Larson Systems Inc.

Super Digital Hand Tester/
Super Digital Hand Tester 2000/
SDHT 2000 Wide Body
User Manual

Current for Software Version 4.25

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About This Manual

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

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1 INTRODUCTION

The Super Digital Hand Tester comes in three distinct models: SDHT, SDHT 2000 and SDHT 2000 Wide Body. All models are manually-operated force and length testers designed for in-process control measurements right on the factory floor. Bright, two-line backlit LCD displays allow easy viewing of highly accurate length and force measurements. Both testers can select a variety of measurement units, both English and Metric, for ease of use. Length measurement can be selected to read in inches or millimeters; force measurement can be selected to read in ounces, pounds, Newtons, grams or kilograms. Both models operate in compression or extension mode and feature a high degree of built-in precision and accuracy to assure excellent repeatability and reproducibility.

1.1 SDHT Features

- Compression and extension testing of force and length
- Tracking or peak modes (2,000 samples / sec)
- Load cell and frame deflection compensation
- Mechanical and software overload protection
- Built-in shunt calibration verification
- Backlit digital LCD display of force and length
- Wipe-clean embossed key faceplate
- Push button force and length zeroing
- Push button English or metric unit selection
- User programmable filter
- Length / force offset
- Customizable print headings
- Front panel digital calibration
- NIST traceable calibration
- Micro-Length Adjust with built-in length stops
- Internal 8 hour battery for portable use
- RS 232 data communications port
- Statistical summary printout
- Built-in 1,800 test point data logger
- Complete computerized tester diagnostics
- High resolution linear scale

1.2 SDHT 2000 Features

- **All Standard SDHT Features, plus...**
- Smart, interchangeable load cell capability
- Lever operation or choice of high or low fine-adjust wheel
- 2,000 lb capacity
- Increased range, stroke and platform diameter
- Rigid two-column design

1.3 SDHT 2000 Wide Body Features

- **All SDHT 2000 features, plus...**
- Super-rigid four-post frame
- 16”-diameter platform

1.4 Additional Options

- Thru-rod support kit
- 4” extended platforms for SDHT
- 8” extended platforms for SDHT 2000, 16” for SDHT Wide Body
- Vibration damping options
- Wire crimp attachments
- Wedge grip attachments
- Dust covers
- Extension hooks for all applications
- Twist Under Load (TUL) indicating attachment
- Squareness Under Load (SUL) indicating attachment
- Digital Squareness Under Load (DSUL) indicating attachment
- Statistical and Spreadsheet Interface Software (SSS) for PC communication
- Printer for statistical printouts

1.4.1 Safety and Usage Considerations

Before you use your SDHT, read this manual to gain an understanding of its proper operation. Observe the following important considerations:

- **Compressed or extended springs have stored potential energy proportional to the spring constant. Use care and release this energy in a controlled manner to avoid possible injury.**
- Do not apply more force than the tester is designed to handle. The tester has overload stops to protect it, but damage can still result from excessive loads. Force readings are not accurate above the rated limit.
- Be sure the operating location is clean and dry, and all parts to be tested are free of oil and contaminants.
- Keep your SDHT away from any source of liquid.
- Keep this user manual handy for reference.
- Follow all instructions and warnings concerned with the use of the SDHT.

1.5 Tester Specifications

Force Specifications

SDHT-Force Specifications

Part No.	Capacity	Resolution	
		0-20% FS	20-100% FS
050-0000-0043-00	2 lb 907 g 8.9 N	0.00002 lb 0.01 g 0.0001 N	0.0002 lb 0.1 g 0.001 N
050-0000-0044-00	11 lb 5 kg 49 N	0.0002 lb 0.1 g 0.001 N	0.002 lb 1 g 0.01 N
050-0000-0087-00	22 lb 10 kg 98 N	0.0005 lb 0.2 g 0.002 N	0.005 lb 2 g 0.02 N
050-0000-0076-00	66 lb 30 kg 294 N	0.001 lb 0.5 g 0.005 N	0.01 lb 5 g 0.05 N
050-0000-0045-00	110 lb 50 kg 489 N	0.002 lb 0.001 kg 0.01 N	0.02 lb 0.01 kg 0.1 N
050-0000-0077-00	200 lb 91 kg 890 N	0.005 lb 0.002 kg 0.02 N	0.05 lb 0.02 kg 0.2 N
050-0000-0046-00	750 lb 340 kg 3,336 N	0.02 lb 0.01 kg 0.1 N	0.2 lb 0.1 kg 1 N
Accuracy = +- Resolution x 2			

SDHT 2000-Force Specifications

Part No.	Capacity	Resolution	
		0-20% FS	20-100% FS
025-0000-0394-01	2 lb 907 g 8.9 N	0.00002 lb 0.01 g 0.0001 N	0.0002 lb 0.1 g 0.001 N
025-0000-0394-02	11 lb 5 kg 49 N	0.0002 lb 0.1 g 0.001 N	0.002 lb 1 g 0.01 N
025-0000-0394-03	22 lb 10 kg 98 N	0.0005 lb 0.2 g 0.002 N	0.005 lb 2 g 0.02 N
025-0000-0394-04	66 lb 30 kg 294 N	0.001 lb 0.5 g 0.005 N	0.01 lb 5 g 0.05 N
025-0000-0394-05	110 lb 50 kg 489 N	0.002 lb 0.001 kg 0.01 N	0.02 lb 0.01 lb 0.1 N
025-0000-0394-06	200 lb 91 kg 890 N	0.005 lb 0.002 kg 0.02 N	0.05 lb 0.02 kg 0.2 N
025-0000-0433-00	750 lb 340 kg 3,336 N	0.02 lb 0.01 kg 0.1 N	0.2 lb 0.1 kg 1 N
025-0000-0433-01	1,500 lb 680 kg 6,672 N	0.1 lb 0.05 kg 0.5 N	1 lb 0.5 kg 5 N
025-0000-0433-02	2,000 lb 907 kg 8,896 N	0.1 lb 0.05 kg 0.5 N	1 lb 0.5 kg 5 N
Accuracy = +- Resolution x 2			

1.4.2- Length Specifications

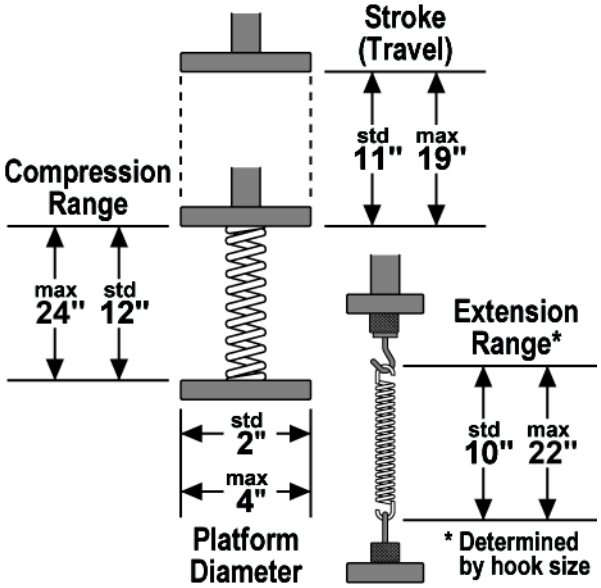
SDHT - Length Specifications

Capacity	Standard Resolution	
	Resolution	Accuracy (+-)
2, 11, 22, 66, 110 & 200 lb	0.0005 in 0.01 mm	0.001 in 0.02 mm
750 lb	0.0005 in 0.01 mm	0.002 in 0.04 mm

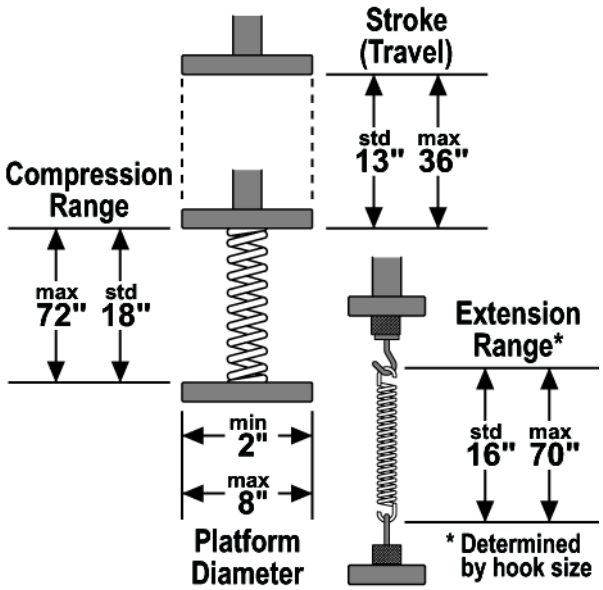
SDHT 2000 - Length Specifications

Capacity	Standard Resolution	
	Resolution	Accuracy (+-)
2, 11, 22, 66, 110 & 200 lb	0.0005 in 0.01 mm	0.001 in 0.02 mm
750, 1,500 & 2,000 lb	0.0005 in 0.01 mm	0.002 in 0.04 mm

