Sturtevant Richmont

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Operating and Service Manual
1100-Series Exacta® 2 Digital Torque Wrench

S/R 1100-Series **Exacta® 2** Digital Torque Wrenches are designed to work with the Global 8, Global 8 - Ethernet, RFE and RFE - Ethernet controllers to provide torque application integration that extends from your shop control system all the way to the fastener. The details of programming the tool through each controller are found in the controller manual.

Safety
�’ Always wear appropriate personal safety equipment when operating this tool.
�’ Never use this tool for any purpose other than that for which it is intended.
�’ Never use the tool beyond its' rated torque capacity.

Caution
• When using this product with an S/R controller and radio communication is lost, the tool will retain the most recently-downloaded specifications until radio communication is re-established or alternate means are used to change the specifications.

Battery and Battery Charger Selection
The **Exacta® 2** digital torque wrench has very specific battery requirements that <u>must</u> be adhered to. Only batteries meeting these requirements may be used.

  • <u>Use of any batteries other than those provided by S/R or meeting the specifications on the Batteries page of our website (http://www.srtorque.com/batteries.html) may cause the tool to become inaccurate.</u>

  • <u>Use of any batteries other than those provided by S/R or meeting the specifications on the Batteries page of our website (http://www.srtorque.com/batteries.html) may damage the tool.</u>

  • <u>Use of any batteries other than those provided by S/R or meeting the specifications on the Batteries page of our website (http://www.srtorque.com/batteries.html) will void the warranty on the tool.</u>

  • <u>Under no circumstances should alkaline batteries, rechargeable or disposable, be used in the tool.</u>

The correct battery and charger pack (NAFTA countries only) for tools in the **Exacta® 2** digital torque wrench line is S/R part number 21259. This pack includes a 15-minute charger and four (4) AA NiMH 2200 mAh batteries.

The correct replacement battery pack (NAFTA countries only) for tools in the **Exacta® 2** digital torque wrench line is S/R part number 21258. This pack includes four (4) AA NiMH 2500 mAh batteries.

For countries outside NAFTA, consult the batteries page on our website (http://www.srtorque.com/batteries.html) to find the correct battery and battery charger for use in your country. Follow the manufacturer links provided and select the appropriate product for your country and need.

Battery Installation
At the end of the grip is a battery cap that covers the battery compartment inside the grip. To install the batteries:

1. Insure that the correct batteries are those to be used, and that they are completely charged. Follow the instructions that come with the charger to charge the batteries before installing them.

2. The battery cap is screwed into an internal thread inside the grip. Remove the battery cap by unscrewing it from the grip (CCW).

3. The battery compartment will be exposed. There are two labels inside the compartment. Install the batteries in the locations given by the labels and maintaining the battery orientation shown by the labels and in the photo here.

4. Reinstall the battery cap. Tighten the cap only to snug; do not overtighten the cap.

The 1100-Series **Exacta® 2** has a Low Battery Indicator on the display. If the battery voltage falls below 4.1 volts, a battery icon will appear in the upper right-hand section of the display, the "BAD" icon will illuminate and "bAtt" will be displayed in the main display. When this occurs it is time to replace the batteries. Wrench will continue to operate until the battery voltage drops below 4.0 volts. At that time the display will show the message "bAtt" and the ability to operate the wrench will be lost. Readings stored prior to that point will remain in memory. The tool will remain inoperable until the batteries have been replaced with charged batteries.

Interchangeable Heads
The1100-Series Exacta® 2 digital torque wrenches of 150 foot-pound capacity and below use the S/R dovetail system. The tools are calibrated for use with S/R Interchangeable Heads having a 1 7/16" Common Centerline. Any S/R heads with this centerline length may be used without affecting torque accuracy. If an interchangeable head of a different centerline length is to be used, the tool must be recalibrated with that head (or one of the same centerline length) before the tool is used.

The 400 foot-pound capacity tool is calibrated for interchangeable heads having a Common Centerline length of 3 7/8". When used with heads having the same Common Centerline length, no recalibration is

needed. If a head with a different Common Centerline length is to be used, the tool must be recalibrated before use with an interchangeable head of the same Common Centerline length as the one to be used.

1100-Series Exacta® 2 digital torque wrenches of 250 foot-pound capacity and above (except 400 ft. lb.) use S/R slide pin ratchets. The ratchets should be disassembled and cleaned periodically. Ratchet renewal kits having the appropriate parts for each ratchet are available.

Power Switch, Serial Port and Cover
On the top of the electronics housing are the power switch and serial port for the tool. These are protected by a rubber that can be lifted to expose them for use. The cover should be closed at all times when access to the serial port and/or power switch is not immediately needed.

The tool power is enabled (power On) by sliding the switch away from the grip as shown here. Power to the tool is disabled (power Off) by sliding the power switch towards the grip.

The serial cable for the wrench connects to the round serial port that is also used to hold the cover in place. The cable should first be connected to the computer (9-pin connector) then to the tool (single-pin connector) when the tool is to communicate with a computer during calibration.

Component Identification
1. Electronics Module
   The electronics module houses and protects the circuit boards, display, operating buttons and other electronic components.

2. Display
   The display conveys the visual information needed for use and generated by use.

3. Indicator Labels
   These labels, working with indicators on the display, inform the user what mode or function is currently active.

4. Buttons
   These buttons (Clear, Select, Up, Down) are used to access program functions and data on the display.

5. Grip
   The grip is where the tool should be grasped when in use. The load point on the grip is marked by the plain ring in the center of the grip.

6. Battery Compartment Cover
   The battery compartment cover protects the batteries and associated parts, and permits access for battery replacement.

