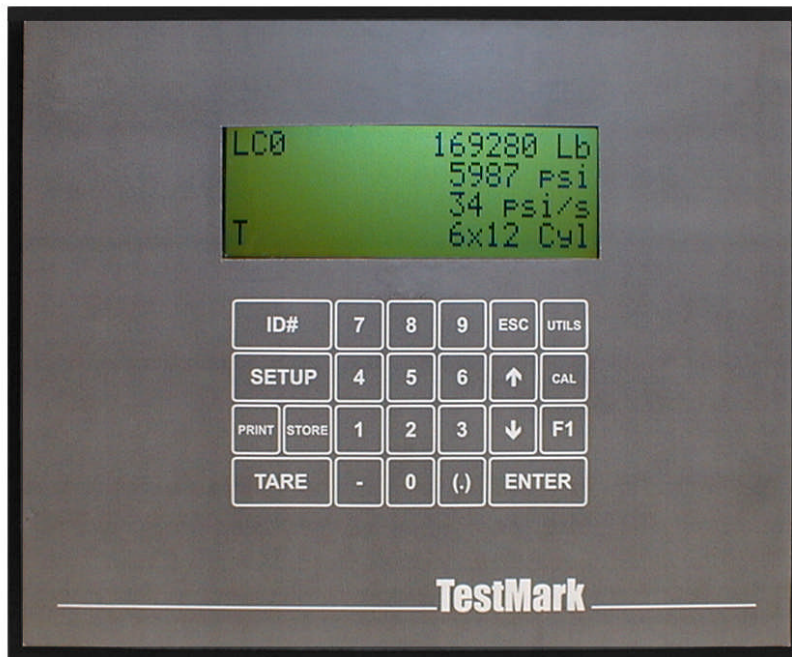


# LXI Digital System



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## **FORWARD**

Test Mark's LXI Indicating System has been designed and constructed with great care in every phase of assembly. In order to ensure reliability, both the mechanical and electrical components have been built with the best available materials. Nevertheless, it has been proven that a thorough understanding of the machine, together with proper attention, will pay big dividends. The sections of this manual provide descriptions and instructions on the operation and maintenance of the mechanical, electrical and software components.

You as a customer are our most valued asset. We take pride in our systems and are proud that you have become an owner. We welcome your comments about our products and wish that you expressed them. It is the only way that we can continue to build the best available test systems to satisfy your needs. Thank you for your support.

## **HOW TO USE THIS MANUAL**

This manual is intended to educate the customer on the capabilities, operation and maintenance of the LXI Indicating System. Read this manual and become familiar with the operation of your test machine prior to operating the LXI Indicating System.

## **TECHNICAL SUPPORT**

If a problem should occur with your testing machine:

- ✓ First check that all external inputs are properly connected.
- ✓ Second, call Test Mark for technical support at 800-783-3227 or 330-426-2200 (8AM to 5PM EST)

## 1.0 INTRODUCTION

The LXI Load Indicator is designed and manufactured for Test Mark Industries for compression testing. The LXI features high resolution, high accuracy, fast sampling rates, large data storage capability and is designed for high reliability and ease of use.

### Standard Features:

- ✓ Indicate Live Load, Peak Load, Live Stress, Peak Stress, Load Rate and Stress Rate
- ✓ Select Engineering Units of Lb, N, kN and Kg.
- ✓ Store up to 1,000 test results to permanent memory.
- ✓ Generate a hardcopy printout of the results on a compatible printer (not included).
- ✓ Store up to six load cell calibrations for multiple load cell systems. The load calibration Algorithm allows up to 10 calibration points per cell with piecewise linear fit between points. Accuracy exceeds ASTM E-4 standards and in general is greater than 0.5% from 1% to 100% of full scale.
- ✓ Activate Auto-Store to automatically store the results of each test.
- ✓ Define and detect the end of test with the Sample Break Detector.

### 1.1 Options:

- ✓ Download stored test results to a remote computer through the RS-232 port with optional Wincom or Wincom Plus software system. The data format on the receiving computer is in ASCII delimited format for easy import into many common spreadsheet and database programs such as Microsoft Access or Excel®.

### 1.2 Test Reports:

- ✓ Each test report consists of: Date, Time, Specimen ID #, Specimen Type, Area, Peak Load, Peak Stress, plus a statistical summary of Peak Load and Stress, plus all Test Report Option menu items that have been activated.

