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WORK INSTRUCTION
FOR CDI SURETEST 600TL-2
TORQUE CALIBRATOR

GAM/WI-CDI 600TL-2

ISSUE 1

REVISION 0

GALAXY AEROSPACE SDN. BHD

GalaxyAerospace maintenance repair overhaul	**WORK INSTRUCTION FOR CDI SURETEST 600TL-2**	
	ISSUE NO: 1	REVISION NO: 0

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FRONT MATTERS

RECORDS OF AMENDMENTS

No	Issue No	Revision No	Date Of Amendment	Affected Pages	Detail Of Amendment
1	1	0	01 JULY 2023	ALL	Initial Issue of GAM/WI/CDI

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Supervisor Date: 04 JULY 2023	Workshop In Charge Date: 05 July 2023

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USING THIS WORK INSTRUCTION

This Work Instruction contains instructions for use and setup of the **SURETEST 5000-3** Torque Calibration System. A table of contents and a table of illustrations are provided to make this Work Instruction easy to use.

Some of the information shown in text or illustrations is obtained using optional equipment.

References
All information is referenced to the **SURETEST AND 600TL Model 5000-3 Torque Calibration System User's Manual**.

Equipment Damage
The possibility of damage to vehicles or equipment is introduced by a signal wordindicating this condition.

Example:

IMPORTANT

The connector on single transducer cables contains the EEPROM calibration memory chip. Never attempt to remove the connector from the transducer. It is installed with apermanent adhesive.

Safety Messages

Safety messages are provided to help prevent personal injury and equipment damage. All safety messages are introduced by a signal word indicating the hazard level. The types of safety messages are Danger, Warning and Caution.

DANGER   Indicates an imminently hazardous situation which, if not avoided, willresult in death or serious injury to the operator or to by standers.

WARNING   Indicates a potential hazard which, if not avoided, could result in death or serious injury to the operator or to by standers.

CAUTION   Indicates a potential hazard which, if not avoided, may result in minor ormoderate injury to the operator or to by standers.

The three-part message panel, used with safety messages, uses three different type stylesto further define the potential hazard:
- Normal type states the hazard,
- **Bold** type states how to avoid the hazard, and warning.
- *Italic* type states the possible consequences of not avoiding the hazard.

Some safety messages contain visual symbols with signal

words.Example:

WARNING

Flying particles can discharge when applying torque.
- ***Users and bystanders must wear safety goggles.***
- ***Always wear safety goggles when applying torque.***
Flying particles can cause injury.

SAFETY INFORMATION

Important Safety Instructions

This Work Instruction contains important safety and operating instructions for **CDI *5000-3*** Torque Calibration System. Refer to the information in this Work Instruction often for safe operation.

Read All Instructions

Read, understand, and follow all safety messages and instructions in this Work Instruction and on the test equipment. Safety messages in this section of the Work Instruction contain a signal word, a three-part message.

The signal word indicates the level of hazard in a situation:
- **Danger** indicates an imminently hazardous situation which, if not avoided, will result indeath or serious injury to the operator or bystanders.
- **Warning** indicates a potentially hazardous situation which, if not avoided, could resultin death or serious injury to the operator or bystanders.
- **Caution** indicates a potentially hazardous situation which, if not avoided, may result inmoderate or minor injury to the operator or bystanders.

The three-part message uses three different type styles to further define the potentialhazard.
- Normal type states the hazard.
- **Bold** type states how to avoid the hazard.
- *Italic* type states the possible consequences of not avoiding the hazard.

SAVE THESE INSTRUCTIONS

WARNING

Risk of electric shock and fire.
- For indoor use only. Do not expose the charger to rain or snow. Do not use in damplocations.
- Replace defective cord immediately. Return to qualified service center for replacement. Electric shock or fire can cause injury.

WARNING

Flying particles can discharge when applying torque.
- Users and bystanders must wear safety goggles.
- Always wear safety goggles when applying torque.

- Do not use this equipment with the power off. Always turn on the indicator and loader so the torque and load values are indicated on the display. The safety relays only workwhen the power is on. Flying particles can cause injury.

WARNING

Risk of entanglement.
• When starting power tools, check for obstacles near your hand and anticipate the reaction force by gripping the tool firmly.
• Do not wear loose clothing and jewelry while operating a power tool. Loose clothes and jewelry can be caught in moving parts.
• Keep body parts away from rotating parts.
• Wear a protective hair covering to contain long hair and prevent contact with moving parts.
• Do not overreach. Keep proper footing and balance at all times. Entanglement can cause injury.

WARNING

Improper use can cause breakage.
• Read instructions before operating.
• Follow manufacturer's instructions, safety precautions, and specifications when operating tools. Broken equipment can cause injury.

WARNING

• Make sure all components, including adaptors, extensions, drivers and sockets are rated to match or exceed the torque or load being applied.
• Be sure the capacity of the *5000-3* system matches or exceeds each application before performing a procedure.
• Do not use the *5000-3* system if it makes unusual noises, has loose parts, or shows any other sign of damage. Have repairs performed at a *CDI Service Center* before use.
• Do not use chipped, cracked, or damaged sockets and accessories.
• Do not remove any labels. Replace any damaged label.
• Follow good, professional tool practices:
** *Pull on a wrench handle* ** *do not push* ** and adjust stance to prevent a possible fall.
** *Do not use extensions*, such as a pipe, on a wrench handle.
• When using ratchets, make sure the direction lever is fully engaged in the correct position.
• Never attempt to test an impact tool on this instrument.
• Always position the 40" arm over the front of the stand as shown. Never extend the test arm behind the stand. The stand will tip over when weights are applied.
• Always be alert to the potential for personal injury that may be caused by excessive torque applications, careless handling of heavy weights, and out-of-balance or unsafe weight distribution.

CHAPTER 1

1.1 INTRODUCTION
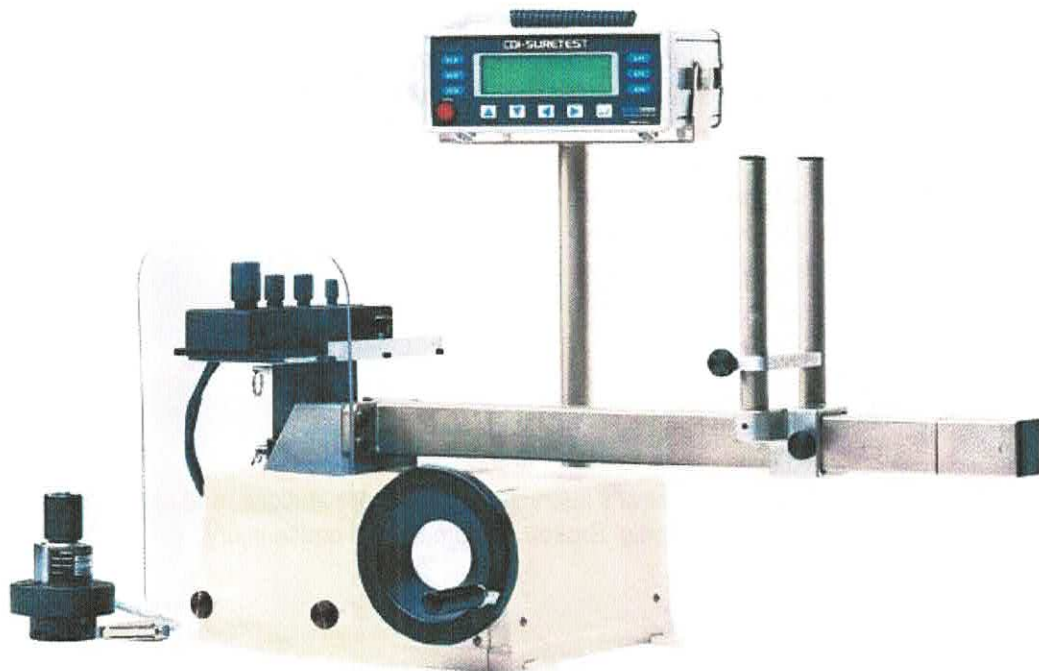
The **SURETEST** is a laboratory grade instrument that providesTORQUE measurements. Although designed as an independent digital indicator, it can also be used in an integrated environment as the principal component of a Torque Calibration System. The **SURETEST** features versatile data acquisition capabilities including measurement storage, retrieval, statistical analysis, and automatic downloading to an external printer/computer. A remote computer COM port is available for PC interfacing.

Used with precision torque transducers, the **SURETEST** provides high speed monitoring of static or dynamic torque inputs. Torque transducers,purchased separately, are available in ranges from 15-200 in.oz, to 200- 2000 ft.lb. and provide system readings with an accuracy of ± 0.25% of indicated value, or better. A special memory chip is built into each torque transducer that identifies its range and maintains its calibration between any other **SURETEST** with an accuracy of ± 0.5%. The **SURETEST** and its transducers may be calibrated by using accessory precision bars and certified weights.

All readout of torque in ft-lb, in-lb, in-oz, Nm, dNm, cNm, mkg as wellas calibration, statistical analysis and set-up functions are reported on a versatile 1.5" x 5.5" graphic dot matrix Liquid Crystal Display (LCD).

Set-up and calibration programming is entered using easy-to-use front panel membrane keys. The number of keys is kept to a minimum. In addition, concise menus and graphic symbols are used to guide the user through all set-ups and operations. HIGH and LOW torque limits are adjustable to give an audible alert. The user selects **TRACK** mode to display torque values as they are applied, **PEAK HOLD** or **POWER TOOL** modes to display the highest torque value applied, or FIRST **PEAK** mode which captures the torque output at the "click" of a set-ablewrench or driver. **CLEAR, STORE** and **SEND** functions can be set up for automatic or manual operation.