7. Switch Cover
   This rubber cover protects the power switch and the serial port.

8. Serial Port
   This is a single-pin serial port for communications.

9. Power Switch
   This switch enables and disables electric power from the batteries to the electronics.

10. Indicators
    There are four triangular indicators in a line across the top of the display. These indicators are activated and deactivated to show what mode or operation is currently active on the tool. To the right of these is a battery icon (not activated in this photograph) used as a battery level (low battery power) indicator.

11. Unit of Measure Area
    This area of the display shows the currently active unit of measure, both during use and during keyboard programming.

12. Data Record Area
    This small four-digit display shows the currently-active data record in memory or, when programming, part of the function information required. When in radio contact, it displays "rAd".
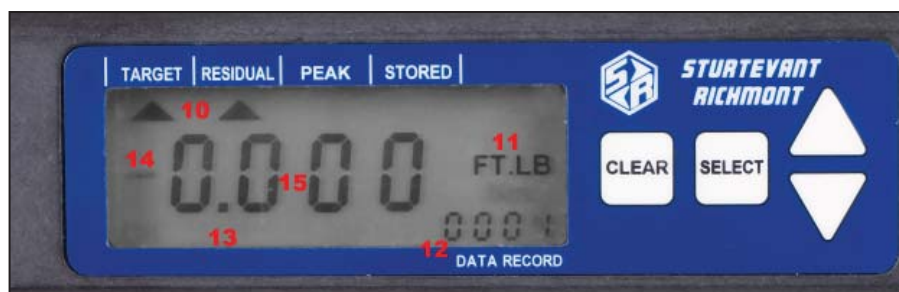
13. Quality Attribute Area
    There are several icons along the bottom of the display to the left of the Data Record area. These include "OK" and "BAD", which provide the attribute evaluation of the torque against the programmed specification when the tool is in use. They also include MAX and MIN

14. CCW Icon
    The CCW icon illuminates when the torque is in the counter-clockwise direction.

15. Primary Display Area
    The primary display area conveys differing information depending upon the current action of the tool. This may be numeric information such as torque values or alphabetic information such as is used in some programming and communication functions.

16. Rear Cover
    The radio cover permits access to the electronics when repair is required; it should not be removed except for repair situations requiring its' removal.

17. Buzzer

This buzzer provides an audible indication of the torque status to augment the visual indicators. When in use, the buzzer emits a single sound when power to the tool is enabled, a rapid series of beeps when the torque specification is attained and while within the specification. It will emit a single longer beep if the torque specification or torque capacity is exceeded.

18. Rear LED Lens (Circular, below #16 in image)

This lens illuminates with the color (Yellow-Orange/Green/Red) in the same manner as the display when the LED color system is in use. This permits the user to know the status of the tightening even when the tool is used in an orientation where the display is not immediately visible.

Starting Routine

To use the wrench slide the power switch to the Enabled or On position. The tool will begin an internal starting routine and the display will first show the version of the firmware that resides on the tool then display the model of the tool (tool capacity in foot-pounds).

Once the starting routine is complete, the tool will then show on the display the information for the status in which it was most recently set. This includes the mode of operation, unit of measure, current data record number and target torque setting.

If the tool has been associated with or learned by a controller, the lower right-hand corner of the display will have the characters "rad" active.

The Controller Association or Learning Process

Each of the controllers these tools can be used with has a different learning process, and the instructions for creating the association for each is slightly different. There are a couple of common elements in the process:

•   The process will start with the tool power disabled (tool turned off)
•   The controller will be placed into a "learning" mode or the tool transmitter serial number will be provided to the controller.
•   At the point in the process where the actual association is to be created, the tool power will be enabled (power turned on).

During this process the controller and tool will establish the communication link, and the controller will notify the operator or programmer that the association has been made, usually through a sound or LED illumination. Once this process is complete, the options for tool programming through the controller and tool use with the controller are available.

Using the Tool Without a Controller

S/R 1100-Series **Exacta**® **2** Digital Torque Wrenches can be used without a controller when needed, but the operating characteristics are significantly different; the tool functions as a standard **Exacta**® **2** Digital Torque Wrench.

When the tool is used with a controller, the keypad is normally locked. This means that the keypad cannot be used to change key settings, only to review results. To use the tool as a standard Exacta® 2 torque wrench, the keypad must be unlocked.

The easiest way to unlock the keypad is to issue the command through the S/R controller with which the tool is associated. Use our Device Programmer software (see controller manual) to program the controller to unlock the keypad. Once that has been performed, the tool may be programmed via the keypad.

Starting Routine
To use the wrench slide the power switch to the Enabled or On position. The tool will begin an internal start-ing routine and the display will first show the version of the firmware that resides on the tool then display the model of the tool (tool capacity in foot-pounds).

Once the starting routine is complete, the tool will then show on the display the information for the status in which it was most recently set. This includes the mode of operation, unit of measure, current data record number and target torque setting.

Normal Operation - Definition
The phrase "normal operation" will be used in several locations in these instructions. The definition of "nor-mal operation" is the condition where the tool is being used as a torque wrench and not currently connected to a computer. Data operations are treated separately.

On-Wrench Programming
The four buttons on the keypad may be in a locked or unlocked state. This section applies when the key-pad is in an unlocked state. For information on locking and unlocking the keypad, see the section on using the tool with the Exawin 5 software.

Many, but not all, of the functions of the **Exacta® 2** digital torque wrench may be programmed using the four buttons on the wrench keypad if the keypad is unlocked. Those that can be programmed from the key-pad are: Unit of Measure (UOM), Minimum (Lo) Torque Specification, Maximum (Hi) Torque Specification, and Mode of Operation (Track, Residual or Peak).

Exacta® 2 uses a single-level menu to access the primary functions, and scrolling to move through the op-tions within the functions. To program the tool, follow the steps in this section.

1. Activate power to the tool by sliding the power switch to the enabled (On) position.

2. Allow the unit approximately five seconds to complete it's internal starting routine and self-checks.

3. When the starting routine is complete, the normal operating mode screen will appear about as it does here during normal operation.