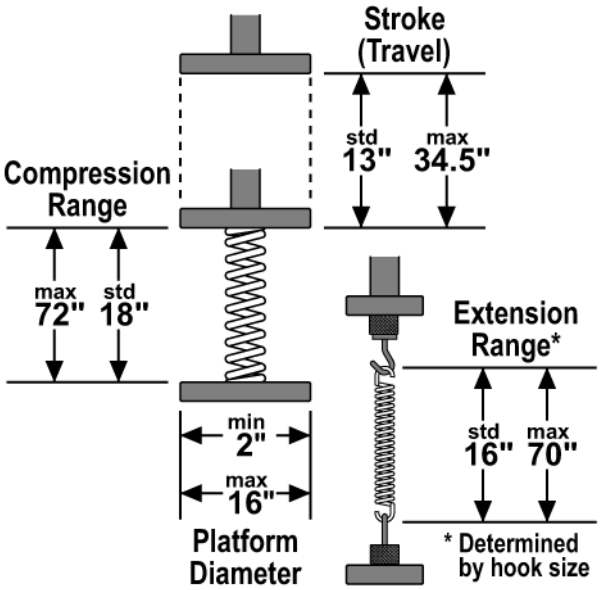
Part Capacity



SDHT

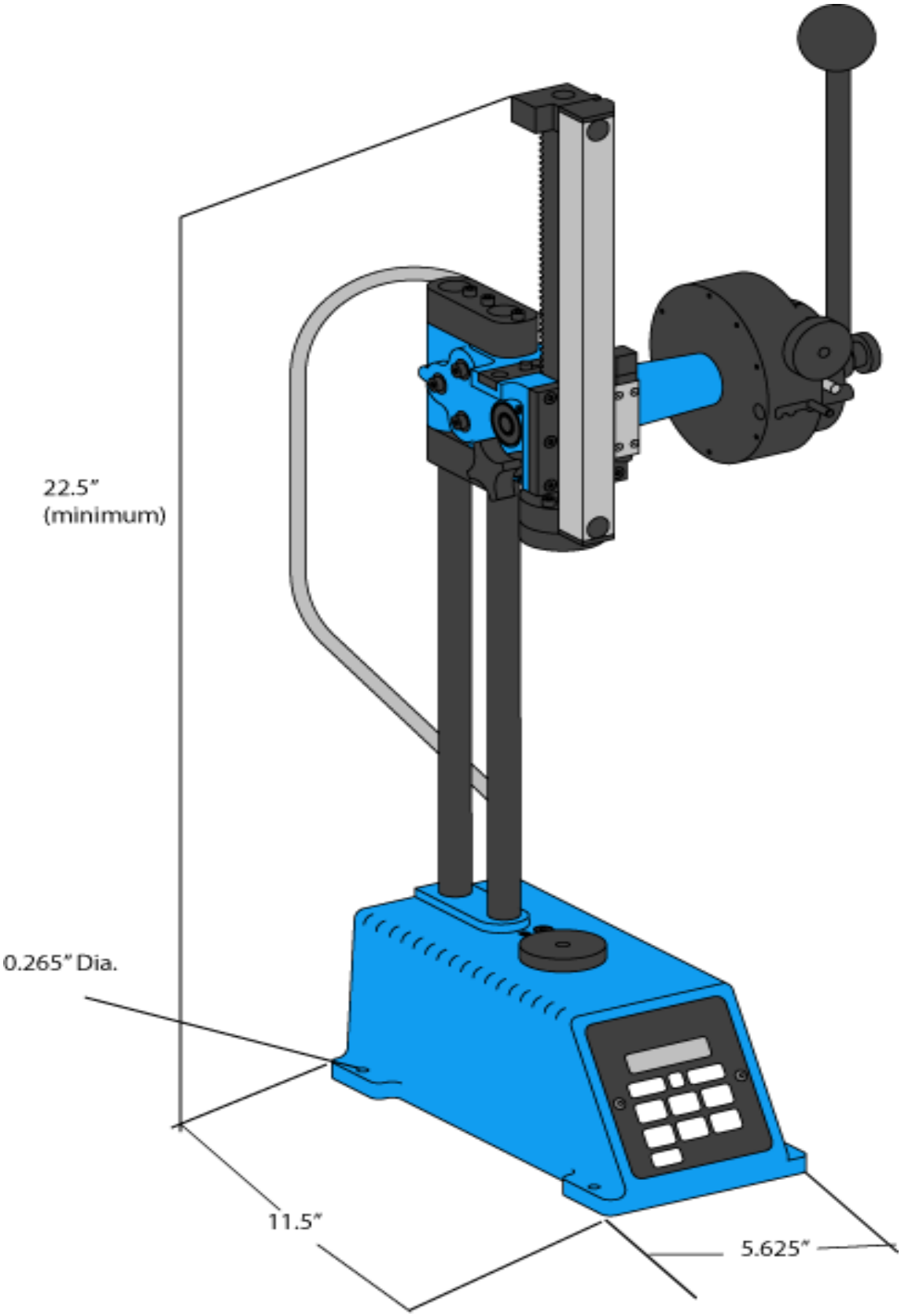


SDHT 2000

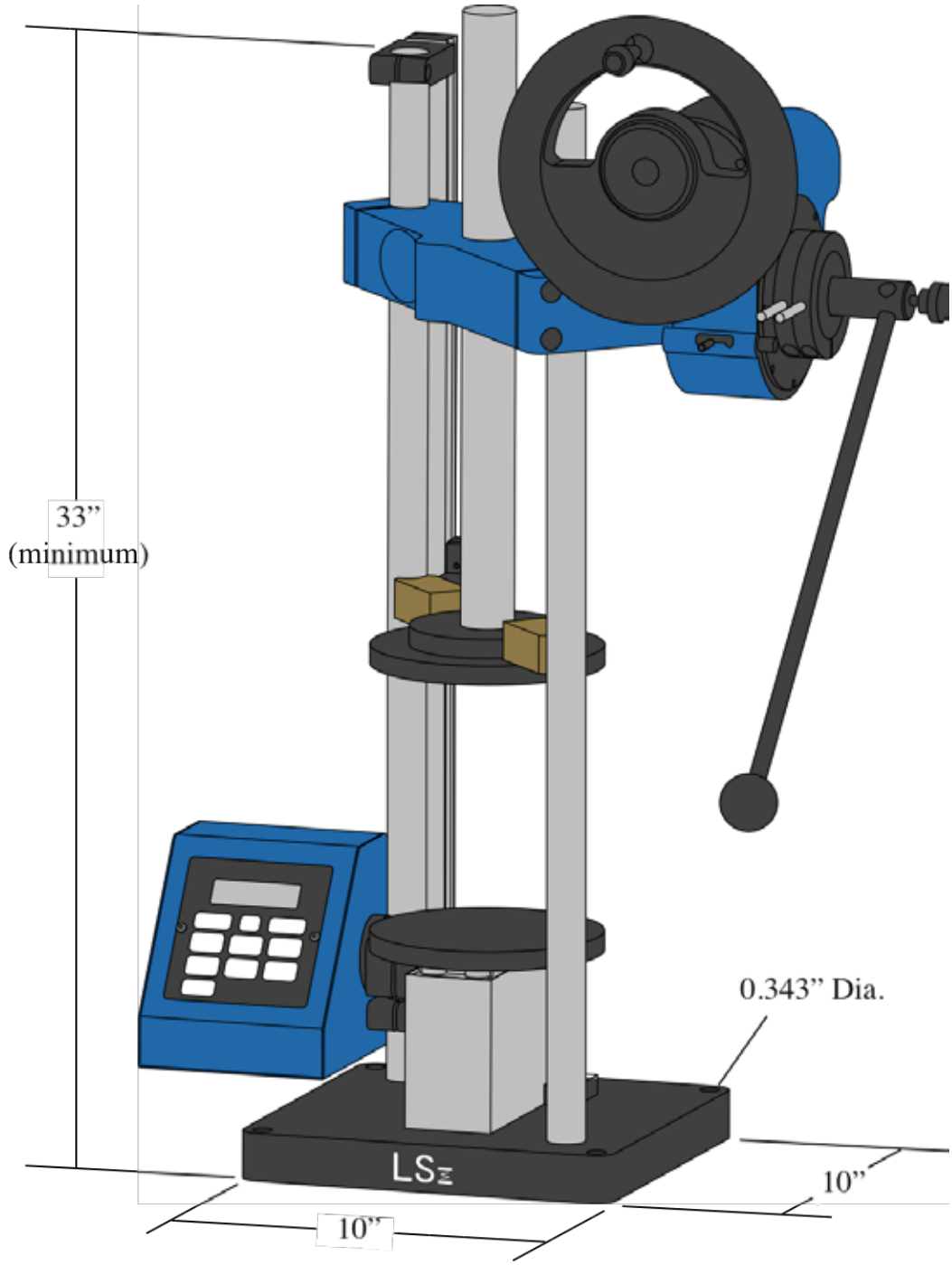


SDHT 2000 Wide Body

Physical Dimensions



SDHT



SDHT 2000

2.0 FIRST STEPS

2.1 Unpacking your SDHT or SDHT 2000

SDHT Unpacking

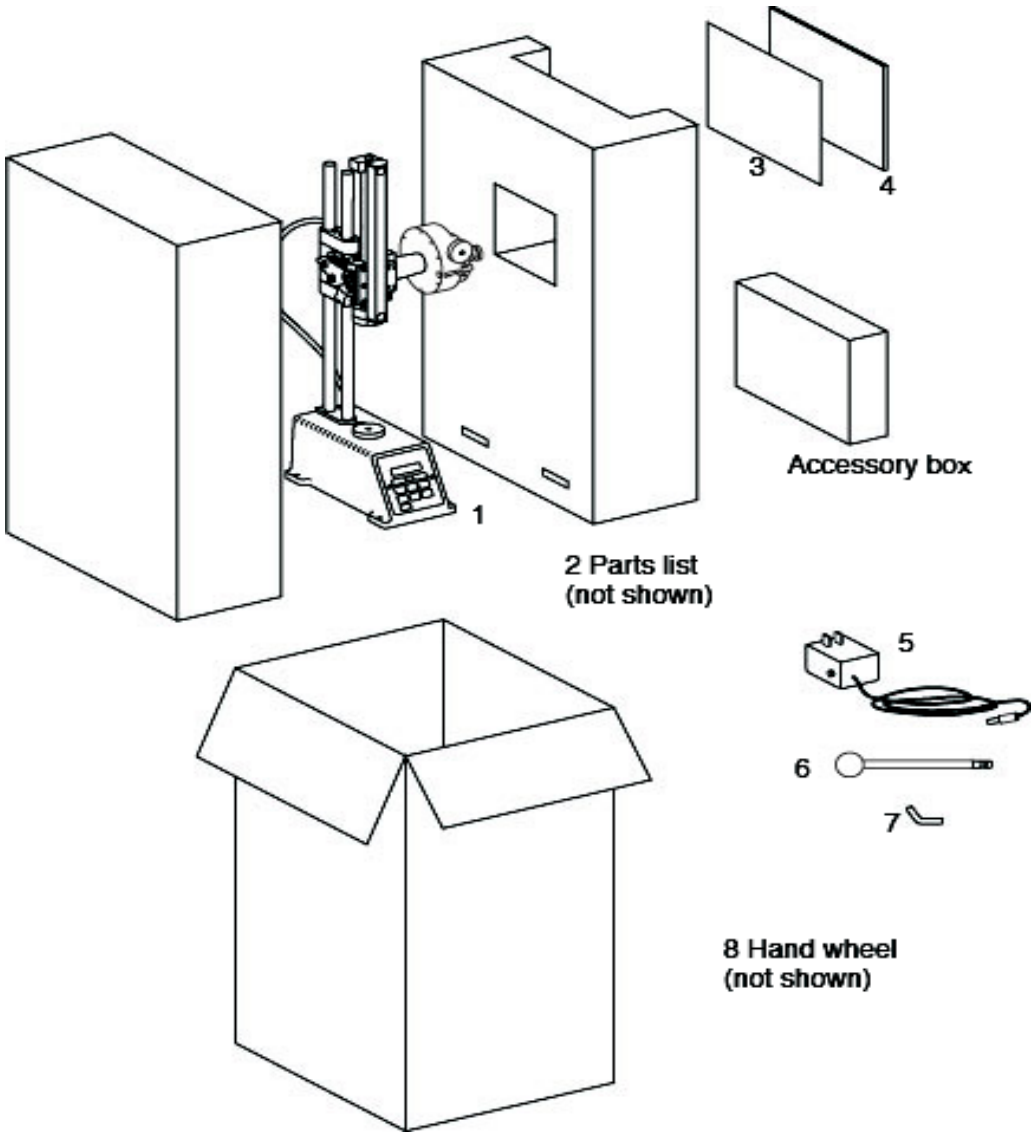
Lay the shipping box on its side and pull out the two styrofoam pieces that encase the SDHT. Check to make sure that you have the following items:

1. SDHT tester
2. Parts list (not shown)
3. Calibration report
4. User manual (this document)
5. Power supply / battery charger
6. Handle knob
7. Handle lock

SHDT 2000 Unpacking

The SDHT 2000 ships in a wooden crate. Check to make sure that you have the following items:

1. SDHT 2000 tester
2. Parts list (not shown)
3. Calibration report
4. User manual (this document)
5. Power supply / battery charger
6. Handle rod
7. Handle lock
8. Hand wheel (not shown)



2.1 Tester Setup

Place the tester on a level and stable work area where you can perform compression and extension testing in a comfortable manner. The lower platform should be at a height to allow easy loading, testing and removal of testable items and the displays should be easy to see and read. Make sure the operating location is clean and dry and all materials to be tested are free of dirt and oil. Keep the tester away from any source of liquid. The SDHT can be mounted on a bench for increased stability during testing; mounting holes have been machined into the base.

2.2 Handle Setup

The handle rod is used to apply the test force. Insert the handle rod as shown in the images at right. Note that this handle rod can easily be removed and reinstalled at 90° increments for convenient operation. Attach the enclosed handle lock as shown to hold the handle rod in place.

2.3 Power Supply/Battery Charger

The SDHT comes equipped with an internal rechargeable battery pack that allows you to move the tester from place to place. The battery pack is charged with the enclosed battery charger. Connect the power supply / battery charger into the power port in the back of the tester. You can operate the tester while the battery charges.

2.4 RS 232 Communications Port

The SDHT comes equipped with an RS 232 port to send and print data. The RS 232 port allows you to connect the SDHT with a number of output devices including printers, data loggers and computers. The tester should already be set up for communication between itself and a printer. Connect the RS 232 device to the tester using an RS 232 cable. Press **Send** at any time to transmit test data to the device. For more details on the Send feature, see section 3.9, pages 24-25.

SDHT

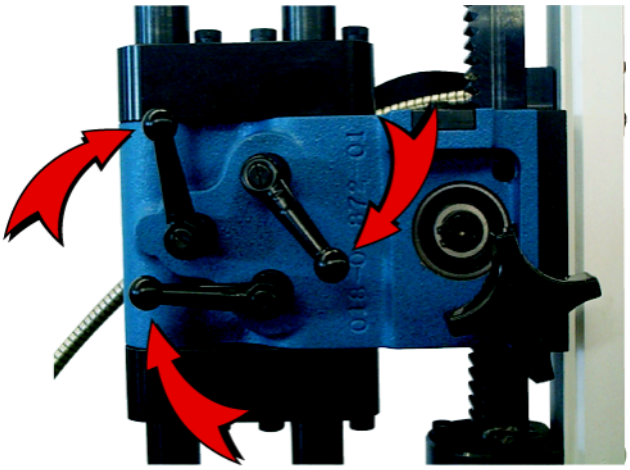
SDHT 2000

2.5 Stroke Lock—SDHT 2000

The stroke lock prevents the upper platform from moving up or down under load at any position. This feature simplifies setting the length stops, which promotes accurate, repetitive testing at two different lengths. The stroke lock is usable at forces up to 100 lb.