The *SURETEST* stores and recalls up to 3000 torque readings and does statistical analysis on them for downloading to printer or computer. The statistical report (print out) includes a simple histogram for process monitoring. True RS-232 serial printer and separate RS-232 computer COM ports are at the back of the unit.

The *SURETEST* operates directly from any AC power line between 100 VAC to 230 VAC, 50–60 Hz without the need for switch selection. A hard-wired lithium battery keeps the internal memory and date-time clock operating for up to 10 years. The real time clock is fully year 2000 compliant.

CHAPTER 2
2.1 FUNCTIONAL, DESCRIPTION AND SPECIFICATIONS

The **CDI 5000-3** is CDI's next generation Torque Measurement System. It provides exceptional accuracy and ease of use. It is packaged in a compact, sturdy and attractive housing unit which requires little room on a laboratory bench. The **SURETEST** is typically used in conjunction with a Transducer and a 600TL bench top Mechanical Loader.
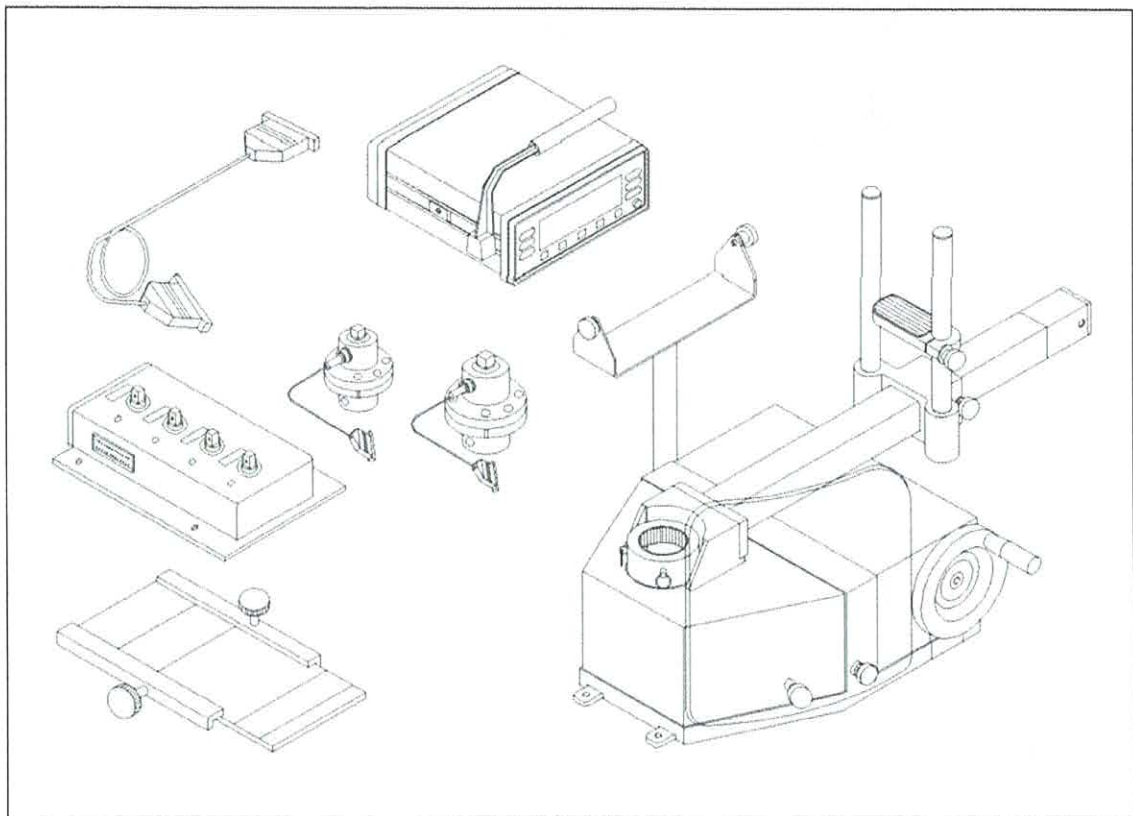
Fig 2-1

Base Unit
The **SURETEST** monitors and displays the torque applied.

Transducer (Accessory)
The loader accepts all **2000** series single transducers directly. Use a 2000-500-02 adapterkit to mount the 2000-400-02 4-in-1 transducer.

Loader

Use the 600TL Manual Loader for testing and calibrating all torque wrenches, drivers, torque multipliers, non-impact pneumatic and electric nut runners. Loader components are:

- Safety Shield
- Hand Crank
- Transducer Mounting

SURETEST BASE UNIT
Front Panel

Figure 2-2   SURETEST Front Panel

A- **Membrane Function** (F1, F2, F3, F4, F5, F6), soft keys,
   and **Cursor/Selection** (Up (↑), Down (↓), Left (←), Right (→) and Enter (↵) Keys.

B- **Soft Key Menu**: Zero, # Data Stored, Setup, Send, Store, Clear, Escape, Format.

C- **Real Time Clock.** HH:MM: SS

D- **Modes:** Track, Peak Hold, First Peak and Power tools.

E- **Maximum Range** of Transducer.

F- **Engineering Units:** Nm, dNm, Ncm, mkg, cmkg, ft. lb., in. lb., in.oz

G- **Power:** On/Off

H- **Bar Graph:** Each dot represents 10% of transducer full scale.

I- **Torque Reading:** Full 5-digit reading Plus Sign (for direction)

Display

A 240 x 64 Full-featured Graphic LCD is used to provide versatile and clear displays of system menus as well as measurements. Characters and symbols are displayed in different fonts:
- Maximum transducer range in the selected UNITS of measure.
- The number of the present data memory location.

Front Panel Membrane Cursor and Function Keys

The *SURETEST* is supported by a powerful Graphic User Interface (GUI). Set up, Command, or Control is done by selecting the appropriate Action Item on one of the provided Menus. Front Panel Membrane Cursor and Functions keys are defined to guide the User in selecting an Action Item.

There are 6 function (soft) keys: **F1** through **F6**. Their respective uses are clearly indicated on the LCD.

To select an Action Item, the User simply presses a Function Key (F1-F6) to get to a Menu, uses a Cursor Key to move to the Item, then hits 'ENTER'.

In addition to the **'ENTER'** key, there are 4 Cursor Keys: **Up** (↑), **Down** (↓), **Left** (←), **Right** (→). The GUI also provides Prompts to further assist the user in navigating the Menus.

Power Up Sequence

Upon power up, the *SURETEST* automatically performs Self-tests and displays the results. Any detected non-functional hardware will be reported on the LCD. If a **4-in-1** transducer is connected, the *SURETEST* performs ZEROTARE, then displays the following default menu while continuously checking for any activity from an input transducer:


```
Data    Select      50.000in-lb 5/5
                    400.00in-lb 5/5
                    1000.0in-lb 5/5
Setup   TRANSDUCER  3000.0in-lb 5/5

        Checking transducer 4
```

The user can either press F1 to display previously collected data (if any) or enter Setup Mode, F2. Any detected torque measurement will cause the *SURETEST* to enter Measurements mode where the following menu is displayed:

```
Zero  00:10:00    26.000 - 30.000
      1.PEAK Max 50.00in-lb
Data
0059    00.000
Setup
```

The **SURETEST** returns to the default menu from the measurements mode in the event there is no selection / Input by the User for more than two minutes. This serves as a reminder for more (input) measurements.

Setup Mode
The following Selections are available:

1. SELECT MODE
2. SELECT UNIT
3. SELECT LANGUAGE
4. MANUFACTURER'S DEFAULTS
5. AUTO SETTINGS
6. EDIT LIMITS
7. CLOCK ADJUST
8. CALIBRATION
9. EDIT PARAMETERS
10. INTERNAL DIAGNOSTIC
11. ABOUT

```
Escape        Select mode
              Select unit
   Setup      Select language
              Manufact. defaults
              Auto settings
              Edit limits
Use ↑ ↓ to scroll,        ↵to accept
```

1. Select Mode

```
Escape         TRACK
               PEAK
   Select mode 1.PEAK
               POWER
Use ↑ ↓ to scroll,     ↵to accept
```
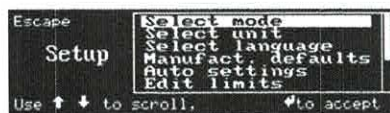
Selects either TRACK, PEAK HOLD, FIRST PEAK, or POWER mode.

- TRACK: continually makes Torque Measurements.
- PEAK   : makes Torque Measurement at the Highest Peak.
- 1.PEAK: makes Torque Measurement at the First Peak.
- POWER: makes Torque Measurement at the Highest Peak at a faster rate.

2. **Select Unit**
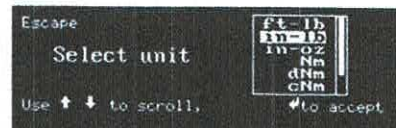
Selects the following Torque **units** on LCD

Display: Nm, dNm, cNm, mkg, cmkg, ft. lb., in. lb.,

in. oz.

3. **Select Language**

Selects either English, German (Deutsch), French (François), Spanish (Española).

4. **Manufacturer's Defaults:**

Default: Min. Track 0.1%; Min. Peak 1%.

A warning message is first displayed. Upon confirmation by the User, the Default

Settings will be loaded into the **SURETEST**.

5. Auto Settings

Sets up CLEAR, STORE, and SEND functions. There are 2 options: Automatic or Manual.

