK.**



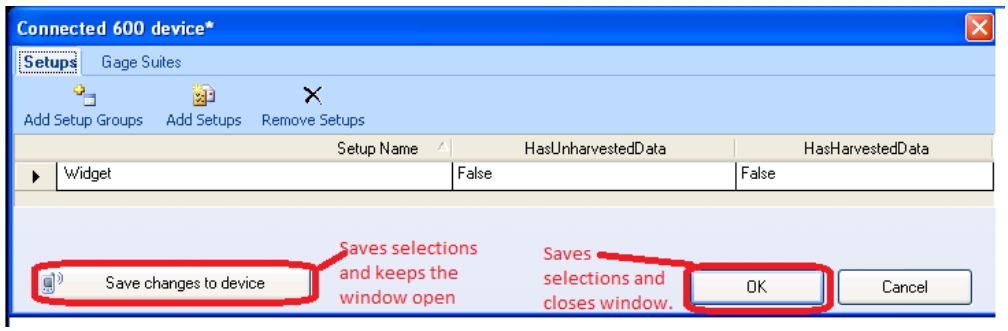
14. **Click OK to this message. The gage suite was selected successfully.**



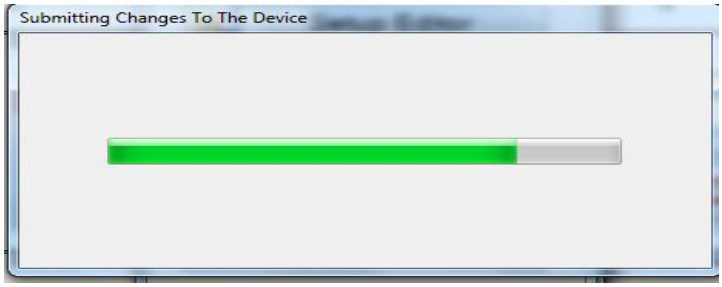
15. **Click the Setups tab. Click Add setups. Check the Widget setup and click OK.**



16. **Click the OK button or the Save Changes to Device button. They both do the same thing.**

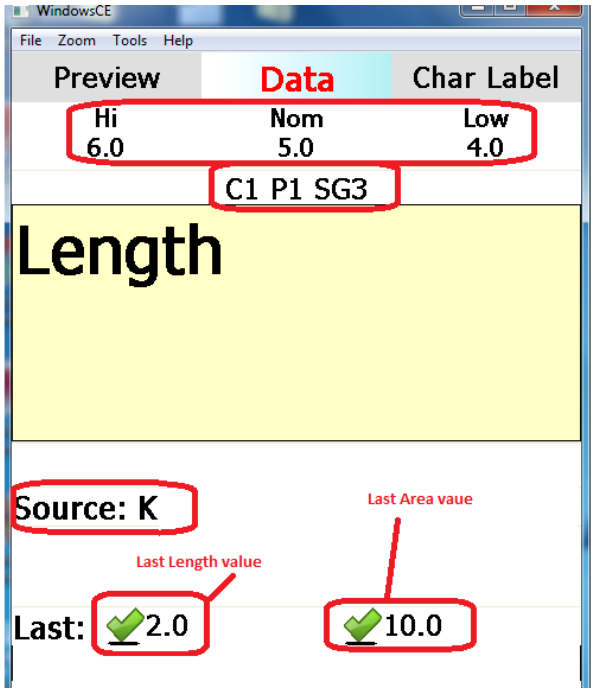


17. **The setups and gage suites are uploaded to the 600. Unplug the 600.**



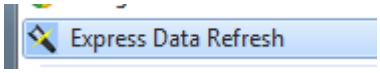
18. **On the 600, with Setup highlighted, press Enter. The Caliper setup now shows. Press Enter to select it.**

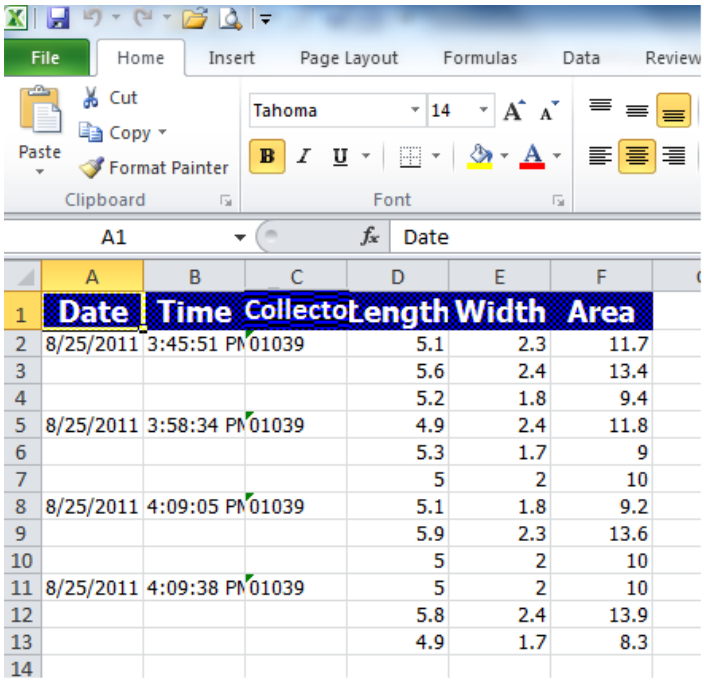
19. **Note the specs. Put in a value between 4 and 6 for Length and press Enter. Enter a value between 1 and 3 for Width and press Enter. Note that after typing in the width, it says Wait! Autoscan while it calculates the Area. Then it brings you back to Length.**



20. **Collect data until the display shows C1P1 SG5.**

21. **Connect the 600 to the PC. From the Start menu, select Express Data Refresh. The Connect screen appears and the Excel data will appear after that. Congratulations!**

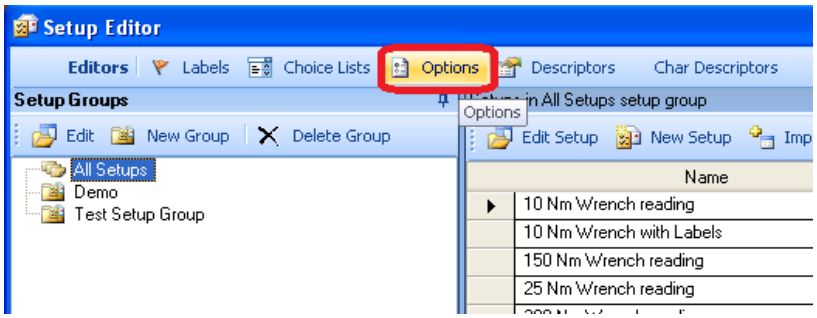




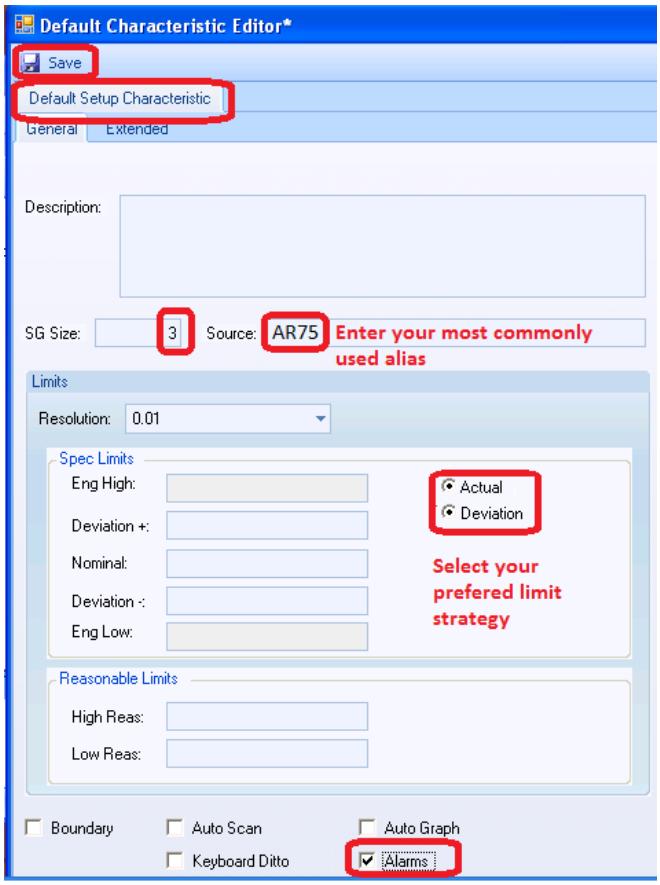
	A	B	C	D	E	F
1	Date	Time	Collecto	Length	Width	Area
2	8/25/2011	3:45:51 PM	01039	5.1	2.3	11.7
3				5.6	2.4	13.4
4				5.2	1.8	9.4
5	8/25/2011	3:58:34 PM	01039	4.9	2.4	11.8
6				5.3	1.7	9
7				5	2	10
8	8/25/2011	4:09:05 PM	01039	5.1	1.8	9.2
9				5.9	2.3	13.6
10				5	2	10
11	8/25/2011	4:09:38 PM	01039	5	2	10
12				5.8	2.4	13.9
13				4.9	1.7	8.3
14						

Editors Menu in Setup Editor

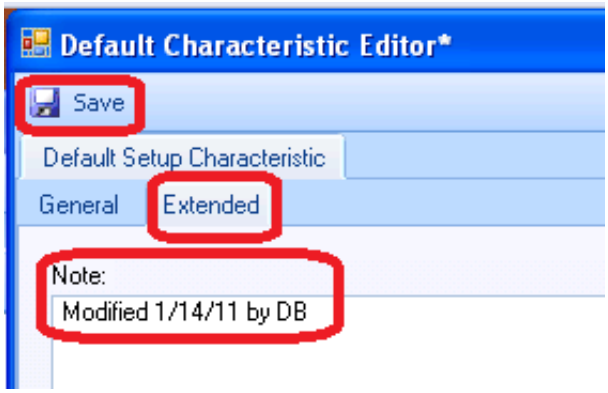
1. From the main TranSend screen, click **Setup Editor**. Click the **Options** Editor.
   Note: Options are where you set defaults.



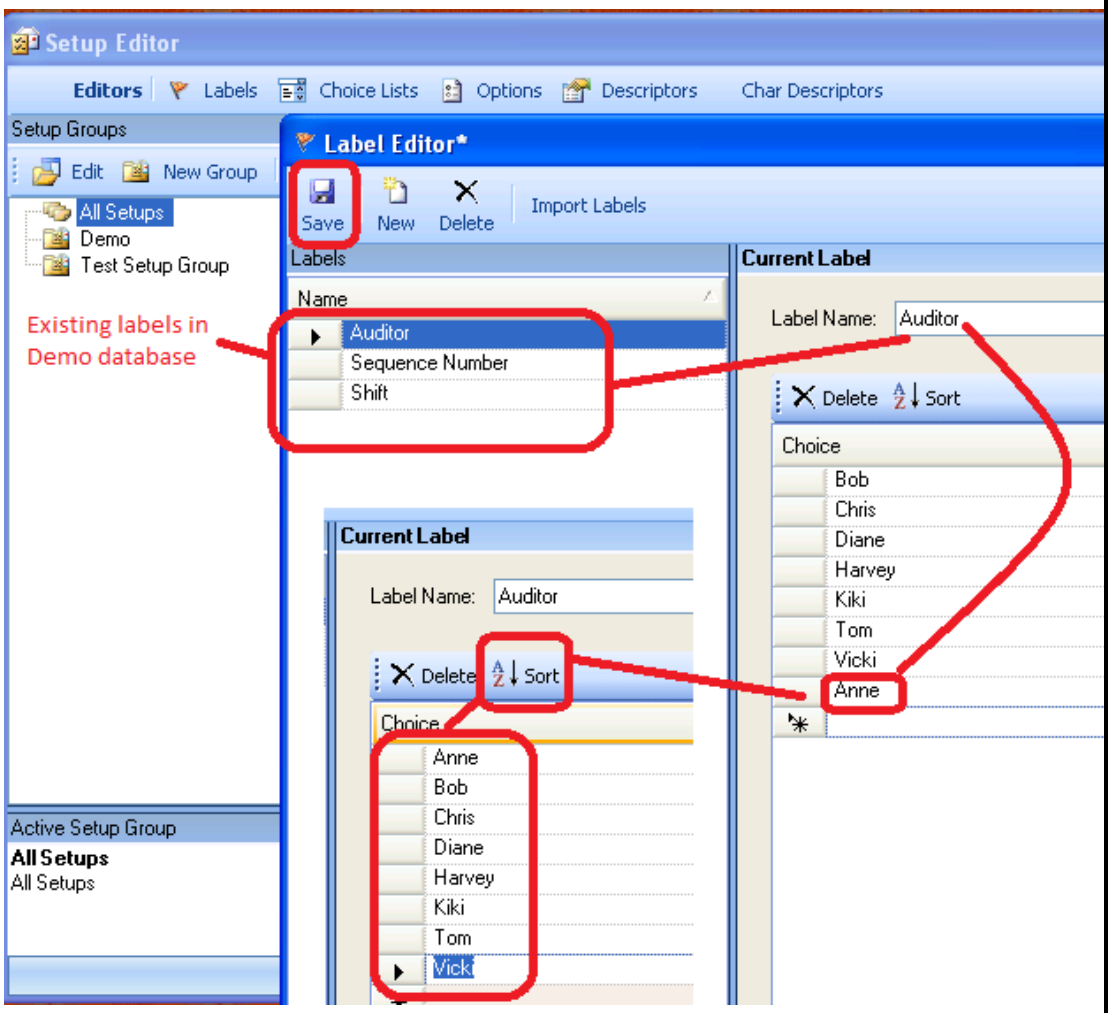
2. On the **General tab**, change the **Default Setup Characteristic** settings to those shown and click the Save button.



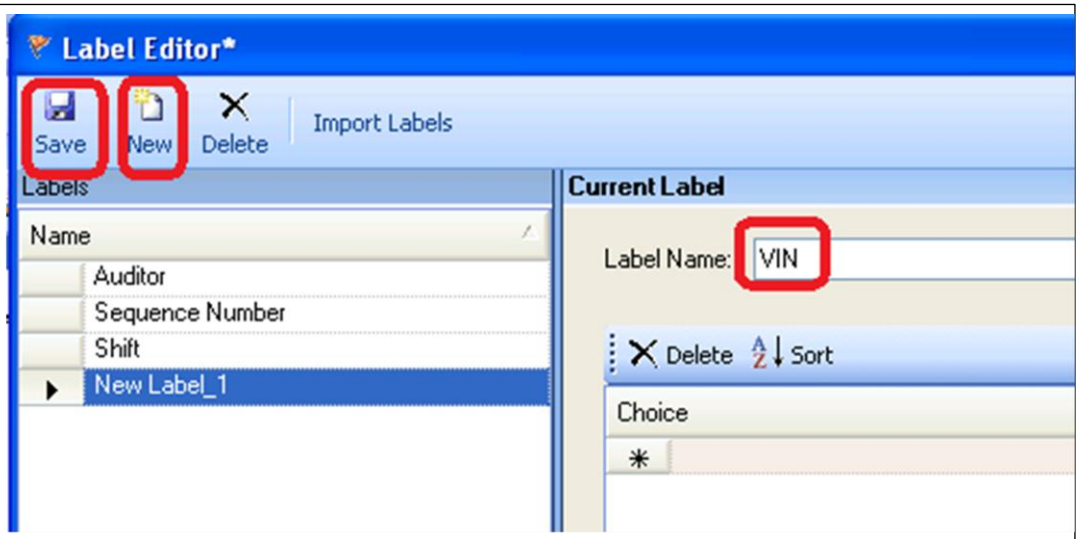
3. Select the **Extended tab**. Type in Modified (today's date) (your initials) as in the example. Save and close the Default Characteristic Editor.



4. Open the **Label** editor and add your name to the list of auditors, sort and **save changes**.



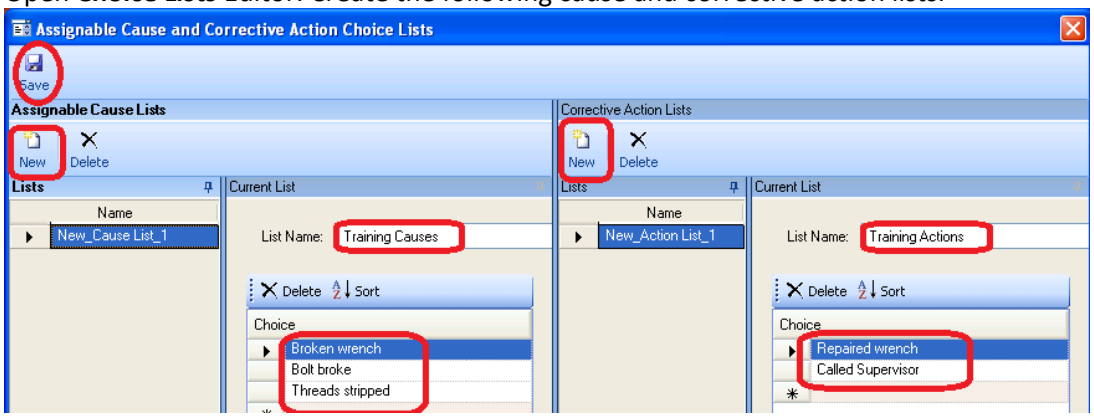
5. Select the New button and name the new label VIN and click **Save**. *This label does not lend itself to being using a choice list.*



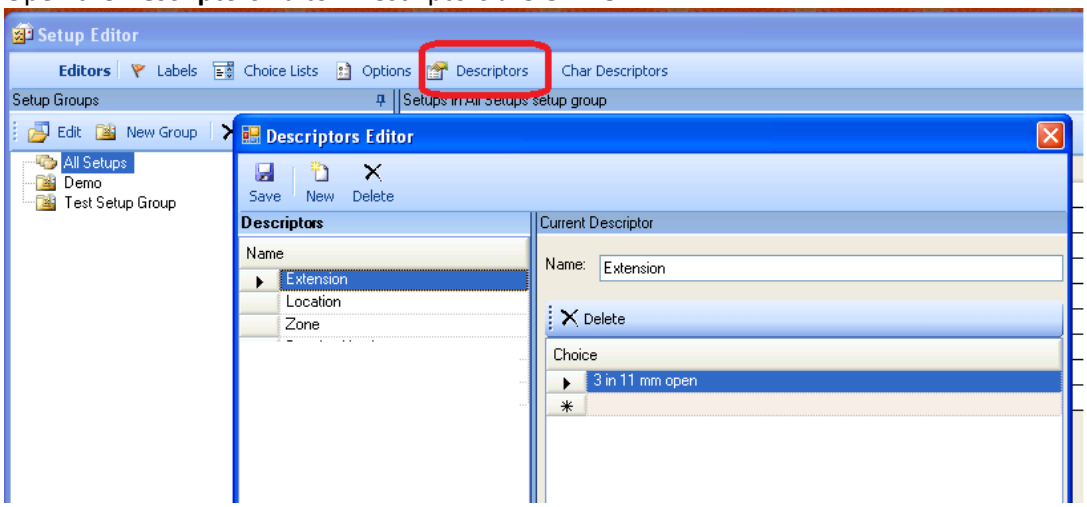
Note: the Import Labels feature retrieve labels from existing TranSend files to save in the database.

6. Create any other labels necessary, save all changes and exit the Label Editor.
    a. Sequence number
    b. ROT# - TCN#
    c. Shift, etc.

7. Open **Choice Lists** Editor. Create the following cause and corrective action lists.



8. Open the **Descriptors** Editor. Descriptors are **OPTIONAL**.



Characteristic descriptors can be used to:

- . Inform the **operator** about how to accomplish the task, such as:
  - Which torque wrench to use
  - Which pad number/location from which to take measurements
- Tag the data with information for the **analyst** such as:
  - the team leader of the project
  - the control plan/drawing number

The quality department generally conducts audits, and therefore creates the characteristic names so the operator knows where to take the measurement.

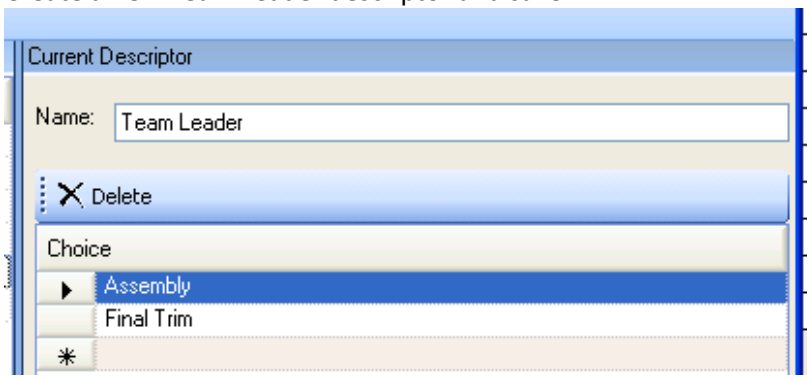
However, engineers have a manufacturing document which generally assigns a specific number for the fastener.

Descriptors can be used to link the fastener the operator measures with the measurement the production engineer defined in the control plan.

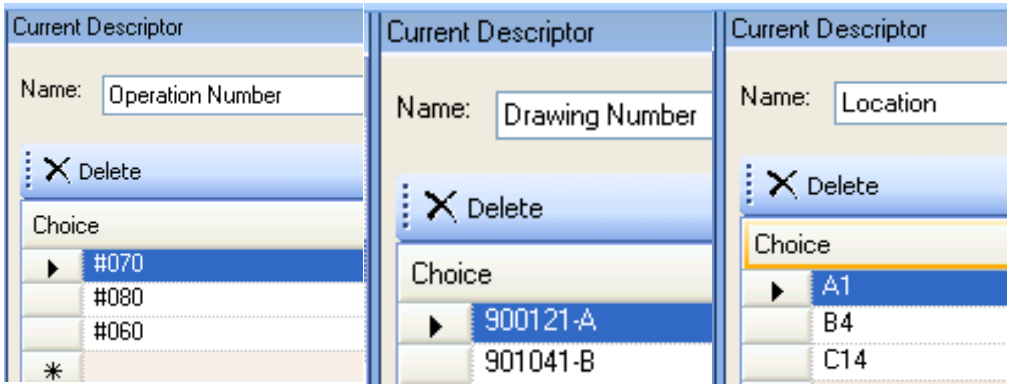
Once a descriptor is assigned to a characteristic, it marries all characteristics in the database that are assigned the same characteristic descriptor so that engineers can track their critical measurements, for example Operation 230B.

Descriptors values are unchanging. Each time the setup is used, the same characteristic descriptors apply, as opposed to labels where the label value may change each time data is collected.

9. Create a new Team Leader descriptor and save:



10. Add Operation Number, Drawing Number and Location as descriptors:



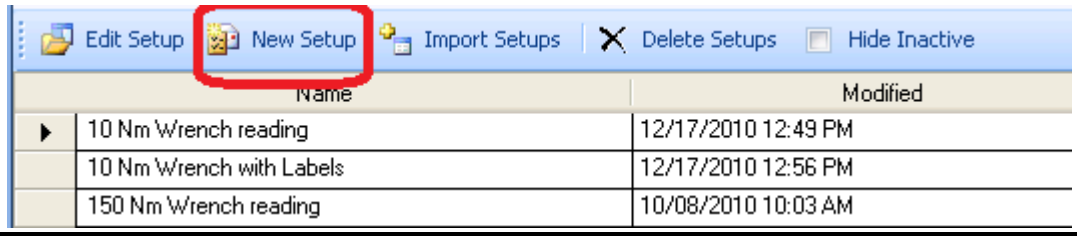
Save and exit descriptors.

11. For additional information regarding characteristic descriptors, review the characteristic descriptor tutorial.

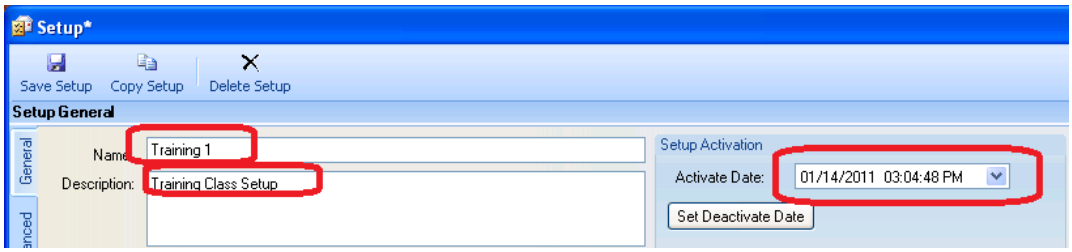
Characteristic Descriptor Tutorial.pps

Create a Setup

1. Select New Setup:

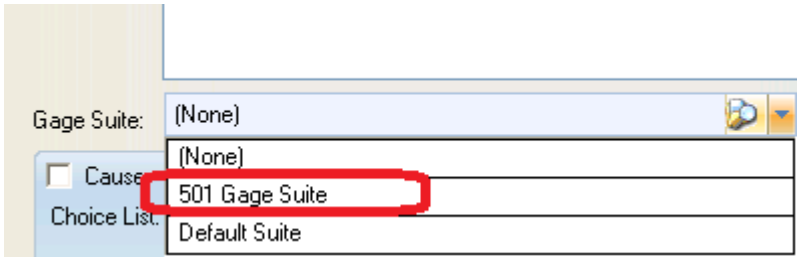


2. Name it **Training 1** with the description **Training class setup** and save the setup.

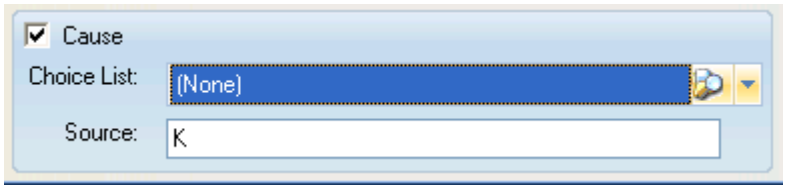


3. Select a **Gage Suite** from the dropdown list and save the setup.

   Note: if you don't pick a gage source, you will get an error when collecting data saying that you have an invalid gage source.



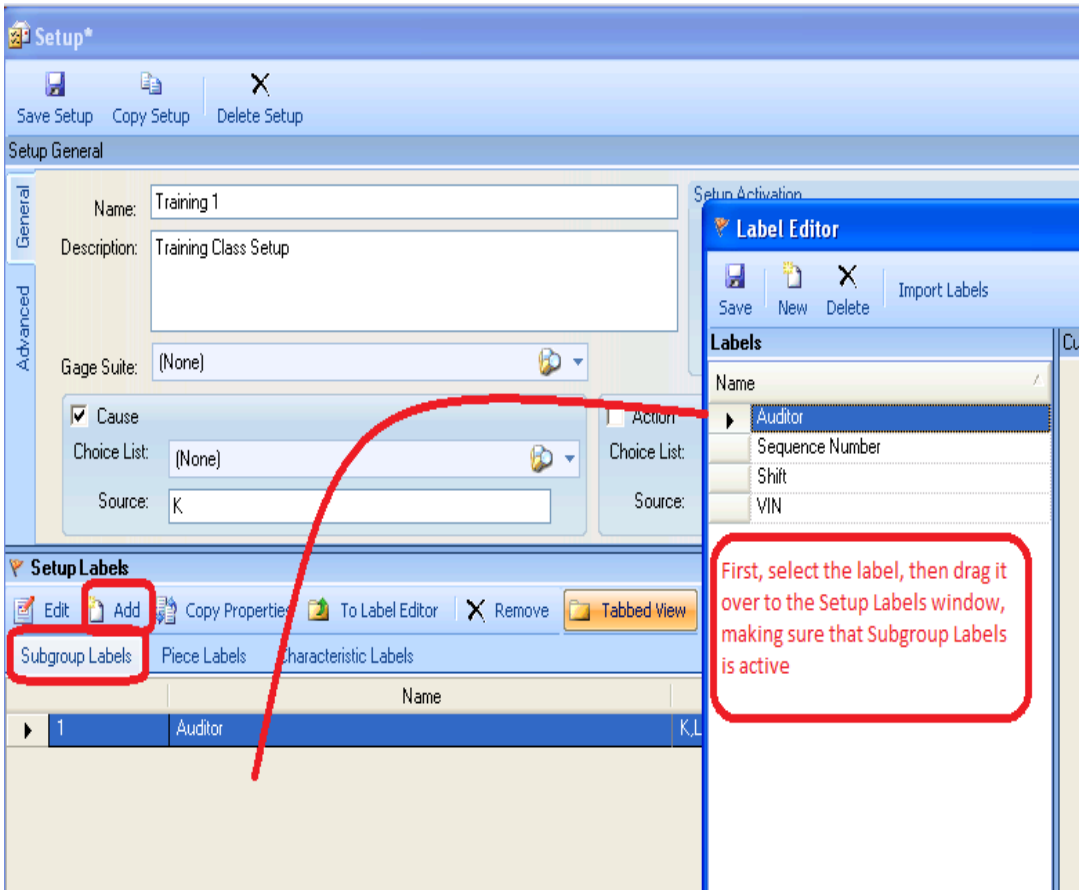
4. Check Cause, no choice list, Source K and save the setup. This will allow you to record vehicle ID component such as VIN when an alarm is triggered.



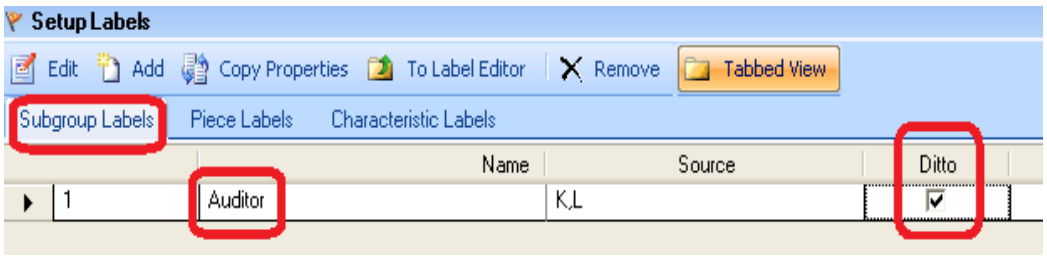
5. On Setup Labels, click either **Add** or **To Label Editor** to bring up the Label Editor. You will be adding **subgroup** and **characteristic** labels to this setup.

   Select the Auditor label.

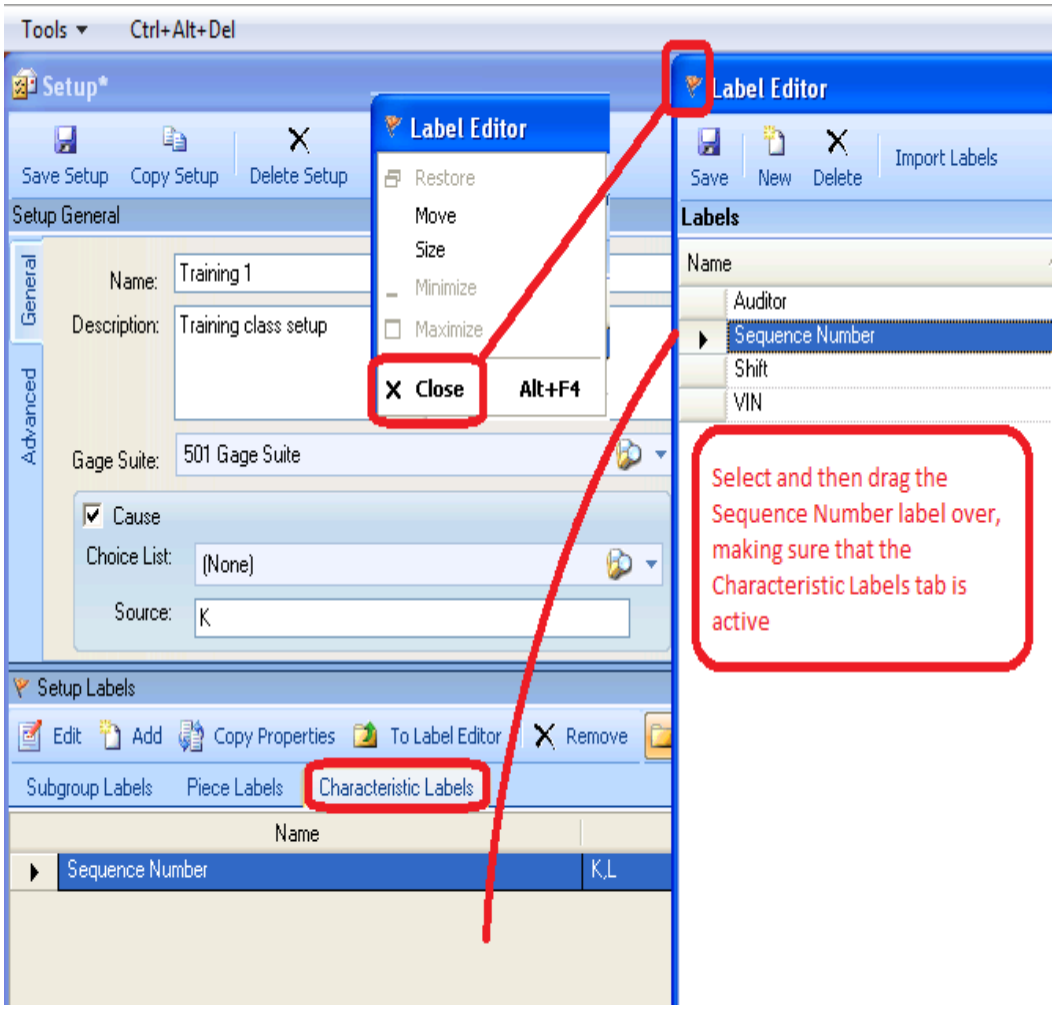
   Drag it over to the setup labels window; making sure the **Subgroup Labels** tab is active before dropping (so Auditor is added as a Subgroup Label).



6. Check Ditto for Auditor. This will bring up the same value when collecting data so that the operator won't have to choose it again. Save your changes.