2.6 Range Adjustment Locks

These locks secure the upper assembly at any desired position on the support rods to increase or decrease the SDHT's length range. Your SDHT may be fitted with Quick Release Range Adjust knobs instead of the standard allen screws, allowing for easy setup for varying test material heights.



SDHT with Optional Quick Release Range Adjust

2.7 SDHT Overload Screws

The overload screws are factory set for overload protection. These screws are located on the top of the tester base, adjacent to the lower platform. The screws have been potted at the factory to resist tampering. **Tampering with the overload screws will void your warranty.**

2.7 Micro Length Adjust with Built-in Stops

The Micro Length Adjust was designed for precise positioning of the upper platform. You can adjust the length in 0.0005” increments at either light or heavy loads. The built-in length stops let you perform a repeatable two-point test.

2.7.1 Micro Length Adjust—SDHT

Raise or lower the upper platform to the desired approximate height using the handle rod, then rotate the sliding stop pin to the right to engage. At this point, the handle rod becomes unusable. Rotate the knob clockwise to lower the platform or counterclockwise to raise it. You can now “fine-tune” the upper platform much more precisely.

2.7.2 Micro Length Adjust—SDHT 2000

The SDHT 2000 gearbox accommodates two different torque ratios--High Torque and Normal. Place the hand wheel [inset] on the High Torque pin for heavy loads and on the Normal pin for lighter loads.

To engage, raise or lower the upper platform to the desired approximate height using the handle rod. Pull the Engaging Pin out toward you with one hand and rotate the entire gearbox assembly to the right to engage. Push the Engaging Pin into the internal locking hole. You can now use the hand wheel on the High Torque pin or the Normal pin for operation.

2.8 Built-in Length Stops

The procedure below describes how to use the Micro Length Adjust with Built-in Stops for a test with two test points. This procedure applies to both the SDHT and SDHT 2000.

1. Move the Stop Pin fully to the right.
2. Loosen both the outer and inner stop Dial Screws.
3. Set the **Outer Stop Dial** to the **longer** test length for compression tests. Set it to the **shorter** test length for extension tests. Tighten the outer Dial Screw.
4. Release the load, then load the sample to the Outer Stop Point. View the length display to verify that you stopped at test point 1. Adjust if needed.
5. Release the load and slide the Stop Pin one click to the left.
6. Set the **Inner** Stop Dial to the **shorter** test length for compression tests. Set it to the **longer** test length for extension tests. Tighten the inner Dial Screw.
7. Release the load then load the sample to the Inner Stop Point. View the length display to verify that you stopped at test point 2. Adjust if needed.
8. Perform any two-point test.
9. For normal operation, disengage the length stops by moving the Stop Pin fully to the left.

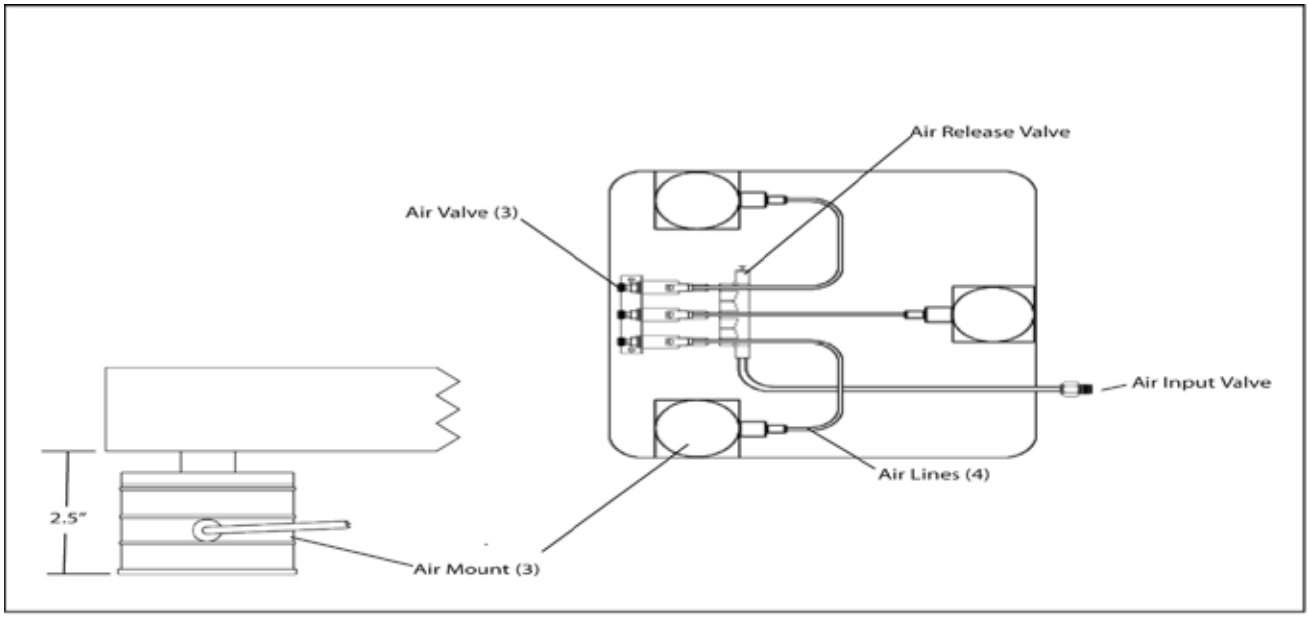
2.9 Air Vibration Damping Table

(Option for SDHT)

The Air Vibration Damping Table allows you to make very accurate force measurements in normal industrial environments that have floor or building transmitted vibrations. These vibrations may be induced by industrial equipment, local car, truck or rail traffic and in some cases, by people walking by. The Air Vibration Damping Table reduces the magnitude of vibration by 10 to 100 times, making it possible to accurately measure forces at very light loads in environments that would otherwise be impossible. The table should be considered for applications with forces less than 10 lb and is highly recommended for applications with forces less than 2 lb. See the following page for setup.

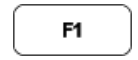
Air Vibration Damping Table Setup

1. Mount the SDHT on the table, using the four, 1/4-20 x 3/4” bolts (included.)
2. Turn three front air valves to Off position (clockwise).
3. Connect a pneumatic air line to the air input valve.
4. Turn air valves counterclockwise to pressurize each mount so that the distance between the bottom of the air vibration damping table and the work bench is 2.5”.
5. Place a leveling instrument on the table and adjust the air pressure equally until the table is level.



3.0 FEATURES AND CONTROLS

3.1 Buttons



Menu selection button used by the Options menu.

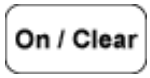
Switches between various user-selected options.

Menu selection button used by the options menu.

Returns the length reading to 0.

Returns the force reading to 0.

Switches between three test modes:

- **Manual Mode:** Always displays current force reading.
- **Peak Mode:** Displays the maximum or minimum force reading. Press  to reset.

- **Two Point with Rate Mode:** Records two test points, then calculates the spring rate.

Units — Switches between various English and Metric units of measure. Unused units can be removed via the user setup menu.

Store — Saves data to an internal 1,800- test-point data logger. Saved tests can be sent to a printer or computer at a later time.

Send — Transmits data via the RS 232 port to an external data logger, printer or computer. You can cancel sending data by pressing Send again.

On / Clear — Turns the SDHT on. Also used as an Enter button in the Option menu and resets the Peak or Two Point with Rate test modes.

Off — Shuts the SDHT off.

3.2 Turning on the SDHT

Press On / Clear to turn on the SDHT. The Load and Length LEDs will flash briefly. Next, the software version number will appear (this information may be required if your SDHT ever requires service.) Next, the load cell capacity will be displayed. Finally, the force and reading measurement units will be displayed. The length will not be displayed until the length initialization is performed.

3.3 Turning off the SDHT

Press On / Clear to ensure the tester is in Test mode and not in the Options menu. Press the Off button. You can also press the Option key until the Offset/Power screen appears. Press F2 TWICE to turn off power to the tester.

3.4 Backlight Off and Power Off Timers

Your SDHT comes equipped with a backlight timer and a power off timer to conserve battery life. The timers are factory set, but can be changed to meet your requirements. See Section 5.7.3, and 5.7.8. These timers start when the tester sits idle (no length movement or buttons pushed). When a backlighting timeout occurs, the screen backlight will shut off until a button is pushed or there is length movement. At this point, you may resume testing. When a power

timeout occurs, the tester automatically turns off. Should the power turn off, you must press [On / Clear] to reinitialize the length and force.

3.5 Selecting Measurement Units

Measurement units can be displayed in the following pairs: (in/lb), (mm/N), (mm/g), (in/g), (mm/kg), (in/kg), or (in/oz). Press [Units] to toggle through the different units and view them on the display.

Note: Different units can be selected, but the first unit selected will be used if there is test data stored in memory or if a printout has started. See5.1 for more information on storing data.

3.6 Storing Test Data

Pressing [Store] will save the test data into the tester's memory. This allows you to download the test data at a later time to a printer, data logger or computer. Using this feature, you can save any of the following:

- Test number, length, force, time and date (Manual or Peak mode, up to 1,800 test results.)
- Two Point with Rate test data (up to 500 test results.)

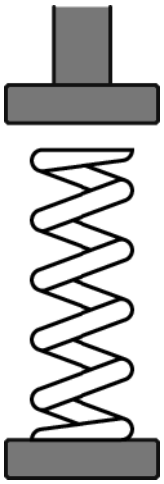
To use this feature, press [Store]. The SDHT will briefly display:

```
Storing Test
Number:    14
```

3.7 Force and Length Initialization

The force and length of the tester must be initialized (or zeroed) at a reference point prior to any testing. The following sections describe how to perform the initialization for compression and extension testing.

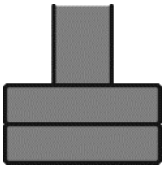
3.7.1 Compression Force Initialization



1. Turn on the tester.
2. Make sure the upper platform does not touch the load cell.
3. Place the fixtures (if required) and test part on the lower platform.
4. Press **Zero Force**.

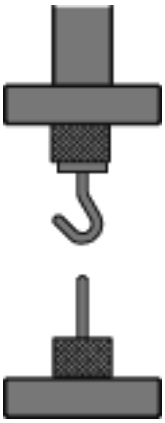
3.7.2 Compression Length Initialization

1. Turn on the tester.
2. Move the upper platform so that it touches the lower platform and exert a force of about 10% of full scale.
3. If your test includes fixtures, be sure to initialize the tester with the fixtures in place, because your zero length point is different from that of flat plates.
4. Press **Zero Length**.



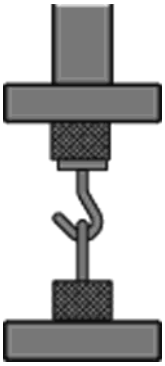
3.7.3 Extension Force Initialization

1. Turn on the tester.
2. Install the extension hooks.
3. Move the upper platform so that the hooks are not coupled and no force is applied to the lower platform.
4. Press [Zero Force].



3.7.4 Extension Length Initialization

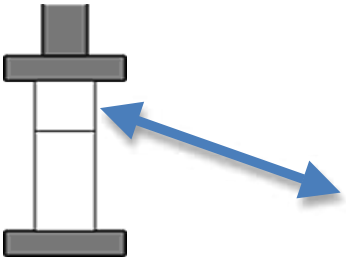
1. Turn on the tester.
2. Install the extension hooks and couple them as shown in the diagram.
3. Move the upper platform up until a force of about 10% of full scale is exerted.
4. Press [Zero Length].



3.7.5 Length Initialization with Setup Blocks

On SDHT testers with a rod range greater than stroke, use setup blocks. Blocks can be added to properly initialize the length scale. This procedure is effective for both compression and extension springs that are longer than the stroke of the tester.