Selection: Automatic Clear, Automatic Store and Automatic Send data out (to RS-232 port). Selection:

Delay 9 seconds then clear the Display, Manual Store and Manual Send.

Selection: Automatic Clear, Automatic Store and Manual Send.
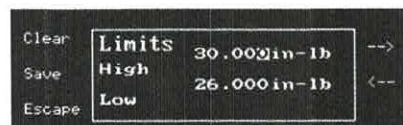
Edit Limits

Sets up high torque limit preset. (-->) (F4) to go Down 1 line. Sets
up low torque limit preset. (<--) (F5) to go Up 1 line.
Use Up or Down cursor key to increment or decrement the respective
value. Use Left (←) or Right (→) cursor key to select digit.
Press 'Save' (F2) to activate the change. Press 'Clear" (F1) to Clear All Limit set-up. Press 'Escape' (F3)
to Exit. Last setup is retained.

6. **Clock Adjust**

Edits DATE/TIME programming function.

To adjust the Clock, use Left (←) or Right (→) cursor key to get to Day, Month, Year, Hour, Minute, or Second field. Then use Up (↑), Down (↓), cursor key to increment or decrement the respective value.
Press and hold the cursor key to change the value quickly.
Press 'ENTER' to activate the change.
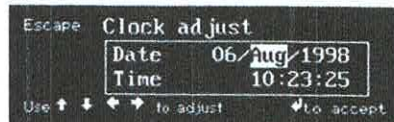
7. **Calibration**

This enables the User to perform calibration of the *SURETEST* base unit and

transducers.(Refer to chapter 5).

8. **Edit Parameters**
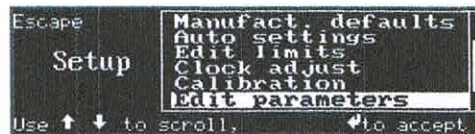
Sets up serial communications protocol.
Sets delay (in ms) per character upon
printing.Sets delay (in ms) per Linefeed.
Minimum block-out with zero at 0.1% F.S. in Tracking Mode.
Minimum block-out with zero at 1.0% F.S. in Peak-Hold Mode.

9. Internal Diagnostic

For Manufacturer's use only.

10. About
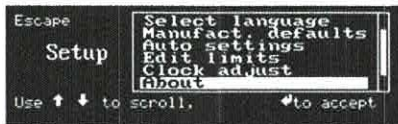
This provides relevant information regarding the Manufacturer, the software version, and the serialnumber of the *SURETEST* device.

11. Other Features:

Provides manual **ZERO TARE.**
Stores present measurement to memory (Data 0001 in the example below).

Sets up memory clear options in RECALL mode. Recalls memory data to display.
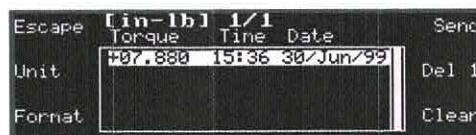
Format (F3) calls Statistical analysis to display.
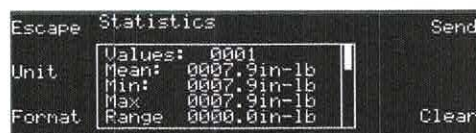
Send (F4). Send data to printer.
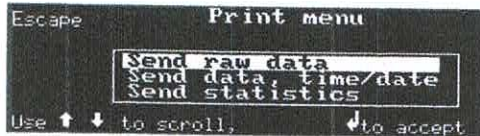
Sends all memory data, statistical analysis, and histogram to printer port. Sends data list with or without date-time stamp to computer / printer.

Manually clears display in PEAK, FIRST PEAK, POWER TOOL modes.

SURETEST BASE UNIT
Rear Panel (Input/Output)
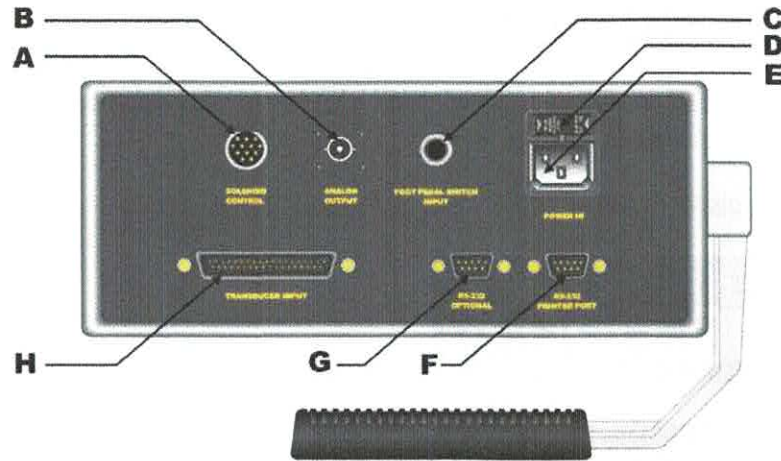
Figure 2-3 SURETEST Rear Panel

A - **Solenoid Control** (Hirose RM15TRD-12S)
(for use with optional 2000-600-02 Loaders)

PIN	FUNCTION
10	Loader Relay Common
11	Loader Relay CCW Limit
12	Loader Relay CW Limit

B - **Analog Output (BNC)**

Analog output provides a voltage level output that is directly proportional to transducer input, from -1.8V (full scale counterclockwise) to +1.8V (full scale clockwise). Zero offset +/-100 mV. Linearity +/-1% of reading. Maximum load = 5 mA.

When using the 4-in-1 transducer, zero output fluctuates until one of the transducers is scan selected by applying 5% of full-scale torque.

C - **Foot Pedal Switch Input**
(Used to send output to printer)

D - **Fuse Holder**
Use AC fuse at specified rating only. (3.15 Amp).

E - **Input AC Voltage**
Automatic Selection of any AC voltage from 100VAC to 230VAC, 50-60 Hz, 50 W.

F-   PRINTER PORT (DB-9P)

PIN   FUNCTION
2   Receive
3   Transmit
5   Ground

G-   OPTIONAL (DB-9P)

PIN   FUNCTION
2   Receive
3   Transmit
5   Ground

H-   TRANSDUCER INPUT (DB-37S)

PIN   FUNCTION
1   not used
2   ground
3   smart chip - bit 2
4   smart chip - bit 0
5   single xducer (-) signal
6   single xducer (+) signal
7   ground
8   4-in-1 xducer (-) signal 2
9   4-in-1 xducer (+) signal 2
10   ground
11   4-in-1 xducer (-) signal 4
12   4-in-1 xducer (+) signal 4
13   4-in-1 xducer LED 2
14   4-in-1 xducer LED 4
15   loader relay CW limit
16   not used
17   not used
18   ground
19   bridge excitation (+3V)
20   not used
21   smart chip - bit 3
22   smart chip - bit 1
23   ground
24   ground
25   4-in-1 xducer (-) signal 1
26   4-in-1 xducer (+) signal 1
27   ground
28   4-in-1 xducer (-) signal 3
29   4-in-1 xducer (+) signal 3
30   no transducer
31   4-in-1 xducer LED 1
32   4-in-1 xducer LED 3

33   loader relay CCW limit
34   loader relay common
35   Vcc (+5V@100 ma. max)
36   ground
37   bridge excitation (+3V)

SURETEST Transducers

SURETEST transducers provide industry standard square drives. They feature a fullbridge strain-gauge @ 350 Ohms nominal. Full range output is 1500 uE, 9mV (3mV/V @ 3.0V excitation).

Torque transducers use a built-in EEPROM memory chip that stores range identification and calibration factors. Calibration of transducers is accomplished using precision torquebars and certified weights. After a transducer is calibrated, it provides ±0.5% system accuracy with any *SURETEST* System. If the transducer and *SURETEST* are calibrated together, the system accuracyincreases to ±0.25%.

Transducer Dimensions/Transducer Torque Range
(Refer to table on page 24).

Display Resolution for Transducers

Calibration also results in a specified display resolution on the *SURETEST*. Display resolution is dependent on the type of transducer being used. Display resolutions for the specified transducer are shown on page 25.

SURETEST torque transducers can withstand an overload of 110% of full range.
The *SURETEST* alarms, (audible beep and display "OVER") at 110% of rated capacity.
To protect the tool under test or to serve as a fastener installation torque preset alert, the *SURETEST* produces a constant audible tone when the input torque exceeds the SET LOW limit. It then produces a pulsating tone when the input torque exceeds the SET HIGH limit.
The *SURETEST* Base Unit ignores inputs less than 0.1% of full range in TRACK mode,1% in PEAK HOLD mode, 7% in FIRST PEAK and POWER TOOL modes.
With the 4-in-1 transducers, the *SURETEST* System ignores inputs less than 1% of full range after scan select.

Specifications
SURETEST TORQUE CALIBRATION SYSTEM Specifications

System Accuracy

±0.25% of reading @ 25°C with *SURETEST* Base Unit and transducer calibrated together. (*SURETEST* Transducers used with, but not calibrated to, another *SURETEST* Base Unit provide asystem accuracy of ±0.5% of reading @ 25°C.
Temperature Drift +0.03%/°C (+0.017%/°F).

Display

5.5" X 1.5" backlighted LCD graphics display, 240x64 dot matrix., 0.67" torque digits character height.

Display Capacity

16-bit A/D, 5 digits ±32,000 counts. Sample rate, 2000 sample/sec., display rate 5 updates/sec. Refer to transducer range & resolution charts on page 24 and 25.

Language Select

English, German, French and Spanish.