    The large number in the center is the Target, or the midpoint value between the minimum and maximum (Lo and Hi) torque values currently active on the tool. The active Target arrow verifies this.

    The current Unit of Measure is displayed beside the large numbers, in this case Foot-Pounds. The ar-row below the Peak indicator shows that the unit is in Peak mode of operation. The data record displays the data point or record that will be the next one recorded.

    There are four buttons forming a keypad to the right of the display. These buttons are used in the pro-gramming of tool functions and for reviewing torque data stored on the tool.

4. To begin programming the tool, press the SELECT button twice.

5. The Unit of Measure is the first item to be programmed. The current UOM is displayed. Press the Up arrow button to scroll through the available units of measure. When the desired unit of measure is displayed, press the Select button once to make it active and advance to the next item to be programmed.

6. The next menu item is the Minimum (Lo) Torque Specification. The appearance of "-Lo-" in the Data Record area of the display confirms this is the current programming function. The current specification value will be displayed, in this case zero foot-pounds. You can press the "Clear" button to set the minimum and maximum values to zero.

To increase the minimum torque specification value, press the Up arrow button once. The value will increase by one. Each time the button is pressed the value will increment by one.

To increment rapidly, press and hold the Up arrow for two (2) seconds. The value will start rising rapidly. Release the button when the desired value is displayed. If the desired value is missed, use single pushes of the Up or Down buttons to obtain the desired value. For this example, the minimum torque value is forty (40). The yellow "Caution" color will become active at 90% of this value when the tool is in use; the green "Good" color will be displayed when this value is attained. The green color will remain until either(1) cycle is complete or (2) the Maximum Torque Specification is exceeded or (3) tool capacity is reached. Press the Select button to lock in this value and move to the next function. Note: When the minimum torque value is set, the maximum torque value is set to the same point to permit more rapid programming of the maximum value.

7. The next function is the Maximum (Hi) Torque Specification. The Data Record area of the display will show "-Hi-" to indicate this function is active. The center numbers will display the current maximum torque value. This specification value can be changed to zero if desired by pressing the Clear button.

The Up button is used to increment the value upwards. The increment is one (1) for each press of the button. If the specification is wide, increasing the value rapidly can be performed as it was on the Minimum Torque Specification selection; press and hold the Up button for two (2) seconds to begin rapid incrementing. The Up and Down arrows can be used to set the final value if it is missed while being rapidly increased. Press the Select button to lock in the desired value and move to the next item.

8. The tool will advance to the Mode of Operation screen. There are three (3) modes of operation available, each with its' own screen symbology. The modes and symbols for each are:

"otrA" = Track Mode, torque rises and falls with force applied. No data is stored.

"oPEA" = Peak Mode, highest torque captured with each use; the store and print/clear processes are used if the autoclear time is greater than zero.

"orES" = Residual Mode, used for auditing torque on installed fasteners. The auto-store/print/clear process is used if the autoclear time is set to greater than zero.

When the symbol for the desired mode of operation is displayed, press the Select button to make it active and advance to the next menu item.

The "data" screen is not part of normal operation. It is used to transfer data, and will be covered in a separate section of this document.

To leave programming of the tool and begin normal operation with it, press the Select button one time. The display will show an active indicator under the indicator label for the current mode, an active indicator for the target torque, the unit of measure selected, the target torque, and the currently active data record. The tool is now ready for use in torque application.

By default, both the LED color scheme and the beeper will be active. These cannot be programmed or altered through use of the keyboard programming method.

Programming and Data Collection Using the Exacta® 2 with S/R Exawin 5 Software
S/R offers Exawin 5 software that may be used to program the wrench and as a data collection tool. This software is available for free on the S/R website when you register your **Exacta® 2**. The software is not required in order to collect data from the tool; the tool is capable of creating a self-generated report when used with Hyperterminal or other terminal software on a computer. Exawin does, however, provide a rapid and simple method for obtaining data from the tool.

The serial cable supplied with the wrench may be used to connect the tool to the computer. If the computer does not have a 9-pin serial port, a powered serial to USB convertor (S/R part no. 10456) is available.

To connect the computer running Exawin 5 to the tool:

1. Ensure the computer is operating and that tool power is disabled (off).

2. Connect the serial cable to the serial port on the computer.

3. Connect the single-pin connector on the cable to the serial port on the tool.

4. Enable power to the tool (turn tool power on).

5. Allow the tool to complete its' starting routine.

6. Start the Exawin 5 software on the computer. Follow the software instructions for using the software with the tool.

7. When complete, disconnect the tool from the serial cable.

Uploading Data from Tool to Computer Using Hyperterminal

Hyperterminal (or another terminal emulation program) may be used with the **Exacta® 2** digital torque wrench to collect the torque data stored on the wrench. The process for doing this is:
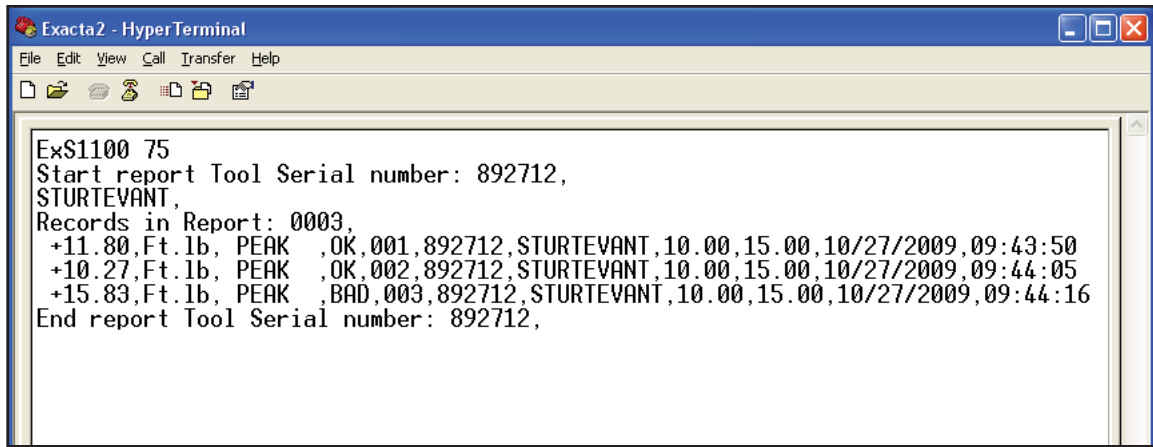
1. Ensure the computer is operating and that tool power is disabled (off).