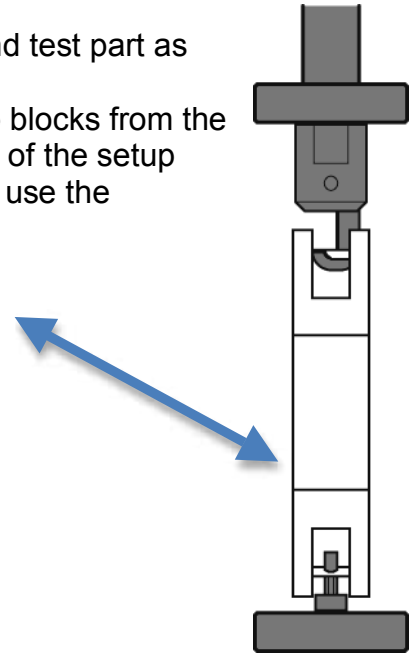
1. Turn on the tester.
2. Install the setup blocks and any fixtures and move the upper platform up (extension) or down (compression) until a force of about 10% of full scale is exerted.



Gage blocks

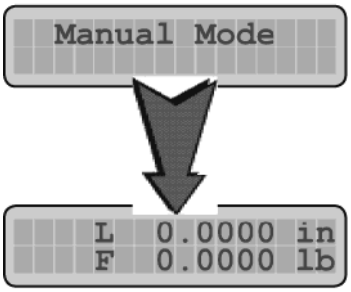
3. Press [Zero Length].
4. Remove only the setup blocks from the platforms and test part as usual.
5. For extension testing, deduct the length of the setup blocks from the test results. For compression testing, add the length of the setup blocks. (To display the correct length during testing, use the Offset option described in Section 5.4.)

Extension Blocks

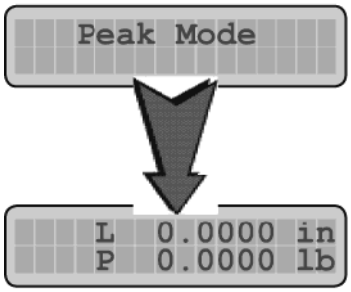


3.8 Test Modes

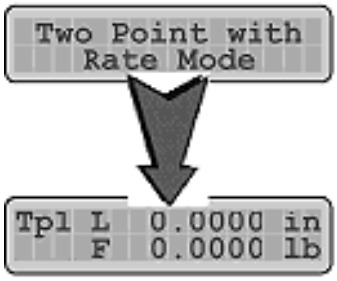
Your SDHT has three test modes: Manual, Peak and Two Point with Rate. The tester will power up in Manual Mode. To switch between test modes, simply press Mode.



The display shows the current length and force at all times. See sections 4.1 and 4.2.



The display freezes, indicating peak force and the corresponding length. See section 4.3.



The SDHT captures and saves two points and calculates the rate between these lengths. See section 4.4.

3.9 Sending Data

The SDHT comes equipped with an RS 232 data communications port. This port sends data to a number of output devices including printers, data loggers and computers. The RS 232 communication settings should already be formatted to send the data to your particular output device (factory set for a printer). To make changes to these settings, see sections 5.7.1 and 5.7.2. Verify that the SDHT is connected the RS 232 device via an RS 232 cable. Press **Send** at any time to output the testing information via your RS 232 device.

We highly recommend using the optional LSI-provided inkjet printer with your SDHT (part # 025-0000-0464-00.)

3.9.1 Printout Examples

The examples illustrate the SDHT's Two Point with Rate statistical printout.

```
                                Your Company Name
                                   Anytown,USA

Date : 02/05/02
Time : 03:23:15 pm

Operator     :_____________________

Part Number  :_____________________

Larson Systems Inc. Tester

  Model               : Super DHT
  Version Number      : 4.00
  Serial Number       : 0684092896
  Calibrated          : 01/02/01
  Recalibration Date  : 01/01/02
  Load Cell           : 110.000 lb

Limit Data
  Tp 1 LSL       : <   21.000 lb
  Tp 1 USL       : >   21.400 lb
  Tp 2 LSL       : <   28.250 lb
  Tp 2 USL       : >   28.750 lb
  Rate LSL       : <   72.000 lb/in
  Rate USL       : >   73.250 lb/in

Two Point with Rate Mode
-----------------------------------------
    Tp 1                  Tp 1    Tp 2                 Tp 2
   Length    Force        Force   Length    Force      Force    Rate      Rate
    (in)   L   M   U      (lb)     (in)   L   M   U     (lb)   (lb/in)  L   M   U
-------+-+-+----------+-+-+----------+-+-+-
   0.8000 *|   |   |    20.66   0.7000 *|   |   |    28.04   73.8000  |   |   |*
   0.8000  |  *|   |    21.16   0.7000  |*  |   |    28.36   72.0000  *   |   |
   0.8000  | * |   |    21.12   0.7000  *   |   |    28.28   71.6001 *|   |   |
   0.8000  |  *|   |    21.14   0.7000  |  *|   |    28.44   73.0001  |   |  *|
   0.8000  |   |*  |    21.26   0.7000  |  *|   |
   0.8000  |   |   |*   21.50   0.7000  |   |   |*
   0.8000  |   |*  |    21.24   0.7000  |   *   |
   0.8000  |   |*  |    21.26   0.7000  |   | * |
   0.8000  *   |   |    21.02   0.7000 *|   |   |
   0.8000  |   |  *|    21.34   0.7000  |   | * |
   0.8000  |   |*  |    21.26   0.7000  |   |*  |
   0.8000  *   |   |    21.04   0.7000 *|   |   |
   0.8000  |   |  *|    21.32   0.7000  |   *   |
   0.8000  |   |*  |    21.26   0.7000  |  *|   |
   0.8000  |   |*  |    21.24   0.7000  |  *|   |
   0.8000  |   |  *|    21.34   0.7000  |   |*  |
   0.8000  |   | * |    21.30   0.7000  |   *   |
   0.8000  |   |   |*   21.60   0.7000  |   |  *|
   0.8000  |   |  *|    21.32   0.7000  |   |*  |
   0.8000  |   |*  |    21.26   0.7000  |   *   |
-----------------------------------------
END OF DATA
```

```
                                   Time : 03:23:15 pm  Date 02/05/02  Page    2

SUMMARY DATA
-----------------------------------------
                 Tp 1        Tp 1        Tp 2        Tp 2
                Length      Force       Length      Force       Rate
                 (in)       (lb)         (in)       (lb)      (lb/in)
-----------------------------------------
Mean            0.80000     21.232      0.70000     28.468     72.3600

Std Dev         0.00000      0.1906     0.00000      0.1877     0.7937

Cp                           0.3499                  0.4441     0.2625

CpK                          0.2939                  0.3872     0.1512

Maximum         0.8000      21.60       0.7000      28.88      73.8000

Minimum         0.8000      20.66       0.7000      28.04      70.8000

Range           0.0000       0.940      0.0000       0.840      3.0000

-----------------------------------------
END OF SUMMARY

HISTOGRAM of Force
-----------------------------------------

   <21.000    1|#          <28.250    3|###        <72.000    4|####
      LSL     |-----      LSL     |-----      LSL     |-----
    21.044    2|##          28.306    1|#           72.139    6|######
    21.089    0|           28.361    1|#           72.278    1|#
    21.133    1|#          28.417    0|           72.417    1|#
    21.178    2|##          28.472    4|####        72.556    0|
  M 21.222    0|         M 28.528    4|####      M 72.694    2|##
    21.267    7|#######     28.583    3|###         72.833    1|#
    21.311    1|#          28.639    2|##          72.972    0|
    21.356    4|####        28.694    1|#           73.111    1|#
    21.400    0|           28.750    0|           73.250    1|#
      USL     |-----      USL     |-----      USL     |-----
   >21.400    2|##         >28.750    1|#          >73.250    3|###

 # =  1
-----------------------------------------
End Of HISTOGRAM
```

3.9.2 Sending Current Data

Information shown on the display is considered current test data.

1. Press [Send]. The data is sent to the RS 232 device:

2. To send more data, press [Send] again.
3. To end the test cycle and print a summary of the data, press [Option].

4. Press [F2]. A summary of previous data is sent to the RS 232 device, which includes mean, standard deviation, maximum, minimum and range.

3.9.3 Sending Stored Test Data

This function sends previously stored test data to an RS 232 device. You have a choice of sending all data or just the current (present) data. If you decide to send the stored data, you will have the option of saving or clearing the data from memory.

1. Press [Send].

2. Press [F1] to send the stored test data or [F2] to send current test data. If the print summary option is enabled, (See section 5.7.1, page 40-42), a summary will be created when the stored data is sent. If no data is in memory, only the current data will be sent. If stored data was sent, the SDHT will display:

3.

Press [F1] to clear the test data, or [F2] to keep the test data.

3.9.4 Retrieving Test Data via Computer

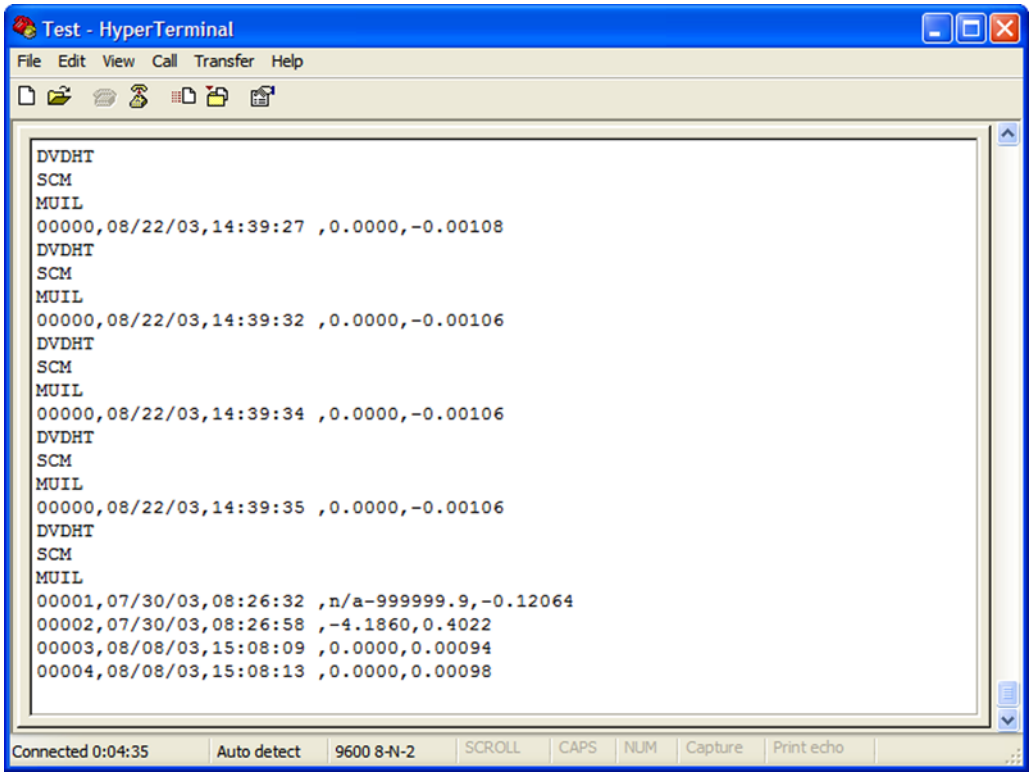
When a computer is connected to the SDHT, it can ask the tester for the present length and force data by sending an ASCII string. The tester will respond by sending the requested data back to the computer.

- ASCII string “DRP <cr>” requests the current length and force data from the tester.
- ASCII string “DRS <cr>” requests all stored test data from the tester.

When <cr> is used, it is meant to simulate a carriage return, or the Enter or Return key.

3.9.5 Viewing Test Data on a Computer

The following example shows the data format that is sent each time Send is pressed:



3.9.6 Description of data format output

Heading

The first three lines of data contain non-numeric data. Line 1 identifies the type of device sending the data. Line 2 identifies the test mode used to find the test data. Line 3 identifies the measurement units used.

Example:	DVDHT	Device (DV) sending the test data is a DHT
	SCM	Specified command (SC) is Manual mode
	MUIL	Measurement units (MU) is inch / lb

Count

If a single test is sent, the test count will always be 0. If stored tests are sent, the test count will start with 1 and continue to the highest test number.

Date

Date of the test. (MM/DD/YY, or as specified in the User Setup option)

Time

Time of the test. (HH:MM:SS, or as specified in the User Setup option)

Tab

A tab character will be inserted after the time is sent. This is for SDHTs connected to a data logger such as DataMyte. It is required to read the date and time as a remark.

Length

The length reading.

Force

The force reading.

Communications parameters

See section 5.7.2.