Bar Graph

Zero to transducer full-scale. Resolution, 10 major divisions, 100 minor divisions.

Units of measure

Ft. lb., in. lb., in. oz., Nm, dNm, cNm, mkg, cmkg.
(Refer to transducer range and resolutions charts on pages 24 and 25.

Measurement Modes

Track, Peak Hold, First Peak, Power Tool.

Keypad

Sealed membrane keypad with audible feedback featuring "Softkey" user interface.
Features: Zero tare; Mode, Units and Language select; High and Low limits setup; Auto Store,Clear and Send select; Clock adjust; Calibration; and RS232 programming.

Data Storage/Recall with Date-Time Stamp.

3,000 measurements
Remote contact, (optional foot pedal) manual send to printer.

Statistical Analysis

Max, Min, Range, Mean, Sigma N, Sigma, Cp, Cpk, %Error, Go, Nogo, Printout Histogram.

Serial Output Ports

Printer, RS232 True, 300-19.2k Baud, 8 data bit, 1 stop bit, no parity, (default 9600 Baud).
Optional Computer COM port, as above, (default 19.2k Baud).

Analog Output

+(CW), -(CCW) 1.8V at transducer full range. Linearity ±1% of reading, ±100mV zero offset.

Loader Control Relays

Two, normally open, from rated 12VDC@1/2A close contact at 110% CW or CCW of torque transducer range, and release at 105% (open contact). (For use with optional 2000 600 Manual Loader)

Power Requirements

100-230 VAC, 50-60 HZ, 50 W, automatic voltage selection. Fused at 3.15 A.

Environmental

Operating Temperature: 10-32°C, (50 to 90°F) Storage
Temperature: -20-50°C, (-2 to 122°F)
Temperature Drift: +0.011%/°C, (0.006%/°F)
Humidity: up to 85% non-condensing

Weight

8.4 lbs.

Dimensions

11.0" Wide, 4.5" High, 13.0" Deep with handle/bail

TRANSDUCER

Specifications Accuracy

±0.2% of reading @ 25°C, within specified range, when used as prescribed with the 600TL.

RANGE AND DIMENSIONS		
STOCK No.	TORQUE RANGE	DRIVE
2000-12-02	60-600 ft.lb.	¾" Ext
2000-400-02	4-50 in.lb.	¼ "Ext
4 –in- 1	30-400 in.lb.	3/8" Ext.
	80-1000 in.lb.	3/8" Ext.
	20-250 ft.lb.	½" Ext.

Environmental

Operating Temperature: 10-32°C, (50 to 90°F)
Storage Temperature: -20-50°C, (-2 to 122°F)
Temperature Drift: +0.02%/°C, (0.011%/°F)
Humidity: up to 90% non-condensing

25

SURETEST Transducer/Display Resolution								
	mkg	cmkg	ft. lb.	in. lb.	in. oz.	Nm	dNm	cNm
2000-4-02	.00001	.0007	.00005	.0006	.01	.00007	.0007	.007
2000-5-02	.00003	.003	.0002	.002	.04	.0003	.003	.03
2000-6-02	.0001	.01	.0008	.01	.2	.0011	.011	.11
2000-65-02	.0003	.03	.002	.03	.5	.003	.03	.3
2000-7-02	.001	.1	.006	.08	1.2	.009	.09	.9
2000-8-02	.002	.2	.016	.2	3.2	.02	.2	2
2000-10-02	.004	.4	.03	.3	5	.03	.3	3
2000-11-02	.007	.7	.05	.6	10	.07	.7	7
2000-12-02	.016	1.6	.12	1.4	n/a	.16	1.6	16
2000-13-02	.03	3	.2	3	n/a	.3	2.7	n/a
2000-14-02	.05	5	.4	5	n/a	.5	5	n/a
2000-400-02	.0001	.01	.0008	.01	.2	.001	.03	.3
	.001	.1	.006	.08	1.2	.009	.09	.9
	.002	.2	.016	.2	3.2	.02	.2	2
	.007	.7	.05	.6	10	.07	.7	7

600TL Loader

Specifications Input

torque (Hand crank)
    6 ft. lb. maximum

Output torque
    600 ft. lb.
    maximum 30°
    Rotation

Dimensions
    48.1" wide (with deflection beam fully extended), 26" high (with SURETEST on bracket),
    29" deep (from crank handle open with SURETEST on bracket)

Weight
    65 lbs.

Optional Calibration Fixturing (load arms and weights)
    ±0.05% accuracy

CHAPTER 3

3.1 SETUP AND PROGRAMMING
CDI 5000-3 TORQUE CALIBRATION SYSTEM SETUP
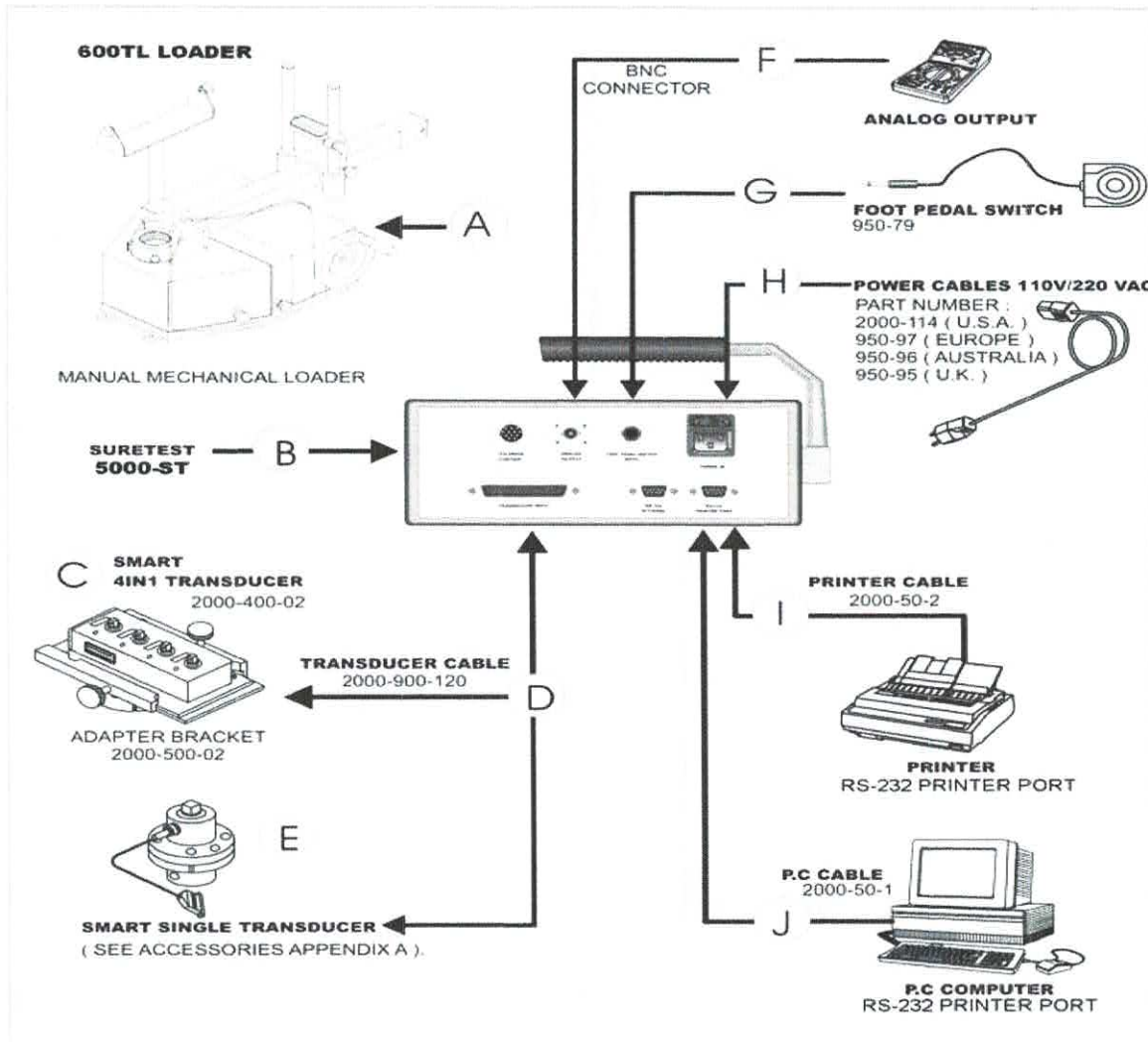
Figure 3-1: CDI 5000-3 Torque Tester/Calibrator/Loader Setup

Back panel connections

A	600TL Manual Loader	F	Analog Output
B	*SURETEST* Base unit	G	Foot pedal switch
C	Smart 4-in-1 Transducer & Bracket adaptor	H	Power cables (100/230 VAC)
D	Transducer cable	I	Printer cable
E	Smart Single Transducer	J	Personal computer cable