## **2.0 THE KEYS**

### **2.1 The <TARE> Key**

The Tare key performs the following functions:

Places the Indicator in a Ready Mode after system boot up, for test set up and data entry.

Defines a new zero load status by nullifying all tare weight values associated with floating the machines piston by moving it off its mechanical stops.

Clears out the previous test results from the test buffer and initializes the indicator for the next test. Make sure the previous test data was stored before pressing Tare key or all test data will be **LOST**.

### **2.2 The <ENTER> Key**

The Enter key performs the following functions:

Accepts and assigns the value in a data entry field to that field

Used during calibration

### **2.3 The <ESC> Key**

The ESC or Escape key performs the following functions:

Returns the Indicator to the live indicating screen from any menu

Clears a data entry mistake by restoring the original number to the data entry field

### **2.4 The <UP & DOWN ARROW> Keys**

The Arrow keys allow the operator to scroll through menu items

### **2.5 The <NUMBER> Keys**

The number keys are used to select an individual menu option from within a menu or input a numerical value in a data entry field.

### **2.6 The <SET UP> Key**

The Set Up key is used to enter and display the set up menu options.

### **2.7 The <ID> Key**

The ID key is used to enter an individual test specimen ID number. It can be up to 8 digits long.

**2.8 The <STORE> Key**

The Store key is used to store displayed test results to memory for printing or computer transfer. This option can be used in either manual mode or as an automatic function at the end of a test.

**2.9 The <PRINT> Key**

The Print key opens the print menu options for printing or computer transfer function of test data.

**2.10 The <F1> Key**

The F1 key opens the menu option for activating the automatic print, store and peak load computer transfer functions.

**2.11 The <UTILS> Key**

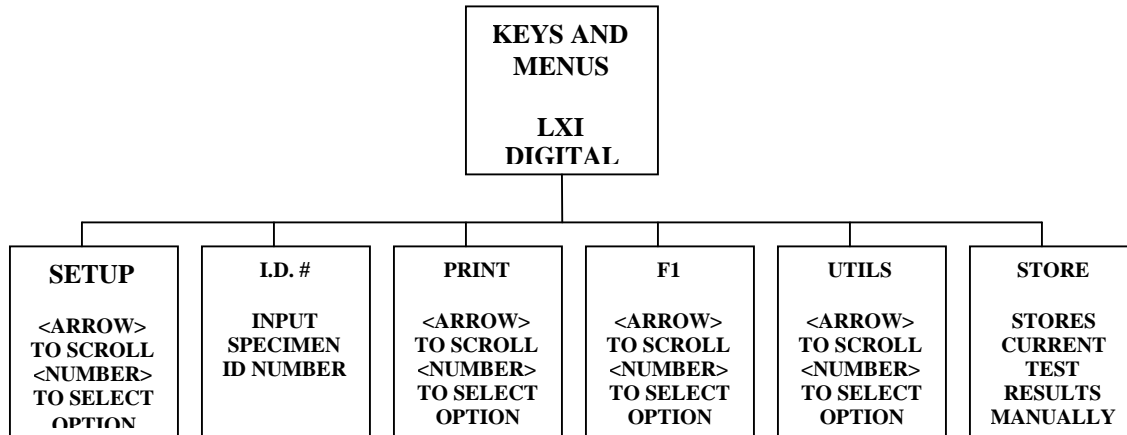
The Utils or Utility key opens the menu options for erasing all test results stored in the indicators memory, setting Date and time functions, checking transducer output, checking I/O, reinstalling the indicators factory default settings, activating supervisor lockout function, changing internal sampling rate time intervals and setup option for transferring stored test data into the optional Concrete Tracker software program.

**2.12 The <CAL> Key**

The Cal or Calibration key is used to enter the Calibration and should only be accessed by an authorized Calibration Company.



### 3.0 THE MENUS



- 1) Units
- 2) Specimen Type
- 3) Sample Break
- 4) Test Rpt Options
- 5) Load Cell Options

- 1) Current Test
- 2) Stored Test
- 3) Individual Test
- 4) X-Y Plot
- 5) Computer Transfer
- 6) S Track Transfer
- 7) X-Y Data →RS-232
- 8) Calibration
- 9) Set Baud Rate

- 1) Auto Print
- 2) Auto Store
- 3) Peak Load→  
RS-232
- 1) Clear Results
- 2) Set Date/Time
- 3) Check Transducer
- 4) Check I/O
- 5) Install Defaults
- 6) S Track Address
- 7) Supervisor
- 8) Rate Setup

### 3.1 THE SETUP MENU

Press the <SETUP> key to enter and display the setup menu options. Use <ARROW> keys to scroll through the menu items. Press the menu item number <NUMBER> keys (1 – 5) to select an individual menu option. The following functions are in the Setup Menu:

1) Display Units Menu. Use <ARROW> keys to scroll through menu options and <NUMBER> key to select items.