2. Connect the serial cable to the serial port on the computer.

3. Connect the single-pin connector on the cable to the serial port on the tool.

4. Start the Hyperterminal software.

5. Set the communication protocols within Hyperterminal to the following settings:
   Baud Rate = 1200 baud (tool default baud rate at startup)
   Data bits = 8
   Stop bit = 1
   Parity = None
   Flow Control = none

6. Ensure that there is no torque load on the tool, and that none will be placed on it during this process. Enable power to the tool and allow it to complete the starting processes. Communication with the computer will be established and the tool will send the firmware version and model information to the computer. In Hyperterminal, the information will appear approximately as it does in the image here.
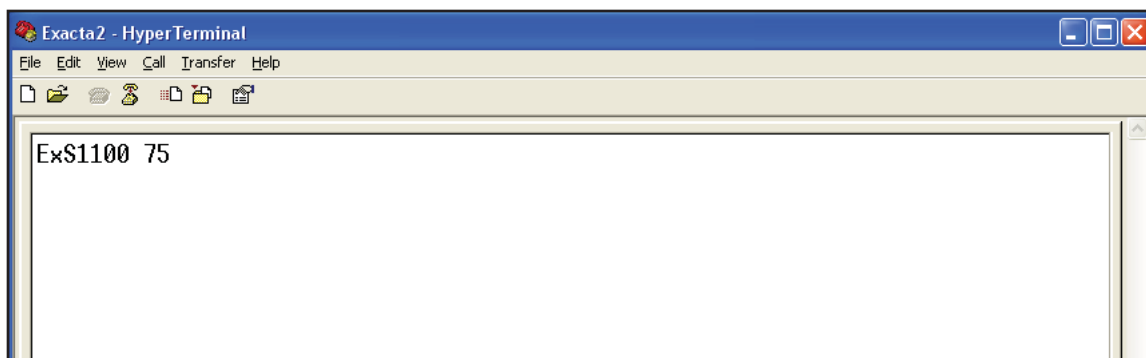
7. Look at the "Data Record" number on the tool display. The data record number that is on the display should be one record number higher (larger) than the last record number you wish to upload to the computer.

   Example: There are three torque records on the tool, and the Data Record shows "0003". You wish to upload all three torque records. With the display showing "0003", only two records would be uploaded. To upload all three, the display must show data record "0004".

   Use the Up or Down button to index to the number of records you wish to upload + 1.

8. Press the Select button to enter and page through the menu until "dAtA" is displayed on the main section of the display.

9. To begin sending the information to the computer, press the Down button on the tool. This will cause the information to be sent to the computer. In Hyperterminal, the information will be displayed approximately as it does in the next image.

```
Exacta2 - HyperTerminal                                              _ □ X
File  Edit  View  Call  Transfer  Help

D ☞  ⑳ ⑳  ⑳ ☞  ⑳

 ExS1100 75
 Start report Tool Serial number: 892712,
 STURTEVANT,
 Records in Report: 0003,
  +11.80,Ft.lb, PEAK   ,OK,001,892712,STURTEVANT,10.00,15.00,10/27/2009,09:43:50
  +10.27,Ft.lb, PEAK   ,OK,002,892712,STURTEVANT,10.00,15.00,10/27/2009,09:44:05
  +15.83,Ft.lb, PEAK   ,BAD,003,892712,STURTEVANT,10.00,15.00,10/27/2009,09:44:16
 End report Tool Serial number: 892712,
```

The structure of the data record string is:

Torque Direction, + is clockwise, - is counter-clockwise
Numeric value of torque
Unit of measure of the torque
Torque Mode
Compliance to programmed specification (OK or BAD attribute)
Tool record number
Tool Serial Number
16-Character User-Definable String (set using Exawin 5)
Minimum Programmed Torque Specification
Maximum Programmed Torque Specification
Date of Record
Time of Record

10. To clear the uploaded data from the tool memory, press the Up button on the tool and allow the clearing process to finish before going to the next step. If you wish to retain the data currently on the tool, just go to the next step.

11. To exit the data transfer process, press the Select button on the tool. This will return the tool to normal operation.

12. Save, print or transfer the data in the Hyperterminal program using the program's menu functions.

13. Exit the Hyperterminal program and disconnect the serial cable from the tool.

Using the 1100-Series *Exacta*® 2 - Normal Operation When Not Associated
Once the tool has been programmed to the torque mode, unit of measure and torque specifications desired, the tool is ready for use. The display will show the target torque (mid-point between minimum and maximum torque specification values) in the primary section of the display. The triangle below the Target indicator will be illuminated, as will the triangle below the torque mode (Residual or Peak). The unit of measure will be displayed, and the current active data record will appear in the lower right-hand corner of the display.

Grasp the tool by the grip, engage the fastener to be tightened (or item to be torqued) and begin applying torque using a steadily-increasing force. When you attain approximately 90% of the minimum torque value,

the display and rear LED lens will illuminate with a bright yellow-orange light to warn you that you are approaching the specified torque.