4.0 OPERATION

Both the SDHT and SDHT 2000 can test samples in Manual Mode (compression and extension), Peak Force Mode and Two Point with Rate Mode. The following sections detail four different examples of testing procedures.

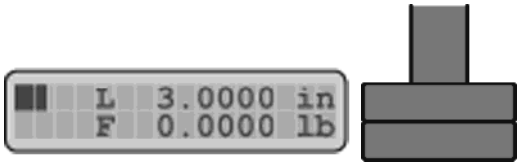
4.1 Measuring a Compression Spring

The following example shows you how to perform a typical compression spring test, display and print the results, and print a statistical summary for one test point.

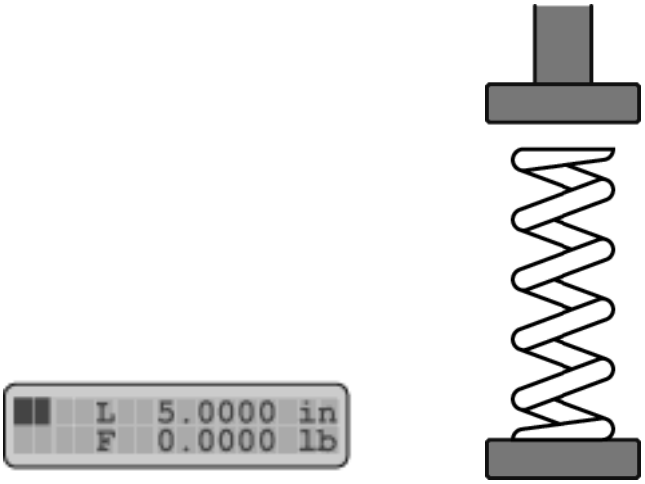
1. Press [On / Clear] to turn on the tester.

2. Press [Mode] until the SDHT displays "Manual Mode" (this is the default mode).

3. Put the platforms together, apply about 10% full scale force and press [Zero Length].

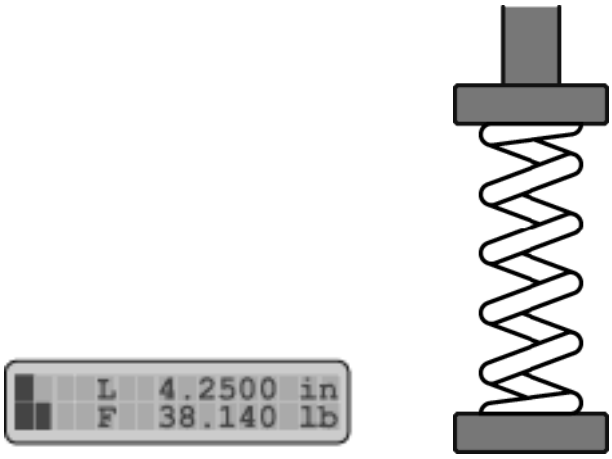


4. Move upper platform up, place spring on bottom platform and press [Zero Force].



5. Compress spring to first load or length (display shows length and force).

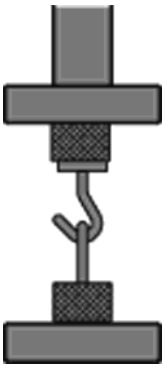
5. Compress spring to first load or length (display shows length and force).



6. Press Send to print or Store to save.

7. Press Option, then F2 (EndPrint) to

4.2 Measuring an Extension Spring



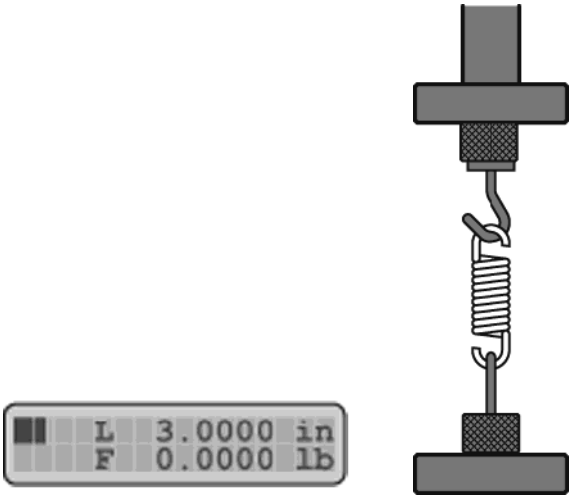
The following example shows you how to perform a typical extension spring test, display and print the results, and print a statistical summary for one test point.

1. Press On / Clear to turn on the tester.

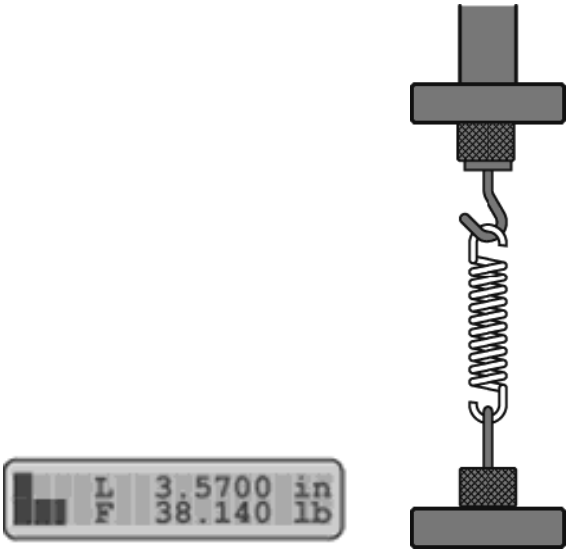
2. Press Mode until the SDHT displays "Manual Mode" (this is the default mode.)

3. Interlock extension hooks, apply about 10% of full scale force and press Zero Length.

4. Raise the upper platform, hang the spring from the upper extension hook and press Zero Force.



5. Extend the spring to first load or length (display shows length and force.)



6. Press Send to print or Store to save.

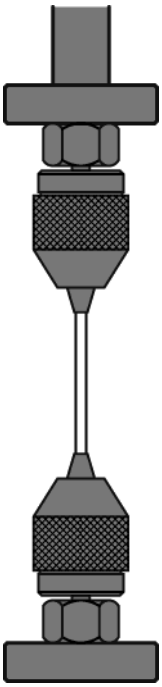
7. Press, Option then F2 (EndPrint) to print the statistical summary.

4.3 Measuring Peak Force

The following example shows you how to measure the peak force, display and print the results, and print a statistical summary for one test point.

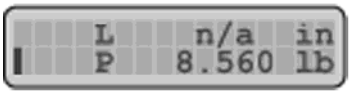
1. Press [On / Clear] to turn on the tester.

2. Install the fixtures that will hold the sample.



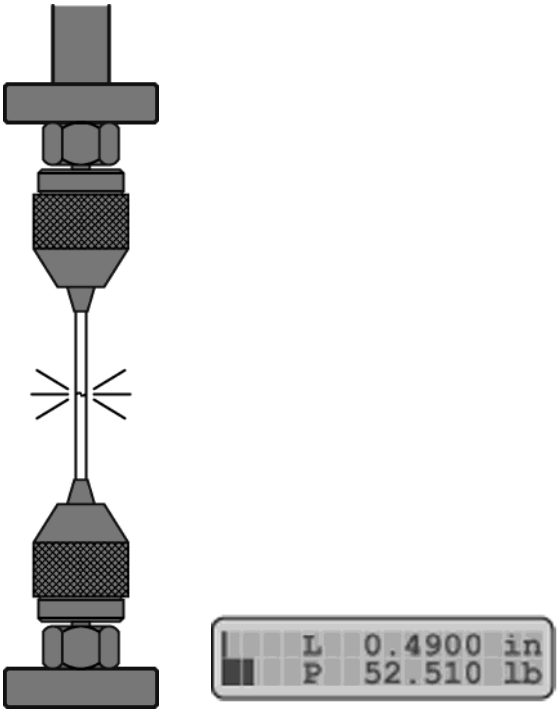
3. Press [Mode] until the SDHT displays Peak Mode."

4. Load the sample and press [Zero Force].

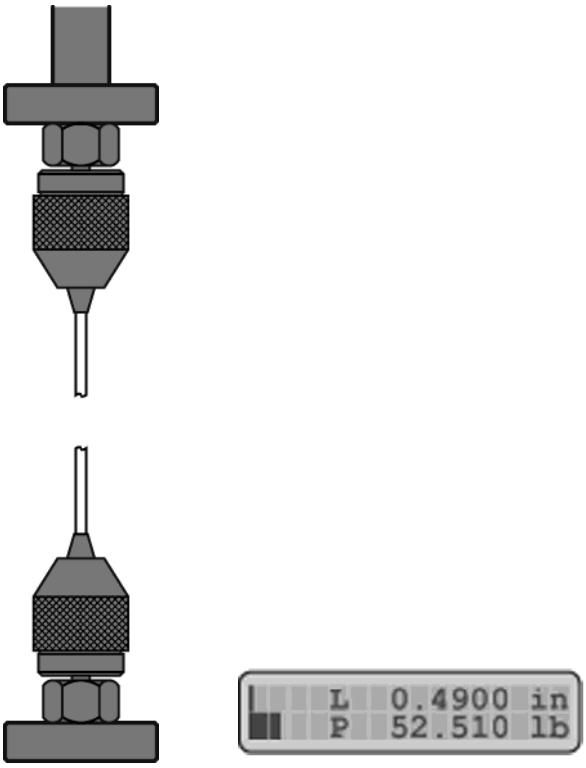


5. Optionally, apply about 10% of full scale force and press [Zero Length].

6. Extend or compress the sample to the desired length, past the peak force point of the sample.



7. The SDHT will display the maximum applied force.



8. Press Send to print, Store to save, or On / Clear to reset to try the test again.

9. Press On / Clear, then F2 (EndPrint) to print the statistical summary.

Note: Diagrams show a sample extension peak force test. A compression peak force test would be very similar.

4.4 Measuring Spring Rate

The following example shows you how to perform a typical compression spring test, display and print the results, and print a statistical summary for two test points. The instructions below are for a compression spring, but the steps are very similar for an extension spring. Refer to section 4.2 for mounting instructions.

4.4.1 Spring Rate - Print or Store Data Directly

1. Press On / Clear to turn on the tester.
2. Put platforms together, and press Zero Length.
3. Press Mode until the SDHT displays “Two Point with Rate Mode.”
4. Raise the upper platform, place the spring on the lower platform and press Zero Force.
5. Compress the spring to the first force or length point and press Send or Store to capture test point 1.
6. Compress the spring to the second force or length point and press Send or Store to capture test point 2.
7. The spring rate is not displayed, but is printed or stored.
8. Press Option then F2 (EndPrint) to print the statistical summary.

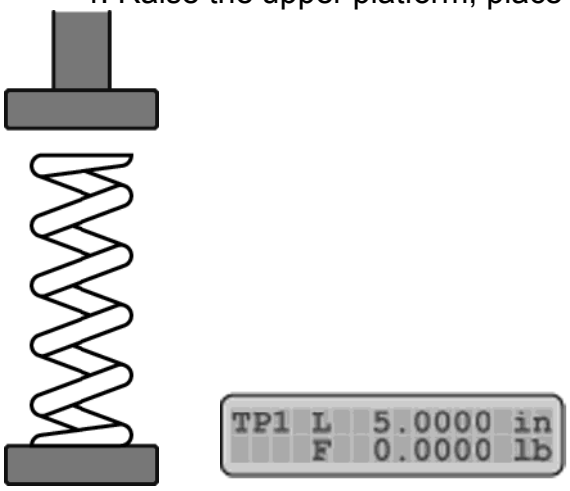
4.4.2 Spring Rate - Display Data

1. Press On / Clear to turn on the tester.

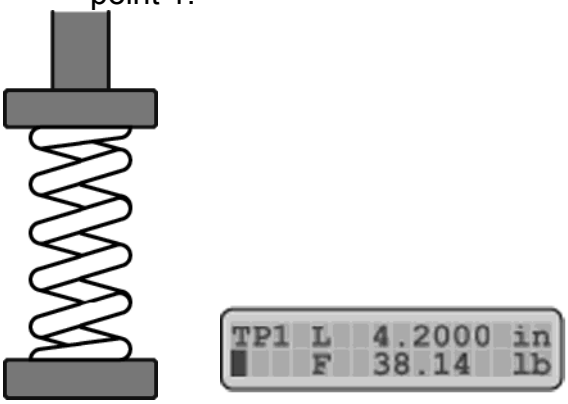
2. Put platforms together, and press Zero Length.