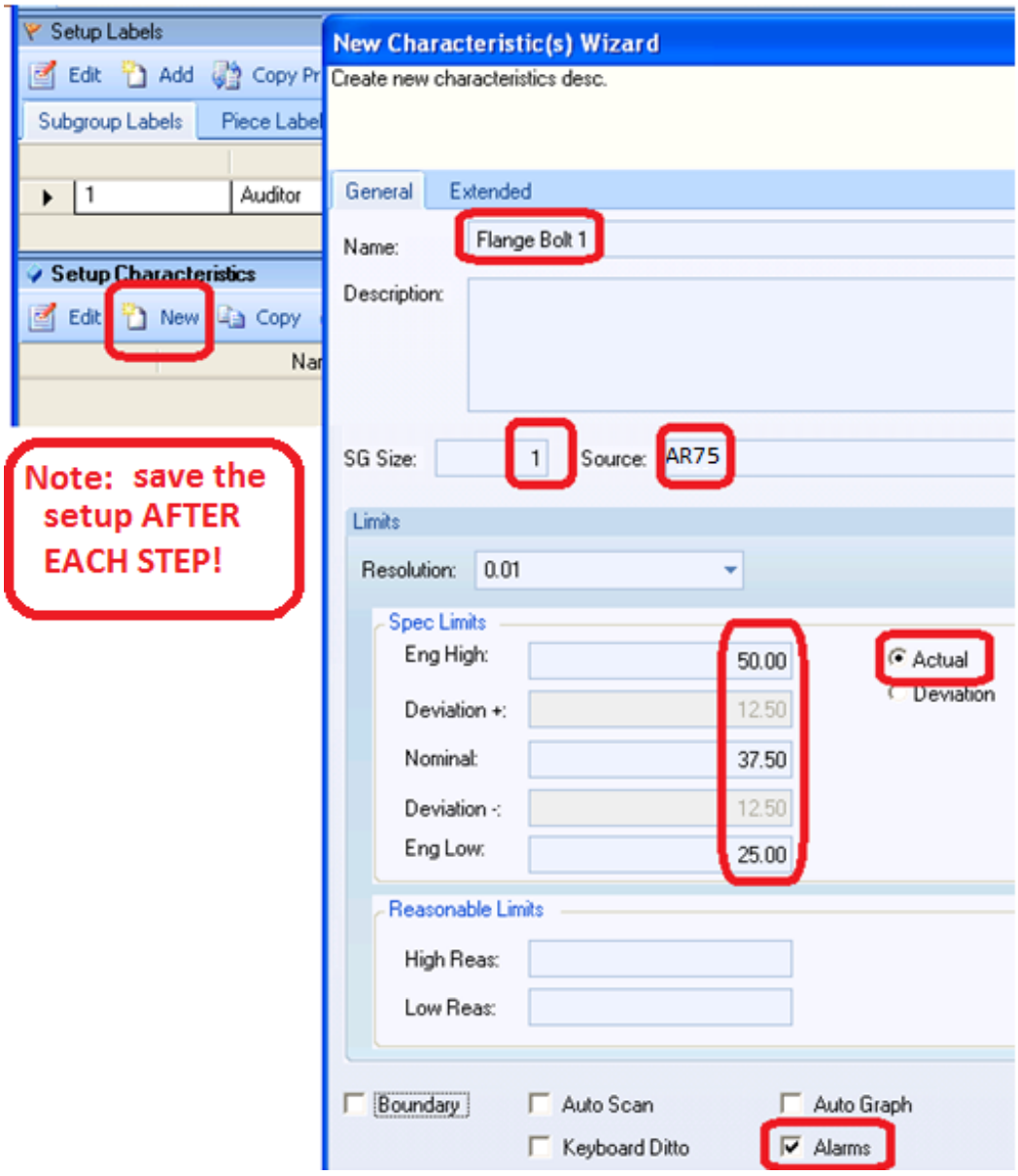
7. Select **Sequence Number** and drag it over, making sure the **Characteristics Labels** tab is active before dropping. Sequence Number is a Characteristic Label.
   Close the label editor. Save the setup.



8. Modify Sequence Number to use only with K (keyboard) as the label source. Save changes.

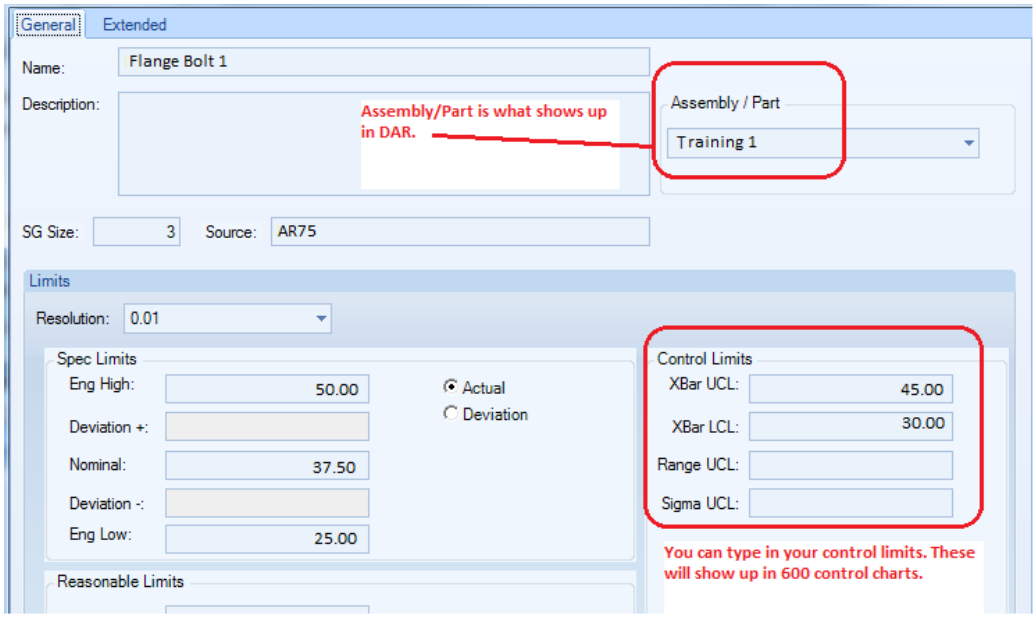
Create Characteristics

1. In Setup Characteristics, click New. Configure your characteristic as shown.

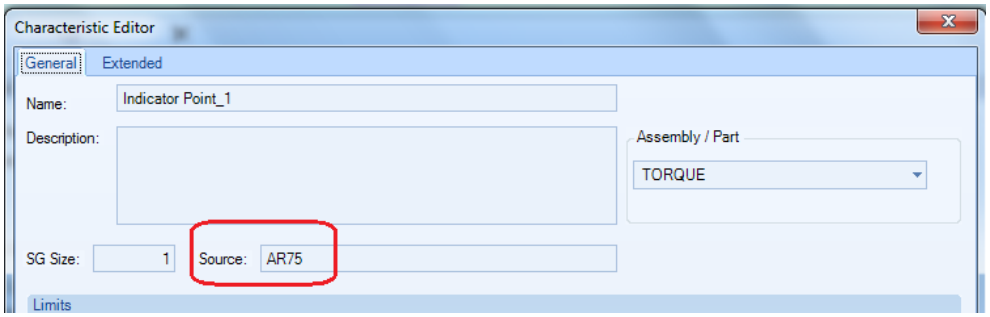


2. Note Assembly/Part. You can type in a name here and it will show up in the Part list in DAR (Analysis and Reporting software).

   Note that you can type in control limits for each characteristic. These will show up in the control charts on the 600.



3. Note the Source for the characteristic. See the following pages for more information about Source.



Source Location Symbols

The 600 Handheld Data Collector uses symbols to refer to source locations.

Source	Meaning	Examples
K	Keyboard	K
XXXXX	Alias name, Up to five characters	Peaks, GI
Cx	Characteristic x	C1, C4, C12
Sx	Subgroup x	S2, S4, S6
N	Nominal	C1-N, N-.00012
Constant	A Number	1.6, G1+1.6, max(7.3,G1)

Operator Symbols

Source	Meaning	Examples
-	Minus	(C1-C2), Peak-C1
+	Add	(C3+C2), (Peak+Peak+Peak)*0+Peak
*	Multiply	(C3*N)-.2, Peak*.0005, C3*C4
/	Divide	(C1/C2), C4/.018
|	Through	(C1|5), (Peak|4)
~ or ^	Exponent	(C1~2), (Peak~2)/3.1416, (Peak^2)
(,)	And	AVG(C1,C2,C3)
[,]	Or	[Peak,K]1
{ n }	Start Threshold (Torque) -- where n overrides the start threshold defined for the torque too.	Peak{14.7} Note that n represents an actual torque value (e.g.. 14.7 lbft, or 19.3 Nm).

You can also allow math calculations on the gage ports of a source that accepts keyboard and/or gage input, such as: k,-1*peak

Order of Operations

Source expressions are evaluated in standard mathematical order. Anything with parenthesis is completed first. Multiplication and division are performed before addition and subtraction.

Boolean Operators

A Boolean expression evaluates to either 1 (true) or 0 (false).

Source	Meaning	Examples
>	if x is greater than y, return 1, else return 0	((C1>10)+(C1<5))*((C1-N)*(C2*-1)
<	if x is less than y, return 1, else return 0	((C1<C2)*C1)*C2
=	if x equals y return 1 else return 0	(Peak=N)*(Peak-0.002)

Function Operators

The following table lists the function operators for creating Source Formulae.

Function	Meaning	Examples
Abs	Absolute Value	ABS(C2), ABS(AVG(C1|7))
Acos	Arc Cosine	ACOS(C1)
Asin	Arc Sine	ASIN(C1)
Atan	Arc Tangent	ATAN(C1)
Avg	Average	AVG(C1|5), AVG(S1,S2)
Cnt	Pulse Count	CNT(PEAK)
Cos	Trigonometric Cosine	COS(C2)
Dsp	Angular Displacement	DSP(PEAK)
Max	Maximum Value	MAX(S2), MAX(PEAK|4)
Med	Median Value	MED(S2), MED(C1|5)
Min	Minimum Value	MIN(S9), MIN(C1|7)
Rng	Range	RNG(C1|5), RNG(PEAK|8)
Sdv	Standard Deviation	SDV(S2), SDV(S2,S3)
Sin	Trigonometric Sin	SIN(C1)
Sqt	Square Root	SQT(C1)
Sum	Summation	SUM(C2|4)
Tan	Trigonometric Tangent	TAN(C1)
Tps	True Position	TPS(ALIAS,C1), TPS(ALIAS,ALIAS,ALIAS)

Notes:

1. Atan(x)—Returns the arc tangent of x, in degrees (–90 to +90).

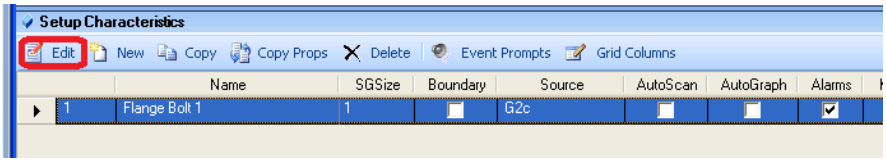
2. Asin(x)—Returns the arc sine of x, in degrees (–90 to +90). The range of x is: -1 <= x <= 1.

3. Acos(x)—Returns the arc cosine of x, in degrees (0 to +180). The range of x is: -1 <= x <= 1.

4. Cnt—Used in combination with Pulse measurement. Example: Peak is configured for Pulse; Characteristic 1 (C1) has a Source of Peak; Characteristic 2 (C2) is auto-scanned with C1 and has a Source of CNT(Peak). When a fastener is rundown with a pulse tool, C1 captures installation torque and C2 captures the number of pulses from snug to peak.

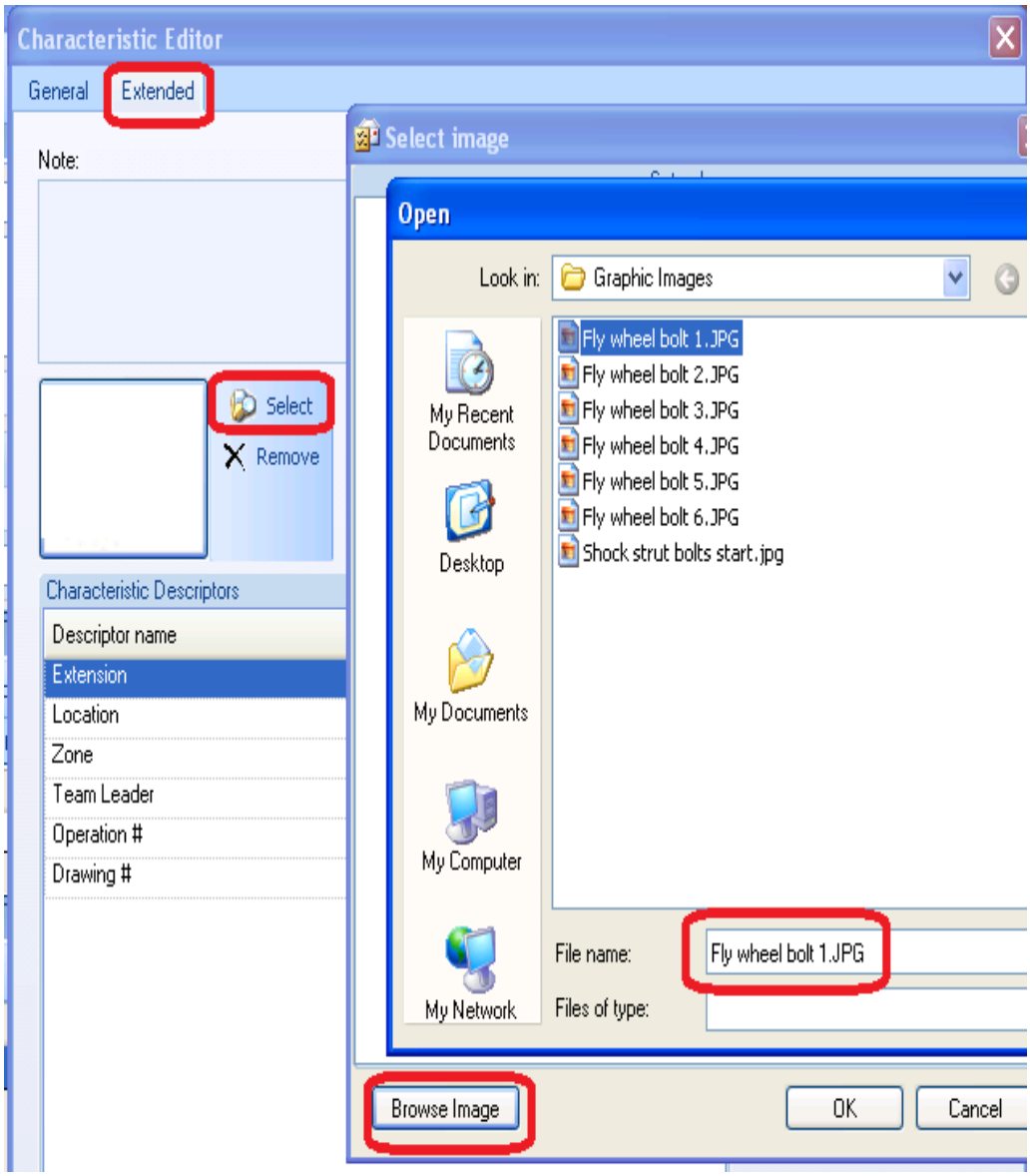
5. Dsp—Used in Angle measurements. The Displaced Angle value will be captured between a start (<Enter>) and stop <Enter> command.

4. Highlight Flange Bolt 1 and click Edit.

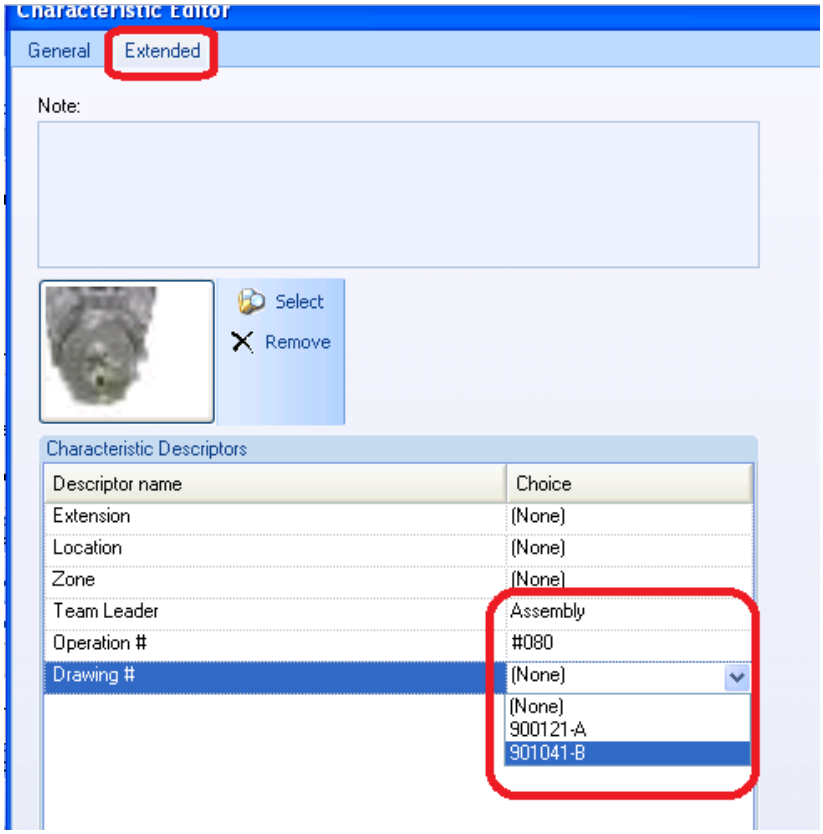


5. Click the **Extended** tab. Click **Select** and **Browse Image**. Locate an image in your network, select it and click Open. Note that a thumbnail image appears. Click OK. Save the setup.

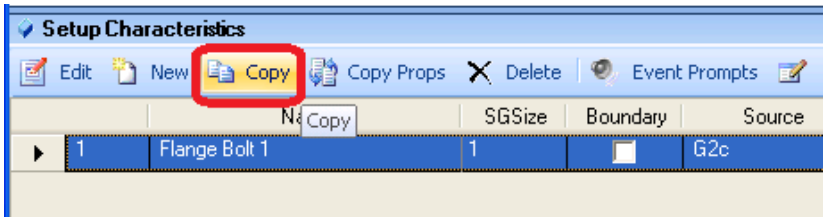
   Note: Images are optional



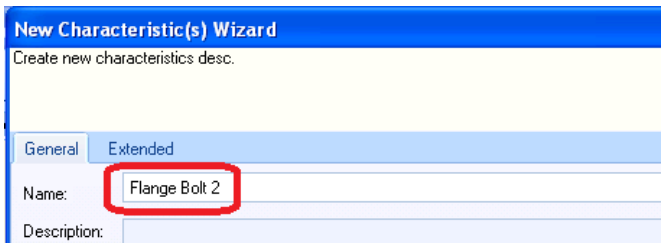
6. Once again, edit Flange Bolt 1 and open the Extended tab. Select the Characteristics Descriptors for Team Leader, Operation # and Drawing # as shown and save the setup.



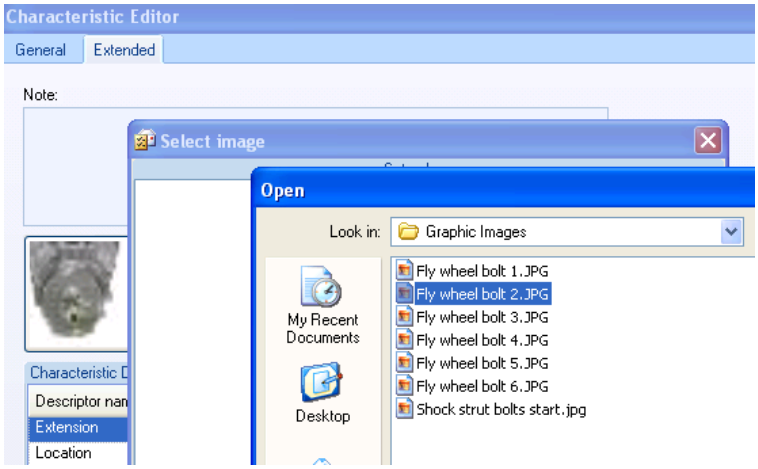
7. Select Flange Bolt 1 and click Copy. This will copy the characteristic.



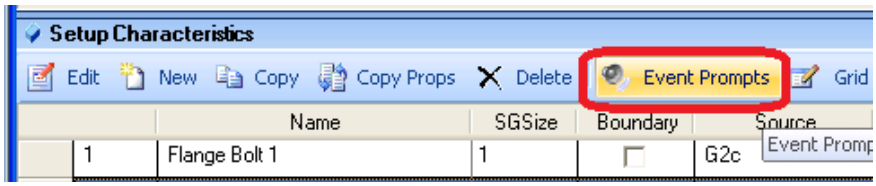
8. Rename the copy Flange Bolt 2 and click OK, save the setup.



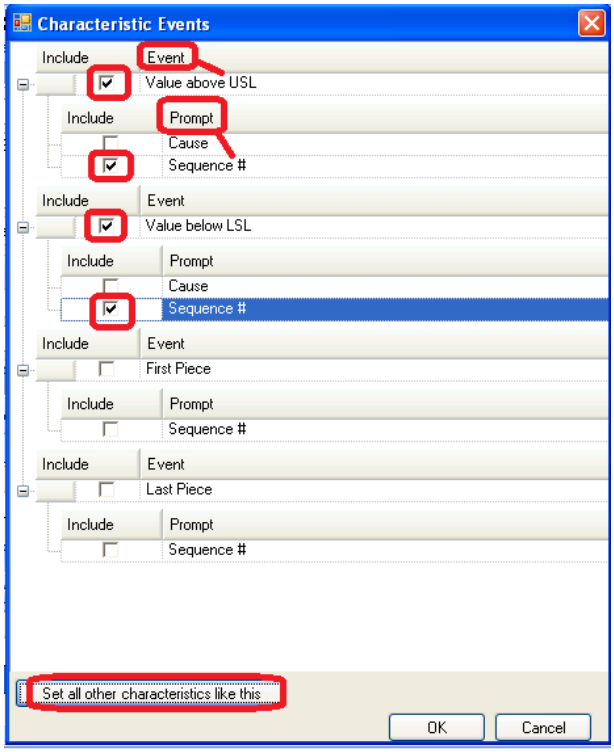
9. Edit Flange Bolt 2 and change the image (see Step 3). Click OK, save the setup.



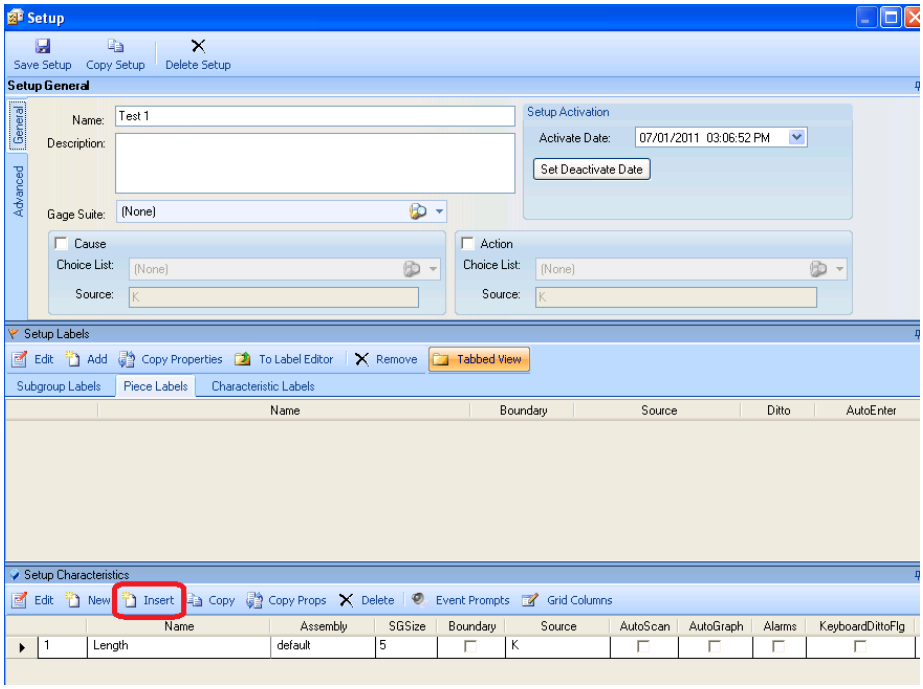
10. Select Event Prompts in Setup Characteristics.



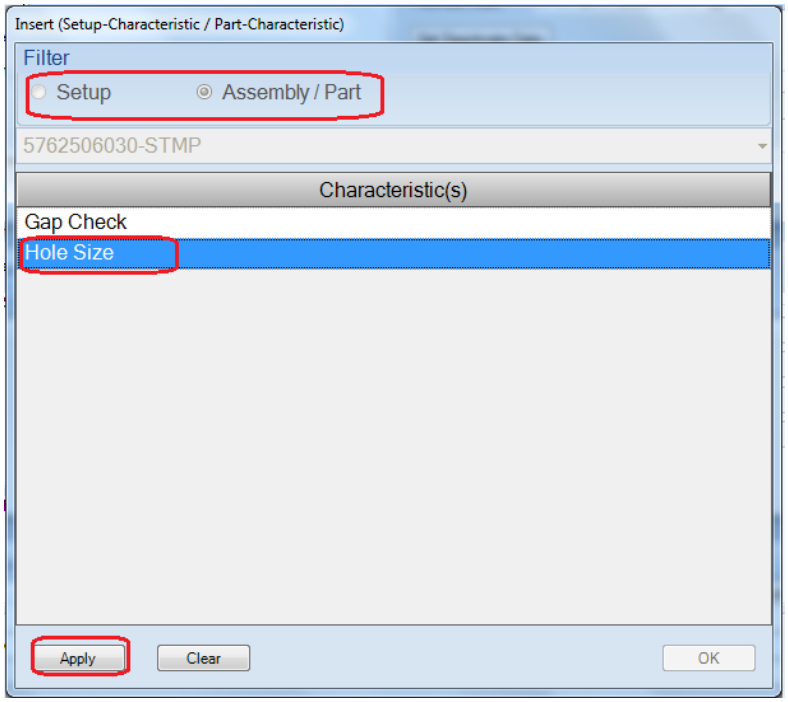
11. Enable the events and prompts as shown. Click OK, save the setup.



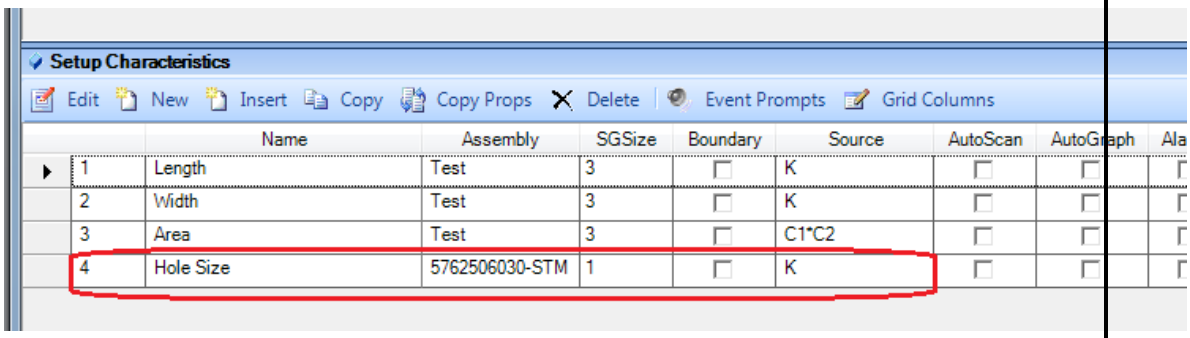
12. Click Insert. This allows you to insert a characteristic from another setup or part.



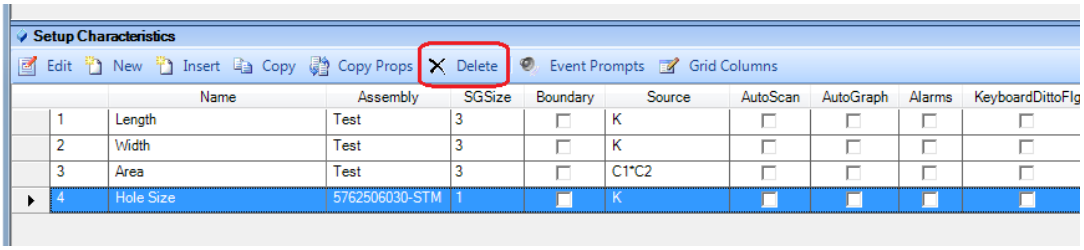
13. Select Setup or Part/Assembly to find the characteristic(s) you want. Highlight them and click Apply and OK.



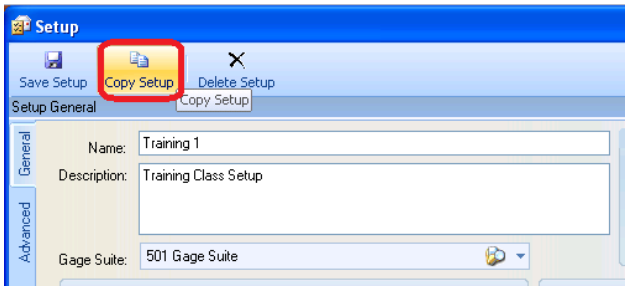
14. Note that Hole Size has now been added to the list of characteristics.



15. Highlight the inserted characteristic and click Delete.

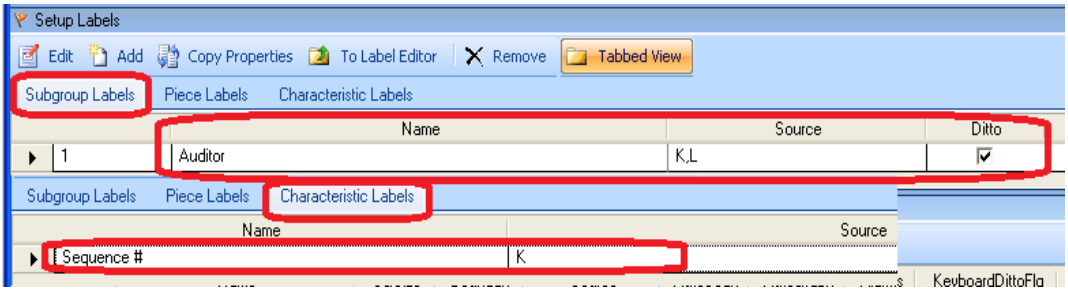


16. Click Copy Setup.

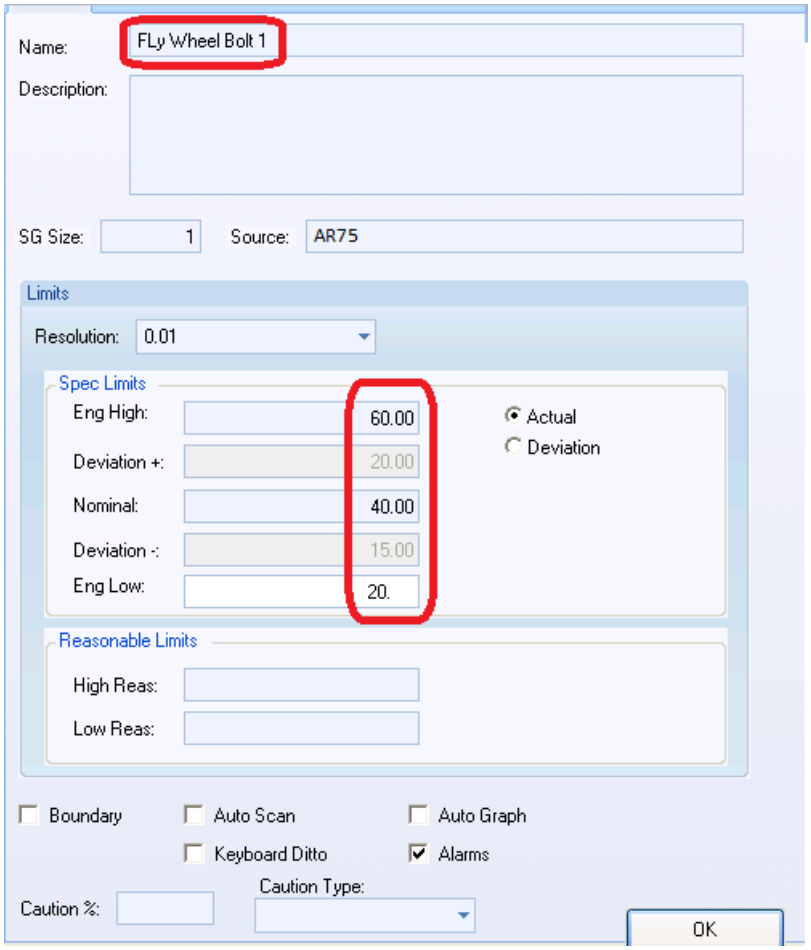


17. Rename it Training 2 and **save** the setup.

18. Verify that the labels are configured as shown.



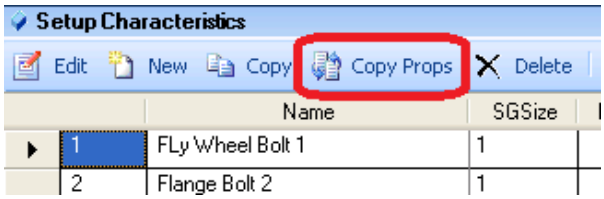
19. Edit Flange Bolt 1 and rename it to Fly Wheel Bolt 1. Change the spec limits as shown and click OK. Save the Setup.

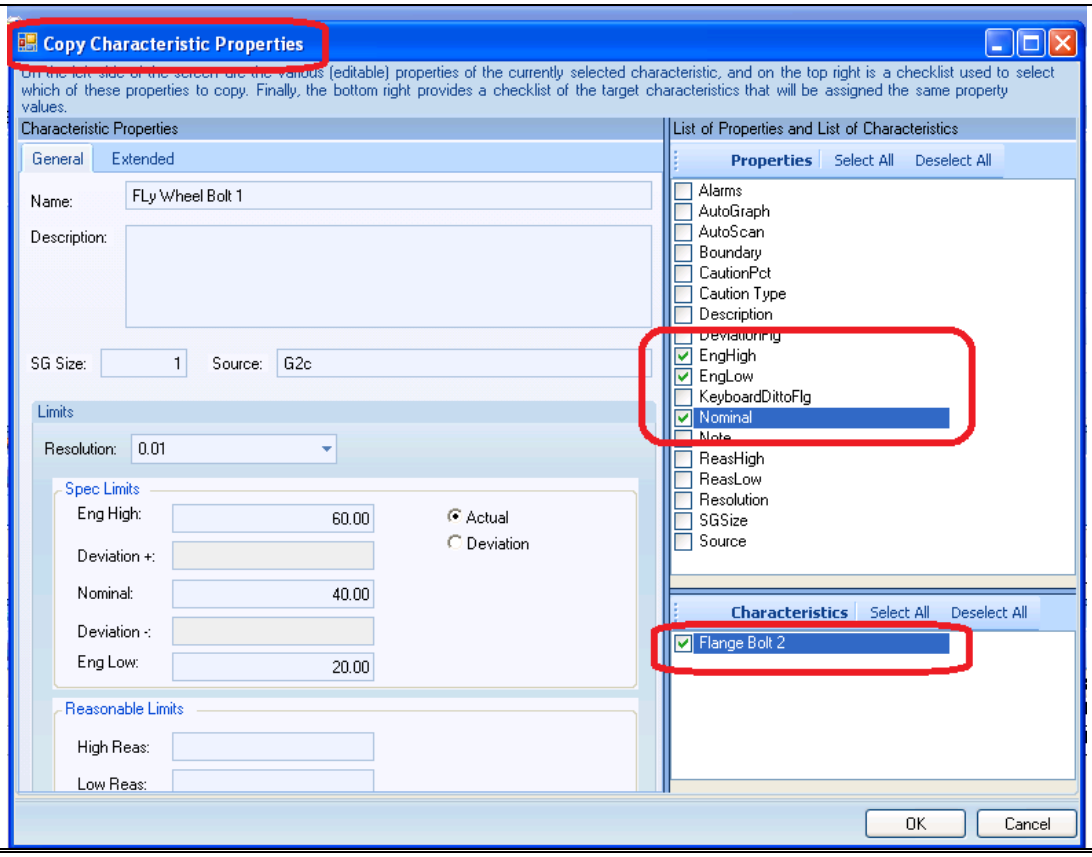


20. Edit Fly Wheel Bolt 1 and select an image (see Step 3). Save the setup.

21. Configure the characteristic descriptors as before (see Step 4). Save the setup.

22. Select Fly Wheel Bolt 1 and click Copy Props. See screen shot for selection .Click OK and save the setup.





23. Edit Fly Wheel Bolt 2 and select an image (see Step 3). Save the setup.

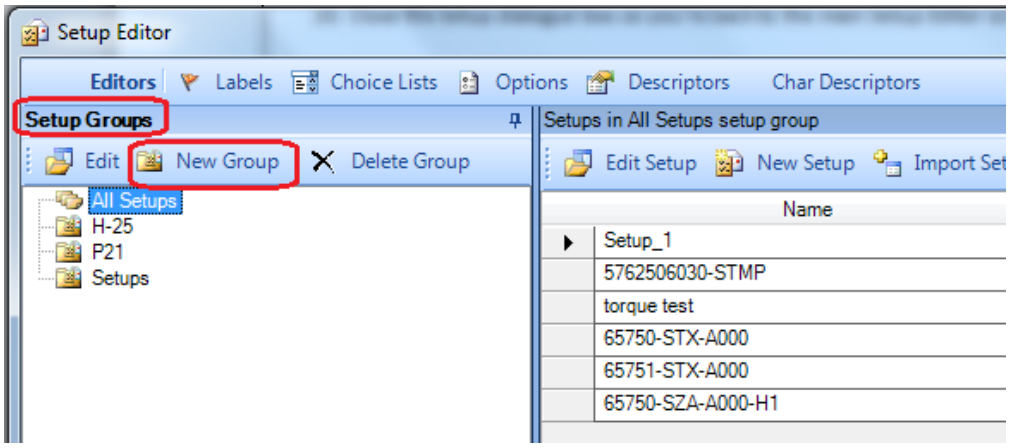
24. Configure the characteristic descriptors as before (see Step 4). Save the setup.