Note: Cable (J) is connected to the Optional Port for software upgrades only.
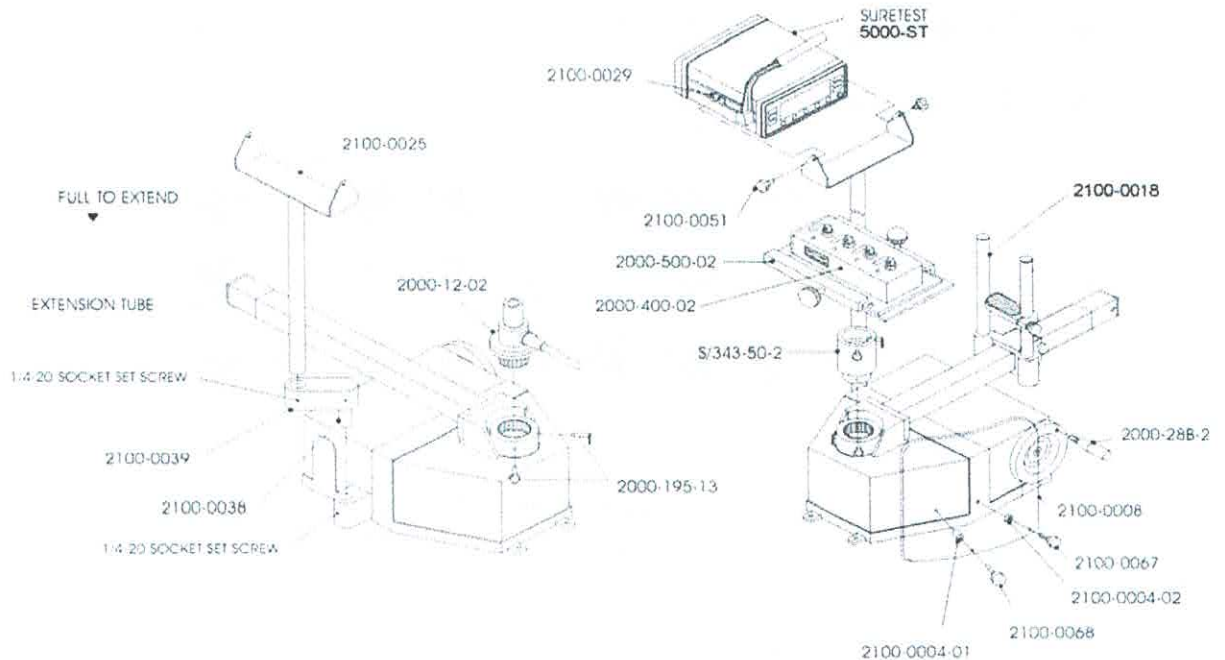
Figure 3-2: Setting Up the CDI 600TL-2 System

Figure 3-3: Setting Up the CDI 5000-3 Torque Calibration System

Setting Up the *CDI 5000-3* Torque Calibration System

1. Bolt the loader to a sturdy location.
2. Install Pivot tube, Extension arm and Bracket. Adjust to desired position then lock using three set screws shown on Fig. 3-2.
3. Install the SURETEST unit to the bracket and lock the unit using the two side knobs.
4. Install slide assembly (2100-0018), then lock using the side knobs as shown on Fig. 3-3.
5. Install the appropriate transducer or standoff (for 4-in-1) to the loader drive.
6. Install two quick release pins, part number 2000-195-13.
7. For 4-in-1 unit, install 4-in-1 bracket (2000-500-02) to the standoff as shown of Fig. 3-3 and insert two quick release pins (2000-195-13). Slide 4-in-1 (2000-400-02) on the bracket and align the selected transducer over the loader drive. Tighten the left knob first, then the top knob.

    Note: To use the two small transducers, remove the 4-in-1, rotate 180 degrees, and reinsert.

8. Connect the transducer cable, part number 2000-900-120, between the SURETEST and transducer.
9. Install the safety shield to the front of the 600TL.
10. Pull Extension tube (to test wrench with extension) as shown on Fig. 3-2 until lock pins snap.

For testing procedures refer to Chapter 4—Using the Torque Tester.

SURETEST Base Unit Controls

Refer to the illustration below when performing the power-up and programming procedures.

Figure 3-4: SURETEST Controls

- – *SURETEST* Graphic Display
- – Power Switch
- – Front Panel Membrane Function Keys

Powering the Equipment

To power the equipment, press the power button on the front of the *SURETEST*.

- At POWER ON, the *SURETEST* performs a self-test and momentarily displays the results on the display.

- With no transducer installed, the display then reads:

- When applying power with the transducer connected, or when connecting a transducer while the power is on, the display momentarily reads:

Zero tare prompt

4- in-1 Transducer Installation

When a 4-in-1 transducer is installed, the following is displayed:
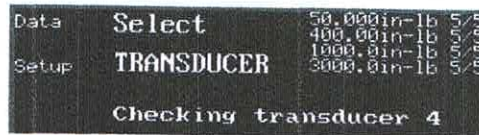
The Engineering Unit are in. lb.
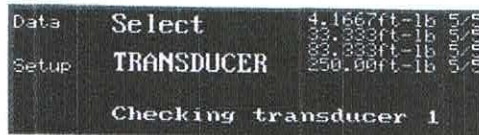
The Engineering Unit are ft. lb.

All four transducers are scanned as indicated by their associated red LED indicators. To select one of the transducers, apply at least 5% of its full range torque. To return to the scan mode, press ENTER (↵). The number of successful calibration checkpoints, (CCW, CW) is shown at the top right for each transducer. Once selected, the display reads as show below.

NOTE: **To return to the scan mode, press ENTER (↵).**

Single Transducer Installation:

When a single transducer is installed, the following is displayed:

The user can enter Setup mode then proceed to make torque measurements.

Setup Programming

Setting up Date and Time

1. Press (**Setup**).

```
Escape          Select language
                Manufact. defaults
      Setup     Auto settings
                Edit limits
                Clock adjust
                Calibration
Use ↑ ↓ to scroll,          ↵to accept
```

2. Scroll Down (↓) to select **Clock Adjust**. Press **Enter** (↵).
   The display reads:

```
Escape   Clock adjust
         Date       06/Aug/1998
         Time         10:23:25
Use ↑ ↓ ← → to adjust        ↵to accept
```
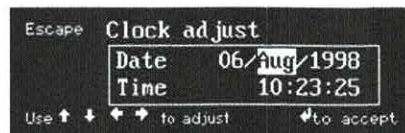
3. Use Left (←) or Right (→) (Up (↑) or Down (↓) Cursor to select (reverse video)the date/time element to be changed.

4. Increment or decrement the date/time element by repeatedly pushing Up (↑) or Down (↓) cursor. Push and hold Up (↑) or Down (↓) cursor to change the display quickly.
   (Day to month to year and seconds to minutes to hours will roll over but not back)

5. Press ENTER (↵) to update date and time and to return to measurements mode.

Setting Up High and Low Limits Alert

Use HIGH and LOW Limits Alert to protect the tool under test or serve as a fastener installation torque preset alert. The **SURETEST** produces a constant audible tone when the input torque exceeds the LOW limit. It then produces a pulsating tone when the inputtorque exceeds the HIGH limit.

It is necessary to program these limits if statistical analysis is to draw a histogram, whichincludes reporting out-of-limit parameters.

Changing transducers does not automatically change HIGH and LOW limits.

Setting High or Low Torque Limits

1. Press (**Setup**).
2. Scroll Down (↓) to select Edit limits.

The display reads:

```
Escape    Select mode
          Select unit
Setup     Select language
          Manufact. defaults
          Auto settings
          Edit limits

Use ↑ ↓ to scroll,        ↵to accept
```

3. Press **Enter** (↵). The display reads:
4. Press --> (F5) or <-- (F6) to select High or Low limit.

```
Clear    Limits
Save     High    030.00in-lb    -->
Escape   Low     026.00in-lb    <--
```

5. Use Left (←) or Right (→) Cursor to select a digit to be changed.

6. Increment or decrement the selected digit by pushing Up (↑) or Down (↓) cursor.Push and hold Up (↑) or Down (↓) Cursor to change the display quickly.

7. Select and change the next digit using Left (←) and Right (→) DIGIT and Up (↑) or Down (↓) cursor, respectively. Continue until all digits are set.

8. Press (Save) to save and to return to measurements mode.

```
Zero    09:09:48   026.00 - 030.00
        1.PEAK Max 400.0in-lb
Data
0010     000.00
Setup
```

Set-up AUTO Settings

Use **AUTO** Settings to program the **CLEAR**, **STORE** and **SEND** functions for automatic or manual operation. Use these functions in **PEAK HOLD, POWER TOOL** and **FIRST PEAK** modes to **STORE** torque measurements to memory, **CLEAR** the display, and **SEND** the last measurement captured on the display to the printer or PC. Auto **STORE** and **SEND** are initiated at either auto or delayed **CLEAR** operations.

Use the manual modes to:
- Store the present reading by pushing **STORE,** (F5) in all measurement's modes.
- Clear a captured display by pushing **CLEAR,** (F6) in measurements modes.
- Send a measurement to the printer/port by pushing **SEND,** (F4) in Measurements modes.

Use the automatic modes to:

- Store the last measurement, and/or
- Send the last measurement to the printer/port by initiating the auto or delayed function.
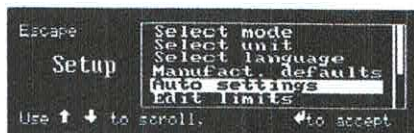
Auto **CLEAR** can be programmed with a 1 to 9 second delay. Use this feature to visuallynote the reading before the display clears. Auto **CLEAR** with no delay stores, prints and/or clears with no delay at the initiation of the next torque input.