When you achieve the minimum specified torque the illumination will change from yellow-orange to a bright green, and rapid beeps will be emitted from the buzzer. Stop applying force immediately.

The torque value (peak or residual) for that use of the tool will remain on the display for two seconds (default value). The "OK" icon will also illuminate, as will the triangle for Stored. The information will be stored in memory, the displayed value will then change back to the target torque, and the data record number will increment by one.

If you inadvertently apply more torque than the maximum specified value, the display and rear LED lens will illuminate with a bright red color, a single long beep will be emitted by the buzzer, and the BAD icon will illuminate. This combination will exist for two seconds (or user-defined time) before the value is stored and the tool indexes and resets for the next tightening.

Stored values from prior uses (tightenings) can be viewed and can be written over. To view a prior value during normal operation, simply press the Down button to scroll down (decrement) to the data record of interest. During this you may also press the Up arrow to scroll up (increment) to a record of interest. Re-member to return to the correct data record number since the tool will record the next torque in the record active when the tool is used.

If a torque is to be eliminated before being written to memory, press the Clear button before the Autoclear time expires. This clears the display and the just-completed value is discarded and not written to memory.

This ability to scroll also permits ready correction of an error in torque application. Assume that in tighten-ing a series of fasteners a slight overtorque occurs on the 7th fastener - data record 0007. After the display clears, the active data record is 0008. To correct this immediately:

- Press the Down button to return to data record 0007.
- Use the tool to loosen the fastener. This will cause the tool to record that torque and again index to data record 0008.
- Press the Down button to return again to data record 0007.
- Correctly tighten the fastener. This will produce a correctly tightened fastener and a record of the torque to which it was tightened.

The tool will store up to 999 data records. Once all the data records are filled, the tool continues writing subsequent torques in the 999 location.

Calibration

The calibration process for the **Exacta® 2** tools has three sub-processes. The first is testing the tool to find the "as found" condition. If the tool is out of calibration, then two subsequent processes are performed; calibration adjustment to bring the tool into calibration, and subsequent repetition of tool testing to assure that the adjustments were effective and the results are valid. This process addresses only the adjustment, not pre- and post-adjustment testing.

We strongly recommend that when performing the calibration process a torque tester of not less than 0.25% Indicated Value Accuracy be used, and that it be used in conjunction with a mechanical loader to obtain proper loading of the tool. We have designed these tools to be as hand-position insensitive as we can within other constraints, but the use of a mechanical loader is still recommended. The load applied during testing must be at the loading point on the grip indicated by the plain ring at the middle of the grip.

It is imperative that when calibrating and testing one of the tools having the S/R dovetail that the calibration be performed with an interchangeable head having the same Common Centerline Length as the head the tool will be used with. Changing the Common Centerline Length does change the readings and using the incorrect head <u>will</u> result in torque inaccuracy.

We strongly recommend that the tool be temperature stabilized before testing, and that fresh batteries be used during the procedure to assure that the tool does not suffer a loss of battery power during the process.

This section of this document presents the information required to make adjustments when the tool is found to be out of tolerance.

Needed items (in addition to tester and loader):
•   A computer with a serial port and Hyperterminal software
•   The serial cable supplied with the torque wrench

Setup for Adjustment
1. Ensure the computer is operating and that tool power is disabled (off).

2. Connect the serial cable to the serial port on the computer.

3. Connect the single-pin connector on the cable to the serial port on the tool.

4. Start the Hyperterminal software.

5. Set the communication protocols within Hyperterminal to the following settings:
    Baud Rate = 1200 baud (tool default baud rate at startup)
    Data bits = 8
    Stop bit = 1
    Parity = None
    Flow Control = none

6. Ensure that there is no torque load on the tool. Enable power to the tool and allow it to complete the starting processes. Communication with the computer will be established and the tool will send the firmware version and model information to the computer. In Hyperterminal, the information will appear approximately as it does in the next image.

Exacta2 - HyperTerminal

File Edit View Call Transfer Help

ExS1100 75
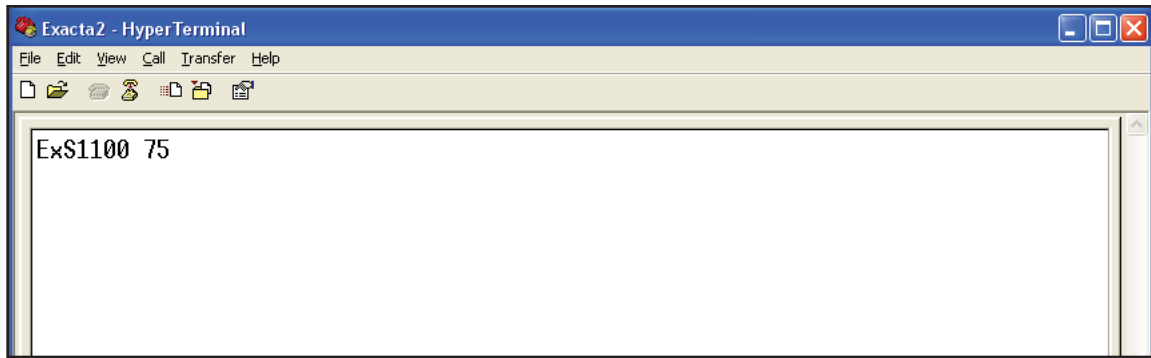
7. Type the diagnostic "D" Command into the terminal and press <enter>. The Terminal display will display "DiaOn". You are now in diagnostic mode.

8. Type the M <enter>. The capacity of the tool should be seen on the display.

9. To enter the Calibration process, press the 'Select' button on the tool keypad.

Calibration Procedure Keypad Functions
- Clear button – Restarts calibration process at Cal point CW 0.

- Up Arrow – Selects calibration point to calibrate. Note: If pressed and held, the percent cal point will be displayed. Upon release the tool will display:
  - If under 1% of tool capacity the target torque value the cal point will be displayed.
  - If over 1% of the tool capacity, the current torque value will be displayed.