25. Configure the Event Prompts (see Steps 8 and 9). Save the setup.

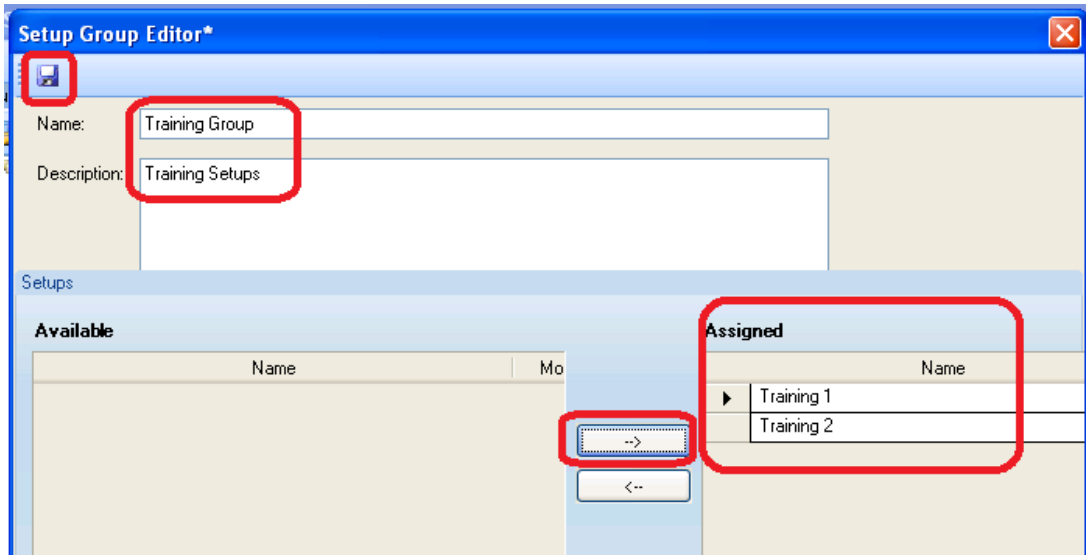
26. Close the Setup dialogue box so you're back to the main Setup Editor screen.

Create a Setup Group

1. On the Setup Groups pane, select New Group.



2. Configure the setup group as shown. Highlight your Training setups and use the right arrow button to assign them to the group. Save and close the setup group.



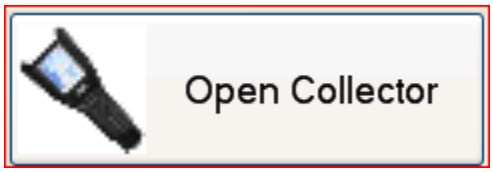
3. Close Setup Editor.

4. For additional information, review Configuration, Setups, Setup Groups and Image Editing tutorials.

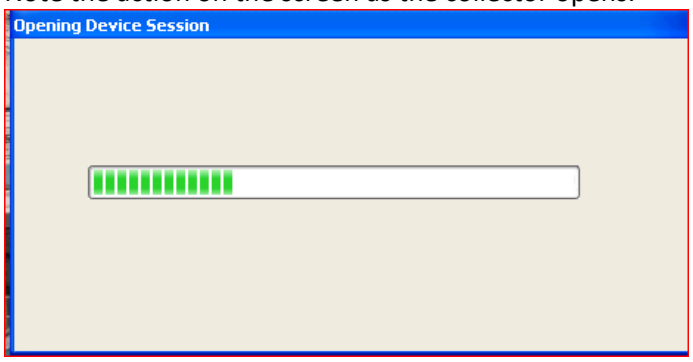
DM600 Tutorial - #3 Configuration.pps
DM600 Tutorial - #5 Setups.pps
DM600 Tutorial - #6 Setup Groups.pps
Image Editing Tutorial.pps

Send Setups to the 600

1. Connect the collector to the host computer and select the Open Collector button in TranSend II.

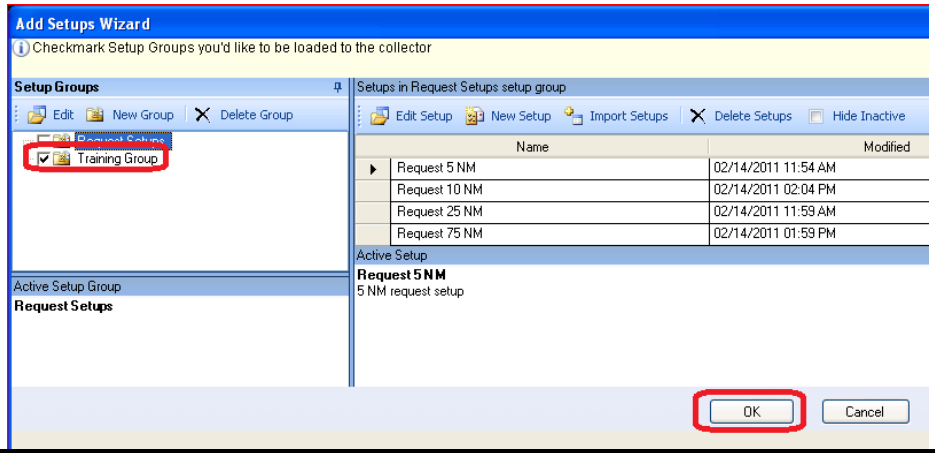


2. Note the action on the screen as the collector opens:

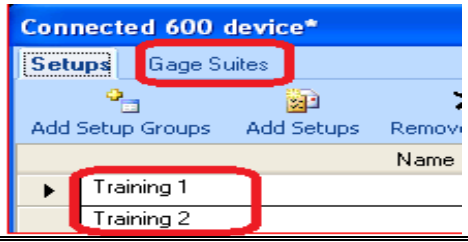


3. Click on Add Setup Groups.

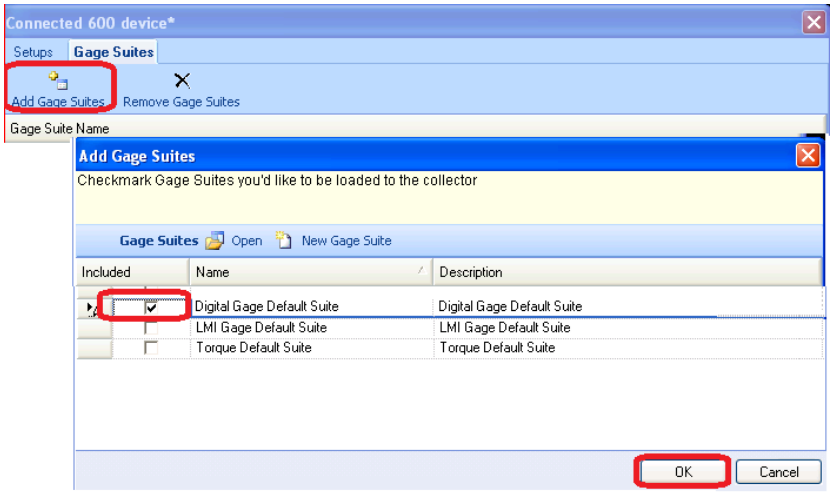
4. Select the Training Group by placing a check mark in the box to the left of the name and select OK.



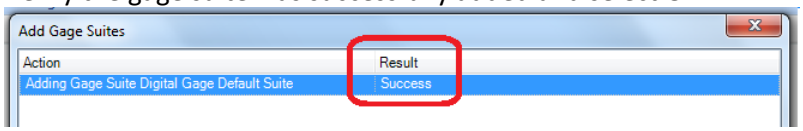
5. Verify the setups from the Training group are displayed. Select the Gage Suites tab.



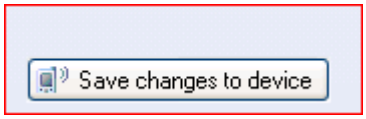
6. Select Add Gage Suites; select the gage suite created earlier by placing a check mark in the box to the left of the name and select OK.



7. Verify the gage suite was successfully added and select OK.



8. Select Save changes to device to send the setups and gage suite to the 600. Select OK to exit the collector communication interface.



9. The 600 is now ready for data collection. Disconnect the 600 from the USB cable.

10. For additional information, review Tutorial #7 – Transfer to Collector

DM600 Tutorial - #7 Transfer to Collector.pps

Data Collection with the 600

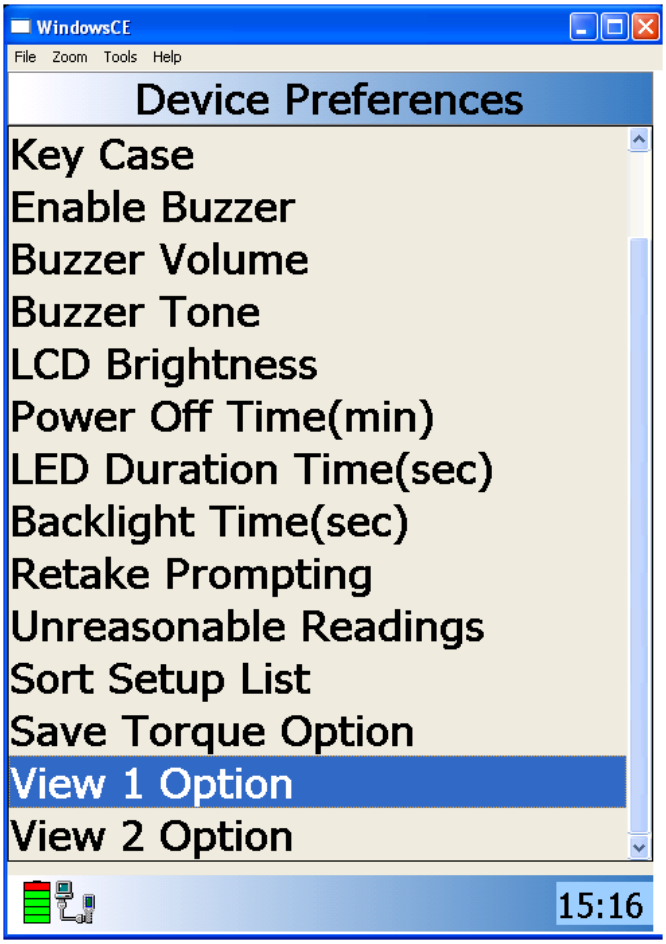
Front View

- **Color Display** – The user interface for the data collector is displayed using a 480 x 640 VGA TFT Active Matrix Color LCD with backlight.
- **Alphanumeric Keypad** – Contains additional keys for entering alphanumeric text.
- **Status Indicators** – Two LED indicators are used to indicate the status of a given reading.

600 Configuration

1. Using the arrow keys, move to Preferences and select enter.

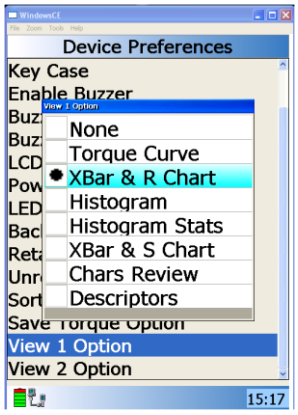
2. Note the preference options. View the table on the next page for more info.

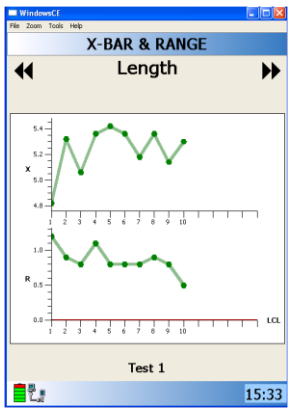


Device Preferences

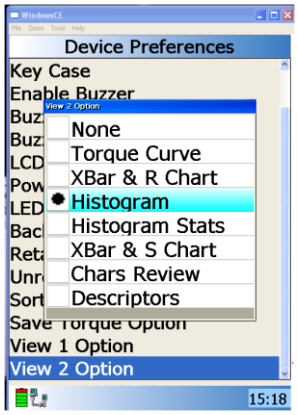
Preference	Description	Settings
Key Click	Clicking sound when Keypad key is pressed.	(On) or (Off)
Key Repeat	Auto-repeat when key is pressed.	(On) or (Off)
Key Case	Determines default case of letter.	(Upper) or (Lower)
Enable Buzzer	Turning on or off the buzzer.	(Enable) or (Disable)
Buzzer Volume	Determines the loudness of the speaker.	(High) or (Low)
Buzzer Tone	Determines the pitch of the speaker.	(1)–(16) (lower to higher)
LCD Brightness	Determines the brightness of the display.	(1)–(8) (dim to bright)
LED Duration	Length of time the LED status indicator lights remains turned on.	(0)–(99) seconds
Backlight Time	Length of time backlight remains on if unit is idle.	(0)–(999) seconds
Retake Prompting	Determines whether a prompt asking the operator to retake an out-of-spec reading appears during data collection.	(On) or (Off)
Unreasonable Readings	Determines the 600's response to an obviously erroneous reading. If Reasonable Limits are used, (Stop) does not accept the reading and forces the operator to retake the reading; (Advance) fills the reading with a NULL value.	(Stop) or (Advance)
Sort Setup List	Determines how the list of setups is displayed.	(AlphaNum) or (None)
Save Torque Option	Determines when torque curve data is stored in memory.	(None), (On Spec Violation), (Exceptions) or (Automatic)
View 1 Option	Determines which default graphical representation of data is displayed when the <view> button is selected.	(None), (Torque Curve), XBar & R Chart), Histogram), (Histogram Stats), (Xbar & S Chart), (Chars Review) and (Descriptors)
View 2 Option	Determines which default graphical representation of data is displayed when <shift> then <view> buttons are selected.	(None), (Torque Curve), XBar & R Chart), Histogram), (Histogram Stats), (Xbar & S Chart), (Chars Review) and (Descriptors)

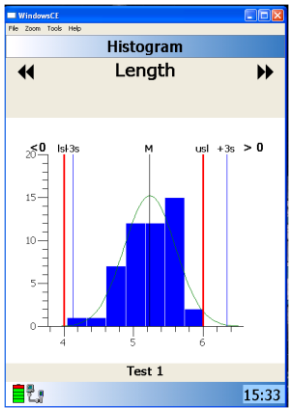
3. Select **View Option 1** and press Enter. Select **XBar & R chart**. This will bring up a control chart when the **View** button is pressed.



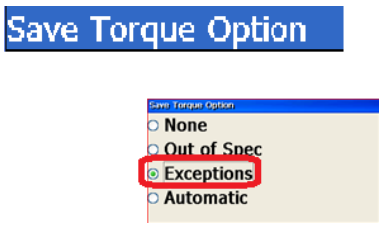


4. Select **View 2 Option** and select the **Histogram**.
Note: To bring up the view 2 option, press **SHIFT** and then **VIEW** buttons.



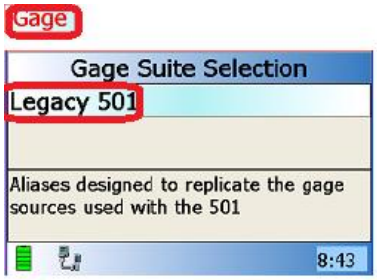


5. Select Save Torque Option and select the Exceptions setting. This will save torque curves that are out of spec or when a torque reading fails.
6.



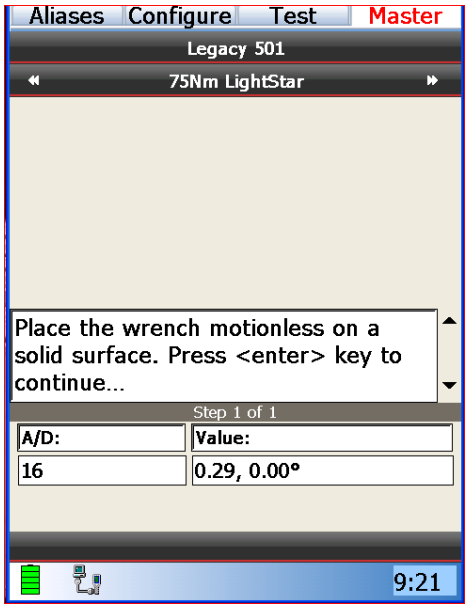
7. Select **Menu** to return to the main menu. Connect the gage to the 600 that you will use for data collection.

8. From the main menu, select Gage and Enter. Using the arrow keys, locate and select the desired gage suite and press Enter.



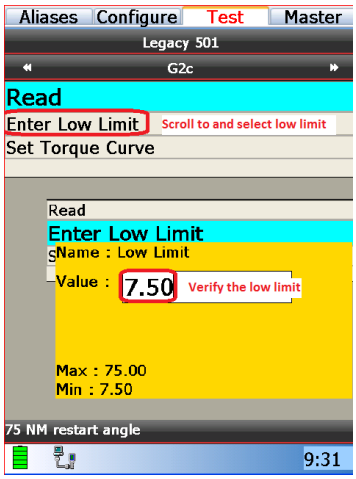
9. Using the arrow keys, scroll to desired gage (G2c in this example).

10. Using your arrow keys, scroll to the Master tab and follow the instructions listed on the screen:

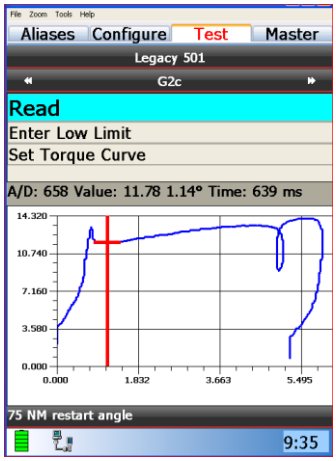


11. Once the mastering process is complete, the collector will indicate as follows:

12. Now use the arrow keys to move to the Test tab. Select Enter Low Limit, review the setting.



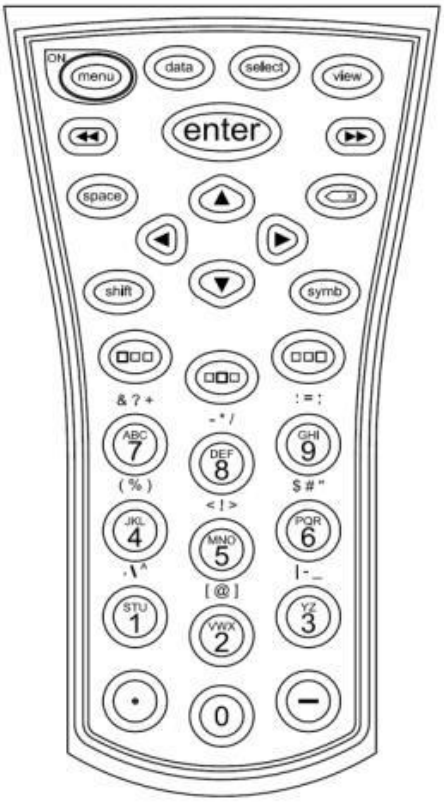
13. Scroll to read and take a reading.



Select the Menu key to exit the gage dialogue.

Alphanumeric Keypad

The 600 Handheld Data Collector's alphanumeric Keypad uses a number of specialized keys to navigate the data collector interface.



Alphanumeric Keypad Key Combinations

Many Keypad keys work in a series by pressing multiple keys. Key combinations are indicated by a —, between the keys.

The alphanumeric/symbol keys are primarily used for entering the numbers 0 through 9. In addition, each number key is associated with up to three letters. Letters and symbols can be entered into fields by pressing the Left Pointer Key, the Center Pointer Key, or the Right Pointer Key and the corresponding alphanumeric/symbol key.

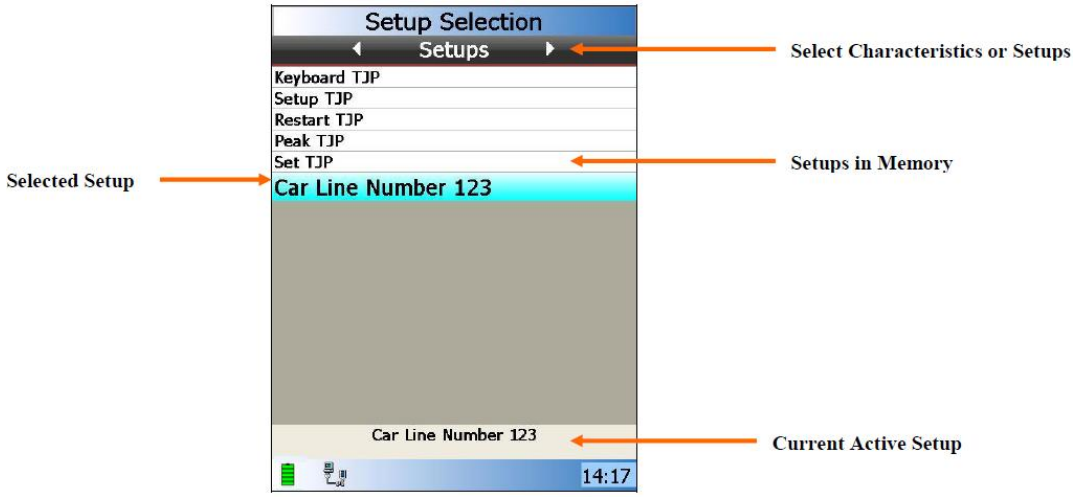
Note: *The alphanumeric keys are "sticky" which means that they are pressed one at a time.*

Key(s)	Function(s)
<menu>	1) Powers collector ON. 2) Displays the Main menu.
<shift>	When entering character string data, changes lower to upper case.
<shift>, <menu>	Move to previous menu action.
<view>	Displays menu for Descriptors, Characteristic Review and Torque Curve selections.
<data>	1) Go to the Data Entry screen. 2) While collecting data, pressing the data key displays assigned image.
<select>	Displays the Select Menu, allowing you to select a setup or characteristic.
<symbol>, <select>	While collecting data, displays a prompt to jump to a specified characteristic for data collection.
<enter>	1) Selects item from a list or menu. 2) Opens or closes an input box. 3) Toggles an option. 4) Triggers a gage reading in data entry or test. 5) Selects and inputs characters.
<▲>	Moves a selection cursor to the previous field in a menu or list.
<▼>	Moves the selection cursor to the next field in a menu or list.
<◀>	1) Move the selection cursor to the left while in a menu. 2) Move the cursor one character to the left in an input box.
<▶>	1) Moves the selection cursor to the right while in a menu. 2) Moves the cursor one character to the right in an input box.
<▶▶>	1) While collecting data, move to the next cell in data collection sequence. 2) When reviewing an item, move to the next operation. 3) When reviewing data move to the next characteristic. 4) When an input box is displayed, close and enter the input string.

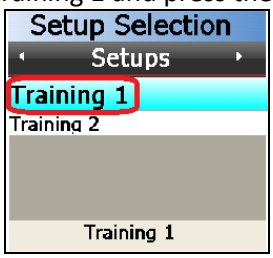
Key(s)	Function(s)
<◀ ◀>	1) While collecting data, move to the previous cell in data collection sequence. 2) When reviewing an item, move to the previous operation. 3) When reviewing data move to the previous characteristic. 4) When an input box is displayed, delete the previous character in the input string.
<symbol>,  , 1-9	Creates the left symbol shown over the selected number key.
<symbol>,  , 1-9	Creates the center symbol shown over the selected number key.
<symbol>,  , 1-9	Creates the right symbol shown over the selected number key.
<.>	Use the period key to enter a decimal point in a number.
<->	Use the minus key to enter a negative number.
space	Creates a space after a letter, number or symbol.
	Deletes one character to the left of the prompt
<shift>, 	Deletes a complete line of characters.
 , 1-9	Creates the left letter shown on the top of the key.
 , 1-9	Creates the center letter shown on the top of the key.
 , 1-9	Creates the right letter shown on the top of the key.
<shift>,  , 1-9	Creates the left letter shown on the top of the key in upper case.
<shift>,  , 1-9	Creates the center letter shown on the top of the key in upper case.
<shift>,  , 1-9	Creates the right letter shown on the top of the key in upper case.

Data Collection

1. To open a setup, navigate to the Setup icon on the main menu and press <select> on the keypad. The list of available setups will display.



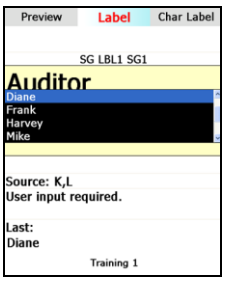
2. Select Training 1 and press the Enter key.



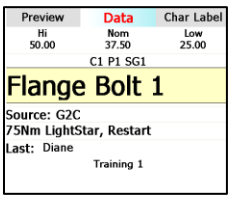
Skill Set # 1

Follow the prompts on the 600 and collect at least two subgroups of data.

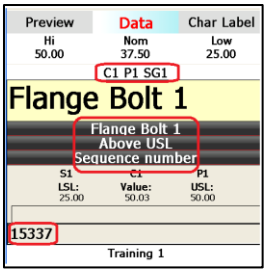
- Label entry



- Take the characteristic readings:



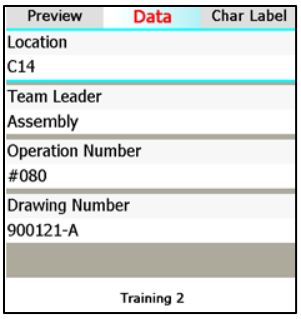
- If triggered, respond to exception condition:



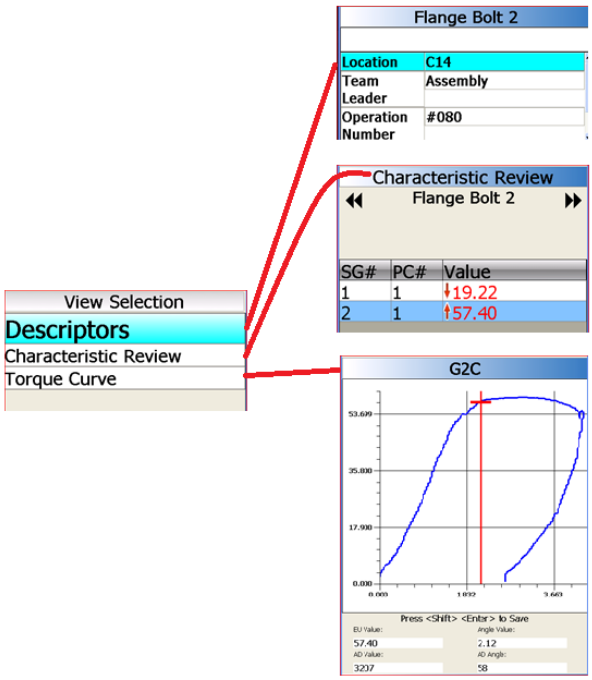
1. Use the select key to return to the setups menu and open Training 2. Follow the prompts on the 600 and collect at least two subgroups of data.

- When collecting characteristic data, select the Data key to see the image you attached to the characteristic:

- Select Data again to review the characteristic descriptors for this characteristic:



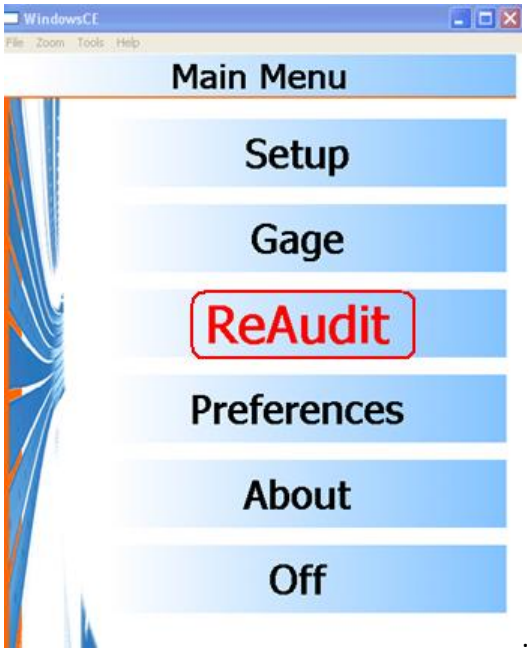
- Press the **View** key to bring up a control chart (preference view option 1)
- Press **Shift** and **View** to bring up a histogram (preference view option 2)
- Press the View key to select a torque curve



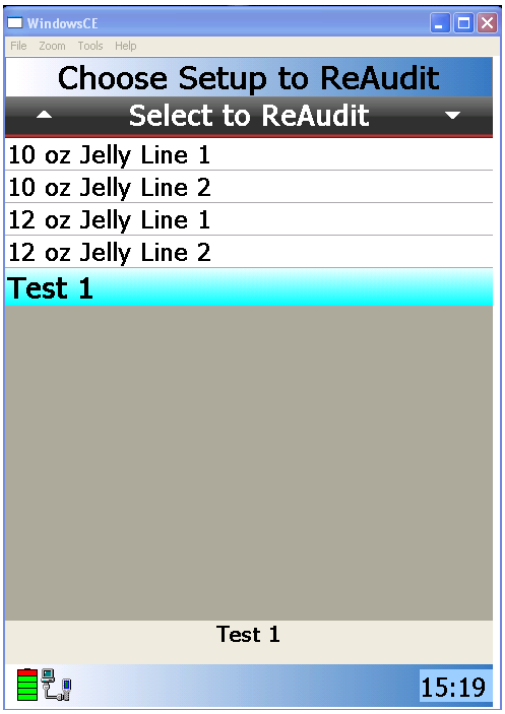
Viewed on the 600, the torque curves should display flex (initial rise), fastener movement (gradual angular rotation) and flex release (rapid fall) as demonstrated below. For additional information, review Tutorial #8 – Collect Data

Reaudit

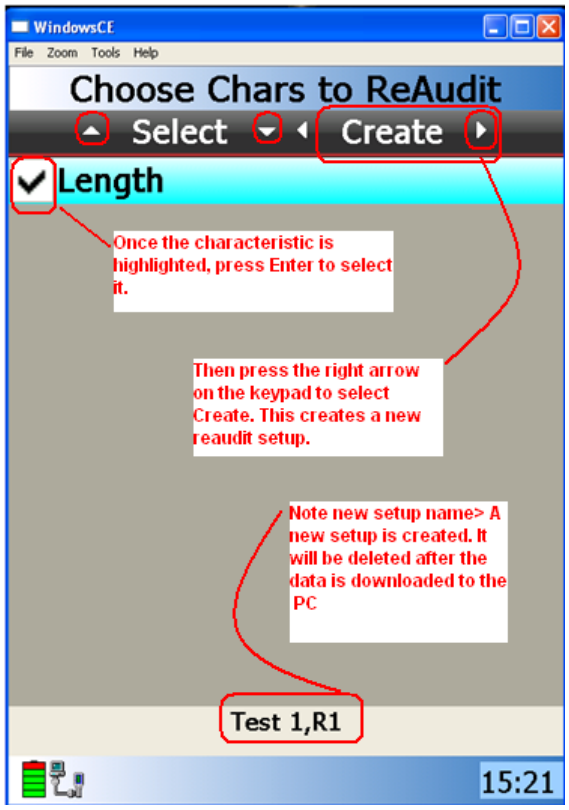
1) On the main TranSend II screen, select ReAudit and press Enter.



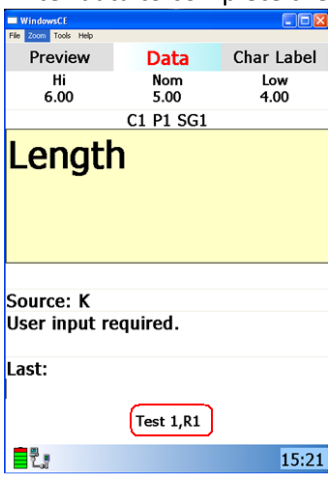
2) Choose a setup and press Enter.



3) Use arrow keys to select the characteristic(s) you wish to reaudit and press Enter. **Then use the right arrow key to select Create**. A new setup is created with the setup name , R1 (which stands for Reaudit).



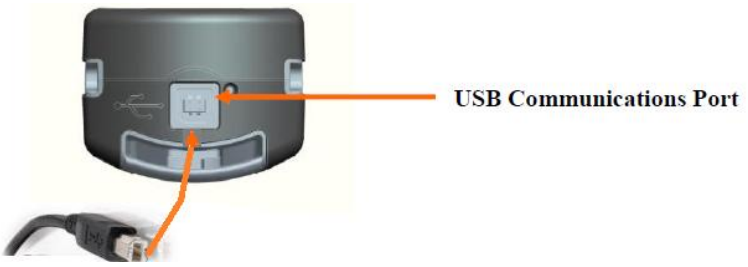
4) Enter data to complete the subgroup.



5) When the data is uploaded to the PC, the reaudit setup will be deleted from the collector.