STORE (F5) *must be pressed manually to save the last reading. Auto* **CLEAR** *must beselected to use auto* **STORE** *and auto* **SEND.**

To Program AUTO CLEAR, STORE, or SEND:

1. Press **(Setup)**.
2. Scroll Down (↓) to select **Auto settings**.

The display reads:

```
Escape          Select mode
                Select unit
     Setup      Select language
                Manufact. defaults
                Auto settings
                Edit limits
Use ↑ ↓ to scroll.        ↵to accept
```

3. Press **Enter** (↵). The display reads:

```
Auto settings

CLEAR STORE SEND
*auto *auto *auto
```

4. Use Right (→) and Left (←) Cursor to position the reverse-video characters underthe function being changed. To program:

   CLEAR, press Up (↑) or Down (↓) cursor to select "**man**" (manual clear), "**auto**"(automatic), or (delayed automatic) from "**1 Sec**" to "**9 Sec**" seconds.
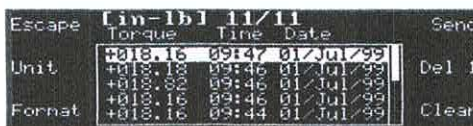
   STORE, press Up (↑) or Down (↓) cursor to select "**man**" (manual) or "**auto**" (automatic).

   SEND, press Up (↑) or Down (↓) cursor to select "**man**" (manual) or "**auto**" (automatic).

5. Press **ENTER** (↵) to save '**Auto settings**' and to return to measurements mode.

DATA LIST Memory

When changing sensors, or when creating a new statistical data list, the data list memory must be cleared. The entire memory list or any single memory location may be selectively cleared. Clearing from the top of the list decrements the total number of memory locations. Clearing from inside the list shifts all subsequently taken readings down from that location and decrements the total number of memory locations.

```
Escape   [in-lb] 11/11              Send
         Torque   Time  Date
         +018.16  09:47 01/Jul/99
Unit     +018.18  09:46 01/Jul/99    Del 1
         +018.82  09:46 01/Jul/99
         +018.16  09:46 01/Jul/99
Format   +018.16  09:44 01/Jul/99    Clear
```

Clear Single Memory Location

Use the procedure in this section to clear a single memory location.

1. Press **(Data)** (F1) to enter data list display. The display reads:

2. The units and present memory location are given on the top line. The total numberof memory locations are to the right -- separated by a forward slash (/). The bar graph to the right of the data list indicates how far in the list the current data display is positioned. Use the Up (↑) or Down (↓) Cursor to select data.

+018.82 in.lb., Time: 09:46 Date: July 01, 1999; Location 9 of 11

3. Press **(DEL 1)** (F5) to delete one data entry (reverse video).
   The display automatically updates, (decrements by one) the total memory locationson the top line.

Clear All Memory Locations

Use the same above procedure for single memory location. Press **(Clear)** (F6) to **clear all** memory locations. The following warning appears:

Select "**Yes**" to clear all memory.
An audible alarm sounds momentarily. The *SURETEST* automatically returns to measurements mode.

Setting Up Printer Port

The *SURETEST* is equipped with two RS-232 serial communications ports for use withan external printer or personal computer. The transfer rate is programmable (for printer port only) from 300 to 19.2K baud rate with 8 data bits, 1 stop bit and no parity. The recommended default is 19200 baud for Optional Port and 9600 for Serial Printer.
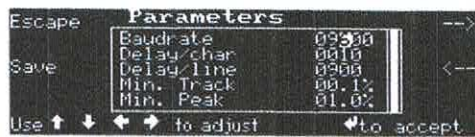
Communication setup as: (300 – 19200), 8 Data bits, 1 Stop Bit, No Parity

Connect the Printer port to a computer or printer. All (serial) communications will takeplace under User's command(s) Edit Parameters set-up mode.

1. Press **Setup**

2. Scroll Down (↓) to select Edit Parameters
3. Press **Enter** (↵) the display read:

4. Press --> (F4) and <-- (F5) keys to select parameter to change.
5. Use Left (←) and Right (→) cursors to select digit to change.
6. Use Up (↑) or Down (↓) cursors to increment or decrement digit.
7. Press Enter (↵) to accept changes and return to measurements mode.

			WORK INSTRUCTION FOR CDI TORQUE CALIBRATOR

Galaxy Aerospace
maintenance . repair . overhaul

**WORK INSTRUCTION FOR
CDI TORQUE CALIBRATOR**

ISSUE NO:	1	REVISION NO:	0

CHAPTER 4

4.1 *CDI 5000-3* TORQUE CALIBRATION SYSTEM SETUP

This chapter contains information on how to test, measure, and use the *CDI 5000-3* Torque Calibration System.

Testing Torque Wrenches and Drivers

To use the *CDI 5000-3* Torque Calibration System for torque wrench testing, a transducer of the appropriate range is fitted to the 600TL Manual Loader.
The Loader provides a stop that holds the torque wrench handle fixed and rotates the transducer under the wrench drive. The system applies a precise, monitored torque to the wrench. For additional information refer to Chapter 6, 600TL Manual Loader.

Selecting a Transducer

When selecting a transducer, choose a single transducer that covers the low to high-end capacity of the torque wrench. Although possible, it is best not to change transducers between calibration checkpoints. For example: to test or calibrate a 20 to 100 ft.lb. wrench, use the **2000-10-02** transducer, which covers the range between 10 and 125 ft. lb.

Installing a Transducer

Install the transducer by lining up the red mark with the "**TORQUE**" label on the loader.For additional information refer to 600TL Manual Loader.

• When changing or replacing transducers, adjust **HIGH** and **LOW** limits to remain within the capacity of the tool under test. For additional information refer to *Chapter 3* Setting Up High and Low Limits Alert.

• If you must retain the statistical analysis, do not change **HIGH** and **LOW** limits after changing the transducers and be careful not to exceed the wrench capacity.

The procedures provided in this manual are general. You may use or establish your own testing procedures, techniques or standards.

Dial and Bending Beam Torque Wrenches and Screwdrivers

Be sure the **SURETEST** transducer is capable of handling the intended torque to avoid damaging the transducer.

WARNING

Do not use this equipment with the power off. Always turn on the Base Unit so thetorque values are indicated on the display.

1. To program the **SURETEST** Base Unit refer to Chapter 3 **Set Up** and **Programming** touse **HIGH** and **LOW** limit alert, data **STORE**, display **CLEAR**, printer **SEND** and Statistical analysis features.

2. Press Setup then **Select Unit** to select the desired engineering unit of measure on thedisplay. It is easiest to match that of the tool under test.

3. Press Setup then Select **Mode** to select **TRACK** mode.

4. Install the tool onto the torque transducer-loader. Slowly apply clockwise (CW) torque using the Loader crank handle until the indicator displays the full-scale torque for the tool. Release the torque and repeat twice again to exercise the tool and the transducer.
    When applying torque by hand, make sure to hold the drive end of the tool perfectly inline with the transducer drive to minimize side loading errors.

5. Remove the tool from the transducer-loader and press **Zerotare**.

6. Press **Setup** then **Select Mode** to select **PEAK HOLD** mode.

7. Reinstall the tool and slowly apply CW torque to the first checkpoint or calibration point recommended by the manufacturer. If the point is not specified, use the desired working torque or about 70% of full scale.

8. Read the tool display. The percentage difference between the **SURETEST** and tool readings should not be greater than the sum of their respective accuracies.

Example:

When tool accuracy is 4% and **SURETEST** System accuracy is 0.25%, readings shouldbe within ±4.25%.

9. Release the torque, **CLEAR** the display, and reapply torque for each of the remaining check points recommended by the tool manufacturer. If no recommendation is available, check at 20%, 40%, 60%, 80% and 100% of the tool's full scale.

10. Repeat steps 4 through 9 in the counterclockwise (CCW) direction.

Adjustable or Preset "Click" Wrenches and Screwdrivers

WARNING

Be sure the **SURETEST** transducer is capable of handling the intended torque to avoid damaging the transducer.

Do not use this equipment with the power off. Always turn on the Base Unit so the torque values are indicated on the display.

1. To program the **SURETEST** Base Unit refer to Chapter 3–Set Up and Programming to use **HIGH** and **LOW** limit alert, data **STORE**, display **CLEAR**, printer **SEND** and Statistical analysis features.

2. Press Setup (F3) then **Select Unit** to select the desired engineering unit of measure as displayed on the display. It is easiest to match that of the tool under test.

3. Press Setup Select **Mode** to select **TRACK** mode.

4. Adjust the tool for maximum "click" setting. Install the tool on the torque transducer-loader. Slowly apply torque using the loader crank handle until the tool clicks or the **SURETEST** displays 100% of the full-scale capacity for the tool. Release the torque and repeat twice again to exercise the tool and the transducer.

   When applying torque by hand, make sure to hold the drive end of the tool perfectly inline with the transducer drive to minimize side loading errors.

5. Remove the tool from the transducer-loader and press **Zero tare**.

6. Press **Setup** then **MODE** to select **FIRST PEAK** mode.

   When testing "**click**" screwdrivers, it may be easier to use the **PEAK HOLD** mode on the **SURETEST** to capture the maximum applied torque reading.

7. If featured, adjust the micrometer or preset knob on the tool to the first check point recommended by the manufacturer, or the desired working torque, or approximately 70% of its full-scale torque.

8. Reinstall the tool and apply torque until the wrench "clicks."

9. Release the torque and note the **FIRST PEAK or PEAK HOLD** reading. The percentage difference between the **SURETEST** reading and tool setting should not be greater than the sum of their respective accuracies.

Example:

When the tool accuracy is 4%, and the **SURETEST** accuracy is 0.25%, then readings should be within ±4.25%.).

10.   **CLEAR** the display and reapply torque for each of the remaining checkpoints recommended by the tool manufacturer. If no recommendation is available, test at minimum torque, 60% and 100% of full scale.