3. Press Mode until the SDHT displays “Two Point with Rate Mode”.

4. Raise the upper platform, place the spring on the lower platform and press Zero Force.

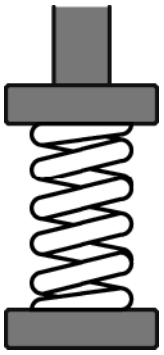


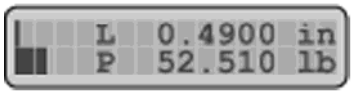
5. Compress the spring to the first force or length point and press F1 to capture test point 1.



(Test Point 1)

6. Compress the spring to the second force or length point and press F2 to capture test point 2.





(Test Point 2)

7. Press F1 to view the test points. Press Send to print, Store to save or On / Clear to reset.

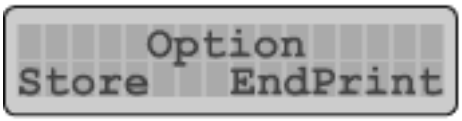
(Spring rate displayed)

8. Press Option, then F2 (EndPrint) to print the statistical summary.

5.0 OPTION MENU

The Option menu helps you access a variety of tester functions, including setup parameters, as well as less frequently used features.

Press Option to enter the Option menu. Press Option again to cycle through all available options (listed below). Press either F1 or F2 to select a particular menu item. Press Store to move up one level while in the Option menu and On / Clear to leave the Option menu and return to the regular test mode.



**

**This menu option shows only if Limits option was purchased.

The following sections have detailed descriptions of the menu items.

```
    Option
Cal Check
```

```
    Option
User Setup
```

```
    Option
Diagnostic
```

```
    Option
Calib menus
```

```
    Option
Factory Setup
```

5.1 Store

Store lets you view all test points, clear a displayed test point or clear all test points.

1. Press [Option] until you see:

```
    Option
Store   EndPrint
```

2. Press [F1] to select Store.

   - If no test data is stored, the SDHT will display:

```
No information
    stored
```

   - If test data is stored, the SDHT will display the first test point:

```
#  1  4.1860 in
-    5.4022   lb+
```

3. Press [F1] or [F2] to scroll through and view the test data.

4. Press [Option]. The SDHT then asks to delete the current test point. Press [F1] to delete this test point or [Mode] to cancel and return to the current test point.

```
Clear Mem     1
Now
```

5. When you see the above displayed, press [Option] again. The SDHT will ask to delete ALL test points :

```
Clear All Memory
Now
```

6. Press [F1] to delete ALL test points, [Mode] to go back to deleting only the current test point, or [Option] to cancel and return to your current test point.

5.2 EndPrint

The EndPrint option allows you to print statistical summary data such as the mean, standard deviation, maximum, minimum and range at the end of testing.

1. Press [Option] until you see:

```
     Option
Store   EndPrint
```

2. Press [F2] to select EndPrint.

• If no tests are in memory or if a printer is not connected, the SDHT will display:

```
Print-out Not
 in Progress
```

• If there are tests in memory, the printer will print the statistical summary and the SDHT will display:

```
Print-out Done
 Please Wait..
```

5.3 Limit Options

The Limit option allows you to set force or length limits. Using the indicator lights, you can sort parts very quickly based on preset criteria.

1. Press [Option] until you see:

```
 Limit Option
On          Off
```

2. Press [F1] to turn on the limit option:

```
 Limit Option
Force     Length
```

3. You can choose whether you want to place limits on the force or length reading of a test. Press [F1] to select Force or [F2] to select Length. Based on your choice, the tester will display:

```
Man. Low   lb
nxt -00.0000   +
```

Force

```
Man. Low   in
nxt -00.0000   +
```

Length

4. You can now set the **low** force or length limit. A blinking cursor will appear on the screen. To move the cursor to the right, press [F1]. To move the cursor to the left, press [Units]. To increase the value of the current digit, press [F2]. To decrease the value, press [Zero Length]. To specify a negative value, place the cursor before the first digit (also the default cursor position) and press [F2] to toggle the (–) minus sign. When satisfied with the low force or length limit, press [Option]. This brings you to this display:

```
Man. High  lb
nxt -00.0000   +
```

Force

```
Man. High  in
nxt -00.0000   +
```

Length

5. You can now set the **high** force or length limit. Refer to the previous step for setting the value. When done, press [Option] to go back to the low force or length limit or [On / Clear] to save the limit values and return to normal test mode.

6. While testing with the limit option enabled, the Low, Good and High limit lights on your SDHT will alert you to the test condition of the part. Good parts will return a green light and out-of-spec parts—too low or too high--will display red lights.

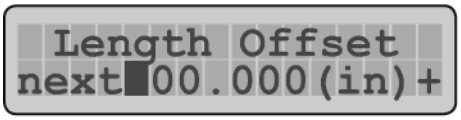
5.4 Offset

This option allows you to set force and length offsets. Offsets will compensate for tooling height, weight, and/or part weight. Use the offset feature, for instance, when testing parts that exceed the stroke of the tester. See section 3.7.5 for more information.

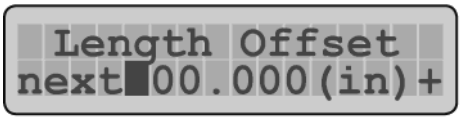
1. Press [Option] until you see:

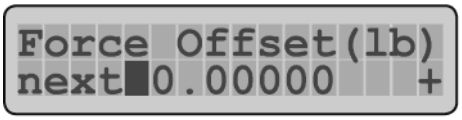
1. 

2. Press [F1] to select Offset:

2. 

3. Press [Option] or [Zero Force] to switch between Length Offset and Force Offset:

3. 



4. You can now set the offset. To move the blinking cursor to the right, press [F1]. To move the cursor to the left, press [Units]. To increase the value of the current digit, press [F2]. To decrease the value, press [Zero Length]. To specify a negative value, place the cursor before the first digit (also the default cursor position) and press [F2] to toggle the (–) minus sign. When offset value is set, press [Store] to return to the option menu or [On / Clear] to return to normal test mode.

5.5 Power: Turning off the SDHT from the Options Menu

Press [Option] until this screen appears:

```
    Option
Offset     Power
```

Press [F2] to select Power:

```
Turn Off Power?
Stay On      Off
```

Press [F2] to turn off power to the tester. You will see a screen that tells you your data is being saved.

```
    Saving
  Information
```

If you are not in the Options menu, simply press the [Off] button.

5.6 Calibration Check

This option allows you to verify the calibration of the SDHT based on shunt numbers set at the factory. This information is recorded on the traceable report included with the tester.

1. Press [Option] until you see:

1.
```
    Option
Cal Check
```

2. Press [F1] to select Cal Check:

2.
```
  Select Shunt
Load Cell  Panel
```

3. If your tester is an SDHT, press [F2] to select Panel. If your tester is an SDHT 2000, press [F1] to select Load Cell. You will see the following sequence of screens:

3.
```
Cal Check Mode
```

```
Press F1 or F2
 to swap display
```

```
Press Clear to
 Exit Cal Check
```

```
S    -1.6218  lb
F    -1.6224  lb
```

4. The number following the S is the shunt value. The number following the F is the force value. Press [F1] or [F2] to view the zero reading:

4.
```
  Zero Readinglb
F    0.00034  lb
```

5. If the force value or the zero value are not within load cell tolerances, the tester must be recalibrated. Press [On / Clear] to exit to normal test mode.

5.7 User Setup

You can use the User Setup menu to customize your SDHT. For example, you can choose power options, enter your company name, and more.

1. Press [Option] to enter the Option menu. Scroll through the Options menu by pressing [Option] until you see:

```
     Option
User Setup
```

2. Press [F1] to select User Setup. You will see the following sequence of screens:

(Note: If you press [Option], you will return to the Options menu.)

```
  Authorized
Personnel Only
```

```
Enter Passcode
or press Option
```

3. To continue and enter the passcode, you must press the following buttons:

[Units] [Send] [F1]

You are now in the SDHT's User Setup menu:

```
     User Setup
RS232      Power
```

4. Press [Mode] to cycle through all the available options, which are shown at right. Press [On / Clear] to return to regular test mode.

```
     User Setup
RS232      Power
```

```
  User Setup
Cal. Info
```

```
  User Setup
I/O Polarity
```

```
User Setup
+/- Rule
```

```
User Setup
1st Peak  Filter
```

```
User Setup
Backlight  Units
```

```
User Setup
Company     City
```

```
User Setup
Dampening   Date
```

5.7.1 User Setup—Getting Ready to Print a Report from the RS 232

This option allows you to set up the communications port. This menu has two options: Report and Data. The Report option allows you to setup the SDHT to print the report. The Data option allows you to establish the communication link between the SDHT and a data logger or other RS 232 device.

```
     User Setup
RS232      Power
```

1. Press [F1] to select RS232. You should see a screen that says:

```
 Output Format
-    Report    +
```

2. You can now choose between sending data and printing a report. Press [F1] to choose Report, or [F2] to choose Data. Choose Report and press [Option] to continue to the next screen:

```
 Print Report :
-     Yes      +
```

3. Press [F1] for Yes; [F2] for No. Press [Option] to continue to the next screen:

```
Print Out Format
-  Full Stats  +
```

4. You may now choose a Standard or Full Stats report. Press either F1 or F2 to toggle between Full Stats and Standard.

5. After you've made your choice, press Option to go to the next screen. Now you must decide if you want to put a heading on your report. Press either F1 or F2 to choose Print Heading or No Heading. Press Option to continue.

```
 Printer Format:
-Print Heading +
```

6. This screen asks if you want to print a summary of your data. Press either F1 or F2 to choose Print Summary or No Summary. After you've made your choice, press Option to go to the next screen.

```
 Printer Format:
-Print Summary +
```

7. This option allows you to choose the number of characters per line and double or single-width characters. To toggle between 80/Double and 80/Single, press F1 or F2. Press Option to continue to the next screen.

```
Printer ch,width
-    80, Double +
```

8. This option allows you to specify the communication method. To toggled between Hardware, None, Delay .01 sec, Delay .025 sec and Delay .05 sec, press either F1 or F2. Press Option to go to the next screen.

```
Printer Protocol
-    Hardware    +
```

9. The default baud rate for the RS 232 is 9600. However, you can set your own transmission speed. To change baud rates, press either F1 or F2. Optional baud rate are 1200, 2400, 4800, 9600 and 19200. Press Option to go to the next screen.

```
Printer BaudRate
-      9600      +
```

10. To choose between Plain Paper (8.5” x 11”) or Roll Feed (for 4” thermal printer paper), press [F1] or [F2]. Press [Option] to go to the next screen.

```
  Paper Type
- Plain Paper  +
```

11. You can now set the number of lines per page. Default value is 66 lines per page. To move the blinking cursor to the right, press [F1]. Press [F2] to increase or the number of lines. Press [Zero Length] to decrease the number of lines. When the desired number of lines has been set, press [Option] to continue.

```
 Lines per Page
next   66      +
```

12. You are now ready to select a printer. To choose an LSI-provided printer (Okidata impact printer—Oki-1F/1E, or Epson inkjet printer—Epson-0E/14) or your own printer (Other), press [F1] or [F2]. Press [On / Clear] to save your selections and exit the User Setup Option.

```
Dbl Wdth On/Off
-   Oki- 1F/1E +
```

5.7.2 User Setup—Getting Ready to Transmit Data via the RS 232

The Data option allows you to set the communications link between the SDHT and a data logger or other RS 232 device.

1. Start at the Options menu and select:

```
    Option
User Setup
```

2. Press [Units] [Send] [F1] to access this screen:

```
     User Setup
RS232       Power
```

3. Press [F1] [F1] to choose Data:

```
 Output Format
-     Data     +
```

Then press Option to continue to the next screen.