- 1 – Load Units: Press <1> to toggle through options of Lbs, N, kN and Kg
- 2 – Stress Units: Press <2> to toggle through options of PSI, MPa, Kpa and Ksc
- 3 – Length Units: Press <3> to toggle through options of in, mm and cm
- 4 – Rate of Load: Press <4> to toggle through options of stress/sec, stress/min, load/sec, load/minute and if optionally equipped extension/sec, extension/min and extension. Per second items have only one decimal point (0.0) in display, all other have three (0.000).
- 5 – Specimen Age: Press <5> to toggle between days or hours

Press <ESC> to return to Setup Menu.

2) Specimen Type Menu. Press <1> key to toggle through menu and select from Cylinder, Cube, Beam Center, Beam 3<sup>rd</sup> point and X-Sect Area. When the desired specimen type is

displayed, press the <ENTER> key. Use the <NUMBER> and <DECIMAL POINT> keys to input specimen dimensions. Press the <ENTER> key to set and return to Setup Menu.

3) Sample Break Menu. The Sample Break feature has two independent functions and settings of load Threshold and specimen yield strength Break Percentage.

Press <3> and **Threshold** load value is displayed. To accept the displayed value press the <ENTER> key. To change the value press <NUMBER> keys to set a new value and press <ENTER> to accept.

**Sample Break (%)** is displayed. To accept the displayed value, press the <ENTER> key. To change the value press <NUMBER> keys to set a new value and press <ENTER> to accept and return to the Setup menu.

### **How Sample Break Functions:**

Load Threshold is an optional load value set point that must be exceeded before test data will be logged into the indicator in order to display peak stress load values at the end of a test. Its main feature is the elimination of false or premature ending of a test caused by wide operator adjustments in the rate of load control. Example: Switching the control valve from rapid to metered load rate position, or when a section of a test cylinder is broken or chipped off in the early stages of a test when testing with unbonded or pad cap system.

Sample Break is defined as a percentage of peak load and is used to define the end of a test. When a test specimen reaches its maximum yield strength, its live load value displayed on the top line of the screen will begin to drop. When it has fallen to a value that is equal to the percentage setting, the indicators screen will change and display the specimens maximum peak stress and load values along with a “D” indicating that the test is done.

Example: If Sample Break Percentage setting = 90% and the maximum peak load value applied to the test specimen is 100,000 lbs. (444.8 kN), the indicator will terminate the test when the displayed live load value drops below 90,000 lbs (400.3 kN) or 10% of maximum applied load.

4) Test Report Options. Press <4> to display Test Report menu options that can be either displayed at the end of a test or will be documented on the test report print out or transferred to a PC. Options are:

- <1> Operator ID number
- <2> Cylinder Break Type
- <3> Cylinder Correction Factor
- <4> Cylinder Cap Type
- <5> Specimen age either days or hours
- <6> Specimen Weight
- <7> Specimen Statistics
- <8> Average Rate of Load applied to the specimen during a test.

To turn any of the above listed menu options ON/OFF, press the <NUMBER> key of the desired option.

5) Load Cell. This option is used to switch the Indicator between active calibration channels when the indicator is being used with multiple transducer/load cell combinations or when it is being used to control an additional auxiliary load frame.

The Indicator can store up to six separate calibration channels, with the active calibration channel number displayed in the upper left hand corner of the indicator screen as LC (0-6). Indicators are normally shipped with one activated calibration channel LC 0, unless requested at time of order. A field calibration technician can program additional channels.

If the indicator has more than one active calibration channel installed, the first channel “0” will always be used for the highest load value calibration channel, with each additional channel being used for progressively lower calibration capacities.

Note: For indicators with firmware Version 0.1B or older with only one active calibration channel installed, pressing the <5> key will cause the indicator screen to momentarily go blank and then return to menu option screen.

For indicators with firmware Version 0.1C or newer with only one active calibration channel installed, pressing the <5> key will cause the indicator screen to maintain reading of Load Cell No. 0.

### **How to select optional calibration channels if installed in indicator:**

Press <5> key to toggle through and display number of active calibration channels. When desired channel number is displayed Load Cell No. (0-6), press <ESC> key. Indicator will return to normal testing screen with activated calibration channel number displayed in upper left hand corner of display.