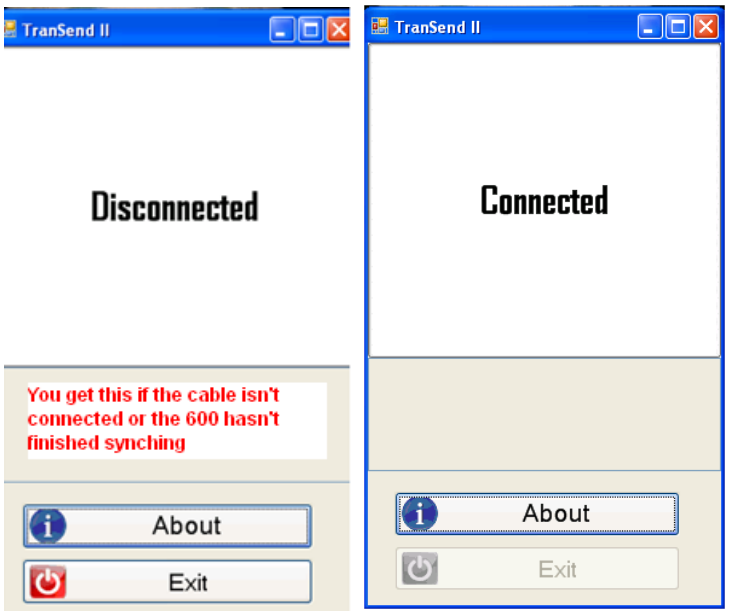
Upload Collected Data Using Express Data Refresh

1) Connect the 600 to the #95748 cable on the computer running TranSend II. **Wait for the 600 to connect.**

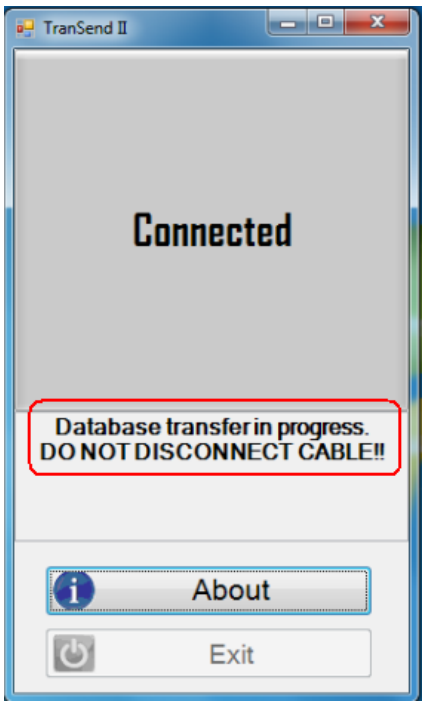


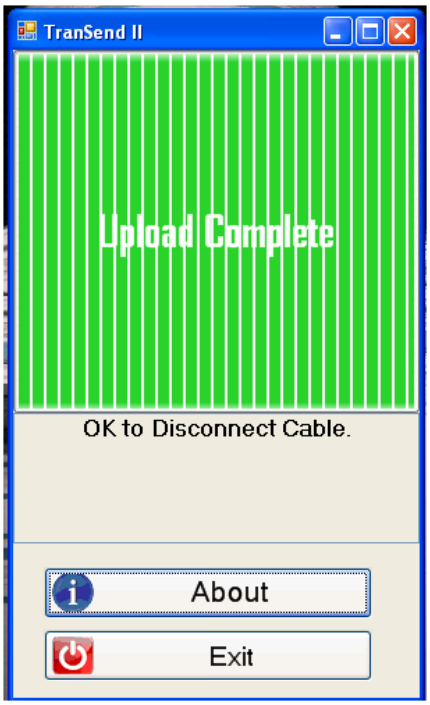
2) On the desktop, click the Express Data Refresh icon (create a shortcut before doing this-- **All Programs /ASI DataMyte / TranSend II / TranSend II)**

3) You'll see Disconnected if the cable is not connected or the 600 hasn't fully booted up. Otherwise, you see the Connected screen.

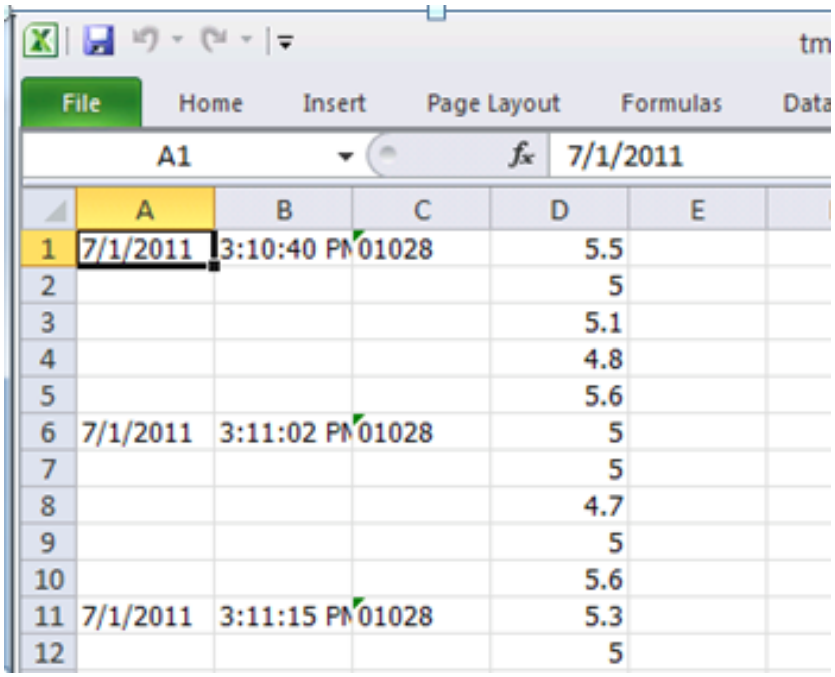


4) Data is being uploaded. Do not disconnect the cable until it is safe to do so.





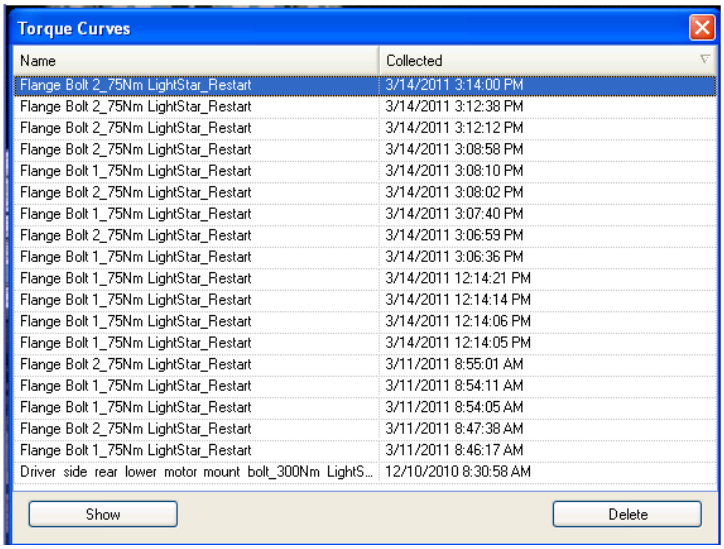
6) If your data options include receiving data in Excel, the spreadsheet will open as the data is retrieved.



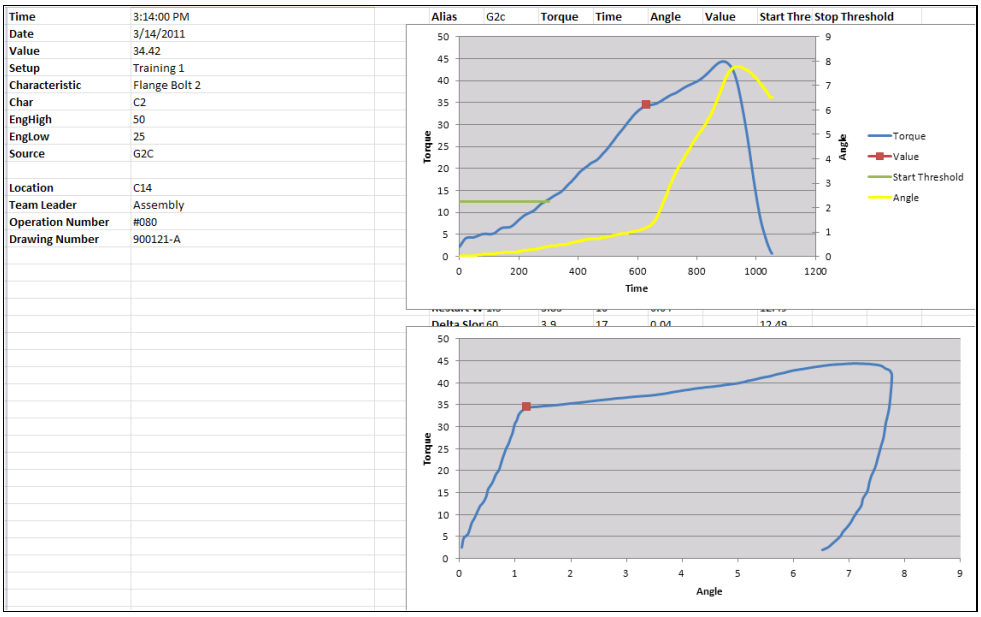
	A	B	C	D	E
1	7/1/2011	3:10:40 PM	01028	5.5	
2				5	
3				5.1	
4				4.8	
5				5.6	
6	7/1/2011	3:11:02 PM	01028	5	
7				5	
8				4.7	
9				5	
10				5.6	
11	7/1/2011	3:11:15 PM	01028	5.3	
12				5	

Reviewing Torque Curves

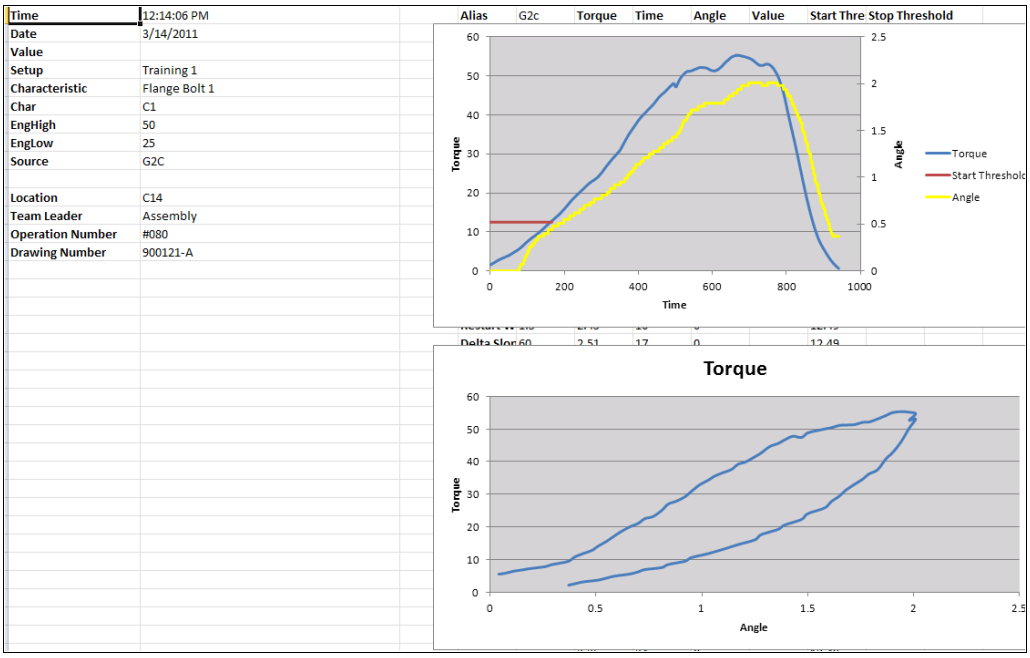
TranSend II allows users to view torque curves stored according to the selection configured in preferences. The Torque Curves stored in the database are accessible through the View Torque Data button:



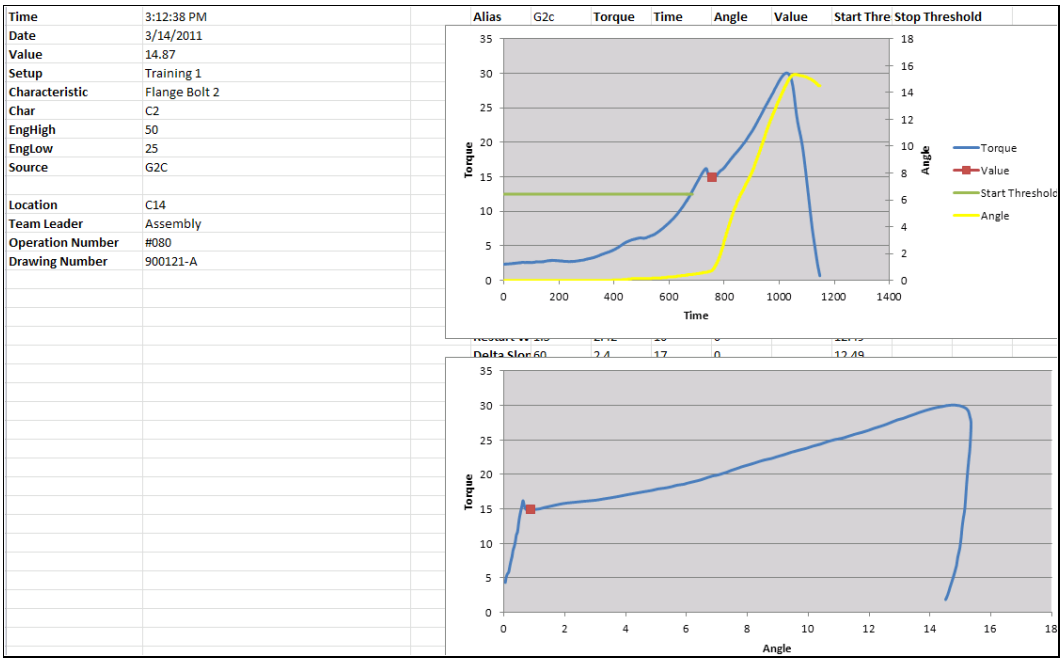
Select the desired Torque Curve which will open in Excel (version 2007 or above required):



The reading above shows a standard rise, flex, flex release pattern. The reading is within the spec limits and should not trigger any alarms.



No reading was captured with this curve (the value column is blank). Because of the slight angular rotation, the torque and the angle curves follow the same path. Notice how closely the flex release path followed the path of the initial rise.



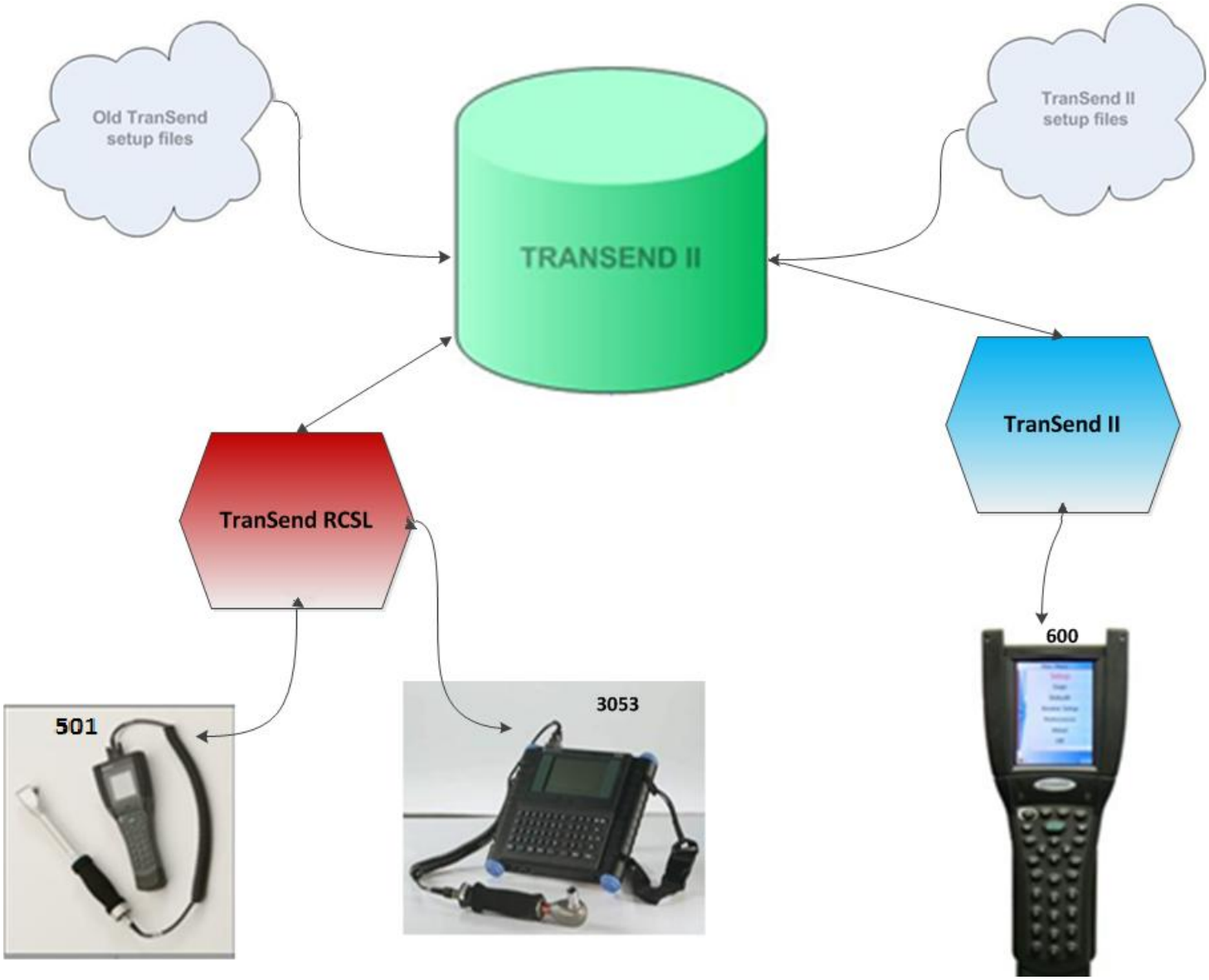
This curve should trigger a spec limit violation as the value is below the lower spec limit.

Legacy collectors and TranSend RCSL

Legacy data collectors can use the TranSend II database if the setup accommodates the source requirements of the target collector.

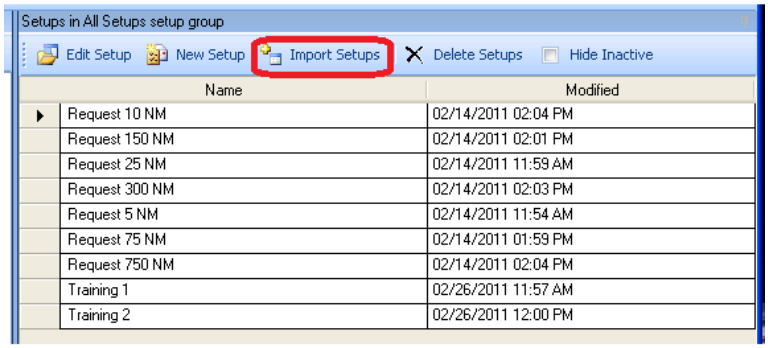
For example, if a setup created in TranSend II uses a gage suite with aliases named the same as the collector's gage addresses, that setup can be sent to the legacy collector for data collection.

TranSend II can also import setups created in the original TranSend utility and these can be used with both legacy and 600 data collectors.

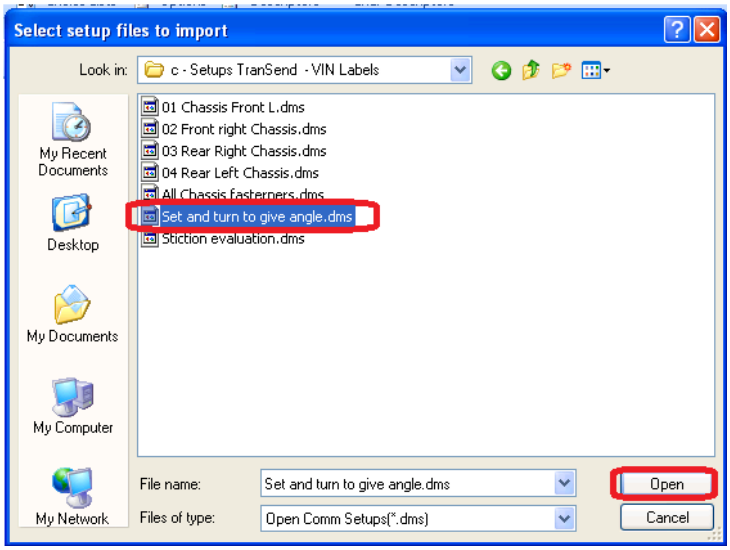


Import Setups from TranSend Utility

1) Open TranSend II Setup Editor. Select Import Setups.

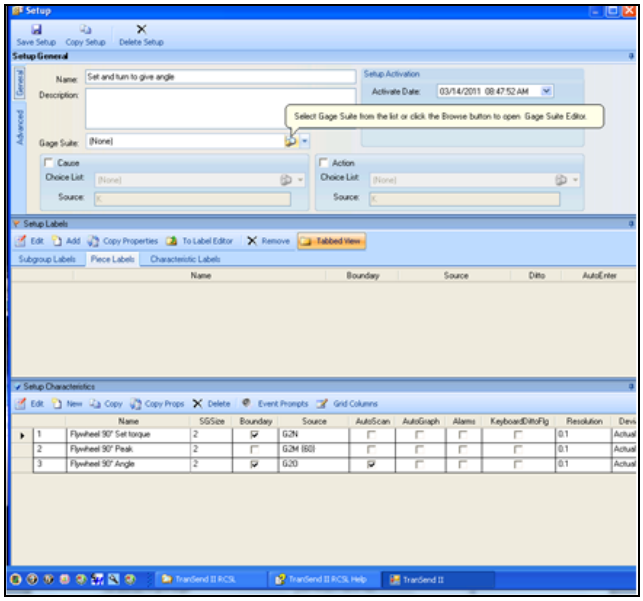


2) Browse to the desired setup in your TranSend Utility folder and open the file.



3) Your migrated setup will appear in your TranSend II setup list.

4) When you open the setup you imported, you will notice there is no gage suite. If you will use this with the 600 data collector as well,
    a. A gage suite must be assigned;
    b. You may add an image;
    c. You may add characteristic descriptors.



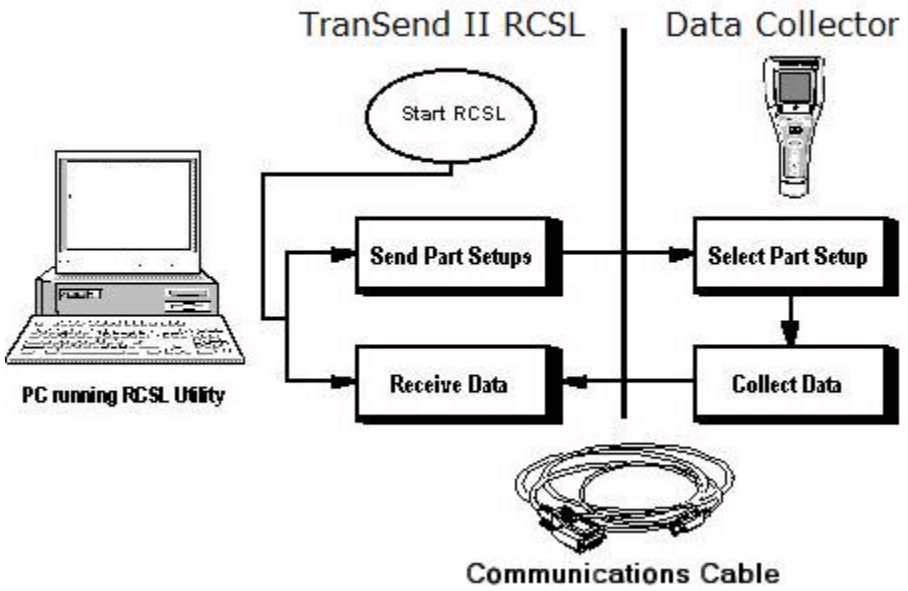
5) Imported setups are sent to the 600 using the TranSend II interface. However, setups sent to legacy data collectors require TranSend RCSL and the ASI DataMyte 91714 cable for serial communication.

TranSend II RCSL Agenda:

1. Introduction to TranSend II Remote Client Serial Link (TranSend II RCSL)
2. Navigation
3. Configuring Preferences
4. Send Setups and Setup Groups
5. Receive Data
6. Collector Maintenance

What is TranSend Remote Client Serial Link (RCSL)?

TranSend II RCSL is a utility that enables a PC to transfer setups from a connected database to a data collector (and to harvest collected data back to the database). You must connect the data collector to the computer running TranSend II RCSL using a serial cable:

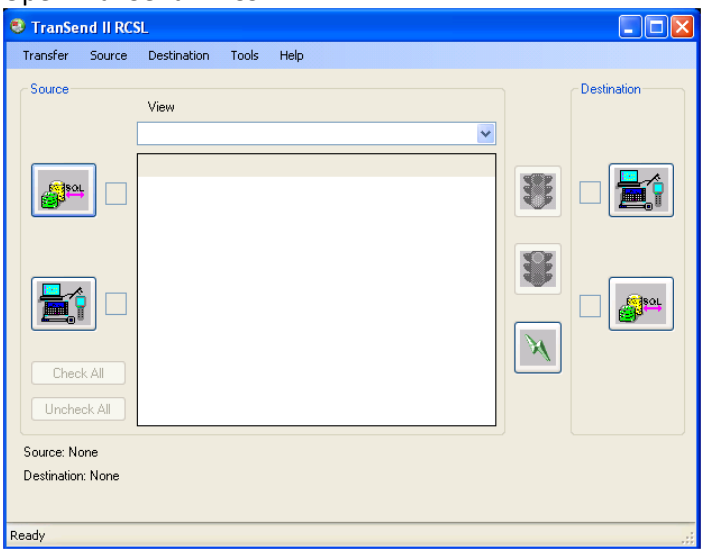


Important: *You must use an approved ASI DataMyte serial cable to connect the collector to a computer running TranSend II RCSL. For more information, contact ASI DataMyte Technical Support.*

- ***Note:*** *Be sure to initialize the data collector before connecting to the TranSend II database the first time.*

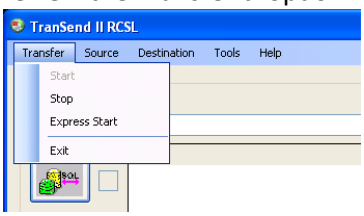
TranSend II RCSL

1) Open TranSend II RCSL.



Icons	Function
	Selects the DataMetrics database as the Source or Destination. ***Note**: Choosing this as Source disables SPC Database as the Destination.*
	Selects the data collector as the Source or Destination. ***Note:** Choosing this as Source disables the data collector as the Destination.*
	Selects all items.
	Deselects all items.
	Starts the data transfer (green light indicator).
	Stops the data transfer (red light indicator).
	Automatically performs a transfer of new data from a connected data collector to the database.

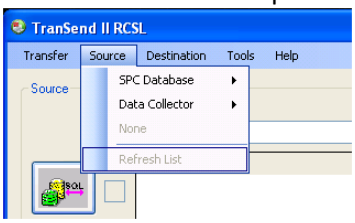
2) Review the Transfer dropdown menu:



- **Start—**Starts the data transfer.
- **Stop—**Stops the data transfer.
- **Express Start**—Connects the data collector (Source) to the SPC database (Destination) and transfers New Data.

Exit—Closes the application.

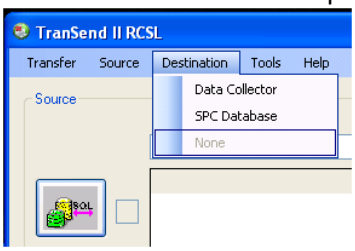
3) Review the Source dropdown menu:



- **SPC Database**—SPC Database source:
- **Data Collector**—Data Collector source:
- **None**—Disconnects Source.
- **Refresh List**—Refresh source view.

Note: *If selection is grayed out, it is inactive.*

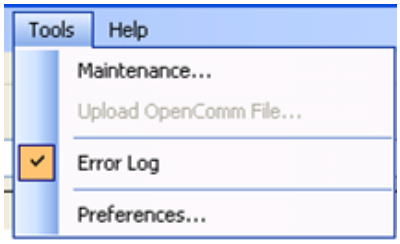
4) Review the Destination dropdown menu:



- **SPC Database**—SPC Database destination:
- **Data Collector**—Data Collector destination:
- **None**—Disconnects Source.

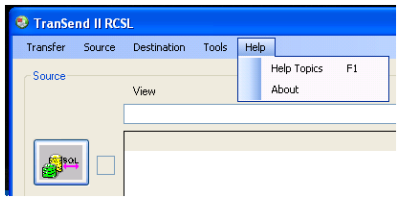
Note: *If selection is grayed out, it is inactive.*

5) Review the Tools dropdown menu:



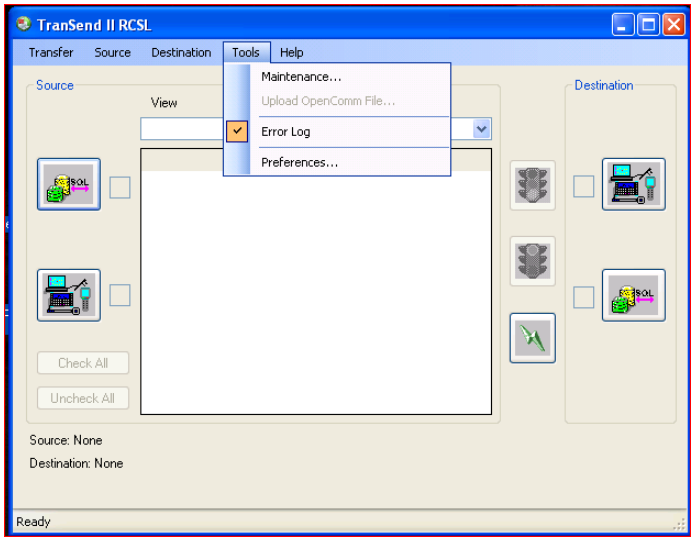
- **Maintenance**—Perform data collector maintenance, including delete selected setups from the connected data collector.
- **Upload Open Com File** – Future function.
- **Error Log**—Logs errors in RCSL.log file.
  Preferences—Set Preference options for DataMetrics RCSL functionality.

6) Review the Help dropdown menu:

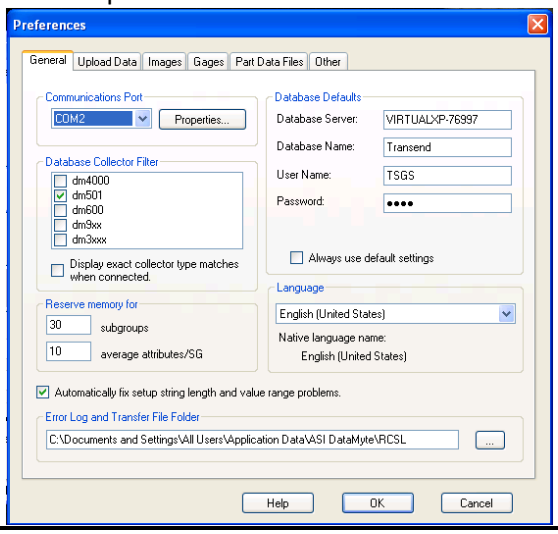


- **Help Topics**—Help <F1>.
  About—Displays System information and Application details.

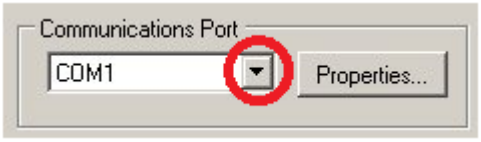
7) Select the Tools dropdown menu, and select preferences.



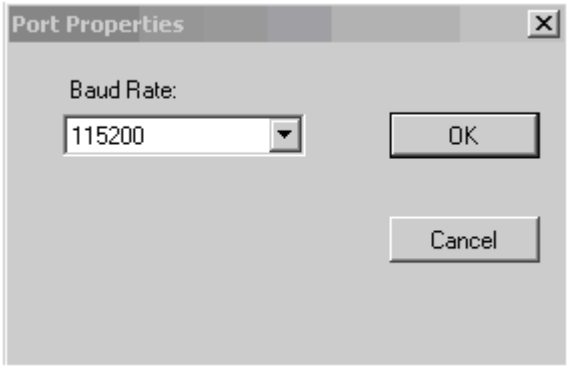
8) General preferences tab:



9) To configure communications, select the serial port to which the data collector is connected from the drop-down list:

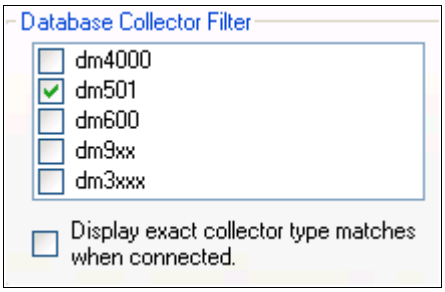


10) Click the Properties button to select the Baud Rate that matches the settings on your data collector.



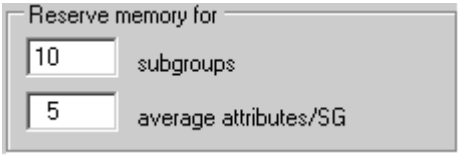
***Note**: The highest available setting for your collector offers the fastest data transfer rate; i.e. The 501 collector Serial Baud Rate is 115200 and the 30XX data collector Serial Baud Rate is 38400.*

11) Select the Database Collector Filter for the types of setups to display in the DataMetrics RCSL main window. For example, if you only want to see the setups designed for a 501 data collector, you would place a checkmark in the 501 checkbox.



Note: *The "Display exact collector type" checkbox is used to automatically select the collector type of the currently connected data collector as the active filter.*

12) Users can decide how much space to hold in reserve to store collected data for each setup in the collector (this setting affects all setups in the collector). Once this space is reserved, nothing else can use this portion of memory. In setting this parameter, users should consider how many setups need to be stored on the collector, how many subgroups are collected in the most frequently used setup and how often the data is moved to the database.



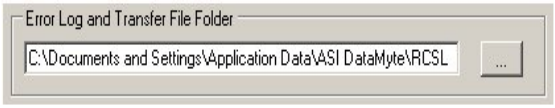
Set the subgroups to 10. The average attributes/SG setting reserves the memory for attribute data collection. Set average attributes/SG to 5.

Note*: If doing attribute data collection on a 30xx/9xx, change the reserve memory for average attribute/SG to 5.*

13) To Automatically fix setup string length and value range issues (truncate) to ASI DataMyte's data collector limitations, place a checkmark in the box.

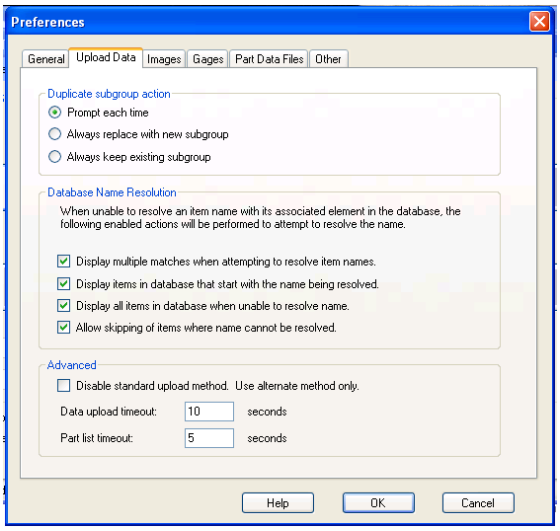
Note*: Selecting this will truncate string lengths for your setups and log information in the RCSL.log file. If unchecked, you will see a message indicating that the string is too long and must be corrected before you can download.*

14) Select the Browse icon < ... > to define the path for the Error Log and Transfer File Folder location. The log file will be stored as a text file named RCSL.log in this directory.