- Down arrow – Saves the new cal point and recalculates the current torque value.

- Select button – Not used during this process

Tool Display Note
- At this point the tool LCD should be displaying "0" in the lower right corner of the LCD display.

- The tool display will use both the main display and the lower right-hand segment to show key information needed during these processes.

Procedure - Calibration Adjustment
1. Install drive square on torque tester. Place wrench onto torque tester. Apply three 100% CW FS loads to ExS1100 wrench. See Pages 14 - 16 of this document for correct loads.

2. Remove the torque load from wrench. Remove wrench from tester, and hold in vertical position. Press DOWN arrow key to save the zero setting. Replace wrench on tester.

3. Press the Up arrow key until 100 appears in the lower right corner of the LCD display. Apply 100% CW FS load to the unit. When exactly 100% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

4. Press the Up arrow key until 90 appears in the lower right corner of the LCD display. Apply 90% CW FS load to the unit. When exactly 90% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

5. Press the Up arrow key until 80 appears in the lower right corner of the LCD display. Apply 80% CW FS load to the unit.   When exactly 80% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

6. Press the Up arrow key until 70 appears in the lower right corner of the LCD display. Apply 70% CW FS load to the unit. When exactly 70% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

7. Press the Up arrow key until 60 appears in the lower right corner of the LCD display. Apply 60% CW FS load to the unit. When exactly 60% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

8. Press the Up arrow key until 50 appears in the lower right corner of the LCD display. Apply 50% CW FS load to the unit. When exactly 50% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

9. Press the Up arrow key until 40 appears in the lower right corner of the LCD display. Apply 40% CW FS load to the unit. When exactly 40% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

10. Press the Up arrow key until 30 appears in the lower right corner of the LCD display. Apply 30% CW FS load to the unit. When exactly 30% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

11. Press the Up arrow key until 20 appears in the lower right corner of the LCD display. Apply 20% CW FS load to the unit. When exactly 20% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

12. Press the Up arrow key until 10 appears in the lower right corner of the LCD display. Apply 10% CW FS load to the unit. When exactly 10% CW FS torque is applied, press the DOWN arrow key. Unload the tool.

13. Apply 3 full-scale loads to the wrench in the CCW direction.

14. Remove the torque load from wrench. Remove wrench from tester, and hold in vertical position. Press the Up arrow key until - 0 appears in the lower right corner of the LCD display. With no torque applied, press the DOWN arrow key. Replace wrench on tester.

15. Press the Up arrow key until -100 appears in the lower right corner of the LCD display. Apply 100% CCW FS load to the unit. When exactly 100% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

16. Press the Up arrow key until - 90 appears in the lower right corner of the LCD display. Apply 90% CCW FS load to the unit. When exactly 90% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

17. Press the Up arrow key until - 80 appears in the lower right corner of the LCD display. Apply 80% CCW FS load to the unit. When exactly 80% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

18. Press the Up arrow key until - 70 appears in the lower right corner of the LCD display. Apply 70% CCW FS load to the unit. When exactly 70% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

19. Press the Up arrow key until - 60 appears in the lower right corner of the LCD display. Apply 60% CCW FS load to the unit. When exactly 60% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

20. Press the Up arrow key until - 50 appears in the lower right corner of the LCD display. Apply 50% CCW FS load to the unit. When exactly 50% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

21. Press the Up arrow key until - 40 appears in the lower right corner of the LCD display. Apply 40% CCW FS load to the unit. When exactly 40% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

22. Press the Up arrow key until - 30 appears in the lower right corner of the LCD display. Apply 30% CCW FS load to the unit. When exactly 30% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

23. Press the Up arrow key until - 20 appears in the lower right corner of the LCD display. Apply 20% CCW FS load to the unit. When exactly 20% CCW FS torque is applied, press the DOWN arrow key. Unload the tool.

24. Press the Up arrow key until - 10 appears in the lower right corner of the LCD display. Apply 10% CCW FS load to the unit. When exactly 10% CCW FS torque is applied, press the DOWN arrow key. Unload the tool. Remove the torque from the wrench.

25. Press the Up arrow key until a DATE appears on the LCD. Press the DOWN arrow key to save the calibration date.

26. Turn tool 'Off', disconnect from computer, wait ten seconds then turn the tool 'On'. This takes the tool out of calibration mode and places it in operating mode. It also provides a check to assure that the information was saved on the tool.

Accuracy Tolerance Tables By Capacity
<u>25 foot-pounds</u>

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
25	10	30	30.3	29.7
	20	60	60.6	59.4
	30	90	90.9	89.1
	40	120	121.2	118.8
	50	150	151.5	148.5
	60	180	181.8	178.2
	70	210	212.1	207.9
	80	240	242.4	237.6
	90	270	272.7	267.3
	100	300	303	297

75 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
75	10	90	90.9	89.1
	20	180	181.8	178.2
	30	270	272.7	267.3
	40	360	363.6	356.4
	50	450	454.5	445.5
	60	540	545.4	534.6
	70	630	636.3	623.7
	80	720	727.2	712.8
	90	810	818.1	801.9
	100	900	909	891

150 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
150	10	180	181.8	178.2
	20	360	363.6	356.4
	30	540	545.4	534.6
	40	720	727.2	712.8
	50	900	909	891
	60	1080	1090.8	1069.2
	70	1260	1272.6	1247.4
	80	1440	1454.4	1425.6
	90	1620	1636.2	1603.8
	100	1800	1818	1782

250 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
250	10	300	303	297
	20	600	606	594
	30	900	909	891
	40	1200	1212	1188
	50	1500	1515	1485
	60	1800	1818	1782
	70	2100	2121	2079
	80	2400	2424	2376
	90	2700	2727	2673
	100	3000	3030	2970