4. To toggle between Yes and No, press F1 or F2. Press Option to continue to the next screen.

```
 Send Results:
-      Yes      +
```

5. This screen asks if you want to put a heading on your data before you send it. Press F1 or F2 to toggle between Send Heading and No Heading. Press Option to go on.

```
 Data Transfer
- Send Heading +
```

6. This screen asks if you want to send a Test Count. Press F1 or F2 to toggle between Send Count and No Test Count. Press Option to go on.

```
 Data Transfer
- Send Count   +
```

7. This function adds the current date to the report. Press F1 or F2 to toggle between Send Date and No Date. Press Option to go on.

```
 Data Transfer
- Send Date    +
```

8. This function adds the current time to the report. Press F1 or F2 to toggle between Send Time and No Time. Press Option to go on.

```
 Data Transfer
- Send Time    +
```

9. The RS 232 device to which your SDHT is connected may require a tab character. To toggle between Send Tab Char and No Tab Char, press F1 or F2. To continue, press Option.

```
 Data Transfer
-Send Tab Char +
```

10. Sometimes, you want to send only the length or force measurements to a data logger. Press [F1] or [F2] to toggle between Send Length and No Length. Press [Option] to go on. Press [Option] to move to the Send Force screen. Press [F1] or [F2] to toggle between Send Force and No Force. Press [Option] to go on.

```
 Data Transfer
- Send Length  +
```

```
 Data Transfer
-  Send Force  +
```

11. This option allows you to specify the communication method. To toggle between Hardware, Delay .05 sec, Delay .025 sec, Delay .01 sec, and None, press [F1] or [F2]. Press [Option] to go on to the next step.

```
 Comm. Protocol
-   Hardware   +
```

12. The default baud rate for the RS 232 is 9600. However, you can set your own transmission speed. To change baud rates, press either [F1] or [F2]. Optional baud rate are 1200, 2400, 4800, 9600 and 19200.

```
Comm. Baud Rate
-      9600     +
```

13. Press [On / Clear] to save your information and exit.

5.7.3 User Setup—Power Timeout

The Power option helps prolong the SDHT's battery life. With this option, you can set the automatic timer to turn off the battery power when no activity is detected for a set value.

Go to the User Setup screen.

```
     User Setup
RS232      Power
```

Press [F2] to select Power. This example shows a time of 90 hours and 20 minutes. To move the blinking cursor to the right, press [F1]. To move the cursor to the left press [Units]. To increase the value of the digit highlighted by the cursor, press [F2]. To decrease the

value, press [Zero Length]. When the desired value is set, Press [On / Clear] to save and exit to normal test mode.

```
 Power Time-out
next    90:20    +
```

5.7.4 User Setup—Dampening

Dampening averages the force measurements to eliminate the noise in the display caused by vibration. Dampening will slow the measurement process. LSI recommends setting dampening to the minimum level necessary to achieve a stable, readable display.

Go to the User Setup screen.

```
      User Setup
RS232        Power
```

Press [Option] to get to the Dampening screen.

```
   User Setup
Dampening   Date
```

To switch between None, Low, Medium and High press [F1] or [F2]. Press [Store] to save and return to normal test mode.

5.7.5 User Setup—Date and Time

You can adjust the date and time to fit the standard your company uses.

1. Go to the User Setup screen.

```
      User Setup
RS232        Power
```

2. Press [Option] to get to the Dampening screen.

```
   User Setup
Dampening   Date
```

3. Press [F2] to select Date.

```
  Date Format
-   MM/DD/YY   +
```

4. The default format is MM/DD/YY. To switch between Month/Day/Year, Year/Month/Day or Day/Month/Year, press [F1] or [F2]. Press [Option] to continue to the next screen.

5. Now you can change the date. To move the blinking cursor to the right, press [F1]. To move the cursor to the left, press [Units]. To increase the value of the blinking digit, press [F2]. To decrease the value, press [Zero Length]. Press option to move to the next screen.

```
    MM:DD:YY
next 08 15 03  +
```

6. You can set the clock on the SDHT to a 12-hour or 24-hour clock. The default format is a 12-hour clock. To switch between the 12-hour clock and the 24-hour clock, press [F1] or [F2]. Press [Option] to continue to the next screen.

```
  Time Format
- 12 Hour a/pm +
```

7. Now you can change the time. To move the blinking cursor to the right, press [F1]. To move the cursor to the left, press [Units]. To increase the value of the blinking digit, press [F1]. To decrease the value, press [Zero Length]. Press store to save your settings. You will automatically return to normal test mode.

```
   HH:MM a/pm
next 09:28 a   +
```

5.7.6 User Setup—Company Name

You can put your company name into your SDHT—a great theft deterrent.

Go to the User Setup screen. Use [Option] to get to the Company screen.

```
     User Setup
RS232      Power
```

Press [F1] to select Company.

```
   User Setup
Company     City
```

You can enter a company name up to 32 characters long. Because of space limitations on the display panel, however, you must enter your company name in four, 8-character sections. (See the diagram at right for the Active Area.) The sections are denoted by the fraction in the upper right corner of the screen.

To move the blinking cursor to the right, press [F1]. To move the cursor to the left, press [Units]. To move through the alphabet from A to Z, press [F1]. To move through the alphabet from Z to A, press [Zero Length]. After you have entered the correct letter, press [F1] to move on to the next letter. When you have entered all the letters in the first section, press [Option] to move to the next section.

```
Company Name 1/4
next Your Com  +
```

Active Area

Continue entering your company name using the above instructions. When you are finished, press [Store] to save your information and return to the normal test mode.

```
Company Name 2/4
next pany Nam  +
```

5.7.6 User Setup—City Name

Use this option to enter the name of the city in which your business is located.

Go to the User Setup screen. Use [Option] to get to the Company screen.

```
     User Setup
RS232       Power
```

Press [F2] to select City:

```
   User Setup
Company     City
```

You can enter a city name that is up to 32 characters long. Because of space limitations on the display panel, you must enter your city name in four, 8-character sections (see the diagram at right for the Active Area). To move the blinking cursor to the right, press [F1]. To move the cursor to the left, press [Units]. To move through the alphabet from A to Z, press [F2]. To move through the alphabet from Z to A, press [Zero Length]. After you have entered the correct letter, press [F1] to move on to the next letter. When you have entered all the letters in the first

section, press Option to move to the next section.

```
  City Name   1/4
next Anytown,    +
```

Active Area

Continue entering your city name according to the instructions. When you are finished, press Store to save your information and return to normal test mode.

```
  City Name   2/4
next  USA        +
```

5.7.8 User Setup—Backlight Timeout

Your SDHT comes with a backlight timer to conserve battery life. The timer is factory set, but you can change it to meet your requirements.

Go to the User Setup screen. Use Option to get to the Backlight screen.

```
      User Setup
RS232        Power
```

Press F1 to select Backlight.

```
   User Setup
Backlight  Units
```

The example shows a time of 90 hours and 5 minutes. To move the blinking cursor to the right, press F1. To move the cursor to the left, press Units. To increase the value of the blinking digit, press F2. To decrease the value of a unit, press Zero Length. When the desired value is set, press On / Clear to save your settings and return to normal test mode.

```
  Light Time-out
next   90:05    +
```

5.7.9 User Setup—Units Used

This feature allows you to disable units of measure that you do not use. For example, if you use only metric measurements, you may wish to turn off English measurements.

Go to the User Setup screen. Use Option to get to the Backlight screen.

```
      User Setup
RS232        Power
```

Press [F2] to choose Units.

```
User Setup
Backlight  Units
```

To scroll through the various units of measure, press [Option]. Press [F1] or [F2] to toggle between Use and Don't Use for each unit and turn them on or off. When all desired units have been enabled or disabled, press [Store] to save and return to normal test mode.

```
Units Used
-   Use lb    +
```

5.7.10—User Setup—First Peak Drop

This feature allows you to set the first peak mode drop-off setting.

1. Go to the User Setup screen. Use [Option] to get to the 1st Peak Filter screen.

```
     User Setup
RS232       Power
```

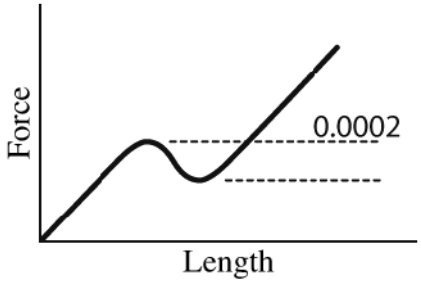
2. Press [F1] to select 1st Peak.

```
User Setup
1st Peak  Filter
```

3. This example indicates a drop of 0.0002 force units. This is the value necessary to identify a first peak point.

```
First Peak Drop
nxt 01x0.000200+
```

If it were diagrammed, the peak might look like this:



4. To move the blinking cursor to the right, press [F1]. To move the cursor to the left, press [Units]. To increase the value of the blinking digit, press [Zero Length]. To decrease the value, press

[F2]. When the desired value is et, press [On / Clear] or [Store] to save your data and return to normal test mode.

5.7.11 User Setup—Filtering

This feature allows you to set the filtering.

1. Go to the User Setup screen. Use [Option] to get to the 1st Peak Filter screen.

```
     User Setup
RS232      Power
```

2. Press [F2] to select Filter.

```
  User Setup
1st Peak  Filter
```

3. Press [F1] or [F2] to change filter settings. Your choices are None, Low, Medium, High, User #1, User #2, User #3, and User #4. Press [Option] to go to the next screen.

```
   Filtering
-    Medium    +
```

4. To choose Yes or No, press [F1] or [F2]. Press [Option] to go to the next screen.

```
 Display Filter
-      No      +
```

5. “Kd” is the maximum gain of the filter. To move the blinking cursor to the right, press [F1]. To move it to the left, press [Units]. To increase the value of the blinking digit, press [F2]. To decrease its value, press [Zero Length]. When the desired value is set, press [Option] to go to the next screen.

```
 Dampening  (Kd)
nxt  100.00  % +
```

6. “M” is the minimum value the gain will achieve while stabilizing. To move the blinking cursor to the right, press [F1]. To move it to the left, press [Units]. To increase the value of the blinking digit, press [F2]. To decrease its value, press [Zero Length]. To continue to the next

screen, press Option.

```
 Dampen Min   (M)
nxt  01.0000 % +
```

7. “C” controls the speed of the gain decline. To move the blinking cursor to the right press F1. To move it to the left, press Units. To increase the value of the blinking digit, press F2. To decrease it value, press Zero Length. To go to the next screen, push Option.

```
 Decay Rate   (C)
nxt  02.0000 % +
```

8. “R” controls the speed of the gain increase when instability in the force reading occurs. To move the blinking cursor to the right, press F1. To move it to the left, press Units. To increase the value of the blinking digit, press F2. To decrease its value, press Zero Length.

When the desired value is set, press On / Clear or Store Store to save your data and return to normal test mode.

```
 Recovery     (R)
nxt  03.0000 % +
```

5.7.13 User Setup—Plus or Minus +/- Force Rule

This option allows you to determine which direction is positive for force and length.

1. Go to the User Setup screen. Use Option to get to the +/- Rule screen.

```
     User Setup
RS232      Power
```

2. Press F1 to select the +/- Rule screen.

```
   User Setup
+/- Rule
```

3. Press F1 or F2 to toggle between Compress Pos and Tension Pos. Press Option to continue to the next screen.

```
 +/- Force  Rule
- Compress Pos +
```

4. Press F1 or F2 to switch between Up Positive and Down Positive. Press On / Clear or Store Store to save your data and return to normal test mode.

```
 +/- Length Rule
- Up  Positive +
```

5.8 Diagnostics

The Diagnostics menu accesses a variety of tester performance functions that may help you troubleshoot problems. Press [Option] to enter the Options Menu. Keep pressing [Option] to cycle through all of the available options until you see

```
    Option
Diagnostic
```

.

Press [F1] to select Diagnostic. Press [Option] again to cycle through all available options, listed at right. To scroll backward through the menu, press [Mode]. Press [On / Clear] to leave the Diagnostics menu and return to the regular test mode. The following sections contain detailed descriptions of the menu items.

```
View Batt Volts
-      No      +
```

```
Perf Keypad Chck
Now
```

```
Perf Screen Chck
Now
```

```
External Inputs
     000
```

```
RS232 Protocols
19200,None
```

```
RS232-Report Off
```

```
Perf RS232 Check
Now
```

```
16 MHz processor
with 64 Kb RAM
```

```
SMC 1       2.01b
-SN              +
```

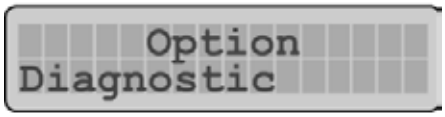
```
Print Cell Info
One          All
```

```
Print All E2 Mem
Now
```

5.8.1 Diagnostics—Battery Voltage

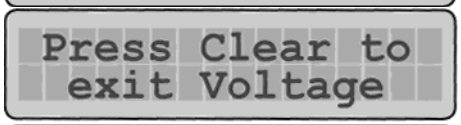
Use this view to check battery voltage. This information can tell you if the battery is charged. A fully charged battery should read between 6.8 and 7.2 volts. A battery connected to a charger should read 7.8 volts or higher.