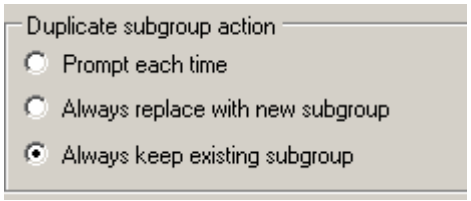


***Note**: The user must have read/write permissions for the folder selected.*

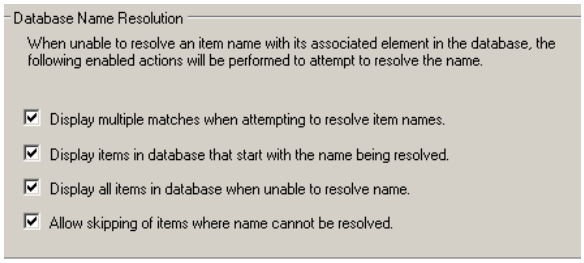
15) Update data tab:



16) A duplicate subgroup is a subgroup that has previously been uploaded and has the same timestamp as a subgroup in the TranSend II database.
Select the desired Duplicate subgroup action:
Prompt each time – Prompt the operator to determine whether to overwrite or maintain the existing subgroup.
Always replace with new subgroup – Replace the subgroup in the database with the subgroup from the data collector.
Always keep existing subgroup – Do not replace the subgroup in the database with the subgroup from the data collector.

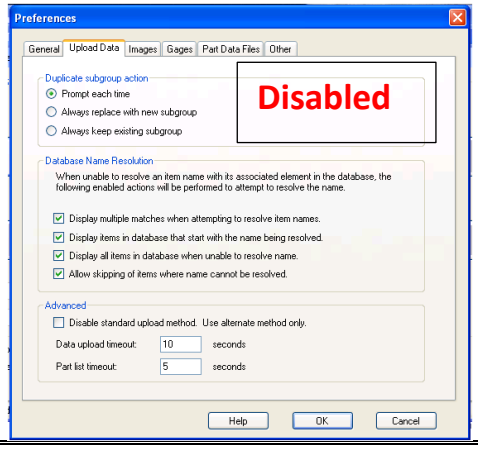


17) Database Name Resolution options manage database name conflicts.

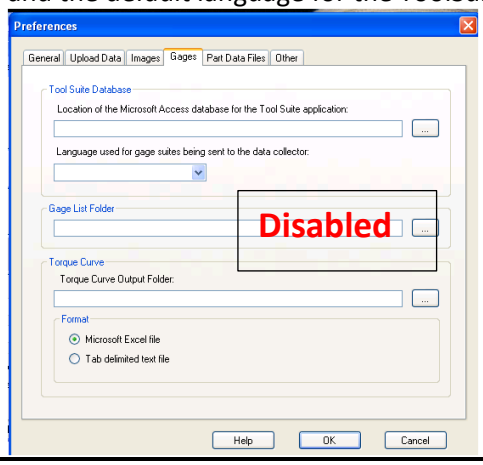


***Note**: deselecting options (removing check marks) disables Database Name Resolution functions.*

18) Images tab—**this function is currently disabled.** The Images tab allows users to configure how the image files used with the DM4000 are retrieved.

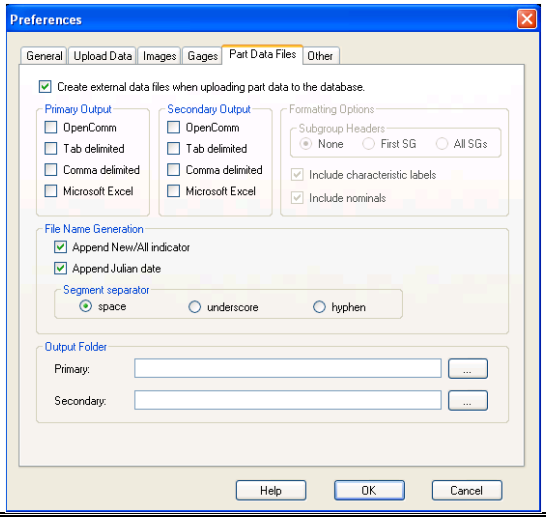


19) Gages tab—**this function is currently disabled.** The Gages tab allows users to specify the location of the Microsoft Access ToolSuite Editor database and the default language for the ToolSuite Editor.

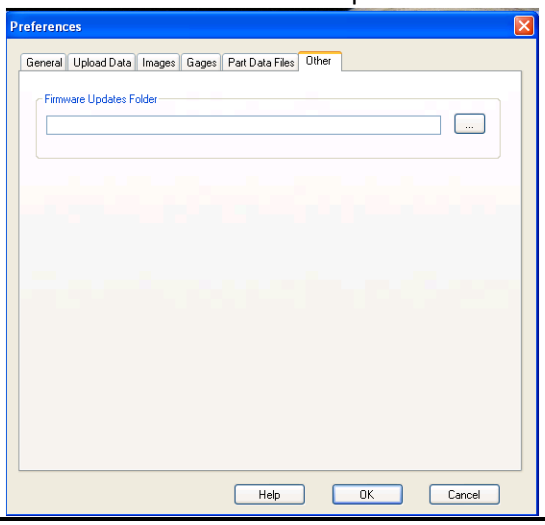


20) Part Data Files tab—note the following:

- Primary output Options
- Secondary output Options
- Formatting Options
- File Name Generation option
- Output Folders



21) Other tab—this is where the path to firmware update files is identified.



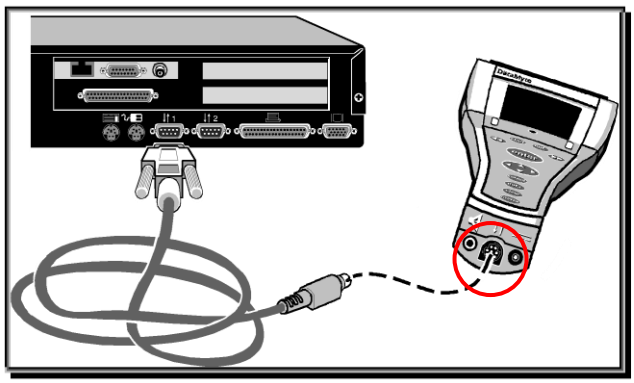
Skill Test #2

- Configure the communications port and the baud rate for your data collector
- Configure the communication in the data collector to match the baud rate in TranSend II RCSL
- Set the Database Collector Filter to display your collector type
- Set the reserve memory for 15 subgroups with an average attribute/SG of 3
- Configure the error log destination folder to your desktop
- Configure the duplicate subgroup action to prompt each time

Send Setups from TranSend II RCSL to the Collector

1. Connect the serial cable. The TranSend II RCSL application uses a direct-connect cable to establish a communications link with an ASI DataMyte data collection device.

Attach one end of the 91714 cable to the designated serial port on your PC and the other end to the COM Port (designated by the ↑↓ symbol) on the data collector.

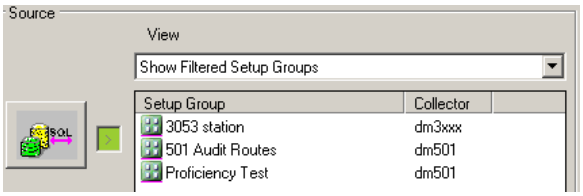


The Serial Baud Rate of the data collector must match that of the PC running the DataMetrics RCSL application. Once you have properly configured DataMetrics RCSL and your data collector to communicate together and connected the cable, you are ready to perform a transfer.

3. On the DataMetrics RCSL main screen, click on SPC Database icon as the Source.

Source

The Show Filtered Setup Groups will appear in the view window as default.



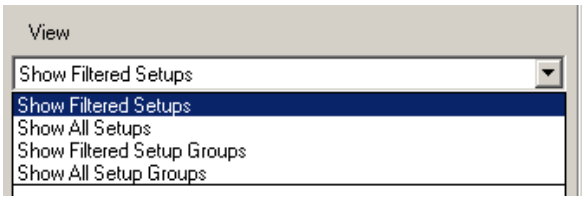
4. Select the View drop down list. The View can be filtered using one of four modes:

    a. Show Filtered Setups – displays only those setups associated with the selected Collector Type(s) as specified in DataMetrics RCSL Preferences.

    b. Show All Setups – displays all the setups in the connected database (no filtering).

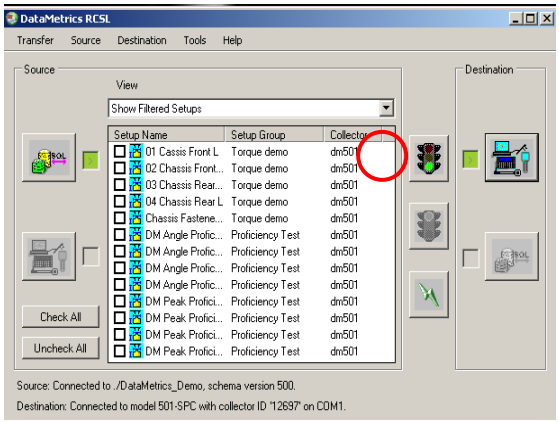
    c. Show Filtered Setup Groups – displays only those Setup Groups associated with the selected Collector Type(s) selected in DataMetrics RCSL Preferences.

    d. Show All Setup Groups – display all the Setup Groups (collections of Setups, Setup Group Alarm Set, and Passwords) in the connected database.

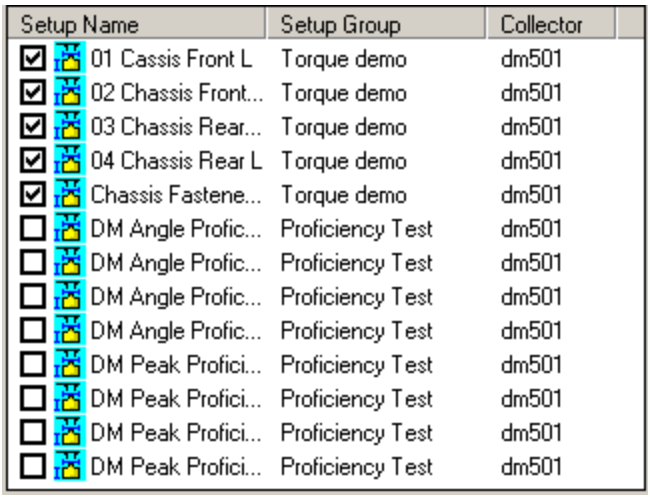


5. Click on the Data Collector Button. **Destination**

The data transfer button is enabled (green stop light).



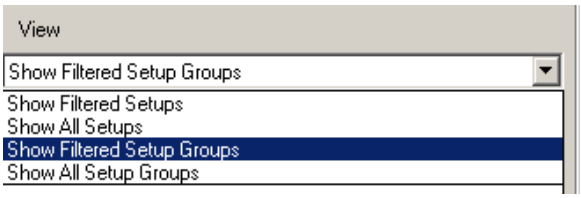
6. Select the Setup item(s) from the list. Place a checkmark next to the setup(s) to transfer.



7. Click on the Traffic Light button to perform the transfer.

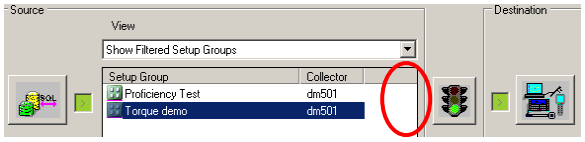
***Note**: If the Setup already exists in the collector, a message appears when a duplicate Setup is found asking whether to replace the existing Setup.*

8. Deselect the destination and source icons. Now select the Source icon and the View drop.



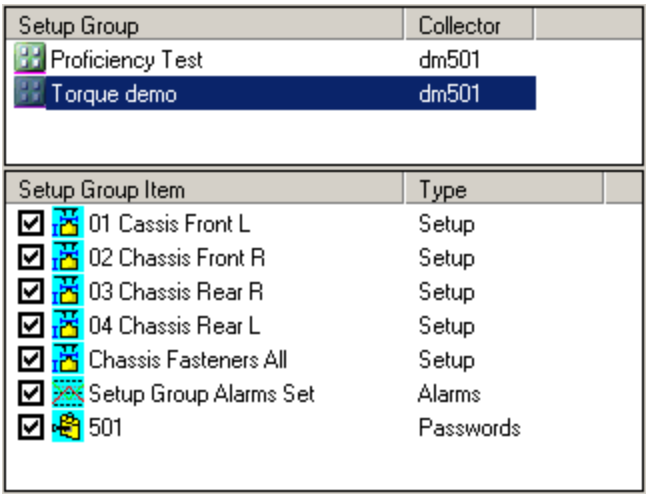
1. Click on the Data Collector icon. **Destination**

The data transfer button is enabled (green stop light).



2. Select a Setup Group. All 3 items are checked by default.

***Note**: Use Check All or Uncheck All to select or deselect all setups in the setup group.*



3. Click on the Traffic Light button to perform the transfer.

***Note**: If the Setup already exists in the collector, a message appears when a duplicate Setup is found asking whether to replace the existing Setup.*

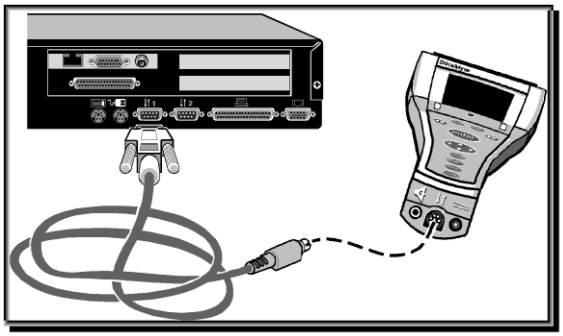
Skills Test #4

- Send Training 1 setup group from TranSend II to the 501 data collector.

Receive Data Practice

1. Connect the serial cable—The TranSend II RCSL application uses a direct-connect cable to establish a communications link with an ASI DataMyte data collection device.

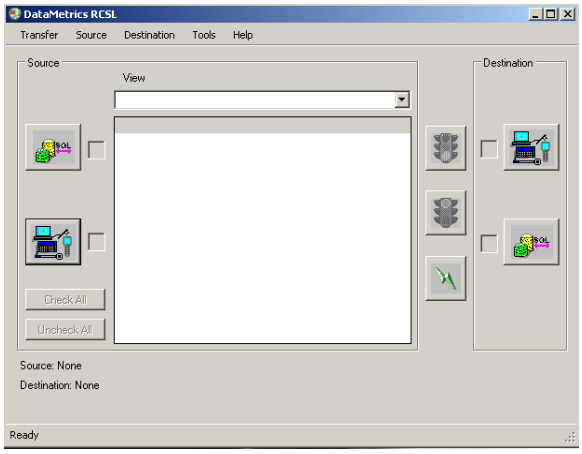
   Attach one end of the 91714 cable to the designated serial port on your PC and the other end to the COM Port (designated by the ↑↓ symbol) on the data collector.



   The Serial Baud Rate of the data collector must match the Serial Baud Rate of the PC running the DataMetrics RCSL application. Once you have properly configured DataMetrics RCSL and your data collector to communicate together and connected the cable, you are ready to perform a transfer.

2. In the TranSend II RCSL main screen, click the Express Start icon. 

   The Express Start was initiated.

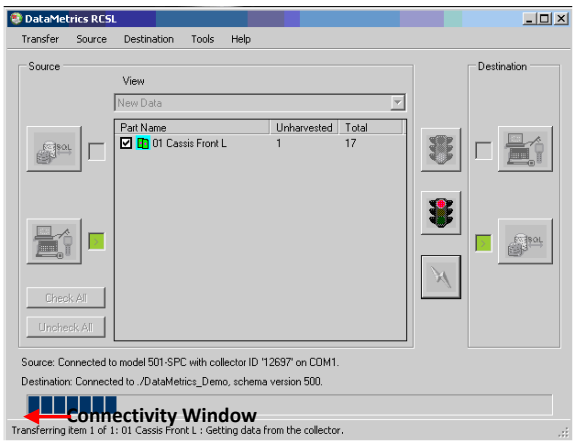


3. Express Start automatically does the following:

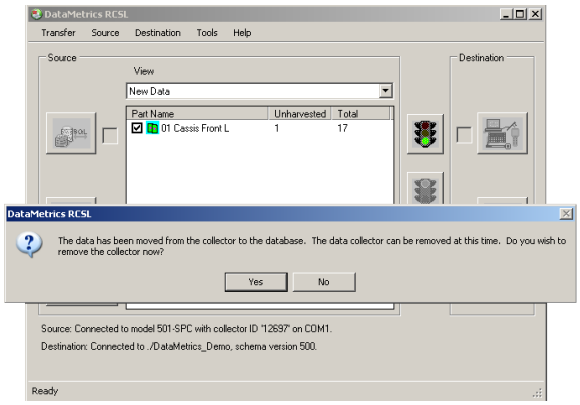
   Selects the data collector as Source.

   Selects the database as Destination.

   Activates transfer of New Data to the database (see Connectivity Window)

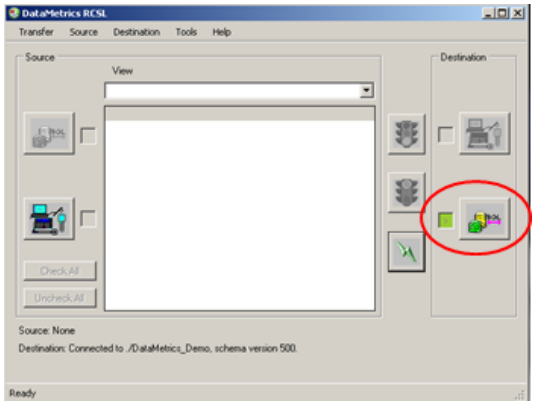


4. When the transfer is completed the user is asked to select whether to remove the collector or not. Select <Yes>.



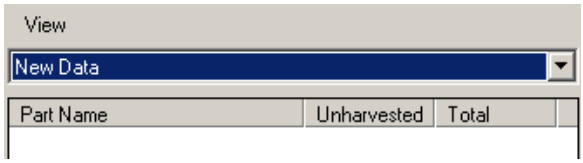
5. Before exiting the sequence, the user needs to deselect the database as the destination.

   Click on Destination SPC Database icon to disconnect.



7. Users can also manually transfer data from the collector to the database. In the TranSend II RCSL main screen, click Source Data Collector icon.

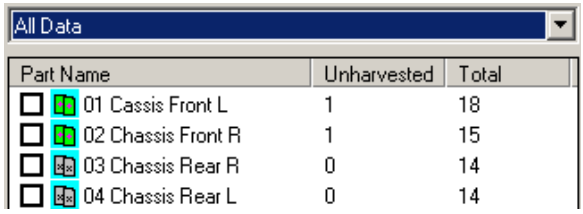
   The New Data option will appear in the View window.



8. Select the View Option:

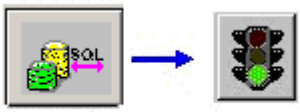
   New Data – display only Setups that have Unharvested (not transferred) data.
   All Data – display all Setups with Unharvested and Harvested data.

   The available parts will appear in the screen.



   Select the Setup(s) to transfer from the list by placing a check mark in each part name box.

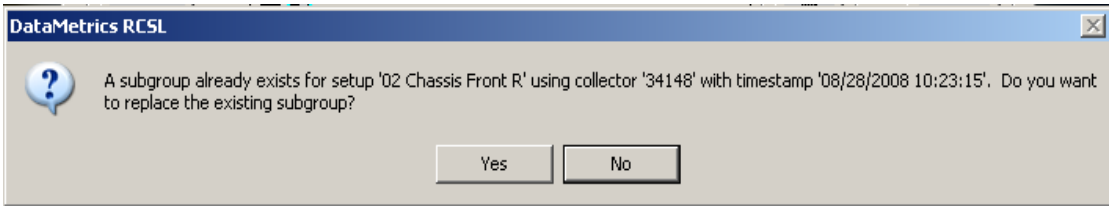
9. Click on the SPC Database icon as the destination. Click the green traffic light button to perform the transfer.



Destination

Note: When the transfer is complete, you will see a message stating the data has been moved to the database and asking you whether you want to remove the data collector. Click Yes to quit the data transfer session or No to perform additional transfers.

10. If All Data was selected for a setup with harvested data, the following message appears during the data transfer:



Select Yes to over write existing subgroup in database. Select No to retain the original subgroup data in the database.

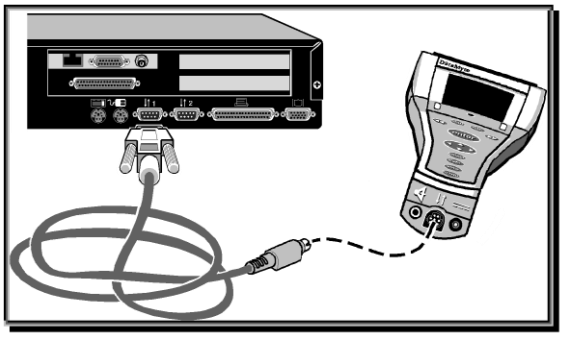
Skills Test #5

- Collect a minimum of one subgroup of new data.
- Harvest all New Data with one click.

Collector Maintenance

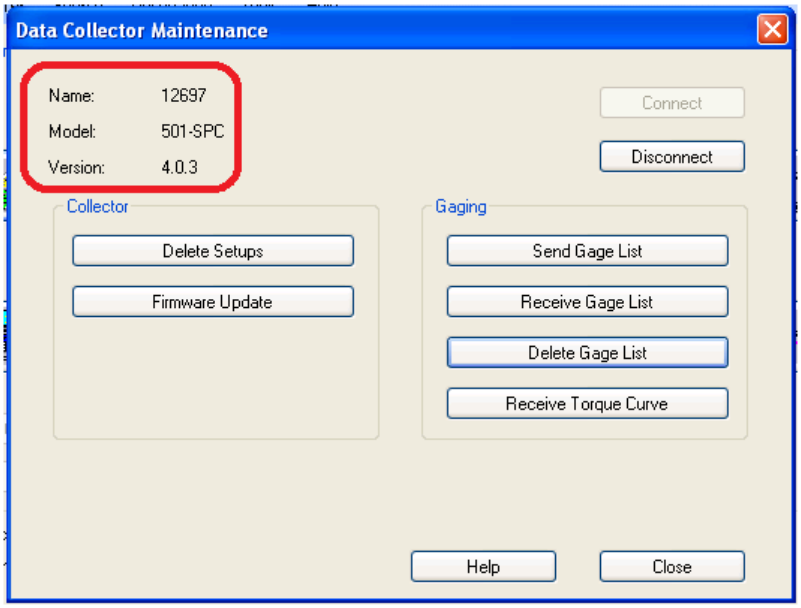
1. Connect the serial cable—The TranSend II RCSL application uses a direct-connect cable to establish a communications link with an ASI DataMyte data collection device.

   Attach one end of the 91714 cable to the designated serial port on your PC and the other end to the COM Port (designated by the ↑↓ symbol) on the data collector.



   The Serial Baud Rate of the data collector must match the Serial Baud Rate of the PC running the DataMetrics RCSL application. Once you have properly configured DataMetrics RCSL and your data collector to communicate together and connected the cable, you are ready to perform a transfer.

2. In the TranSend II RCSL main screen Select Tools, Collector maintenance. Select the connect button to communicate with the collector device. Notice the collector information.



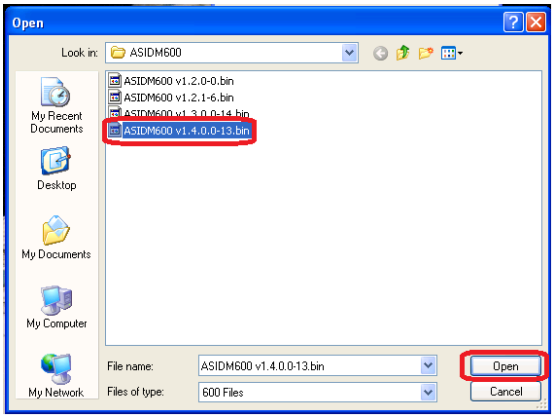
Selected Option	Response
Connect	Establishes connectivity with the data collector.
Delete Setups	Delete Setups from a connected device.
Firmware Update	Select the firmware update file to be sent from the dialog.
Send Gage List	Sends a gage configuration file used at the data collector to reference what gages are attached to it and what the various gage parameters are.
Receive Gage List	Receives a gage configuration file from the data collector.
Delete Gage List	Deletes the gaged configuration file from the data collector.
Receive Torque Curve	Receives a Torque Curve from a data collector.
Disconnect	Stops connectivity with the data collector.
Help	Access to on-line help.
Close	Exits the dialog.

Firmware Update Procedures

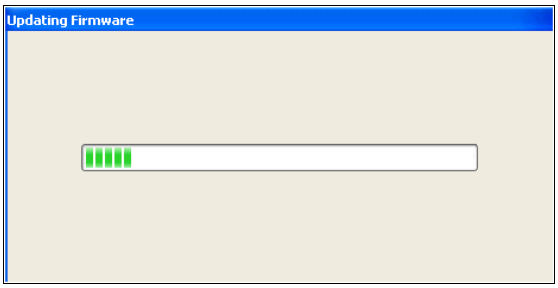
1. With the 600 connected to the TranSend II host via the USB cable, Open the Collector to send data, then select the Device Management option.

2. Select the Update Firmware button.

3. Select the desired firmware version and open the file.

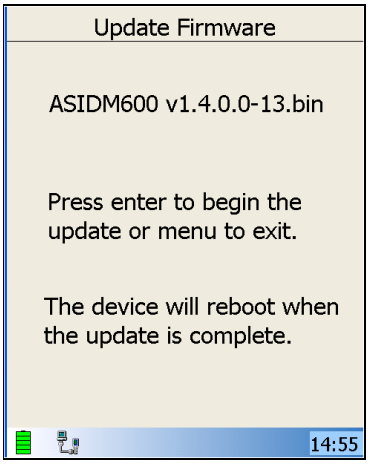


4. TranSend II sends the file to the 600.

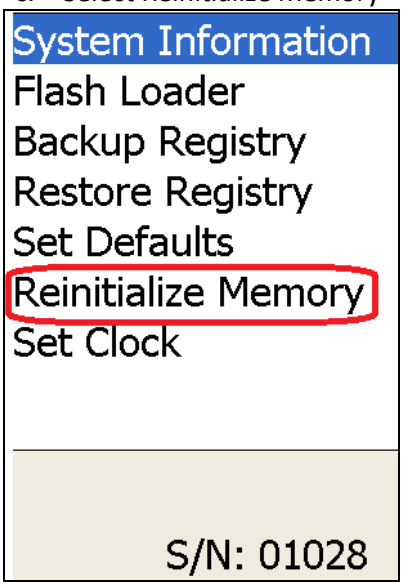


5. When the transfer is finished, the following notice appears:

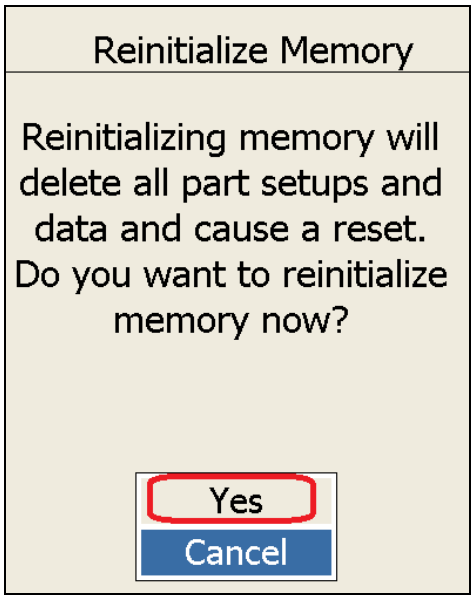
6. Press Enter to load the firmware, the system will reboot upon completion.



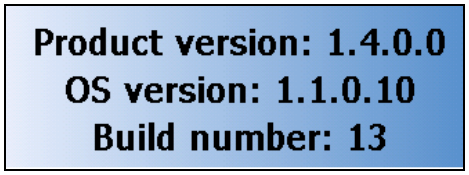
7. Once the 600 powers back on:
   a. Select the About option.
   b. Select the symbol, shift, menu keys in this order
   c. Select Reinitialize Memory



8. Select yes to reinitialize the memory. This will delete the gage suites and setups previously loaded on the system:



9. Verify the updated collector version when the 600 reboots:



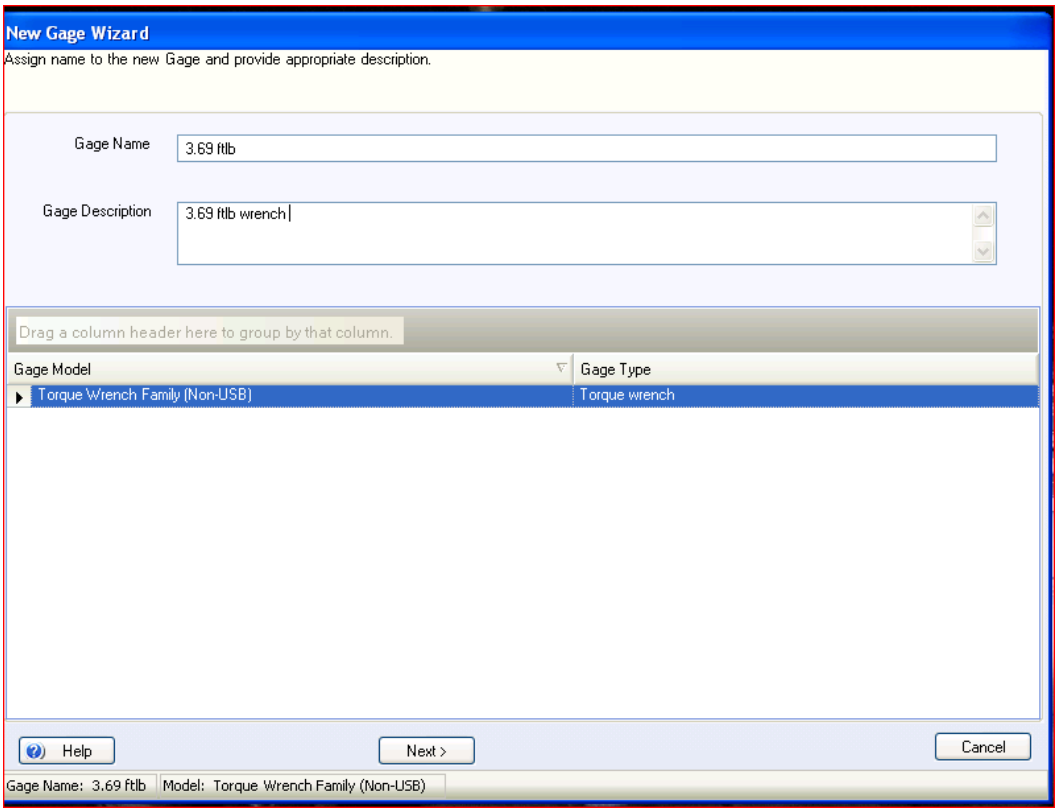
10. See the Sending Setups to the 600 section to reload your data collector.

Additional Practice

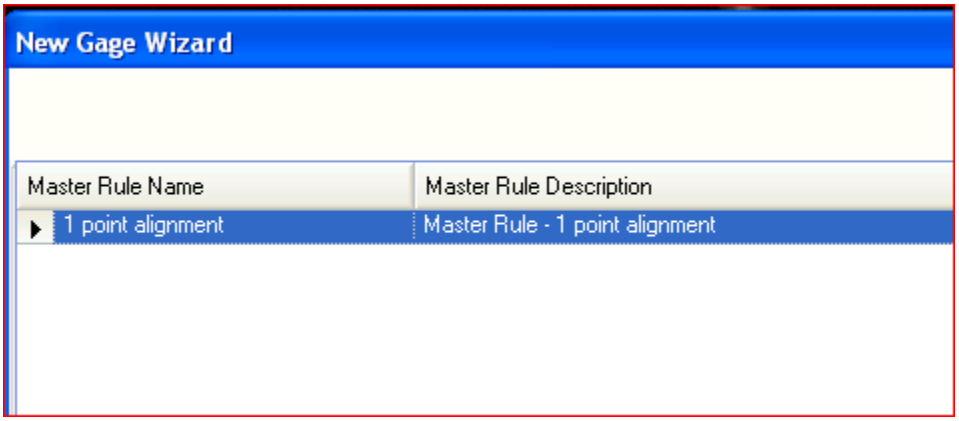
Creating new gages

In the Gage Suite, select the gages option, then new gage.