11.   Repeat steps 4 through 10 in the opposite direction, if required.

Statistical Analysis

The **SURETEST** Base Unit accumulates torque measurements in a data list. The list is created with each auto or manual data store entry. Statistical analysis is calculated on the list and, if HIGH and LOW limits are established, draws a simple histogram of the results. These features are very useful in statistical process control (SPC) management. Statistical analysis can be previewed on the display or sent directly to a printer/computer port. For additional information on setting up printer or PC ports, refer to Chapter 3—Set Up and Programming in this manual.

Displaying Statistical Analysis

1. Press **Data** (F1) select Transducer screen (F2) from measurements mode. Then **Format** (F3).

2. Repeatedly press **Up** or **Down** Cursor Key to scroll through the display as shown the example below:

```
Value:  0009
              Mean:    07.559 in-lb
              Min:     06.768 in-lb
              Max:     08.206 in-lb
              Range:   01.437 in-lb
              SigmaN 00.526 in-lb

              Sigma    00.558 in-lb
              Cp:      0.3287
              Cpk      0.2636
              %Err     33.333%
              -NoGo    1
              +NoGo    2
```
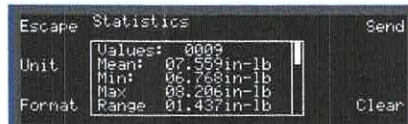
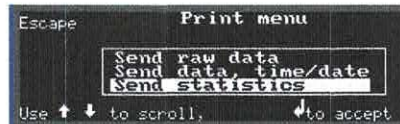*Figure 4-2: Statistical Analysis Display*

3. Press **Escape** (F1) to return to measurements mode.

Note: *The histogram is only available through the printer/computer port.*

Printing Statistical Analysis

1. Press **Data** (F1) in select Transducer screen or (F2) in measurements mode.then Press **Format** (F3).

2. Press **Send** (F4) to display the Print out menu.

Use Down (↓) key to select **Send Statistics** then press **Enter** (↵) to Print.See example printout below.

3. Press **Escape** (F1) to return to measurements mode.

SPC PRINT-OUT

```
SPC listing
─────────────────────

PART NO.
─────────────────────

NAME
─────────────────────


STATISTICAL ANALYSIS
Time : 16/Nov/1998 14:23
  ** LIMIT DATA **
Set High: 254.85 in-lb
Set Low : 251.55 in-lb

 0001 254.45 in-lb
 0002 253.91 in-lb
H0003 254.89 in-lb
 0004 252.89 in-lb
 0005 253.42 in-lb
 0006 253.31 in-lb
 0007 252.40 in-lb
 0008 252.49 in-lb
 0009 252.61 in-lb
L0010 251.49 in-lb
```

```
** R E S U L T **
Data  : 0010
Max   : 254.89 in-lb
Min   : 251.49 in-lb
Range : 3.4039 in-lb
Mean  : 253.19 in-lb
Sig.n : 0.9755 in-lb
Sigma : 1.0283 in-lb
Cp    : 0.5348
Cpk   : 0.5317

%Err. : 20.000%
-NoGo : 0001
+NoGo : 0001
   H I S T O G R A M
LSL :251.55 in-lb
USL :254.85 in-lb
DIV :    10

-NG0001:X
LSL   ----------------------.
 A 0000:
 B 0000:
 C 0002:XX
 D 0001:X
 E 0001:X
 F 0002:XX
 G 0000:
 H 0001:X
 I 0001:X
 J 0000:
USL   ----------------------.
+NG0001:X
Scale: X =01
 A     251.55 in-lb<
 B     251.88 in-lb<
 C     252.20 in-lb<
 D     252.53 in-lb<
 E     252.86 in-lb<
 F     253.20 in-lb<
 G     253.53 in-lb<
 H     253.85 in-lb<
 I     254.19 in-lb<
 J     254.51 in-lb<
       254.85 in-lb
```

*Figure 4-4: Sample Statistical Data Printout*

Displaying or Downloading Data List

Torque measurements stored in the data list also include a date and time stamp. For additional information on setting up printer or PC ports, refer to Chapter 3—Set Up and Programming in this manual.

Displaying Data List

1.   Press **Data** (F1) in select Transducer screen or (F2) in measurements mode.

The display reads:
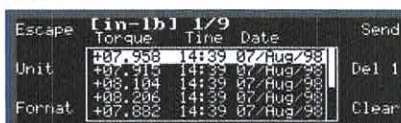
2.   Torque Units of measure are displayed at top of the display with present memory location/total memory locations to the right. Torque readings are to the left of the Time and Date. The last reading is highlighted.

3.   Use Up (↑) or Down (↓) key to view the data list.

4.   Press **Escape** (F1) to return to measurements mode.

Downloading Data List to Printer

1.   Press **Data** (F1) from select Transducer screen or (F2) in measurements mode.
2.   Press **Send** (F4).
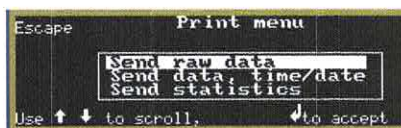
The display reads:

Figure 4-5: Data Download Display.

3.   To download the raw data list, select **Send raw data** then Press **Enter** (↵).

4.   To download the data list plus date-time stamp, press Down (↓) to select. **Send Data, time/date** then press **Enter** (↵) to print.

5.   Press **Escape** (F1) to return to measurements mode.

How to Use Analog Output (Rear Panel BNC Connector)

Analog Output on the *SURETEST* provides a real time voltage level that is directly proportional to the torque applied to the transducer. It is useful for direct driving equipment such as analog plotters and chart recorders, or interfacing to a computer/controller with analog to digital (A/D) data acquisition capability. Maximum output loading must be less than 5 mA.

The output varies between approximately +1.8 volts, full clockwise (CW) torque applied and approximately - 1.8 volts, full counterclockwise (CCW) torque applied. Zero offset is within ±100 mv. Linearity is better than ±1% of reading.

When used with the 4-in-1 transducer, zero output varies with the scan of the four transducers. Select one of the four by applying at least 5% of its full range torque to it. Press **ENTER** (↵) to return to scanning.

1. To program the *SURETEST* Base Unit, refer to *Chapter 3*—Set Up and Programming., use **HIGH** and **LOW** limit alert, data **STORE**, display **CLEAR**, printer **SEND** and Statistical analysis features.

2. Press Select Mode to select the TRACK mode.

3. Connect the recording or monitoring equipment to the ANALOG OUTPUT port using a BNC coaxial connector.

4. With no torque applied, measure the ANALOG OUTPUT voltage, and adjust or program your equipment for zero.

5. Apply full range torque to the transducer in the CW direction.

6. Measure the ANALOG OUTPUT voltage and adjust or program your equipment to display the full range torque value.

7. Apply full range torque to the transducer in the CCW direction.

8. Measure the ANALOG OUTPUT voltage and adjust or program your equipment to display the full range torque value.

CHAPTER 5

5.1. 600TL - 600 FT. LB. CAPACITY
Manual Loader

The 600TL Manual Loader is designed as an integral component of the CDI 5000-3 Torque Calibration System providing a precision output torque of up to 600 ft.lb.

Application
The loader is a laboratory grade instrument used for testing and calibrating all torque wrenches,drivers and electric nut runners.

Transducer Rotation
The manual hand crank provides up to 30° of transducer rotation in both clockwise (CW) and counterclockwise (CCW) directions (±15° from mid-rotation).

CDI 5000-3 Torque Calibration System
Components included in System are:

- Base Unit (*SURETEST*)
- 600TL
- 2000-12-02, 600 ft.lb. transducer
- 2000-400-02, 4-in-1 transducers
- 2000-500-02 Adapter Kit

When the 600TL interfaces with the **SURETEST** unit and the *2000* series of torque transducers,the **SURETEST** Torque Calibration system provides precision loading, monitoring and data acquisition of torque, within **± 0.25%** accuracy.

System capabilities include data storage, retrieval, statistical analysis and automatic downloading to a printer or computer.