400 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
400	10	480	484.8	475.2
	20	960	969.6	950.4
	30	1440	1454.4	1425.6
	40	1920	1939.2	1900.8
	50	2400	2424	2376
	60	2880	2908.8	2851.2
	70	3360	3393.6	3326.4
	80	3840	3878.4	3801.6
	90	4320	4363.2	4276.8
	100	4800	4848	4752

600 foot-pounds

Capacity in Ft.Lb	% FS	Torque Value in In.Lb	+ Tol.	-Tol.
600	10	720	727.2	712.8
	20	1440	1454.4	1425.6
	30	2160	2181.6	2138.4
	40	2880	2908.8	2851.2
	50	3600	3636	3564
	60	4320	4363.2	4276.8
	70	5040	5090.4	4989.6
	80	5760	5817.6	5702.4
	90	6480	6544.8	6415.2
	100	7200	7272	7128

Factory Service, Parts and Calibration
Factory service, parts, and calibration in our ISO/IEC 17025 Accredited Calibration Laboratory are readily available. Simply contact your S/R Distributor, or contact us directly using the information on the front page of this document.

Other Serial Communications Commands and Communications
The serial communications system used by these tools permits flexibility in terms of tool operation control, data transfer and tool operation. Some, but not all, of the these options are available readily through the Exawin software.

Some of the functions covered in this section are only available through the use of Hyperterminal or similar terminal software, such as changing the baud rate used by the tool to communicate with the computer.

All commands incoming from the tool end in a carriage return and a line feed. All commands going out to the tool must end with a carriage return. In this section the carriage return keystroke will be represented by "<cr>'.

Available Tool Baud Rates and Considerations
These tools may communicate at any of the following baud rates: 1200, 2400, 4800, 9600, 19200, 38400, 76800, 115200. The default baud rate is 1200, and when the tool is connected to the computer this rate is used until and unless the baud rate is changed by sending a command to the tool to change the rate.

The default rate works well in two respects; it does not take a lot of time to transfer data for small or medium quantities of records, and it is highly reliable. Higher baud rates are available to expedite the upload of large quantities of records, and each increase in speed provides a commensurate decrease in upload time.

Increased baud rates do come at a cost in reliability for these serial communications just as they do with other serial communications. These tools use a "broadcast" approach; the information is sent and there is an assumption that it was properly received. There is no checksum or other "error-proofing" methodology used. Since error rates (both transmission and reception) increase as the baud rate increases, there is an increased likelihood of communication error when using higher error rates. The error rates are the same for 1200 and 2400 baud, but begin to creep slowly higher as the rate increases.

Note also that when you first enable power (turn on) to the tool, the rate will be 1200. If you send the command to a higher baud rate, you must then also set the terminal software to communicate at that rate. Note that after the tool is disconnected and the power disabled, it will revert to the default rate. To re-establish communication the terminal software will need to be reset to the default rate.

The command to set the baud rate to a different level is "Bb" followed by a <cr> (Enter). In this command, the lower-case "b" is replaced by the number representing the rate to be used for subsequent communications.

The table for the number and represented baud rate:
    1   2400
    2   4800
    3   9600
    4   19200
    5   38000
    6   76800
    7   115200
    Other   All other characters set baud rate to 1200

Set Time/Date Stamp
These tools have an internal clock that can be reset with the time/date stamp. The format of the stamp (U.S. Standard or European Standard) used in the time/date stamp can also be selected. The default is the U.S. Standard method of reporting this information.

The command to set the time/date stamp is "@".

To set the time and date when the U.S. format is used, the command will be structured as:
@UMM/DD/YYYY,HH:MM:SS<cr>

Example: @U12/05/2009,13:45:30<cr> would set the date and time as 12/05/2009 13:45:30

To set the time and date when the European format is used, the command will be structured as:
@EDD/MM/YYYY,HH:MM:SS<cr>

Example: @E05/12/2009,13:45:30<cr> would set the date and time as 5/12/2009 13:45:30

Clear Current Tool Data (Partial)
This command uses "CL" followed by <cr> to clear the data records stored on the tool up to the current record number.

Clear Current Tool Data (All)
This command uses "CLA" followed by <cr> to clear all the data records stored on the tool.

Set Data Report Format
This command allows the user to change the tool-generated report by dropping fields from the data sent by the tool to the computer. The default setting is to send all data in each record, and this was shown earlier by a screen capture. Users not wanting the data in one or more fields may instruct the tool to omit these fields from the transmitted information.

Note that the deletion of fields will be effective for all transmissions to the computer until either another change command is sent or the tool is turned off. Users with access to programmers or programming skills may construct scripts that will manage this function using this and related commands.

The command = "TX00000000000000" followed by <cr> sets the data report format to the default of reporting all fields when the report is generated. Replacing any "0" with a "1" for that field tells the tool to omit that field in the data sent to the computer.

The field sequence is that shown in the first image on the following page.

There are 14 bits between the "TX", but only 11 fields, counting the carriage return and line field, in the data record. The other three bits define the items not particular to an individual data record but pertinent to the report itself. These items are bits numbered 11, 12, 13 and 14 in the table on the following page.