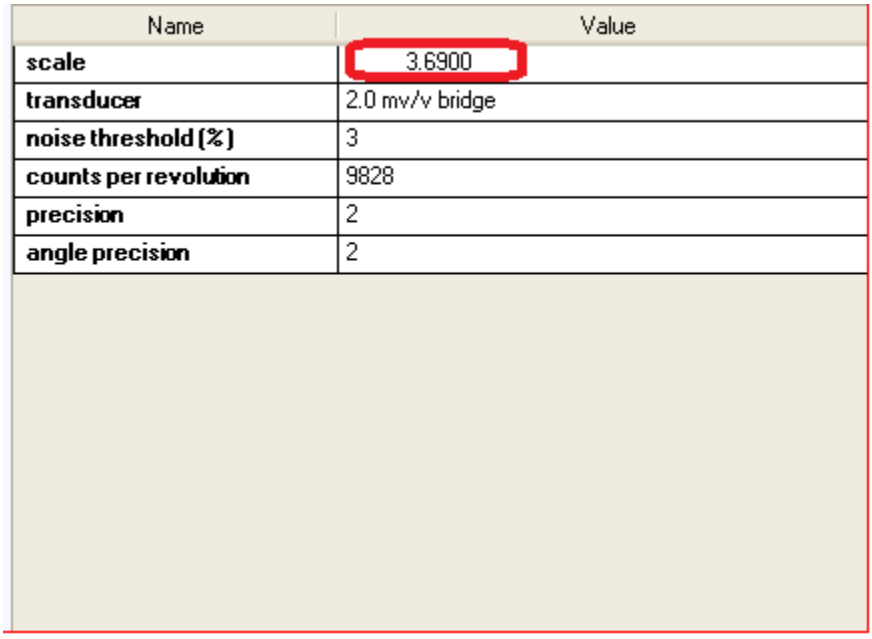
1. Select the New Gage Wizard. Name the gage, include the description and select Next:



2. Accept the mastering strategy and select Next:

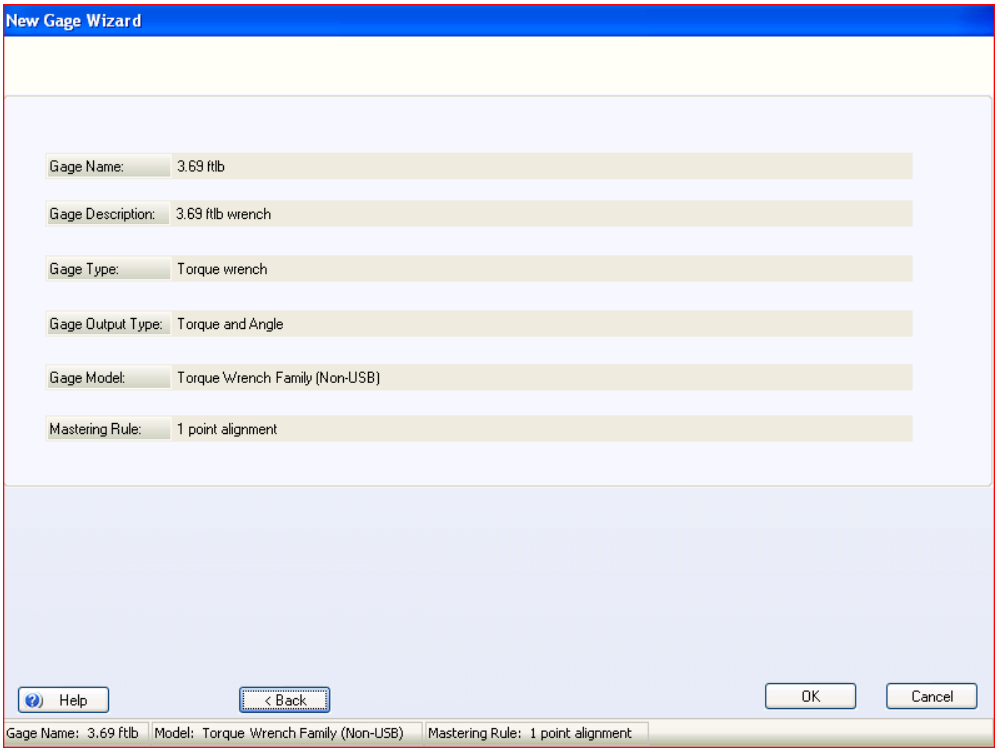


3. Set the full scale value to match the gage and click Next:

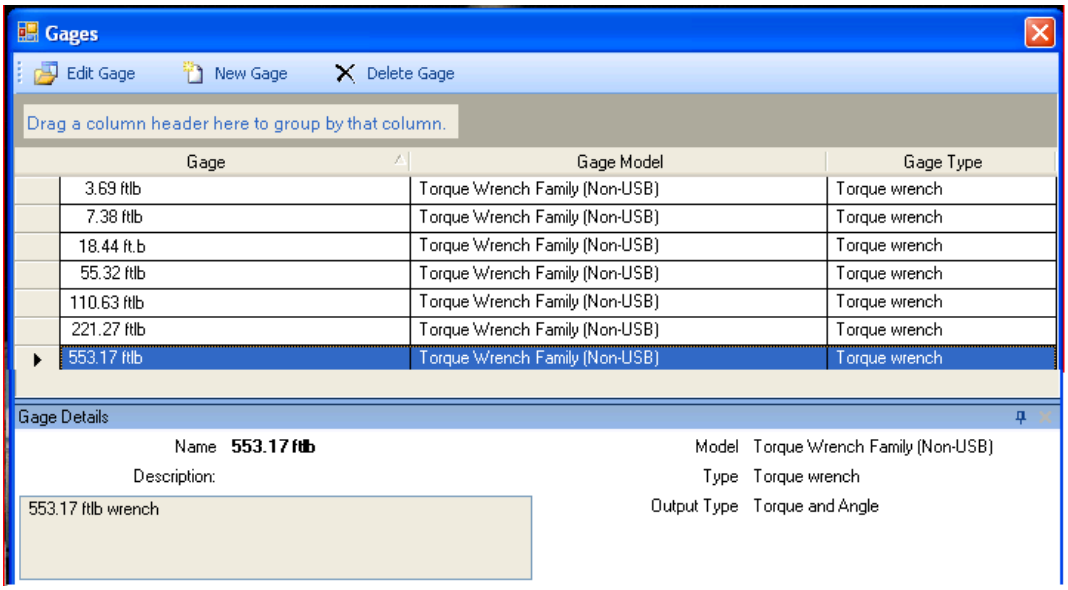


Name	Value
scale	3.6900
transducer	2.0 mv/v bridge
noise threshold (%)	3
counts per revolution	9828
precision	2
angle precision	2

4. Verify your choices and select OK.



5. Continue until your gage choices include the following gages:

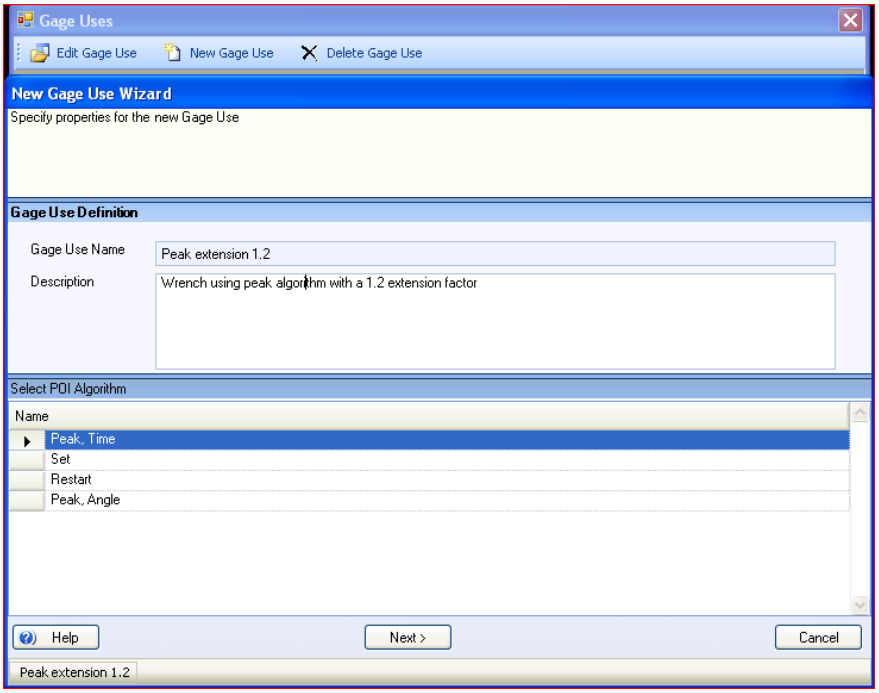


Close gage editor.

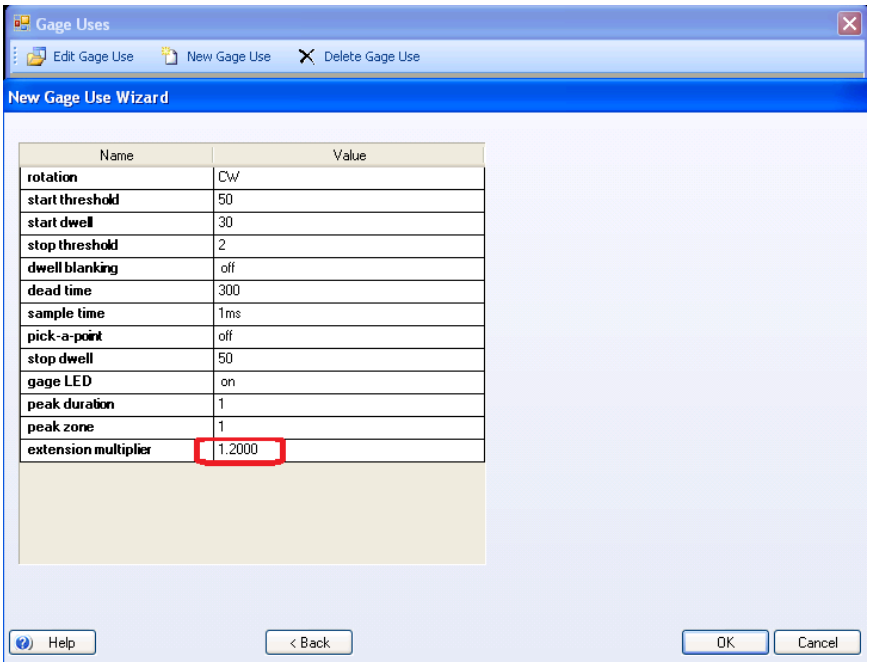
Creating new gage use

In the Gage Suite, select the Gage Uses, then New Gage Use.

1. In the New Gage Use Wizard, name the gage use, include the description, the Peak, Time Algorithm and select Next:



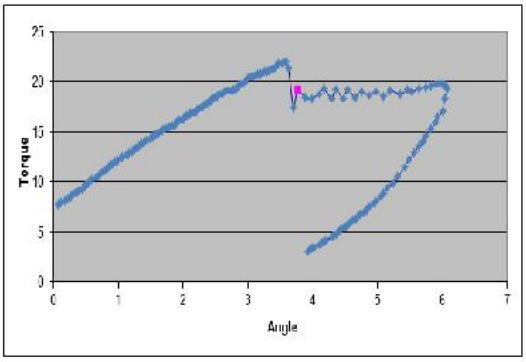
2. Change the extension multiplier to 1.2 and select OK.

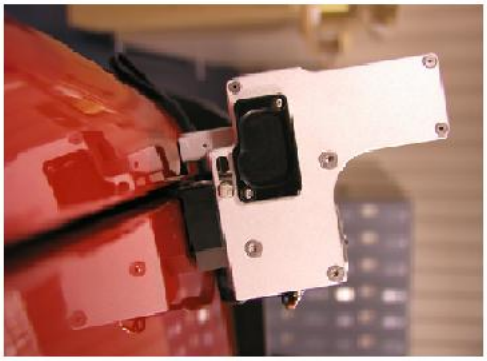


Close Gage Uses.

TranSend II - 600

Appendix





Appendix A – TranSend II Setup Checklist

QUESTIONS:

1. Is there a gage alias in an available gage suite that will work with your gage?
    a. If not, create the gage alias and/or gage suite.
2. Are the labels and choice lists you want to use created?
    a. If not, create the desired labels and choice lists.
3. Are there appropriate cause and corrective lists available?
    a. If not, create the desired lists in the Choice List Editor.
4. Are your default settings in Preferences and Labels set correctly?
    a. If not, configure them as desired.
5. Are the descriptors and choices you need available?
    a. If not, create them in the Descriptors Editor
6. Did you save your changes?

SETUP CREATION:

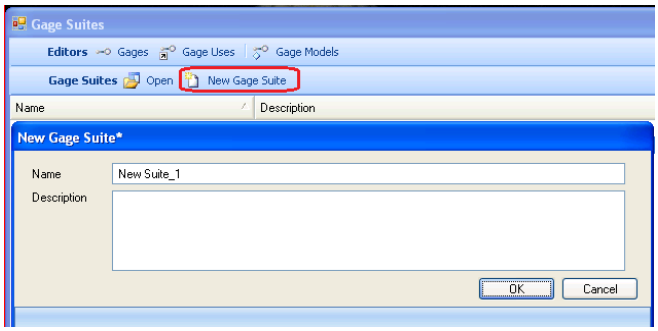
1. Did you name the setup?
2. Did you add a description?
3. Did you assign a gage suite?
4. Is the setup listed as active?
5. Did you add labels to the setup?
6. Did you place them in the correct tab (subgroup, piece or characteristic)?
7. Did you configure the label properties?
8. Did you create variable characteristics?
    a. Does each characteristic have the correct name?
    b. Does it have a valid description?
    c. Is the subgroup size properly configured?
    d. Is the source correct?
        i. If using a gage, did you identify an alias from the assigned gage suite?
        ii. If using operator symbols, Boolean operators or function operators is the syntax correct?
        iii. Is the order of operations correct?
    e. Is the resolution configured correctly?
    f. Did you reset the limit type if using deviation?
    g. Are the target and upper/lower spec limits correct?
    h. Did you add reasonable limits and are they valid?
    i. Did you define the path for image files if necessary?
    j. Did you assign characteristic descriptors?
    k. Did you configure Characteristic Events?
9. Did you save the setup?

SETUP GROUP:

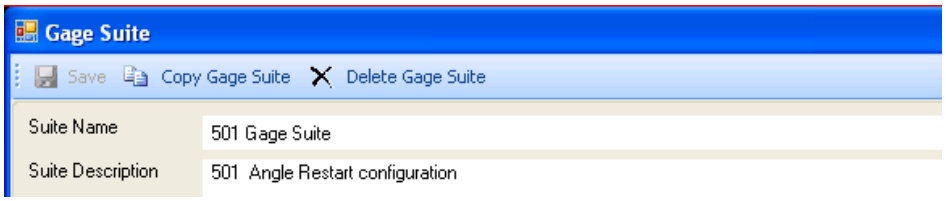
1. Did you open or create a setup group?
2. Did you add your new setup to the group?
3. Did you save your changes to the setup group?

Appendix B – Create a Gage Suite

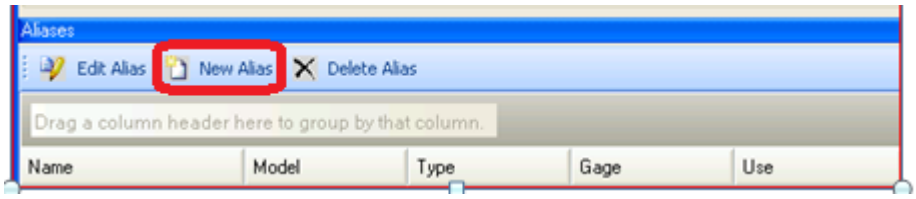
22. Select New Gage Suite.



23. Name it 501 Gage Suite with description 501 Angle Restart configuration.

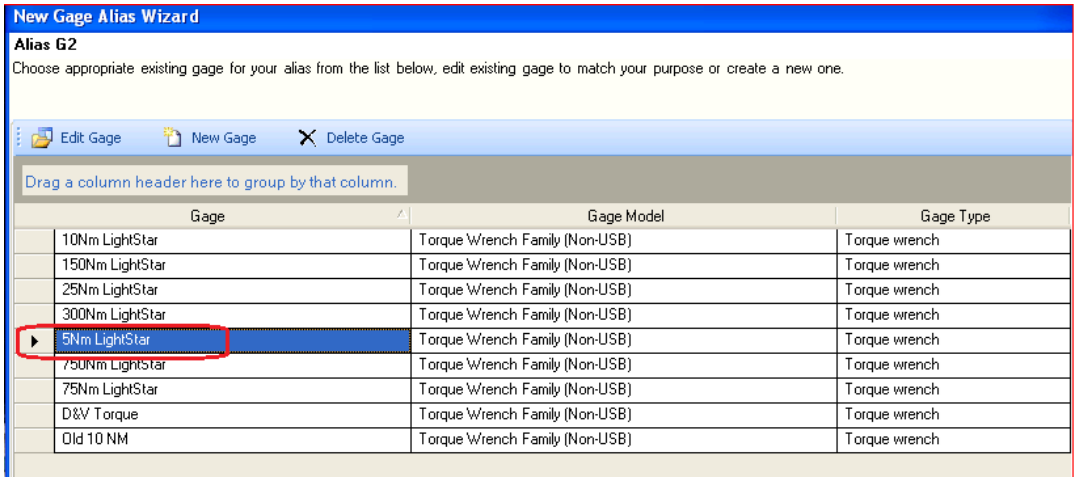


24. Click New Alias. This will start the New Gage Alias wizard.

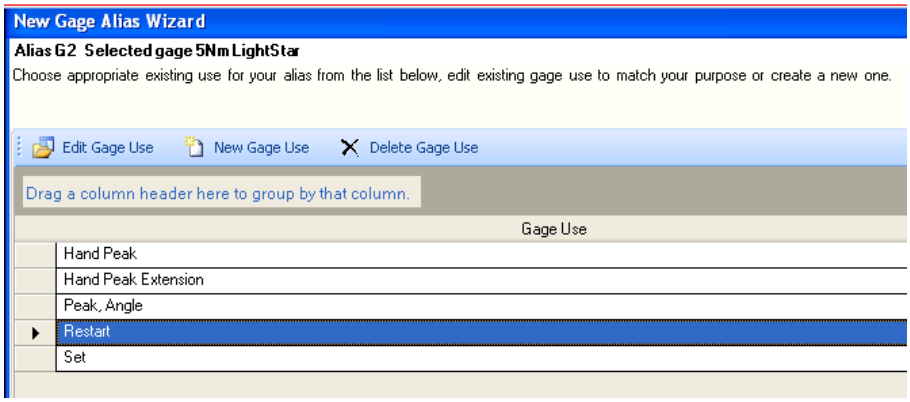


25. Name the new alias G2 with description as shown and click Next.

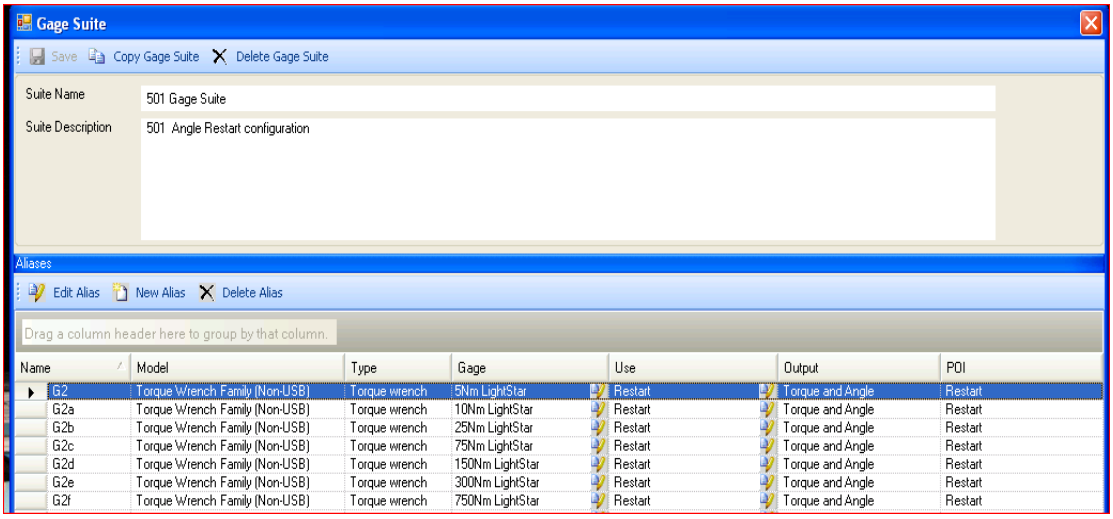
26. Select the 5Nm LightStar gage and click Next.



27. Select Restart for Gage Use and click OK.

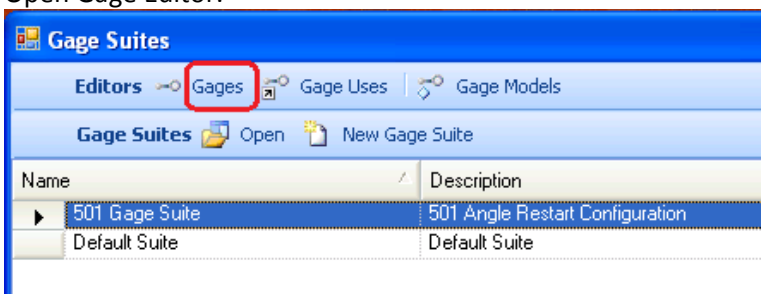


28. Skillset 1: Create the aliases as shown (steps 5-7).

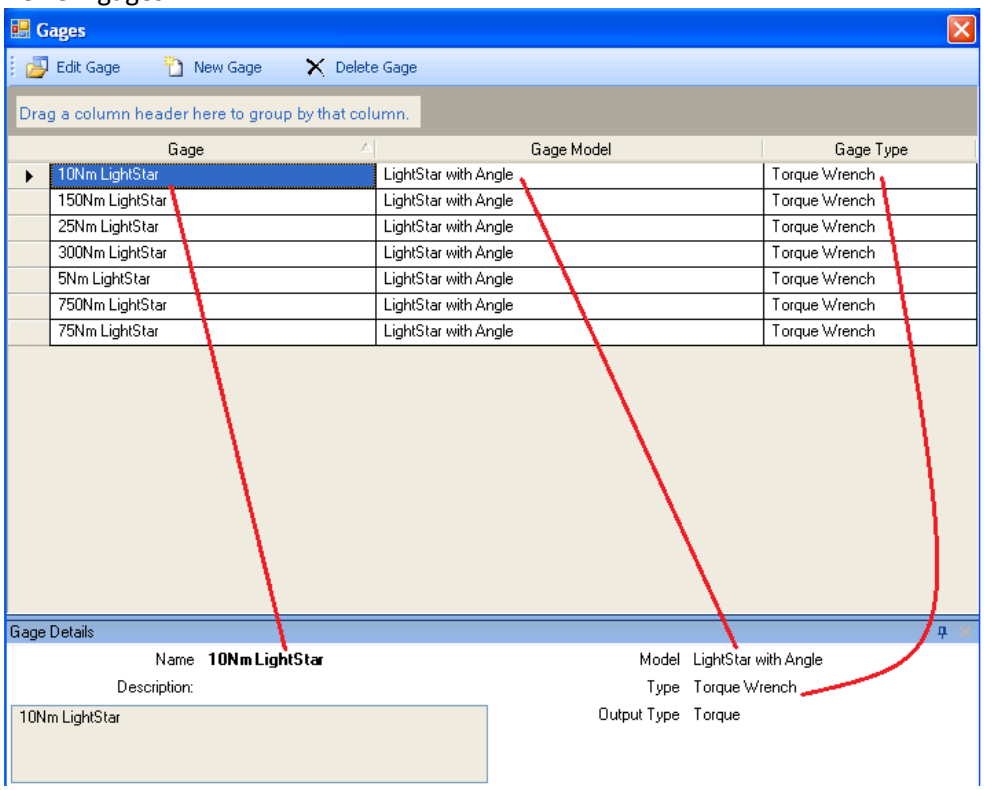


Appendix C – Create a New Gage

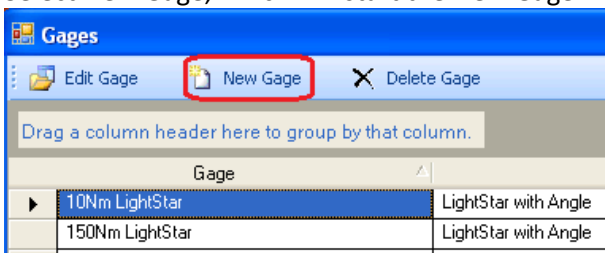
1. Open Gage Editor.



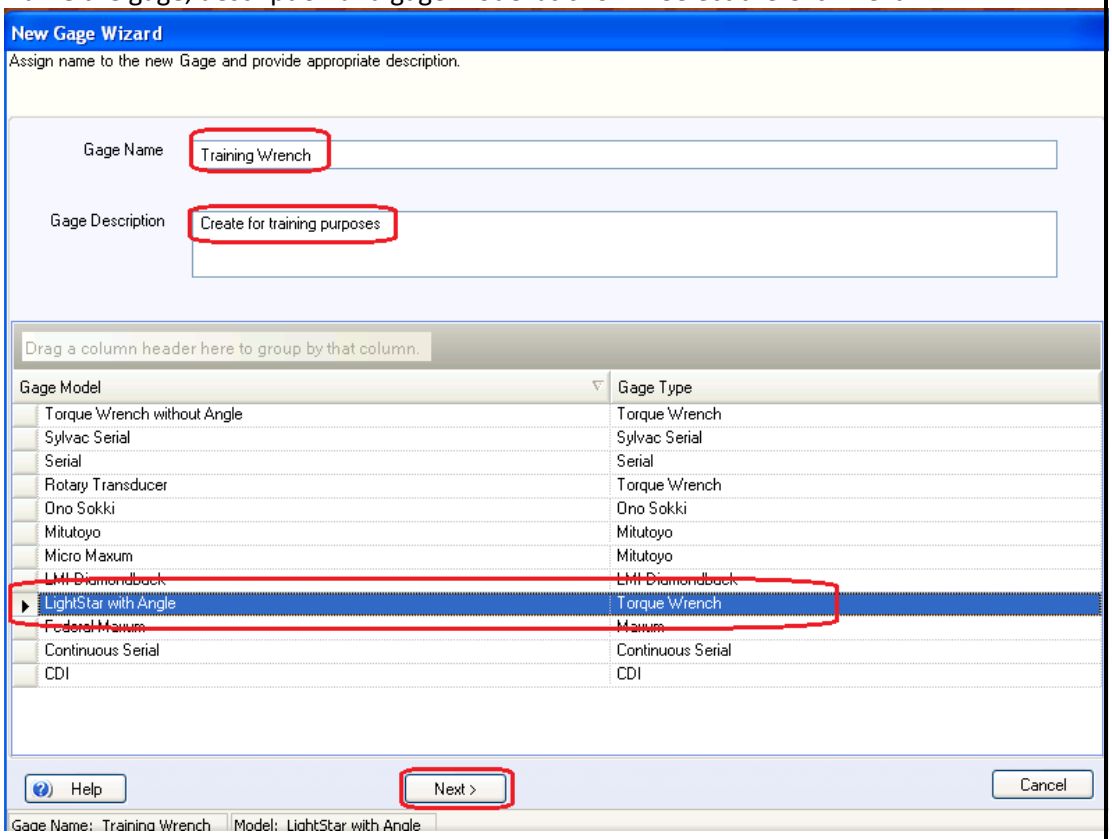
2. Review gages.



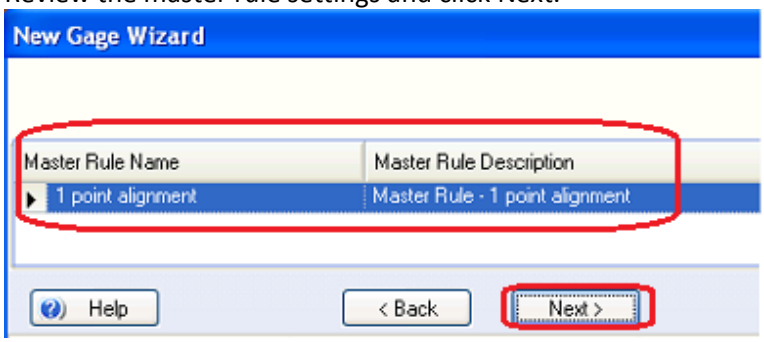
3. Select New Gage, which will start the New Gage wizard.



4. Name the gage, description and gage model as shown. Select the Click Next.



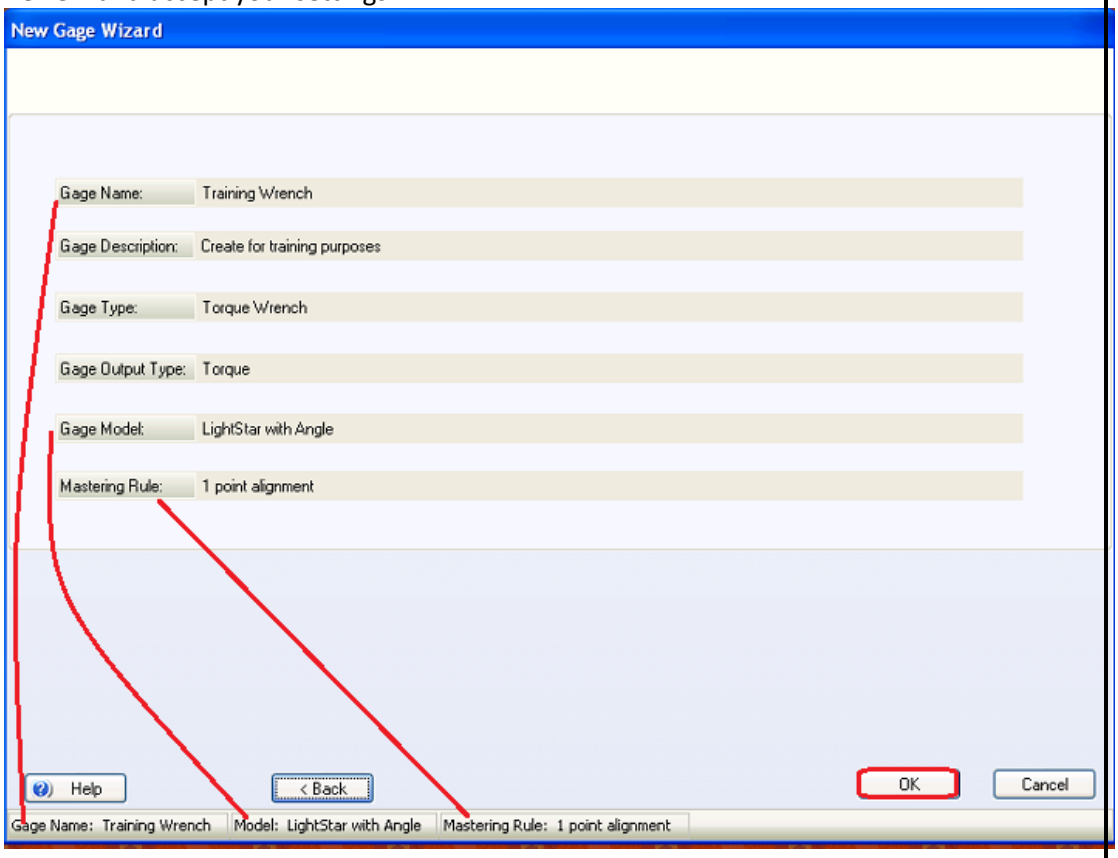
5. Review the master rule settings and click Next.



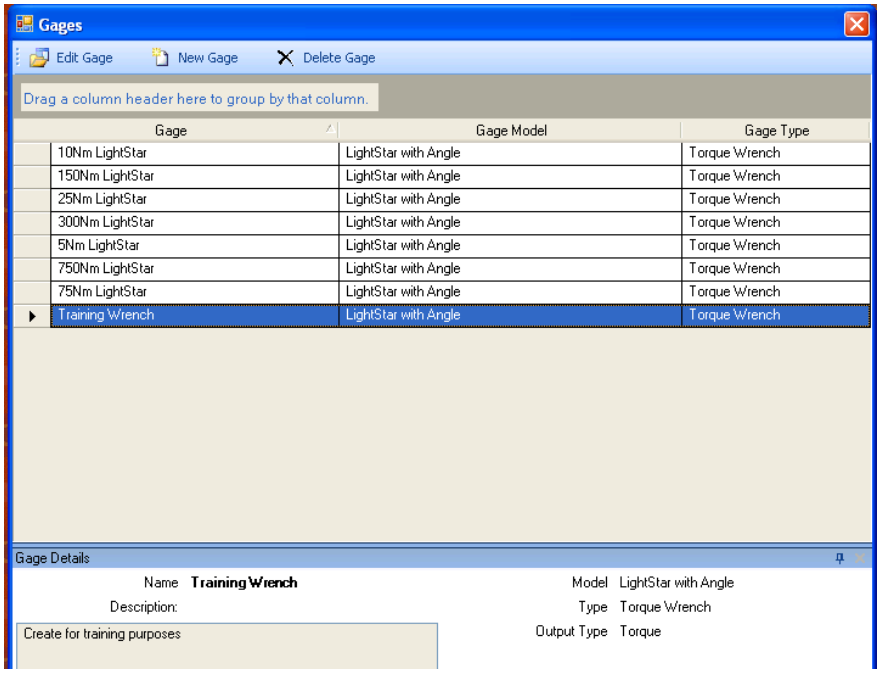
6. Change the Scale to 75, note the other settings and click Next.

Name	Value
Scale	75.0000
Transducer	2.0 mv/v bridge
Noise Threshold (%)	3
Counts per Revolution	9828
Precision	2
Angle Precision	2

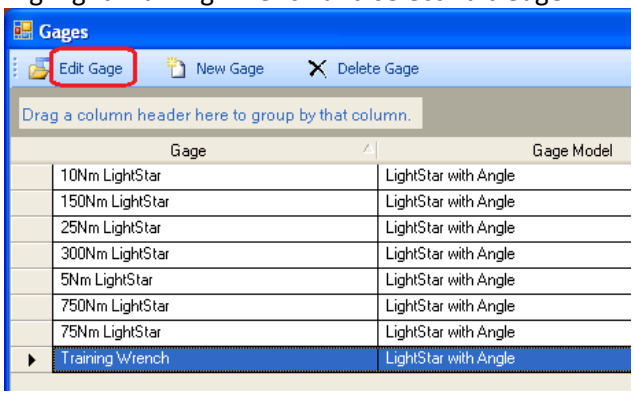
7. Review and accept your settings.



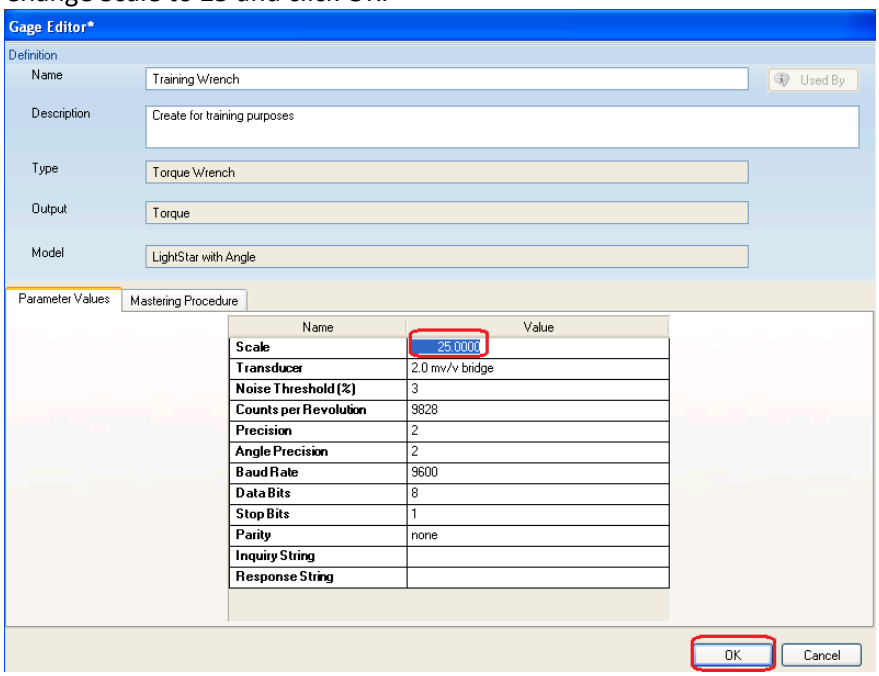
8. Your new gage appears at the bottom of the list. *Note: you can sort by column.*



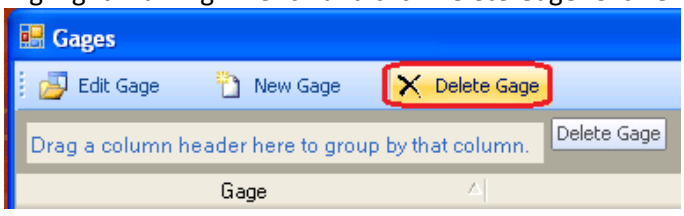
9. Highlight Training Wrench and select Edit Gage.

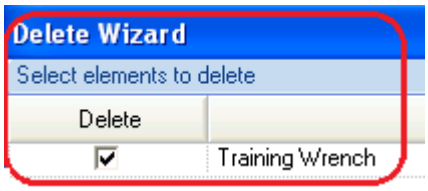


10. Change Scale to 25 and click OK.



11. Highlight Training Wrench and click Delete Gage. Click OK.

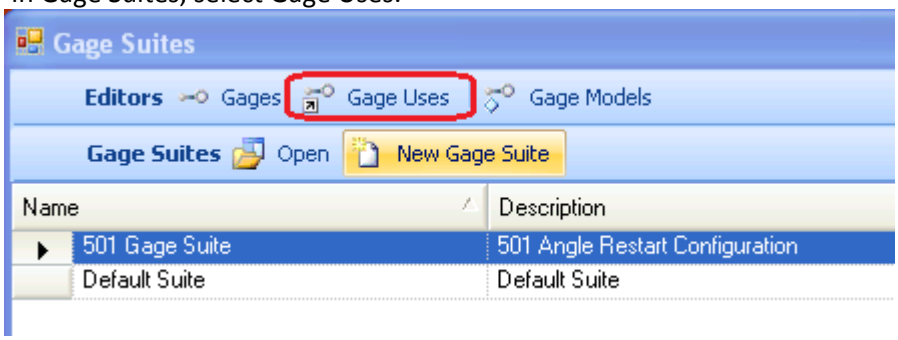




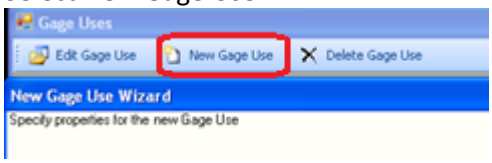
Exit Gage Editor.