Accessory Torque transducers, purchased separately, are available in ranges from 15-200 in. oz to200-2000 ft. lb. The *CDI 5000-3* Torque Calibration system features accessory calibration equipment including precision torque bars, certified weights, calibration mounts and stands.
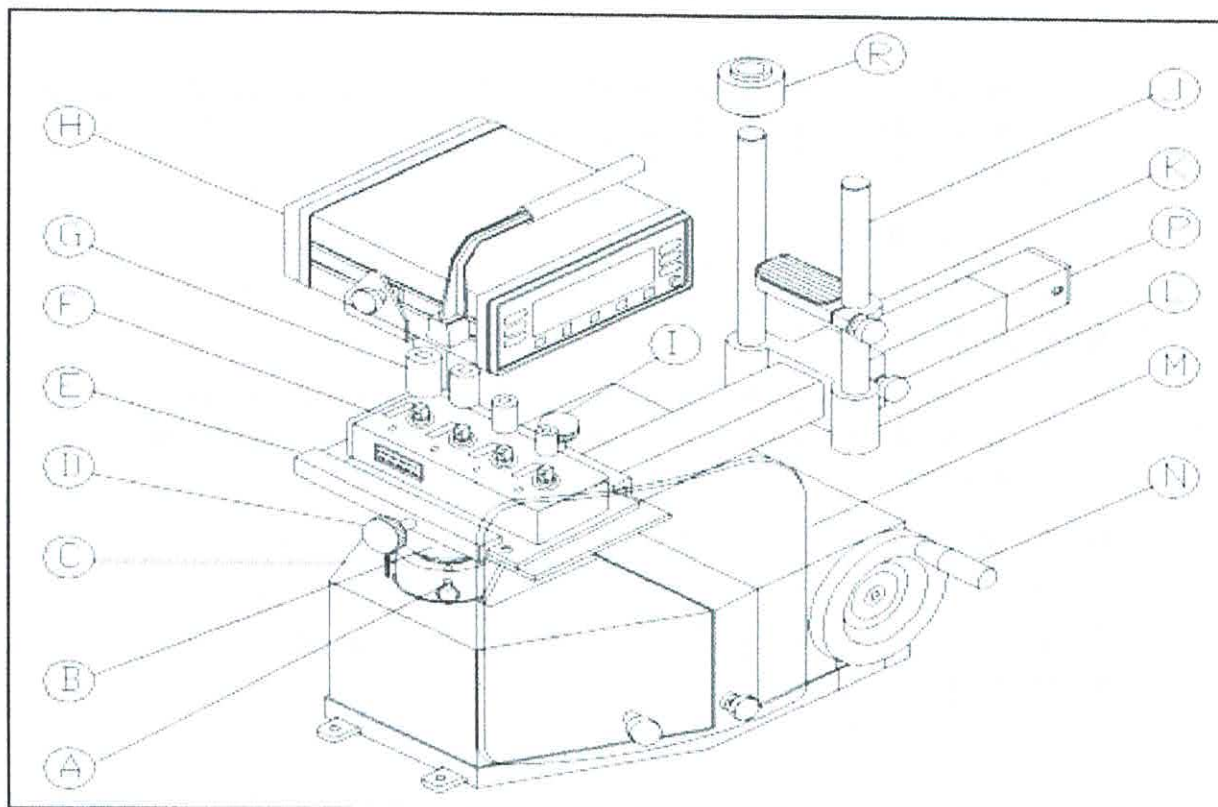
Torque Tester/Calibrator

Figure 5-1: Installation multiple transducers

A- Quick release pin (Transducer)
B- 4-in-1 Transducer Standoff
C- 600TL (Manual Loader)
D- Side thumb screw
E- 4-in-1 Adapter Bracket
F- Multiple Transducers
G- Drive Adaptors
H- SURETEST
I- Top thumb screw
J- Tube, Load (Part of rest assembly)
K- Rest, Adjustable
L- Reaction Slide Assembly
M- Safety shield
N- Hand Crank
P- Extendable Reaction Bar
R- Linear Bearing Assembly

Quick Release Pins
Four quick release pins must be installed to lock the standoff to the adapter bracket and loader.

Slide thumb screw
Two knobs on the bracket are used to align the selected transducer over the loader drive. Tighten the left knob first, then the top knob. The wrench or driver to be tested is then coupled to the selected transducer using an internal-internal adapter.

4-in-1 Adapter Bracket
Holds the 4-in-1 transducer horizontal to the loader.

IMPORTANT

> **Adjustable rest on the load tube may be raised or lowered to level the wrench prior toloading. It is normal for the wrench handle to rise as it levels itself under load.**

Drive Adaptor

A drive adaptor couples the wrench to the transducer. Low torque **2000** series transducers use an internal-internal drive adaptor and high torque **SURETEST** transducers may use an adaptor/reducer.

Transducer (Accessory)

The loader accepts **2000** series single transducers directly. The **2000-400-02** 4-in-1 transducer can bemounted using a **2000-500-02** adaptor kit.

Multiple Transducer - Mounting

Multiple Transducers **(2000-400-02)** must be installed into the loader using a 4 in 1 Transducer Standoff (B) and a 4 in 1 Adapter Bracket (E) as shown in Fig.6-1 and 6-2. Each transducer must be properly alignedbefore use. The transducer is properly aligned when the square drive of the transducer is approximately in line with the extendable reaction bar (P). For easier alignment use the marked lines on the 4 in 1 Adapter Bracket as a guide. Aligning the top edge of the Multiple Transducer with each marked line on the 4 in 1 Adapter Bracket provides proper alignment for each transducer. When aligning the 50 in. lb. transducer, the 4 in 1 Adapter Bracket, together with the Multiple Transducer, must be rotated in the 4 in 1 Transducer Standoff (B) for 180 degrees prior to alignment, to avoid interference with the Safety Shield (M).

Reaction Slide Assembly (R)

The Linear Bearing Assembly is to be used over the reaction pins for wrenches that are more sensitive to side loading (some electronic type wrenches) and for wrenches that cannot be fully loaded if supported juston the reaction pin (fixed head dial type torque wrenches).

Extendable Reaction Bar (P)

The Reaction Bar can be extended to accommodate wrenches up to 43 inches long. There are two lock positions for the slide bar. Only the first one is to be used for testing. The last lockposition is just a safety stop before the slide bar completely disengages from the loader.
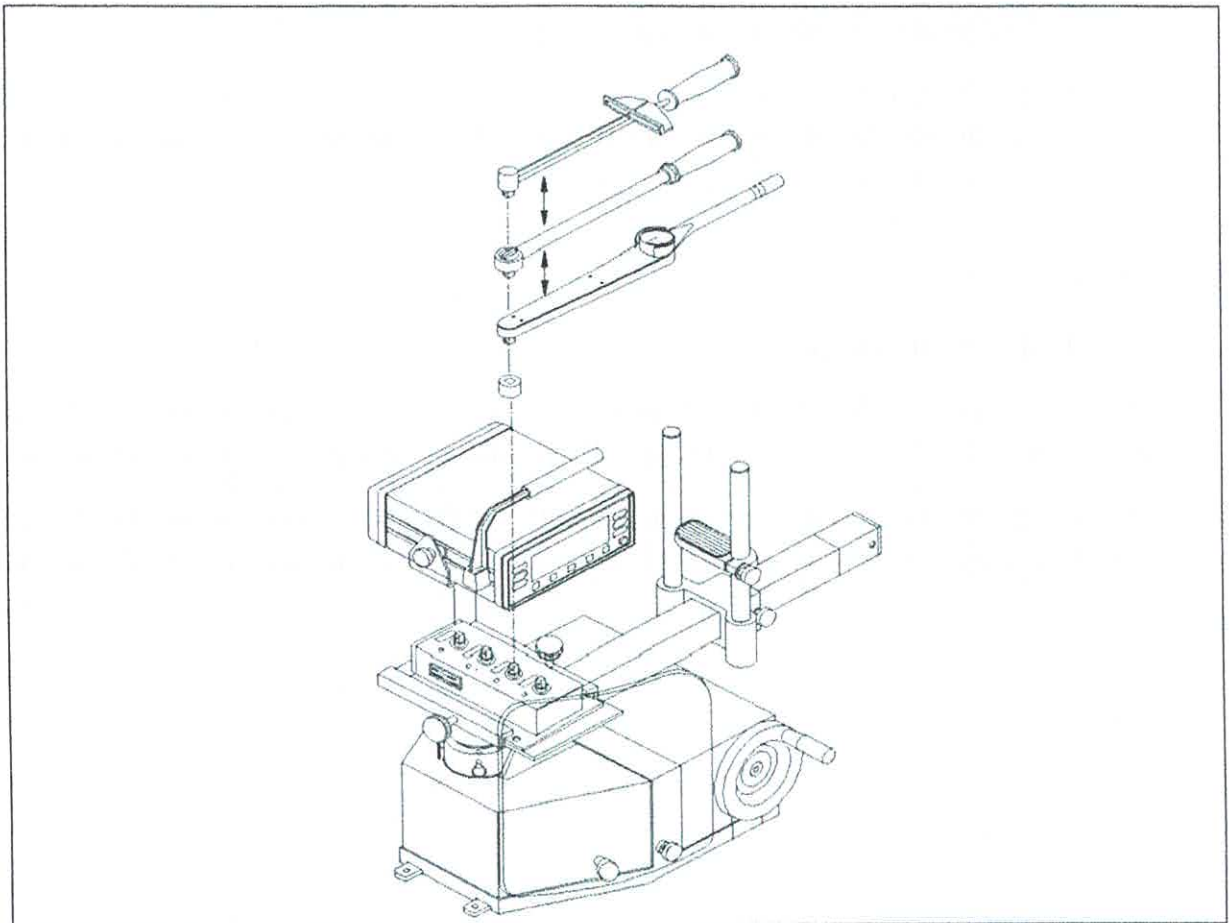

Figure 5-2 Set up for Dial indicating, Deflection Beam and Micro-Adjustable Torque Wrenches.

1- Transducer Mounting

A transducer facilitates the low-to-high ranges of the wrench under test. The transducer must be installed into the loader by lining up the red mark and securing it using two quick release pins.

**WORK INSTRUCTION FOR
CDI TORQUE CALIBRATOR**

IMPORTANT

The connector on single transducer cables contains the EEPROM calibration memory chip. Never attempt to remove the connector from the transducer.

2- Hand Crank
Turn hand crank on the loader to apply torque.

3- Reaction Slide Assembly's
The reaction slide is positioned so that the reaction pins straddle the wrench handle at the handhold position specified on the wrench.

Types of Loaders

Testing Torque Driver Testing

An optional torque screwdriver testing kit is available for use in testing or calibrating most torque screwdrivers and "T" handled drivers. In addition to providing perfect driver-transducer alignment, it allows the use of the 600TL crank for precision torque application. Certain torque screwdrivers, "T" handled drivers, electric or pneumatic nut runners, and non-impact power tools must be tested by hand. Double check to be sure that the transducer you choose is capable of handling the maximum torque that you will apply. Hold the tool exactly in line with the transducer drive while testing. Off-axis side loading may compromise the test or calibration of the tool.