Bit 12, the "User Defined String" is an accommodation to customer requests pertinent to use of these tools with Exawin software. The User Defined String in Exawin allows the user to have a 16-character alphameric identifier (tool number or name) of the user's own creation and assignment. This line appears in the top section of the report (above the record data) when this item is printed.

```
+128.6,IN.LB,Peak,OK,0049,100.0,150.0,09/28/2009,13:10:52<cr+lf>
```
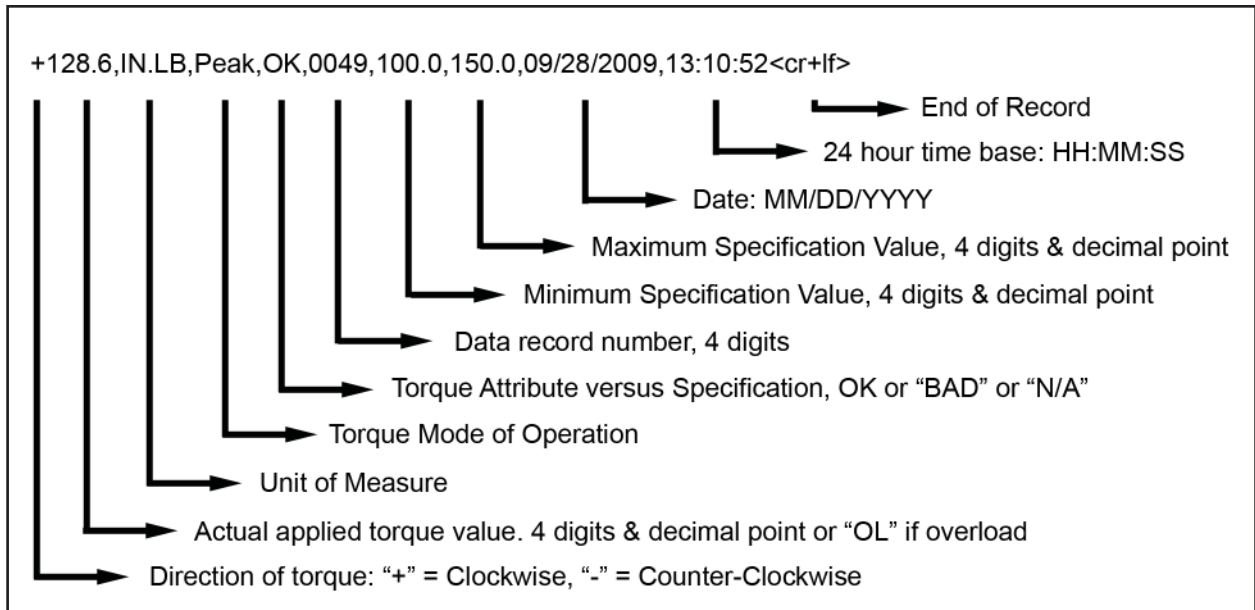

Bit 13 causes the number of records in the report to be printed or not printed. This is true whether the report includes all of the records on the tool or only a subset of them. This item is printed above the data record section of the report when the report is printed.

Bit 14 allows the user to choose to keep the comma separation default for field delineation or to switch to tab delineated separation.

TX Command Byte Usage Table

Field #	Default (0) Effect	Option (1) Effect
1	Print Sign	Do not print
2	Print Actual Torque	Do not print
3	Print Unit of Measure	Do not print
4	Print Torque Mode of Operation	Do not print
5	Print Torque Attribute	Do not print
6	Print Data Record Number	Do not print
7	Print Minimum Specification	Do not print
8	Print Maximum Specification	Do not print
9	Print Time & Date Stamp	Do not print
10	Print U.S. format	Print European format
11	Print Serial Number at start and end of report*	Serial Number not printed
12	Print User Defined String	Do not print
13	Print Records in report	Do not print
14	Print comma for field separator	Print tab for field separator

Frequently Asked Questions

Can I modify the light scheme?
Yes. There are several ways to use the Warn/Good/Overtorque light scheme.

If you program the tool from the keypad with a maximum torque specification only, the yellow-orange Warning and green "Good" colors will not be used. The LED will illuminate red for Overtorque (and overload) if the maximum torque specification (or tool capacity) is exceeded.

If you program a minimum torque only, the LED will illuminate with green for torque above the minimum, there will be no warning illumination, and the red illumination will occur only if the tool is overloaded.

If you program neither a minimum nor a maximum torque specification, there will be no LED illumination unless tool is loaded above capacity.

The display turned red and showed "OL". What happened?
The tool is designed to be used within its rated capacity, and one of the calibration points for the tool is the 100% of capacity point. The tool is not designed to be used above this point.

At approximately 106% of capacity we use the LED and show "OL" on the display to tell the user that the rated capacity has been exceeded and that the tool is in danger of being damaged. Even a single use above this level can cause the tool to become less accurate, and repeated use at this level increases the probability of accuracy degradation and expensive damage to the tool.

At approximately 120% of rated tool capacity there is a very high probability of damage to the sensor, including damage of a level that necessitates replacement.

We strongly recommend that the tool never be used beyond its rated capacity, and that if the tool is inadvertently overloaded it be immediately removed from service and the calibration checked.

During the starting routine I saw "CAL" and 0 (or -0) appear on the display. What does this mean?
During the starting routine the tool checks the calibration table against the output from the sensor. This message appears if the two are not in agreement. Most frequently this is a response to an overload of the sensor (and tool) to the point where the sensor has suffered a deformation.

If this occurs the tool should not be used. Have the tool calibrated, and repaired if necessary, before use.

When using the tool with a controller, I got "rAd" and "BAD" on the display. What happened?
For one reason or another (power loss to controller, brownout, interference, etc.) the tool and controller with which it is associated have lost radio communication with each other. The tool attempted repeatedly to send the information with no success and is now notifying you of this.

You can (1) diagnose and correct the problem before assembling any more products with the tool. It may be as simple as restoring power to the box, or something more complex such as determining a new source of interference that has appeared.

You can (2) continue using the tool with the understanding that the settings will remain at the last ones set on the tool by the controller and that data will be lost until communication is re-established.

Or you can (2) turn the tool off, wait 10 seconds, then turn the power back on. If communication with the controller is not established, the tool will operate as described starting on page 10 of this document since it will no longer be associated with a controller. This will let you capture the data from assemblies on which the tool is used, although alternative means will be needed to obtain the data from the tool. These methods are described in the applicable section of this document.