Appendix D – Create a New Gage Use

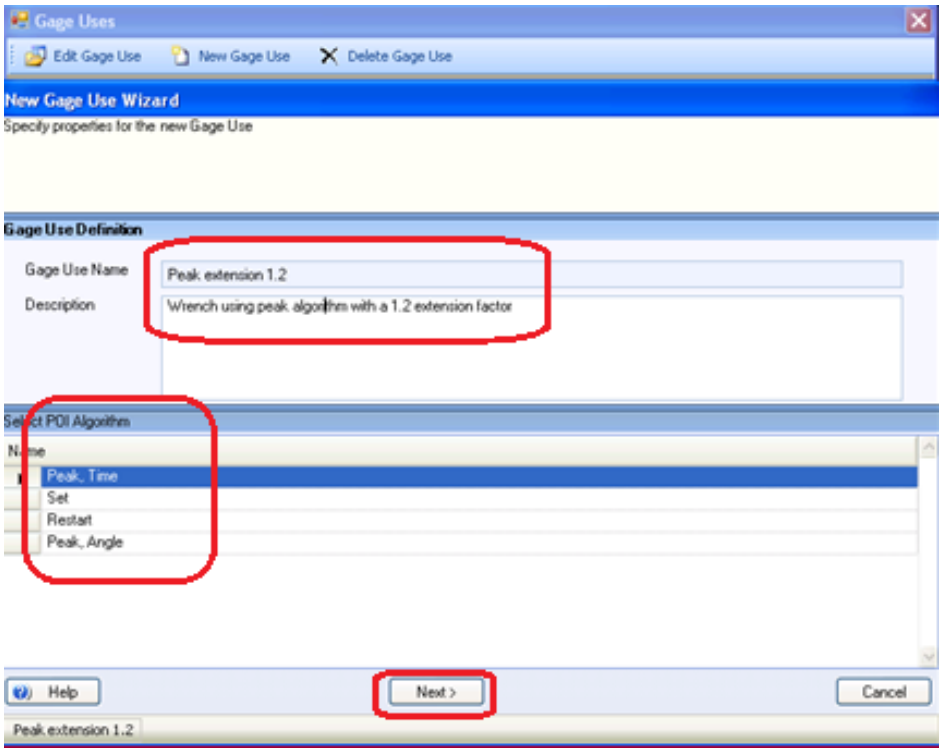
1. In Gage Suites, select Gage Uses.



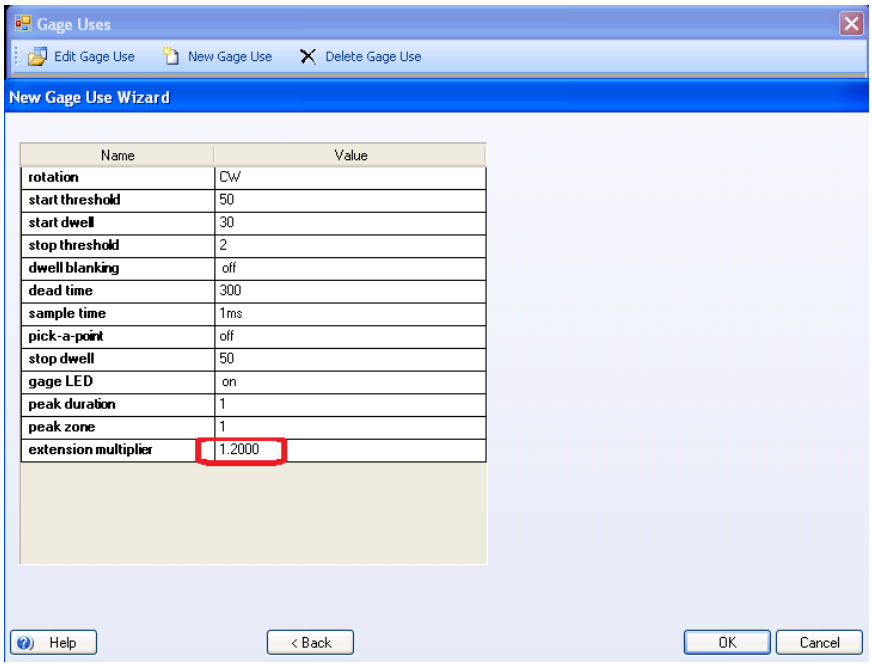
2. Select New Gage Use.



3. In New Gage Use Wizard, name the gage use, include the description, the Peak, Time Algorithm and select Next.

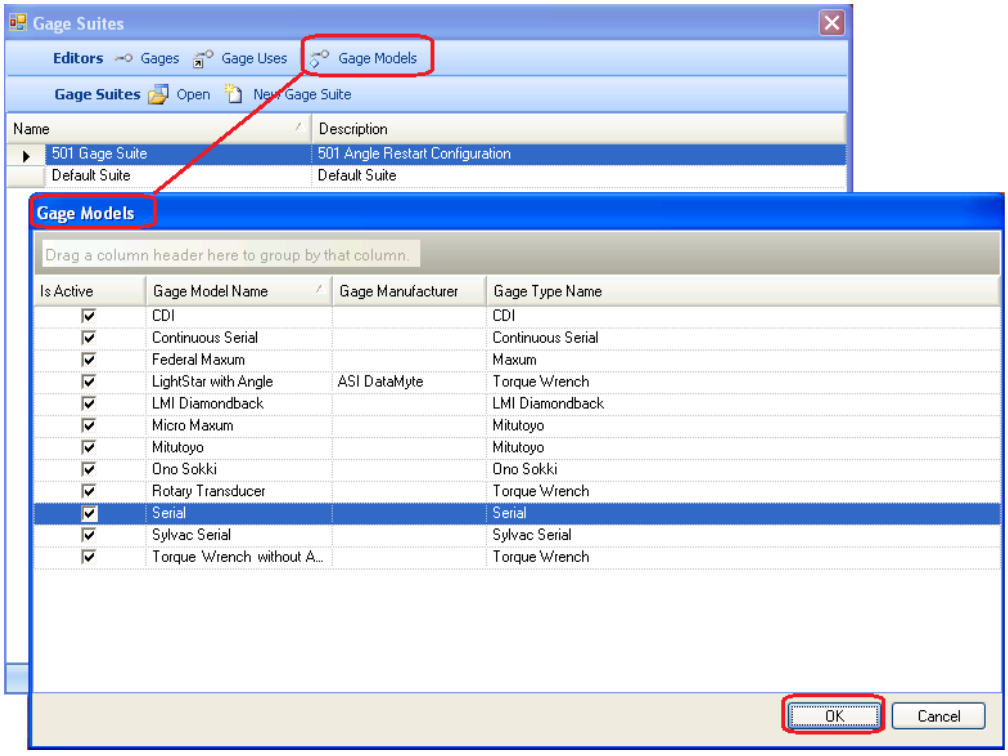


4. Change the extension multiplier to 1.2 and select OK.



Close Gage Uses.

5. Open Gage Models Editor. Review and close.
For additional information, review the Gage Suites tutorial



Appendix E – Gage Suite Skillset

Create New Gage Suite for Peak (non-angle)

1. Name it **Peak Only** with description **Non-LightStar Wrench**
2. Select New Alias and name it **P10** with description **Non-Angle Use**
3. Select the **10Nm LightStar**
4. Select **Peak, Time**
5. Save and exit Gage Suite Editor

Gage Extension Considerations

- An adaptor extends or shortens the pivot point of the torque wrench when taking measurements
- To compensate for using an adapter you must multiply the adapted length of the wrench by a calculated scaling factor (see Appendix D for additional information)
- This can be done either in the gage source or in the use assigned to the gage alias
- Gage source example:
    - 1.2*G2C (multiplying the gage reading G2C by a scaling factor of 1.2)
        - This option requires users to apply the scaling factor to every reading in a setup that requires use of an adapter
        - Because this is a modified source, the tool does not require additional mastering
- Gage Use Example:
    - The scaling factor can be applied to the gage use (see step 4 above)
    - The use can be tied to the alias for all setups with this use
    - In a 600, mastering is done by tool, not by use

Appendix F – Torque Basics

How Fasteners Fasten

The purpose of a fastener is to clamp parts together. Engineers select fasteners, (nuts and bolts) by how much tension or clamp force is necessary to maintain the integrity of the joint.

In the case of a bolt the tension derives from applying enough twisting force (torque) to the head to actually stretch the bolt. In the example on the opposite page the bolt is threaded into the lower metal piece and torque is applied until the head of the bolt is seated. After the head is seated additional torque is applied resulting in bolt stretch. This stretch is the source of the tension which will maintain a clamping force holding the two pieces together.

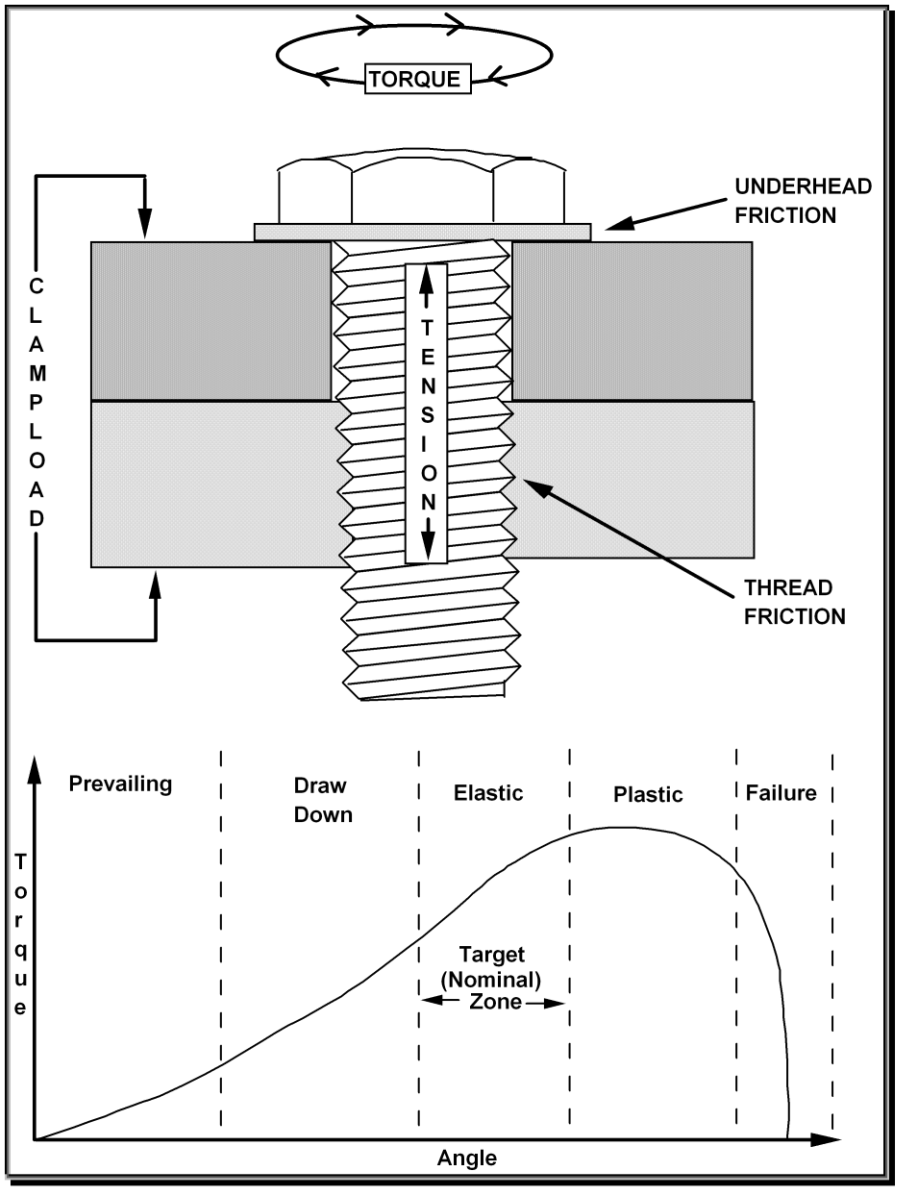
The amount of torque applied should not exceed the amount which will stretch the bolt beyond the "elastic" region. Staying within the elastic region means that if we loosen the bolt it will return to its original length. This is the region that engineers target when specifying installation torque values.

Stretching the bolt beyond the elastic region into the plastic region begins to permanently stretch the bolt. If we then loosen the bolt it will not return to its original length but will have been permanently stretched, even though it may not be visible, the bolt has been weakened. This will of course weaken the whole assembly due to an unreliable joint.

Applying torque sufficient to stretch the bolt beyond plastic region into the failure region will cause the bolt to break.

One way to measure fastener tension is to measure the length of the fastener after installation and compare it to its length at rest. Since this is usually impractical, torque measurement is used as an indication of tension.

1. Fastener Diagram—Review the torque fastener diagram below.



Review

In this lesson we reviewed the purpose of a fastener is to clamp parts together. Engineers select fasteners, (nuts and bolts) by how much tension or clamp force is necessary to maintain the integrity of the joint.

What is Torque?

Torque is the twisting force applied to an object, in this discussion a fastener. Rotational force or Torque can be expressed in several different units of measure, i.e. Foot Pounds, Inch Pounds or Newton Meters.

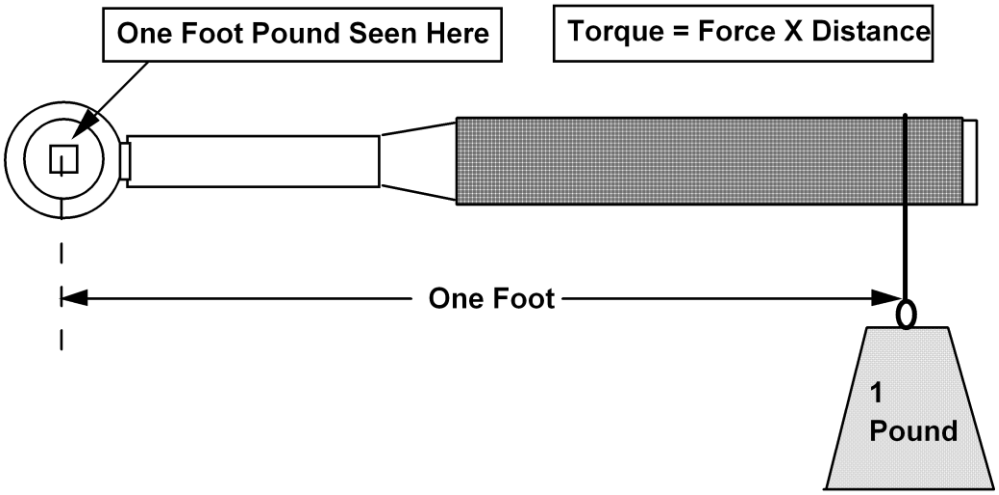
One Foot Pound (Ft. Lb.) is the rotational force, seen at the pivot point, resulting from attaching a *One Pound* weight at distance of *One Foot* from an arms pivot point.

One Inch Pound (In. Lb.) is the rotational force, seen at the pivot point, resulting from attaching a *One Pound* weight at distance of *One Inch* from an arms pivot point.

One Newton Meter (Nm) is the rotational force, seen at the pivot point, resulting from attaching *Sir Isaac Newton* at a distance of *One Meter* from an arms pivot point. (Just seeing if you're paying attention).

One Newton Meter (Nm) is actually a measure of torque in the metric system. A Newton Meter is equivalent to 1 kilogram-meter per second squared (1 Newton Meter = .73756 Foot Pound).

1. Torque Diagram—Review the torque diagram below.



Review

In this lesson we learned torque is the twisting force applied to an object, in this discussion a fastener. Rotational force or Torque can be expressed in several different units of measure, i.e. Foot Pounds, Inch Pounds or Newton Meters.

Torque Conversion

In this section we will review torque conversion.

Objectives

At the end of this lesson, you will be able to:

Calculate a torque conversion using the conversion factors.

Torque Conversion

Conversion Tables

Torque can be expressed in several types of "units" when expressing a wrenches capacity. These same units are used to specify a limit set or audit target for a fastener.

Converting from one unit of measure to another is done by applying a conversion factor, for example:

If 1 Foot Pound = 1.35582 Newton Meters (from conversion table)

and

you have a torque wrench that is rated for 50 Ft. Lb.

and

you want to determine the wrenches rating in Newton Meters.

next

Convert from Ft. Lb to Nm by multiplying 50 X 1.35582 = 67.79

so

A 50 Ft. Lb wrench is also a 67.79 Nm wrench.

Conversion Factors—Review the Conversion Factors below.

Conversion Factors

1 Foot Pound = 1.35582 Newton Meters

1 Newton Meter = .737562 Foot Pounds

1 Foot Pound = .138255 Kilogram Meters

1 Kilogram Meter = 7.23301 Foot Pound

Review

In this lesson we learned torque can be expressed in several types of "units" when expressing a wrenches capacity. These same units are used to specify a limit set or audit target for a fastener.

Converting from one unit of measure to another is done by applying a conversion factor.

Skills Set

Convert a 75 Nm wrench into the ft lb equivalent.

Convert a 100 ft lb wrench into the Nm equivalent

Torque Measurement

Torque can be measured mechanically or electronically. Common methods include:

Manual Torque Wrench

One mechanical measurement method utilizes a hand held wrench which provides a visual interpretation of the torque seen at the pivot point. The readout can be a simple pointer and scale indicator or a mechanically driven dial indicator. Some varieties indicate the maximum value seen in a measurement cycle, these types of wrenches can be used to measure "peak" torque values.

Click Wrench

Another mechanical method uses a wrench that briefly releases or clicks at an adjustable point in a range of torque values. This type of wrench can only indicate whether a measured torque value is greater or less than a set value.

Electronic Torque Transducers

Torque transducers are devices that convert torque energy into electrical energy. The transducer itself consists of a resistor network (bridge) which is affected by the amount of strain (torque) placed on a mechanical pivot point.

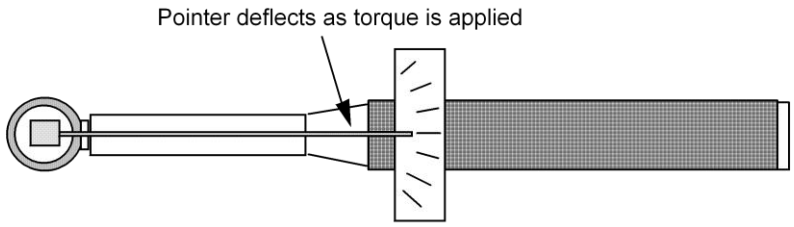
These transducers are built into either hand held wrenches or in line devices to provide an electrical signal which is proportional to the amount of torque being applied to the pivot point. This output voltage can be interpreted by a variety of devices (i.e. the DataMyte 501) into a converted digital value representing events occurring at the pivot point.

Transducers are rated for maximum ranges, for instance a 100 Ft Lb wrench would be used in an application where the measured values range between 0-100 Ft Lbs.

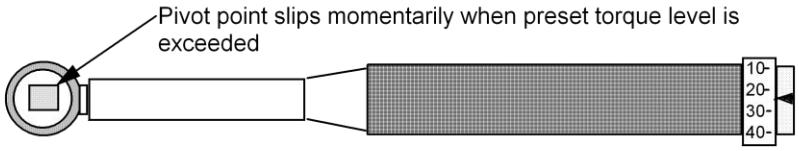
Hand held torque wrenches are typically used to audit previously installed fasteners.

In line transducers are used to monitor a powered installation tools torque characteristics during an installation cycle.

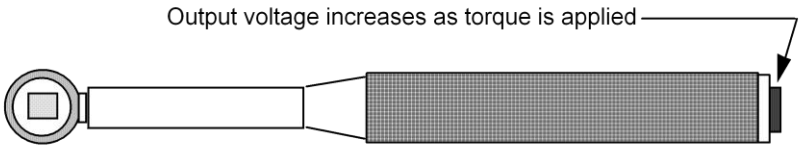
1. Torque Wrench Diagram—Review the torque wrench diagram below.



Manual Torque Wrench



Click Wrench



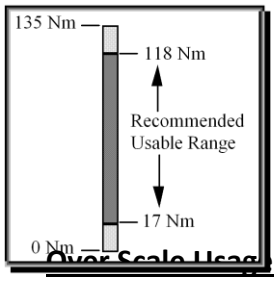
Electronic Torque Wrench

Review

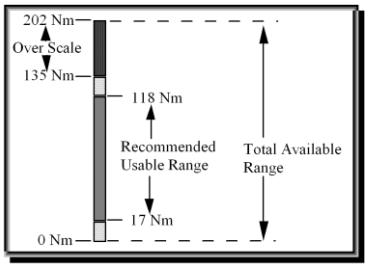
In this lesson we learned torque can be measured mechanically or electronically. Common methods include: manual torque wrench, click wrench, and electronic torque transducers.

Wrench Selection

Torque Transducers are rated for maximum mechanical durability and accuracy. For example a hand held torque wrench rated for 135 Nm would normally be used to measure values no greater than 135 Nm. The rule of thumb is to use the central 75% of the full scale for maximum accuracy. A torque transducer is less accurate at the extremes of the scale.



The example above deals with normal usage, note that most transducers can read values as high as 50% over scale. For example, a wrench rated for 135 Nm can probably read as high as 202 Nm. Accuracy may suffer in over scale readings. If testing shows acceptable accuracy in over scale readings then the number of wrenches needed to cover a route may be reduced.



***Note**: The "Full Scale" entry in the 501 data collector is unchanged in an over scale application. In the example above the full scale entry would be 135. Note: any value beyond 150% may permanently degrade the wrench.*

Gage	Type	Name *(Char max = 12)*	Full Scale	Recommended min	Recommended max	Over Scale Max *
G2	Restart Torque	5Nm A-RST or Violet A-Rst	5 Nm	.5 Nm	4.5 Nm	7.5 Nm
G2A	Restart Torque	10 Nm A-RST or Silver A-Rst	10 Nm	1 Nm	9 Nm	15 Nm
G2B	Restart Torque	25 Nm A-RST or Red A-Rst	25 Nm	2.5 Nm	22.5 Nm	37.5 Nm
G2C	Restart Torque	75 Nm A-RST or Blue A-Rst	75 Nm	7.5 Nm	67.5 Nm	112.5 Nm
G2D	Restart Torque	150 Nm A-RST or Gold A-Rst	150 Nm	15 Nm	135 Nm	225 Nm
G2E	Restart Torque	300 Nm A-RST or Black A-Rst	300 Nm	30 Nm	270 Nm	450 Nm
G2F	Restart Torque	750 Nm A-Rst or Green A-Rst	750 Nm	75 Nm	675 Nm	1125 Nm

** No permanent degradation of performance*

Appendix G – Audit Examples

Audit Example - Dynamic

As previously discussed it is fastener tension which holds an assembly together. Residual tension on the fastener is the characteristic that is really of concern in a fastener audit. Due to its nature, tension is a very difficult thing to measure. Since fastener tension results from the applied torque energy it follows that the two bear a relationship to each other. In other words *measuring torque yields a picture of tension.*

In this example we will discuss auditing a bolt used to secure a seat belt anchor point. A 12 mm bolt is used; the bolt is installed using a powered installation tool which applies 90 Newton Meters of torque. A previous design study found that 90 Nm of torque applied to the fastener in this application yields the desired 8,000 pound clamp load on this joint. The powered tool is equipped with a built in transducer which can read a maximum torque value of 135 Nm and the tool is adjusted to release when it senses 90 Nm of torque at the socket.

One way to verify that the anchor bolt is actually being installed to 90 Nm (or 8000 Pounds of clamp load) is to monitor maximum torque seen at the socket during the installation cycle.

Since this tool incorporates a built in transducer it is a simple matter to connect a monitoring device, such as the DataMyte 501, and electronically capture the "Peak" torque seen during each installation cycle.

The data collector can capture the peak torque values seen during multiple installations. Once collected this data can then be processed by the 501 to yield a picture (histogram) of the 6 sigma torque scatter for the tool. The data collector can then compare this 6 sigma distribution to the high and low specification limits the tool is adjusted to work within. This type of study very quickly yields a picture of a tools capability (Cpk) to perform the desired task. A Cpk of less than 1.33 is considered insufficient.

Ongoing or periodic checks of this tool using this approach preclude any further auditing of this fastener.

Audit Example - Static

If it is not practical to dynamically monitor a tool on an ongoing basis a "static" audit can be implemented. As previously discussed static auditing can be done after a fastener has been installed. Static audits are performed downstream from the installation process. Usually checks are made on a variety of fasteners as part of an inspection route by QA personnel.

Using the same fastening example discussed in the dynamic example, the data collector would be set up to interface to a hand held torque wrench instead of an in-line transducer. The significant difference in the gage setup is the use of the "Breakaway" algorithm instead of "Peak". The wrench is then used to apply torque (usually clockwise) to the fastener. The operator applies a steadily increasing amount of force until fastener movement is felt, pressure is then released. The data collector then stores the torque value at which breakaway occurred.

The theory behind static auditing is:

If 90 Nm of torque was initially applied to reach a specific tightness (or tension), re-applying 90+ Nm of torque will overcome the residual friction and cause the fastener to move. In other words, the audit will find the fastener breaking away at 90 Nm.

The reality of static auditing is:

To cause a previously tightened fastener to move, the residual friction must be overcome. Since static friction is usually greater than dynamic friction, the breakaway point is usually greater than the installation torque. This fasteners breakaway point could be in the 90's or in the 100+ Nm range.

Alternatively if a gasket was part of the assembly, gasket compression could relieve tension through time. This would yield a breakaway value less than 90 Nm due to lessened friction.

Over 200 factors have been identified which can affect the breakaway point in either direction. See page 6-30 in the Fifth Edition DataMyte handbook for more information on this subject.

Prior to creating a static audit setup, acceptable high and low audit limits should be established since they will probably differ from the specification (installation) limits.

Appendix H – Residual torque specifications

You may have residual torque specification limits established in your organization. If not, we recommend the following procedure for establishing them.

Since static friction is greater than dynamic friction, joints can relax after tightening, and there is variability in the residual measurements, specification limits may be established as follows:

Step	Action	Example
1.	Note installation (dynamic) specification limits.	70Nm to 90Nm
2.	Take a large sample (30 to 100 pieces) of dynamic measurements. The larger the sample the better, and the more operators doing the residual measurements the better.	
3.	Measure the residual torque on each of the joints measured dynamically.	
4.	Find the mean of the dynamic measurements.	78Nm
5.	Calculate the standard deviation of the dynamic measurements.	1.0Nm
6.	Find the mean of the residual measurements.	86Nm
7.	Calculate the standard deviation of the residual measurements.	1.5Nm
8.	Determine the midpoint of the dynamic specification limits. Lower spec limit plus upper spec limit all divided by two.	(70+90)/2 = 80
9.	Determine the midpoint of the residual specification limits. Mean of residuals times midpoint of dynamic spec divided by mean of dynamic measurements.	80*86/78 = 88.2
10.	Establish the tolerance spread of the residual limits. Tolerance of dynamic limits times residual standard deviation divided by dynamic measurements standard deviation.	(90-70)*1.5/1.0 = 30
11.	Establish the upper residual specification limit. Calculated mid point for residual measurements plus half the calculated tolerance.	88.2+30/2 = 103.2
12.	Establish the lower residual specification limit. Calculated mid point for residual measurements minus half the calculated tolerance.	88.2-30/2 = 73.2

Appendix I – Use of Adapters

Using Torque Wrench Extensions

Adapter extensions are sometimes required when the fastener location, on which a torque reading is to taken, does not allow direct access with a conventional socket. When an adapter is used it has the effect of extending, or in some cases shortening, the pivot point of the torque wrench and thus creating a lever arm affect that must be accounted for when taking measurements.

When the adapter is positioned at 0°, 90°, or 180° with respect to the torque wrench, calculations are performed based only on the length of the extension and the length of the torque wrench. When the adapter is oriented at angles between 0° and 90° or 90° and 180° the calculations are based on the effective length of the adapter.

Torque Adapter Orientations

Adapter In Line With the Torque Wrench

Measure the wrench's handle length (distance from transducer center point and point where the force is applied, usually the center of the wrench grip area).

Measure the length of the adapter.

Add the two together and divide by the original length. That's your scaling factor. For example:

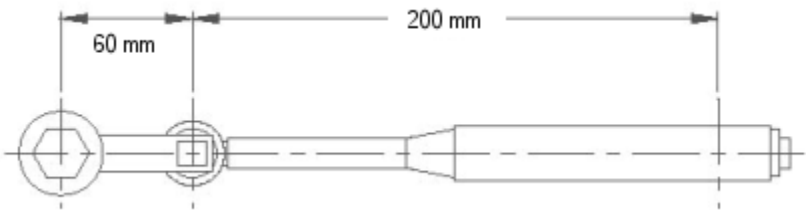


Figure 41: Adapter in Line with Torque Wrench

Example:

Scaling factor = (200+60) / 200 = 260/200 = 1.3

*Source Example: G2y*1.3*

Adapter Used at an Angle between 0° and 90° to the Torque Wrench

1. Measure the wrench's handle length (distance from transducer center point and point where the force is applied, usually the center of the wrench grip area).
2. Measure the distance from the center of the adapter fastener connection to the center point of the transducer along the line of the torque wrench handle as shown below. Note this result will be less than the length of the adapter itself.
3. Add the two together and divide by the original length. That's your scaling factor. For example:

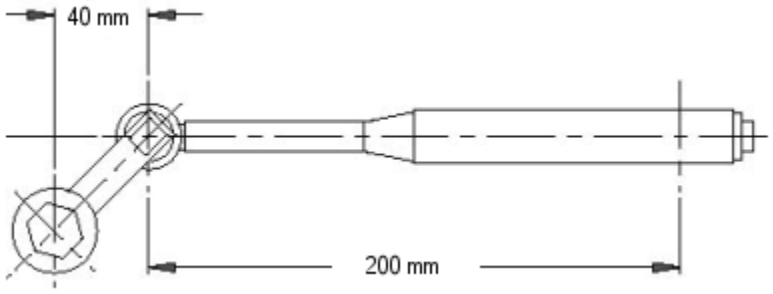


Figure 42: Adapter at Angle between 0° and 90°

Example:

Scaling factor = (200+40) / 200 = 240/200 = 1.2

*Source Example: G2y*1.2*

Adapter Used at an Angle of 90° to the Torque Wrench

1. Measure the wrench's handle length (distance from transducer center point and point where the force is applied, usually the center of the wrench grip area).
2. If the adapter is at 90°, the scaling factor will be 1.0 because there is no change in the effective length of the wrench. Therefore there is no need to adjust the gage address by multiplying it by 1.

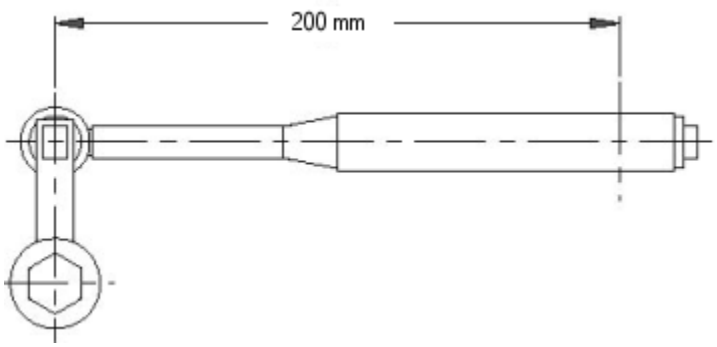


Figure 43: Adapter at 90° Angle

Example:

Scaling factor = (200+0) / 200 = 200/200 = 1.0

Source Example: G2y

Adapter Used at an Angle between 90° and 180° to the Torque Wrench

1. Measure the wrench's handle length (distance from transducer center point and point where the force is applied, usually the center of the wrench grip area).
2. Measure the distance from the center of the adapter fastener connection to the center point of the transducer along the line of the torque wrench handle as shown below. Alternately, if the angle of the extension to the torque wrench is known this may be used in the calculations.
3. Subtract the two and divide by the original length. That's your scaling factor. For example:

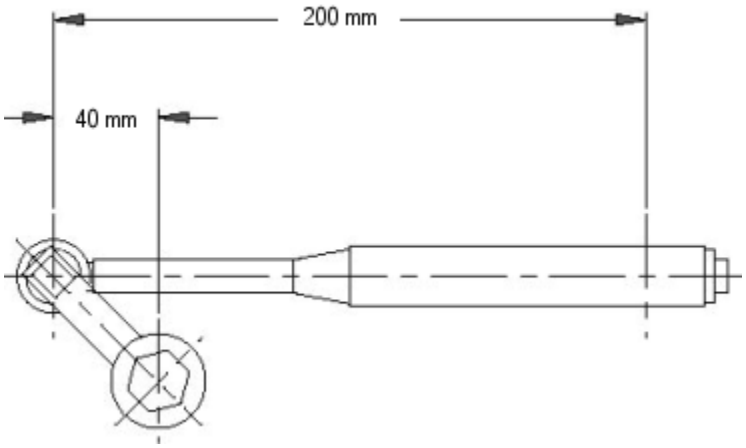


Figure 44: Adapter at Angle between 90° and 180°

Example:

Scaling factor = (200-40) / 200 = 160/200 = 0.8

*Source Example: G2y*0.8*

Adapter in Line at 180° with the Torque Wrench

1. Measure the wrench's handle length (distance from transducer center point and point where the force is applied, usually the center of the wrench grip area).
2. Measure the length of the adapter.
3. Subtract the two and divide by the original length. That's your scaling factor. For example:

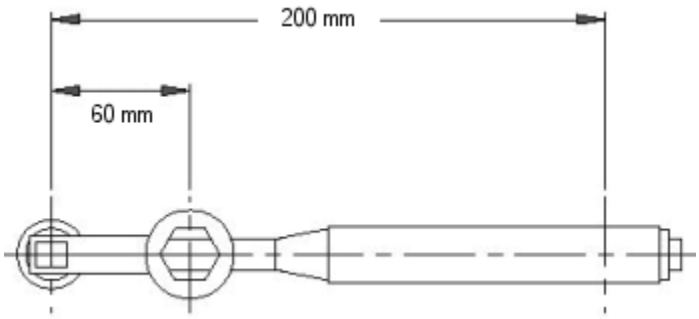


Figure 45: Adapter in Line at 180°

Example:

Scaling factor = (200-60) / 140 = 140/200 = 0.7

*Source Example: G2y*0.7*

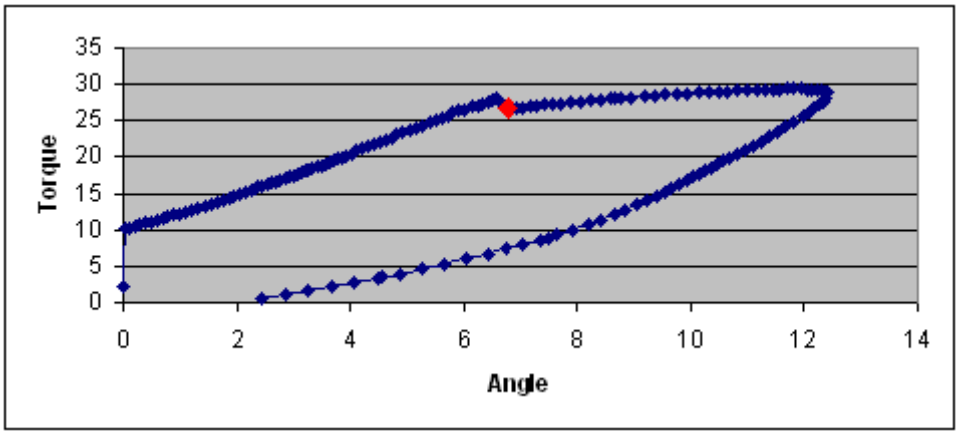
Appendix J – Torque Algorithms

Dynamic Torque Algorithms.—The 501 and600 Handheld Data Collectors use several different algorithms (or sets of rules) to convert the transducer's analog signal to a digital value that represents the force applied The algorithms include Restart (Angle), Torque at Angle, Breakaway, Restart (Time), Peak and Set Torque. Note: Peak being the Ford convention.