1. At the Diagnostic screen, press [Option] to choose the View Battery screen.



2. To toggle between Yes and No, press [F1] or [F2].

3. To view voltage now, press [Zero Force]. The Voltage Mode screen will come up, followed by the Press Clear screen and a reading that tells you how much voltage the battery is supplying at the moment.



5.8.2 Diagnostics—Keypad Check

Use this option to test the button layout and responsiveness of the SDHT.

1. At the Diagnostic screen, press [F1] to get to the Diagnostic options. Press [Option] to choose the Perform Keypad Check screen.

2. Press [F1]. You will see this screen, followed by another:

3. You can now press any button on the SDHT, and the display will update. For example, by pressing the [Zero Force] button, the SDHT will briefly display:

```
Press any key
Zero Force Key
```

Press [On / Clear] to return to the Diagnostics menu. The SDHT will briefly display:

```
Press any key
On/Clear-exiting
```

5.8.3 Diagnostics—Screen Check

This option displays a self-advancing cursor that moves across the screen. If any inconsistencies are present on the display, they will show up in this test.

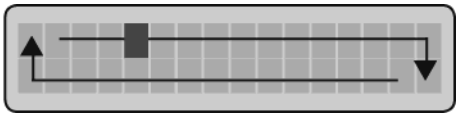
1. Scroll through the Options menu until you see the Diagnostic screen. Press [F1] to get to the Diagnostic options. Press [Option] to choose the Perform Screen Check display.

```
Option
Diagnostic
```

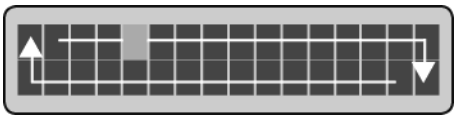
```
Perf Screen Chck
Now
```

2. Press [F1]. The Press Clear to Exit Screen Check screen will come up, then a single dark cursor will automatically advance clockwise around the display. You will hear an audible beep with each advance of the cursor.

```
Press Clear to
exit Screen Chck
```



3. When the cursor returns to the upper left corner, the entire display inverts:



4 Press [On / Clear] to return to the normal test mode.

If you purchased the Programmable Sequence option, you may see this screen on your SDHT. It is used for testing the pin settings. The inputs are not included in the standard version of the SDHT.	External Inputs 000

5.8.4 Diagnostics—Output Diagnostics Test

This test allows you to take manual control of the four (4) output signals, if the Programmable Sequence option is ordered.

1. Scroll through the Options menu until you see the Diagnostic screen. Press Option to choose the Output Diagnostics Test screen.

```
    Option
Diagnostic
```

2. Scroll through the Diagnostic options by pressing Option until you reach the Output Diagostics screen. To toggle the Output On or Off, press F2.

```
Output Diag Test
nxt  1 Off   tgl
```

3. Press F1 to advance to the next Output. Continue through all four (4) output options.

Press On / Clear or Store to return to the normal test mode

```
Output Diag Test
nxt  2 Off   tgl
```

5.8.5 Diagnostics—RS 232 Protocols

This display shows the current RS 232 baud rate and flow control. Data bits, stop bits and parity do not change and remain at 8.2 and “none.” Press Option to go to the next diagnostic option.

```
RS232 Protocols
19200,None
```

5.8.6 Diagnostics—RS 232 Output Format

This display shows the current data output format, send status and associated options. You can select these report settings through the User Options menu.

1. When Report is selected in the User Options, the SDHT will display:

```
RS232-Report On
 Heading Summary
```

2. When Data is selected in the User Options, the SDHT will display:

```
RS232-Data   On
-Heading Count +
```

3. Press [F1] or [F2] to toggle between the different displayed options.

```
RS232-Data   On
-Date     Time  +
```

```
RS232-Data   On
-Length  Force +
```

4. Press [Option] to move to the next diagnostic option.

5.8.7 Diagnostics—RS 232 Check

This function allows you to send a short message out of the RS 232 port to detect an RS 232 device. To perform this test, you will need to purchase or make a loop-back cable that attaches to the RS 232.

```
Perf RS232 Check
Now
```

Press [F1] to run the test. The SDHT will indicate if the test is successful or fails. Press [Option] to move to the next diagnostic option.

```
 Trying to send
info with RS232
```

5.8.8 Diagnostics—Processor Check

This check confirms the processor speed and RAM capacity of the SDHT.

```
16 MHz processor
with 64 Kb RAM
```

Press [Option] to move to the next diagnostic option.

5.8.9 Diagnostics—Smart Memory (SM)

This check displays the load cell capacity and serial number of all smart cells stored in the tester. The letter "C" in SMC indicates the cell is currently installed in the SDHT. Press [F1] or [F2] to view all of the cell locations. Press [Option] to move to the next diagnostic option.

```
SMC 1      2.01b
-SN            +
```

5.8.10 Diagnostics—Print Cell Info

This option allows you to print all of the calibration information for any or all of the smart cell locations in the tester. LSI may request this information if you have problems with your SDHT.

1. Select Print Cell Info by scrolling through the Diagnostics menu:

```
Print Cell Info
One          All
```

2. Press [F2] to print all of the cell information. The screen should look like this, and the information will print if the SDHT is attached to a printer.

```
 Printing Out
Cell Information
```

3. To choose to print a single cell, press [F1]. Press [Option] to send the information to the printer.

```
 Print Cell 01
Now
```

4. To move the blinking cursor to the right, push [F1]. To move the cursor to the left, push [Units]. To change the cell number to a higher number, press [F2]. To change to a lower number, press [Zero Length]. When you have set the desired number, press [Option] to

print. Press Option to continue to the next diagnostic option.

```
  Printing Out
Cell Information
```

5.8.11 Diagnostics—Print All Info

This option allows you to print out all tester settings and information. LSI may request this information if you have trouble with your SDHT.

Press F1 to select Now.

```
Print All E2 Mem
Now
```

If a printer is attached to the SDHT, the information will print and the display will return to the previous screen. Press Option, Store or On / Clear to return to normal testing mode.

```
  Printing Out
 E2 Information
```

5.9 Calibration Menus

```
     Option
Calib menus
```

There are no user-selectable options in this area. Only authorized calibration personnel who have a pass code can perform calibration. **Any calibration modifications done by unauthorized personnel will void the warranty.**

5.10 Factory Setup

```
     Option
Factory Setup
```

There are no user-selectable options in this area. Only authorized LSI personnel who have a password may work in this area. **Any factory setup modifications done by unauthorized personnel will void the warranty.**

6.0 SDHT ERROR MESSAGES

If your SDHT experiences an error, you should hear a beep and see on of the following error codes:

1. Error 4 Past Full Scale!

1. Load cell is compressed or extended beyond full scale force. Permanent damage to the load cell may occur. **Damaged load cells are not covered by warranty.**

2. Error 39 Printer Error

2. RS 232 device timeout. The SDHT tried to send data through the RS 232 port to a printer, but a timeout occurred.

3. Error 40 Send PC Error

3. RS 232 device timeout. The SDHT tried to send data through the RS 232 port to a computer, but a timeout occurred.

4. Error 55 No Contact results to store

4. Store was pressed, but no test results were stored.

5. Error 56 No Contact results to send

5. Store was pressed, but no test points have been tested.

6. Error 60 Storage Maxed

6. Store was pressed, but the maximum number of test points has already been stored.

7. Error 62 Manual Only Send to end set

7. Store was pressed when not in Manual Mode. The SDHT can store only test points of one test mode at a time.

8. Error 63 Peak Only Send to end set

8. Store was pressed when not in Peak Mode. The SDHT can store only test points of one test mode.

9. Error 70 Key n/a

9. A button was pushed that is not available in the current test mode.

10. Error 72 Not avail this model

10. Zero Length was pressed on a tester that is not available in the current test mode.

11. Error 75 Device Not Enabled

11. Send was pressed when no RS 232 devices were enabled.

12. Error 80 Keybrd Not Working

12. A power-up check found an error in the keypad. Contact LSI for service.

13. Error 81 Manual A/D Not Working

13. A power-up check found an error in the Manual Mode A/D feature. Contact LSI for service.

14. Error 82 Peak A/D Not Working

14. A power-up check found an error in the Peak Mode A/D feature. Contact LSI for service.

15. Error 85 Must Use (lb) (in) units

15. Units was pressed during the testing cycle, then Store was pressed. The current test cycle must be competed using the same unit of measure.

16. Error 86 Must Use (lb) (in) units

16. Units was pressed during the testing cycle, then Send was pressed. The current test cycle must be completed using the same unit of measure.

17. Error 87

17. A connected computer asked for stored test data from a tester that has no stored data.

18. Error 89 Must be at least 1 min.

18. In the User Setup option, a display sleep time of less than 1 minute was entered. This setting must be at least 1 minute.

19. Error 92 Call LSI Initialize? No

19. A power-up check found an error in the E2 prom memory. Press F2, then contact LSI.

20. Error 95 Call LSI RAM Error

20. A power-up check found an error in the RAM memory on Chip 2. Press any button to continue. This error will also produce a 2-second beep just after the initial power-on beep. Contact LSI for service.

21. Error 98 Low Battery Please Charge

21. The internal battery is almost discharged and needs to be recharged.

22. Error 99 Battery Too Low! Must Charge

22. The internal battery has become almost completely discharged and needs to recharge. The tester powers off to charge.

7.0 TESTER DEFAULTS

The SDHT is equipped with defaults set at the factory. You may wish to refer to the following if you need to change certain settings.

Note: Some settings (such as calibration) are customized for each tester and therefore have no default setting.

Options > User Setup > RS232 >Report:
Print Report: No
Print Out Format: Full Stats
Printer Format: Print Heading
Print Summary
Printer ch, width: 80, double
Printer Protocol: Hardware
Printer BaudRate: 9600
Paper Type: Plain Paper
Lines per page: 066
Dbl Wdth On/Off: Oki- 1F/1E

Measurement Units: lb, in
Length Offset: 000.0
Filtering: Medium
Peak Dampening: High
Backlight Timeout: 00:01:00
Power Timeout: 00:20:00

Company: Your Company Name
City: Anytown, USA

8.0 TESTER MAINTENANCE

Routine maintenance is limited to periodic cleaning. Apply oil to the rack and any other non-printed surfaces to prevent rust, minimize wear and to maintain smooth motion.

Side clearance of the upper rack is user-adjustable and should be adjusted periodically to maintain smooth motion.

The tester should be calibrated annually, and the frequency of verification should be set based on the application. For optimal performance, we recommend calibration by an LSI technician.

Title

Title to the described equipment shall remain in the seller until full, actual payment therefore shall have been made. In the event of a default, the seller shall have the right to repossess the said equipment and whatever monies shall have been paid on account shall be deemed to have been rental for the use thereof to the date of such repossession. The seller shall also have the right to hold the purchaser liable for a sum equivalent to the unpaid balance of the purchase price together with all expenses and damages that the seller may have sustained, the purchaser to receive credit however, for the net monies realized on the sale of the equipment. At the election of the seller, the seller may deem title to have passed to the purchaser, in which event the seller need not repossess the equipment, but may sue at law for the balance unpaid thereon.

Warranty

The LSI Spring Testing Systems parts and labor are warranted against defects in material and workmanship to the consumer for a period of twelve months from the date of purchase. This warranty covers all parts, except consumable items. It applies only to machines and accessories which have been installed and operated in accordance with instructions in our reference manuals, have not been tampered with in any way, misused, suffered damage through accident, neglect or conditions beyond our control and have been serviced only by authorized personnel. Larson Systems Incorporated is not responsible for loss in operating performance due to environmental conditions, such as humidity, dust, corrosive chemicals, deposition of oil or other foreign matter, spillage or other conditions beyond our control. There are no other warranties expressed or implied, and Larson Systems Incorporated shall not be liable under any circumstances for incidental or consequential damage. Warranty service is conducted at LSI's facilities in Minneapolis, MN. Return the tester freight prepaid during the warranty period, and Larson Systems Incorporated will make a warranty determination, repair and return the tester freight collect. Shipments sent collect will be rejected.

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