Angle Based Restart

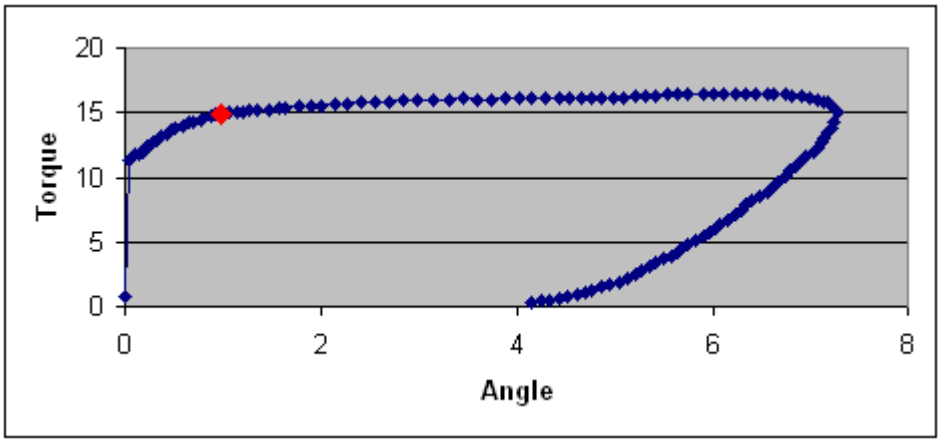
Restart Torque is used in residual torque measurement applications where you need to remove the effects of stiction. **This use requires a rotationally stable joint.** The restart point is essentially the point at which the installing tool ended the application of torque. Paint, temperature differences, lock washers, metallic adhesion, and adhesive compounds can all increase the amount of force required to break the fastener loose. To more accurately record the torque applied by the original fastening process, it may be preferable to record the point after the breakaway when the fastener "restarts." This is the preferred measurement strategy for almost all joints.

The following represents force applied over time on a high stiction joint in a Restart torque application:



Restart on a high stiction joint.

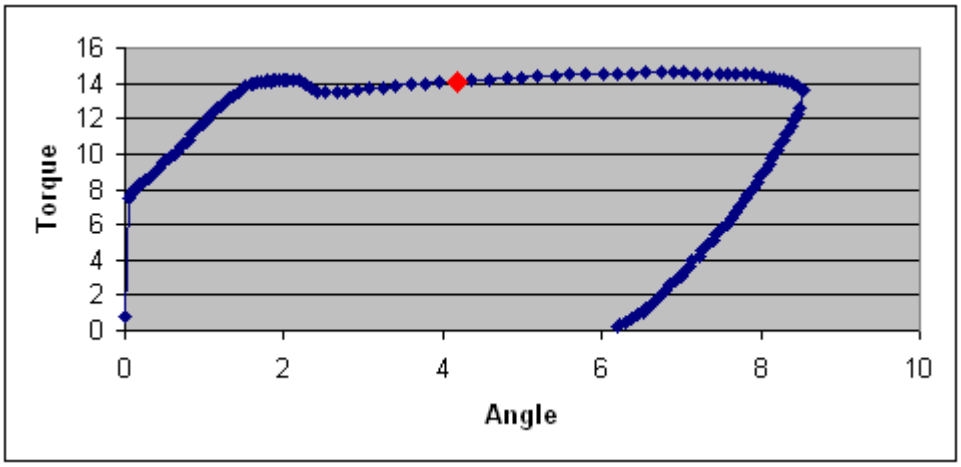
The following curve represents force applied over time on a low stiction (i.e., well-lubricated) joint in a restart torque application:



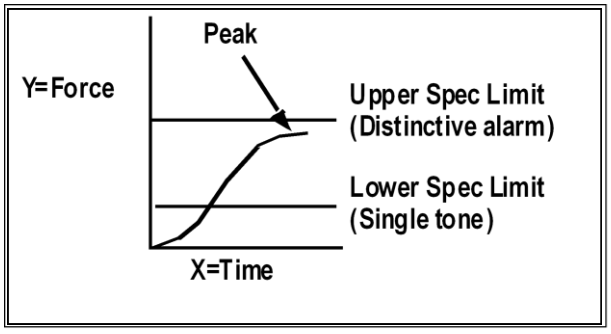
Dynamic Torque Algorithms.—The 501 and600 Handheld Data Collectors use several different algorithms (or sets of rules) to convert the transducer's analog signal to a digital value that represents the force applied The algorithms include Restart (Angle), Torque at Angle, Breakaway, Restart (Time), Peak and Set Torque. Note: Peak being the Ford convention.

Torque at Angle

Torque at Angle is the measured torque at a preset number of degrees of sensed rotation past a starting torque threshold. **This use requires a rotationally stable joint.** Note: Sensed rotation includes windup in the wrench, the work piece, the socket, the extension, as well as the fastener rotation itself.

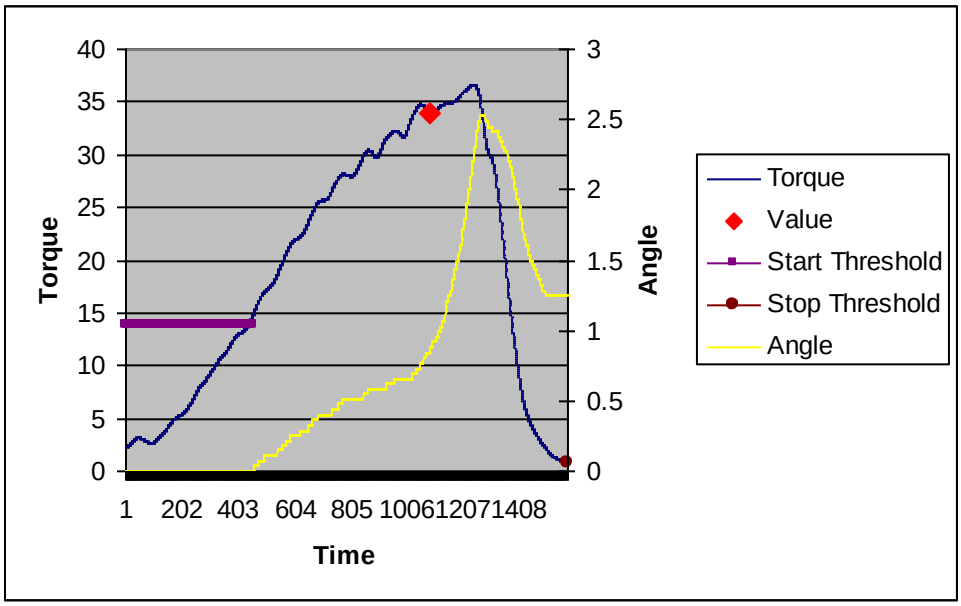


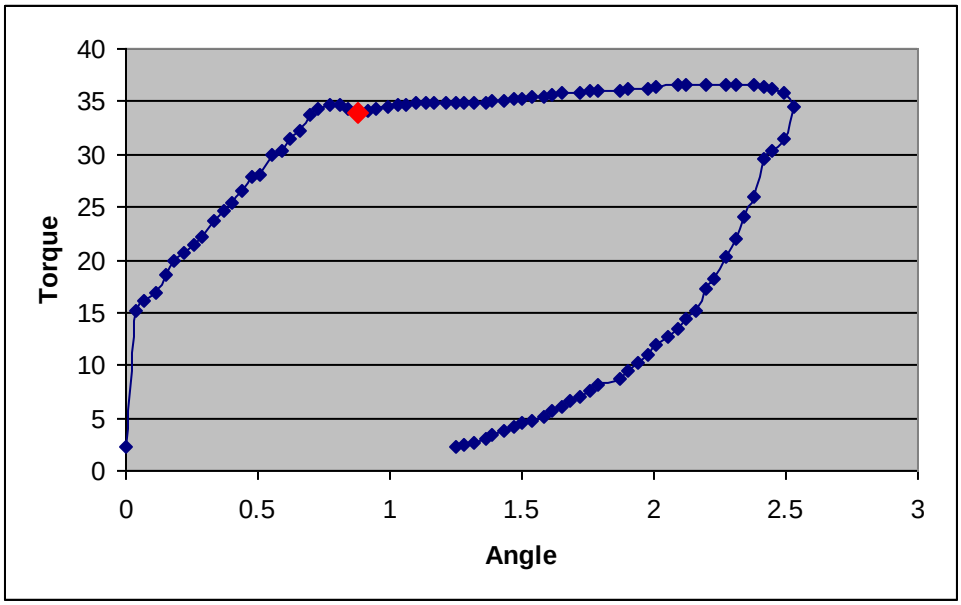
Set Torque—Set torque is used in applications where fastening is done manually with a hand held wrench. This is typically found in low volume production applications, such as aircraft assembly, or as a rework tool in more automated settings. For example, head bolts on a 6-cylinder engine may be fastened with a closed loop multi-spindle in-line system. Those engines that are tagged for rework may be quickly checked with the data collector using Set Torque, even where multiple fasteners with different torques are involved. Set Torque allows you to record the maximum or peak torque applied and also provides audible signals to the operator when the lower and upper specifications limits have been surpassed. The lower spec limit is indicated with a release tone and the upper spec limit is indicated with a distinctive alarm. The following curve represents the force applied over time in a set torque application, and also shows lines where the specification limits are reached:



Peak Torque - Angle

Peak Torque is used to measure the torque on a fastener at installation. This is done by monitoring the voltage signal generated by an in-line transducer and recording the maximum or peak reading. Since fastening systems, such as air stall tools, can produce a series of peaks during the installation of a single fastener, the parameters for the peak algorithm can be configured to read only the desired peak signal. The following curve represents the force applied over time in a peak torque application.



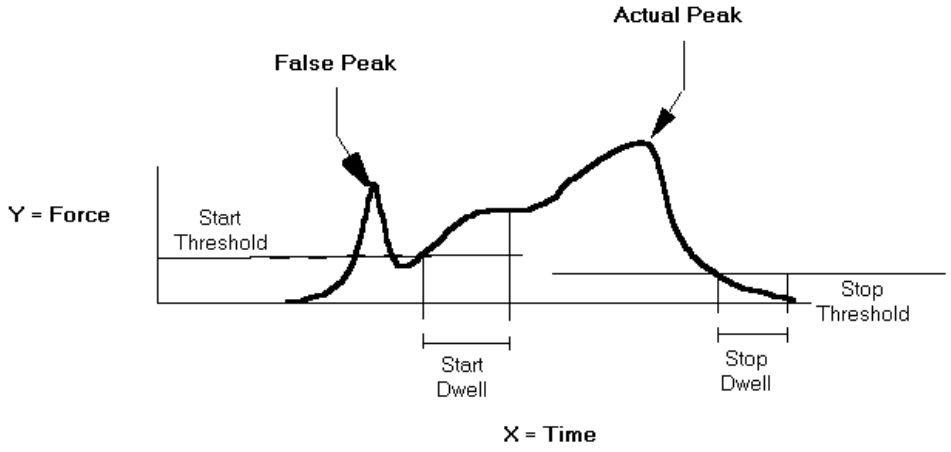


* The minimum sample rate is 1ms for 1M or 2M SRAM boards and TM firmware 1.0. Sample Time and Start Dwell resolution is 1ms when minimum sample rate is 1ms.

** If the actual stop threshold becomes greater than the start threshold, the torque algorithm code will constrain the stop threshold to be equal to the start threshold.

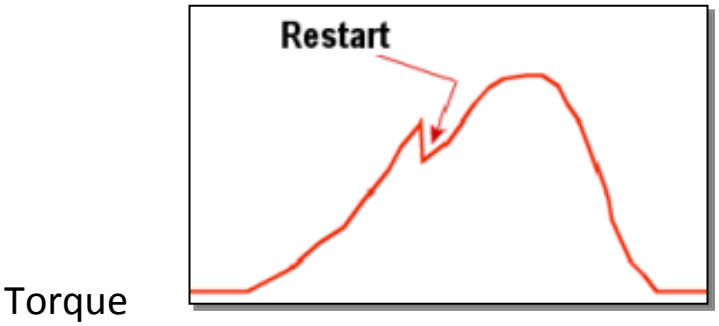
Peak Torque - Time

Peak Torque is used to measure the torque on a fastener at installation. This is done by monitoring the voltage signal generated by an in-line transducer and recording the maximum or peak reading. Since fastening systems, such as air stall tools, can produce a series of peaks during the installation of a single fastener, the parameters for the peak algorithm can be configured to read only the desired peak signal. The following curve represents the force applied over time in a peak torque application.



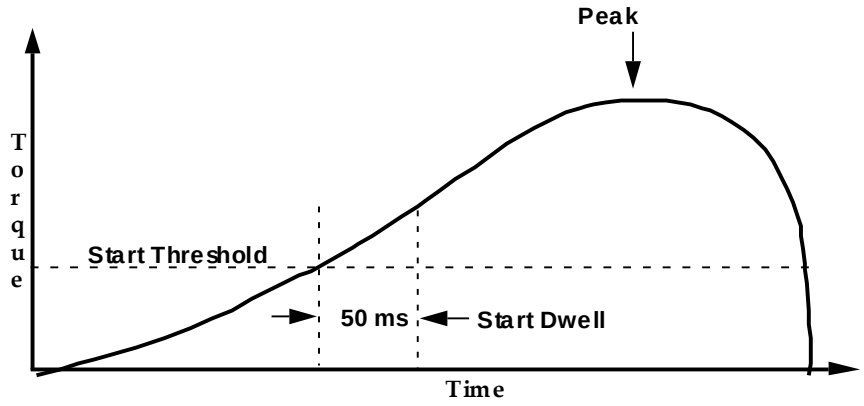
Time Based Restart

Restart (Time) —Restart (Time) Torque is used in static as described above when using a traditional torque wrench to measure fastener rotation. The following curve represents the force applied over time in a restart torque application.



Breakaway Torque

Breakaway Torque is used in applications where fasteners are already secured. It detects the point at which movement of the fastener begins. **This use requires a rotationally stable joint.** At the instant that the movement begins, there is a sudden reduction in the applied force since static friction offers greater torque resistance than dynamic friction. The amount of drop in the breakaway is from the lower static friction of the fastener. The force applied over time in a breakaway torque application.

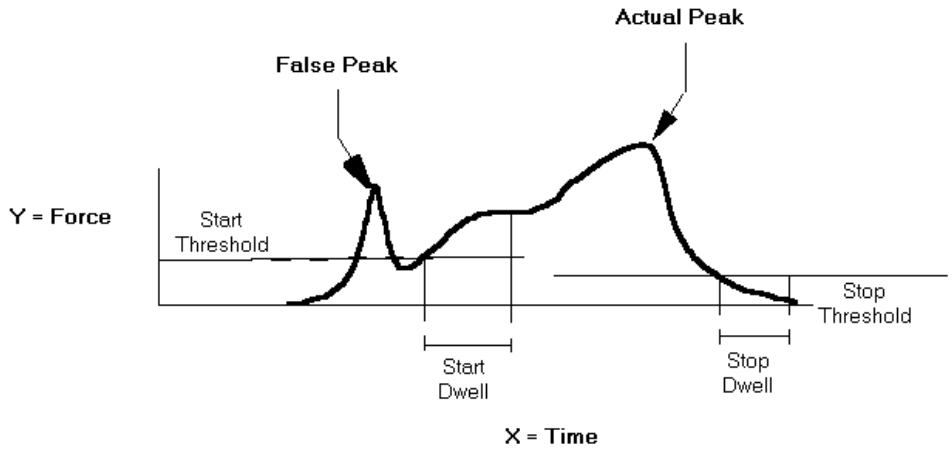


Dynamic Torque Algorithms.— The 501 and 600 Handheld Data Collectors use one of three different algorithms (or sets of rules) to convert the transducer's analog signal to a digital value that represents the force applied. The algorithms are: Peak, Pulse and Set Torque.

Peak Torque

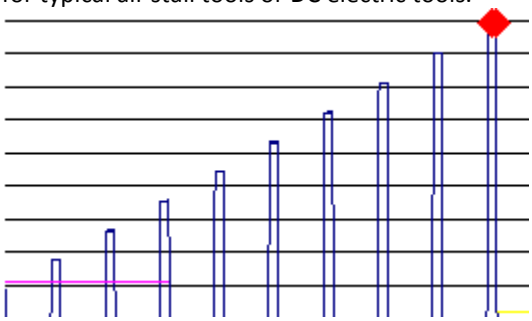
Peak Torque is used to measure the torque on a fastener at installation. This is done by monitoring the voltage signal generated by an in-line transducer and recording the maximum or peak reading. Since fastening systems, such as air stall tools, can produce a series of peaks during the installation of a single fastener, the parameters for the peak algorithm can be configured to read only the desired peak signal.

The following curve represents the force applied over time in a peak torque application.



Pulsed Torque Parameters

Pulse Torque measures the highest peak from a series of peaks. This requires higher sampling frequency than for typical air stall tools or DC electric tools.



Note: This capability requires that 4MB of SRAM be installed in the data collector. The pulsed torque gage type will be capable of sample rates as fast as 50 micro-seconds (20Khz).

Pulse Count

When a gage type is set to Pulsed Torque, the number of pulses that occur between snug and the occurrence of the peak reading can be recorded. Snug is typically defined as 50% of the lower specification limit.
To capture the Pulse Count an auto-scanned pair of characteristics must be set up where the first characteristic source is 'Gx' (where 'Gx' is a pulsed torque gage type configuration) and the second characteristic source is of the form 'Cnt(Gx)'. Note that the Cnt() function is used to count pulses.
In the gage test mode, pulse counts will be displayed with the peak value for pulsed torque gage type configurations.

Angle

An Angle gage type will support three different applications: Torque and Angle, Angular Displacement, and Angle Set. In addition, a change in angle may be used as a sample event for torque measurements alternatively to a change in time.
Torque and Angle—To capture the installation torque and angle between snug and peak, an auto-scanned pair of characteristics must be set up where the first characteristic source is set up for Peak (or Pulse) and a second characteristic is setup for Angle (capture). When the torque event is captured, the angle will be measured between snug (were snug is the start threshold for the first characteristic) and peak.

Example:

Source of C1 = g2{13.7} (where g2 is configured Type=Peak (or Pulse) and 13.7 = start threshold or snug)

Source of C2 = g2d (where g2d is configured Type = Angle, Use = Capture)

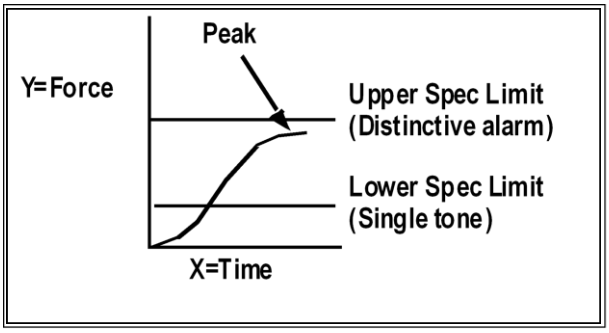
Note: In the gage test mode, when an analog reading occurs for a torque gage setup, the angle value will also be displayed if angle encoder pulses are present and the next gage setup in the gage list is an angle gage type. In the gage master mode, the angle value will be displayed in real-time if the gage setup is an angle gage type.

* The minimum sample rate is 1ms for 1M or 2M SRAM boards and TM firmware 1.0. Sample Time and Start Dwell resolution is 1ms when minimum sample rate is 1ms.

** If the actual stop threshold becomes greater than the start threshold, the torque algorithm code will constrain the stop threshold to be equal to the start threshold.

Note: *grayed out cells are not alterable.*

Set Torque—Set torque is used in applications where fastening is done manually with a hand held wrench. This is typically found in low volume production applications, such as aircraft assembly, or as a rework tool in more automated settings. For example, head bolts on a 6-cylinder engine may be fastened with a closed loop multi-spindle in-line system. Those engines that are tagged for rework may be quickly checked with the data collector using Set Torque, even where multiple fasteners with different torques are involved. Set Torque allows you to record the maximum or peak torque applied and also provides audible signals to the operator when the lower and upper specifications limits have been surpassed. The lower spec limit is indicated with a release tone and the upper spec limit is indicated with a distinctive alarm. The following curve represents the force applied over time in a set torque application, and also shows lines where the specification limits are reached:



Angular Displacement—To capture angular displacement, one characteristic, C1, is set up as the source of Dsp(g2a), where g2a is configured for angle (capture) and Dsp() is a function used to record angular displacement. Angular displacement is then obtained by rotating an angle transducer between start and stop key presses (<Enter>) while in data entry mode:

Typical Application: Tool Checking

C1 is configured as above, C2 is configured for keyboard input, C3 is the difference between C1 and C2 and is auto scanned with C2. The Angle Transducer is installed on an angle-capable run-down tool that has its own angle display. Zero the display on the run-down tool and press <Enter> on the data collector to start the measurement. Rotate the tool approximately 360 degrees and press <Enter> again. Key in the angle as displayed on the run-down tool for C2. C3 will detect any deviation between the two angular measurements.

Angle Set— Angle Set is for hand assembly where joints or clamp load is critical, and a given angular rotation of the transducer past "snug" is required (for example, when a fastener needs to rotate 6 degrees past 30 Nm of torque).

To apply the 'set angle' algorithm, an auto-scanned pair of characteristics (C1 and C2) must be set up where the C1 source is 'Gx' and 'Gx' is Type=Peak, and C2 is set up where source is 'Gxn' and 'Gxn' is an angle gage type configuration with the 'Use' parameter set to 'Set'.

Per Above Example:

Source of C1 = g2{30} (where g2 is configured Type=Peak and 30 = start threshold, i.e., snug)

Source of C2 = g2a (where g2a is configured Type = Angle, Use = Set) and the lower spec limit is set to 6.0.

Sample Event: Angle

Torque algorithms may now be configured to be sampled by a change in angle or by a change in time (in previous releases, sampling was only time-based).

A 'Sample Event' parameter has been added to torque gage configurations. If set to 'Angle' (instead of 'Time'), the analog signal will be sampled for algorithm satisfaction whenever the angular displacement changes.

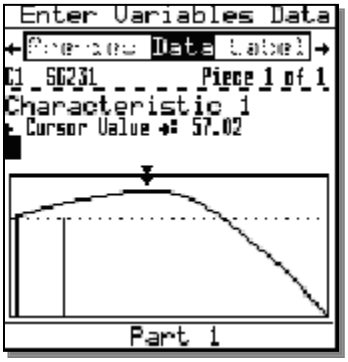
Pick-a-Point

Normally, the value of the characteristic for the piece is determined by the algorithm in the data collector based on the torque type selected in the gage configuration. Use Pick-a-Point to select any point from the torque curve to enter as the data value. The pick-a-point feature can be used for any port where the Gage configuration uses Peak, Breakaway, or Restart, and where Pick-a-Point has been turned on for the gage setup.

Steps

1. Make sure that **Pick-a-Point** is set to ON in the gage configuration.
2. Use the gage to take a reading as part of the normal data collection process.

   The data collector displays the torque curve in the data collection window instead of storing the reading. The data value is indicated by a set of cursors:



   You can accept the value indicated, continue to take readings, or use the arrow keys to move the cursor to the point on the curve that you want to record.

   The value shown in the Cursor Value reflects the lower cursor position.
   The upper cursor marks the original reading selected by the 501 system.

3. Press <Enter> to accept the value shown by the Cursor Value.

Multiple Points

When measuring more than one characteristic in an Auto Scan sequence with pick-a-point enabled, you can pick a different point for each characteristic. As force is applied to the transducer, the angle of rotation is recorded when the applied torque achieves “snug.” As rotation continues, the operator will be alerted (by a “let go tone”) when the amount of rotation exceeds the lower spec limit for C2.

Note: If the second characteristic source has the format ‘Gxn{y}’ where y is an angle value in degrees, y will be substituted as the ‘nice’ alarm threshold instead of the characteristic’s low limit.

Appendix K – Definitions

1. Fastener – a threaded device that clamps two or more parts together.

2. Torque – turning a previously tightened fastener another few degrees to evaluate the clamping force holding the joint together. The target is a clamp load that can be sustained when the assembly parts are subjected to service load.

3. Qualifying a joint – determining the amount of tension attained at a given torque value and relating the tension to the angular displacement of the bolt.

4. Audit – an evaluation of the manufacturing process to determine whether a part or group of parts meets the required specifications.

5. Route – The complete set of inspection plans which "Sets Up" the data collector for use on an application. The Route is a set of Setups usually to be collected by one person in one shift.

6. M-alpha – auditing method – presents the tightening torque as a function of the bolt assembly angle, which correlates the stretch of the bolt to the angular displacement of the fastener. This relationship provides a method of monitoring the tension in the joint, or bolt stretch, by analyzing the torque-angle signature of the audit.

7. Alias – tool configuration used by the collector to define its port functionality.

Appendix L – Troubleshooting

Battery performance issues:

The following steps should be taken:

1) From the 600 main menu highlight “Off”, then select ‘symb – shift – menu’.
2) From the default desktop on the 600, press “menu”.
3) The 600 test view is displayed.
4) Navigate to ‘Fuel Gauge’ and press “enter”.
5) Highlight the golden file name and select ‘shift – enter’.
6) A busy cursor will be displayed and a Success message will be displayed.
7) Press ‘menu’. Remove the battery, reinsert the battery and power on the 600.

Collector Management:

There are two reasons why all the menu selections would be disabled.

1. The DM600 is connected to TranSend II. TranSend II maintains control.
2. The battery door cover switch is not closed.

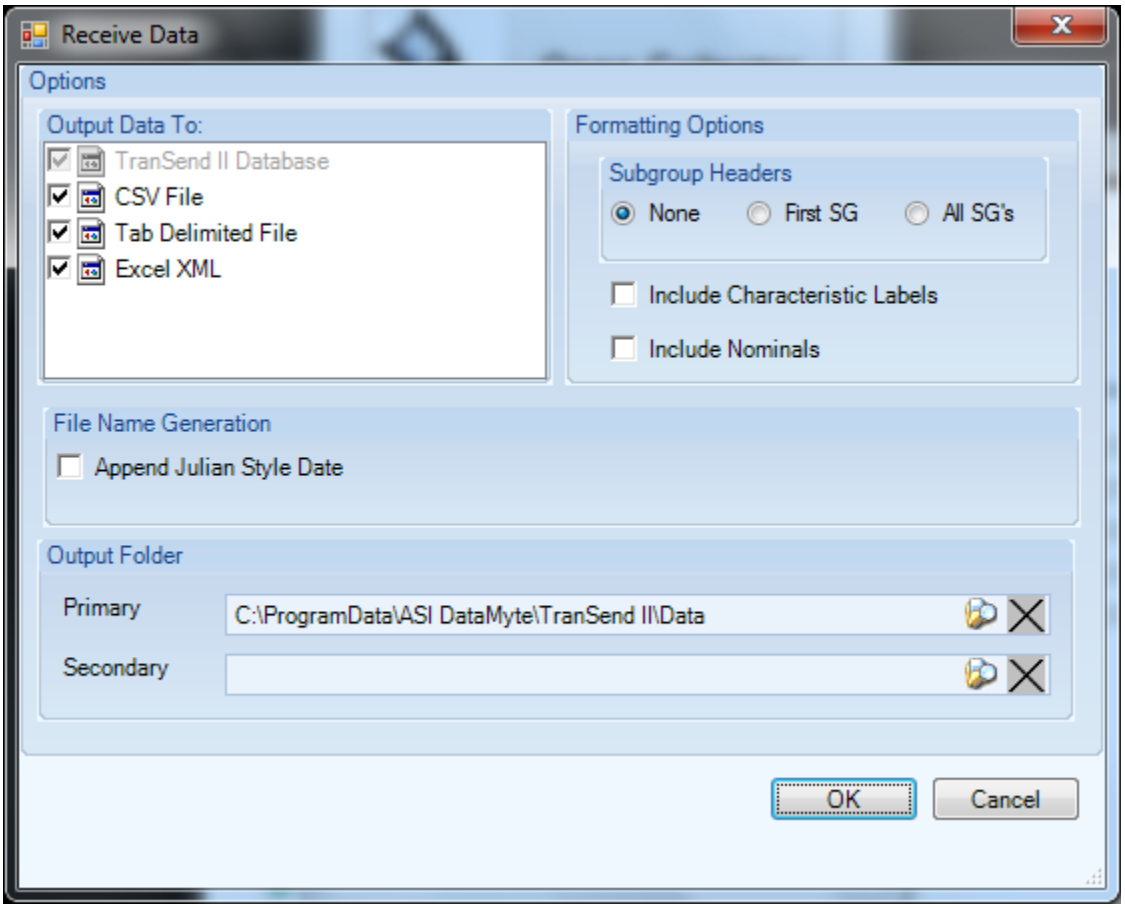
How to reinitialize memory on a DM600:

1. From the DM600 main menu, select About.
2. On the DM600 keypad, select the <Symb> then <shift> then <menu> keys.
3. Select Reinitialize Memory.

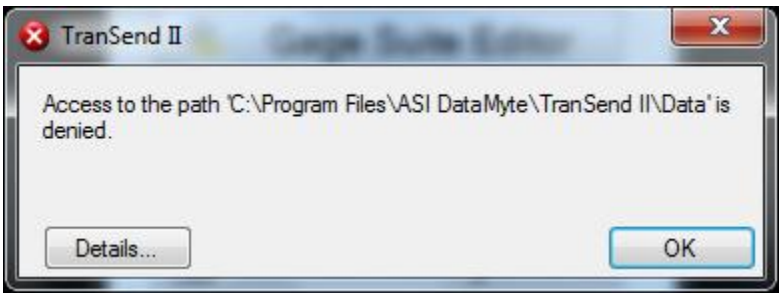
When attempting to power on the DM600 and both leds flash red and the data collect application does not start is due to the battery cover door switch not closed.

Windows 7 32-Bit (Cannot write to Program Files directory)

Launch TranSend II application.
Select Options and set the Primary Output folder to a location where you are able to write to; i.e. C:\ProgramData\ASI DataMyte\TranSend II\Data (create folder called Data).

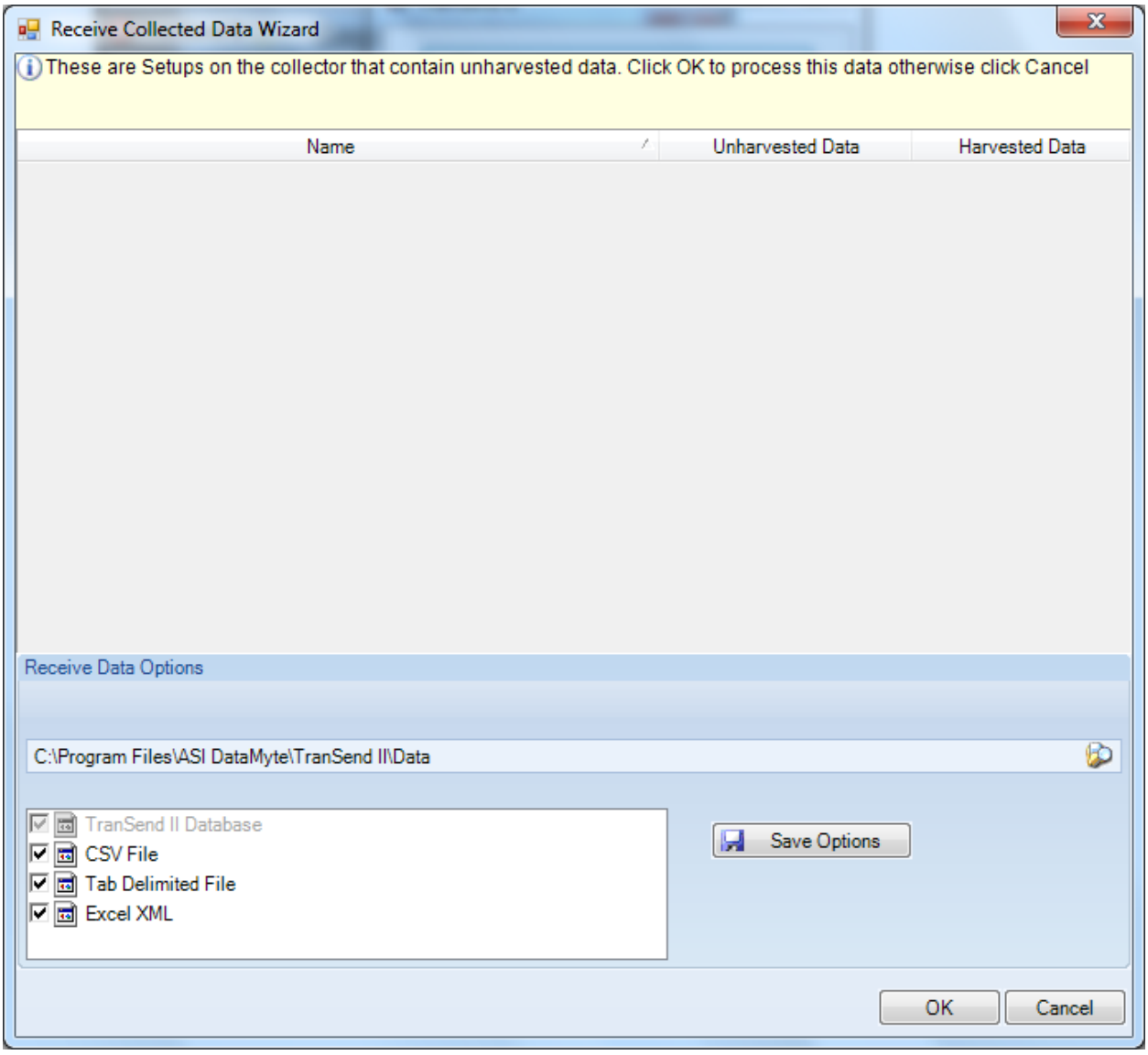


If you click on Open Collector prior to setting Options to a location you are able to write to, the following TranSend II Error displays because you are unable to write to Program Files directory.



Click OK.

The following screen displays.



Click on the browse icon and path out to a location that you are able to write to.

Example: C\Program Data\ASI DataMyte\TranSend II\Data (create Data folder) and click OK.