Note: Verify settings first. After changing a calibration channel be sure to check that all other optional menu items are correctly set before running a test. Example, specimen type menu for type and size.

### **3.2 I.D. # MENU**

The ID # key is used to input a test specimen ID number. It can be up to 8 characters long and will be listed on all test reports. If you are not printing, storing or transferring test data for hard copy documentation, it is not necessary to set a specimen ID number.

To use, press the <ID #> key to open the function. At the prompt, use <NUMBER> keys to input ID number code, press <ENTER> key to accept and return to test screen. If you inadvertently input a wrong number when setting, press <ESC> key and the previous number will be displayed. At the prompt, input correct number and press <ENTER> to accept and return to test screen.

### **3.3 THE PRINT MENU**

Do not enter function without a printer or software option programs installed.

Press the <PRINT> key while in the test indicating screen to open and display the menu options available for printing test reports, X-Y Plots and computer transfer of test data. Optional software programs are required for transferring test data into a computer. Menu

options requiring additional software are: 5) Computer transfer – requires Wincom transfer program option, 6) S Track Transfer – requires Concrete Tracker program option, and 7) X-Y Data RS-232 – requires Wincom Plus transfer program option.

### **How to use:**

Press <PRINT> key to display menu options, use <ARROW> keys to scroll through menu items, press <NUMBER> keys to select menu item.

1) Print Current Test. Print only the test data for the current test. Note: If any of the Test Report Option Menu items have been activated, (example, cylinder break type) the indicator will prompt you to select and enter a break type before printing. Once entered, the report will print automatically.

2) Print Stored Test. Print all tests stored in memory automatically. Up to 1,000 tests can be stored.

3) Print Individual Test. Print a single individual test stored in memory. Tests are stored to memory in sequential order as they are conducted (1 – 1,000). To print a test, you will need to know its sequential test number as stored. Use <NUMBER> keys to enter the sequential test number and press <ENTER> key. The report will print automatically.

4) X-Y Plot. Press <1> to select Load as vertical axis of plot or press <2> to select Stress as vertical axis of plot. Plot will print automatically after number key is pressed. All menu items activated in the Test Report Options menu list will be printed in the plot header information list.

5) Computer Transfer. Used to transfer all test data stored in memory to a computer. Note: requires optional Wincom transfer program. Activating option without program installed will cause the digitals display to lock up. To release display, turn digital OFF, wait 10 seconds, turn digital ON, at prompt press the <TARE> key and continue.

### **How to use:**

After installation of Wincom program and transfer cable, press <5> key. Follow the instructions displayed on the screen to complete the transfer.

Test data will remain stored in memory after transfer is complete. To clear memory, see Utility section. Note: cleared test data is not retrievable.

6) S Trak Transfer. Used to transfer all test data stored in memory to a computer. Note: requires optional Concrete Tracker software program. Activating option without program installed will cause the display to lock up. To release display, turn digital OFF, wait 10 seconds, turn digital ON, at prompt press the <TARE> key and continue. Installation and operation instructions are supplied when purchased.

- 7) X-Y Data RS-232 Transfer. Used to transfer X-Y Plot of current test computer. Note: requires optional Wincom Plus transfer program. Activating option without program installed will cause the display to lock up. To release display, turn digital OFF, wait 10 seconds, turn digital ON, at prompt press the <TARE> key and continue. See installation and operating instructions.
- 8) Print Calibration. Used to print a calibration report listing date and time of calibration set load value points and their corresponding A/D counts.
- 9) Set Baud Rate. Used to set Baud Rates for RS-232 computer transfer. To select, press the <9> key then press the <1> key to toggle through available options. When required rate is displayed press <ENTER> to set. To return to indicator screen press <ESC> key.

### 3.4 F1 FUNCTION MENU KEY

Press <F1> to display the menu. Press menu item <NUMBER> key to activate function.

- 1) Auto Print. Press <1> key to turn Auto Print function ON/OFF as indicated on the display. Caution: Printer required. Turning ON the Auto Print option without a printer connected to the digital will cause the unit to lock up. If problem occurs, call the factory for deactivation instructions. Note: Option requires Dot Matrix printer with optional software to function properly.
- 2) Auto Store. Press <2> key to turn Auto Store function ON/OFF as indicated on the display. This function stores test results to memory automatically at the end of each test, briefly displaying its sequential test number indicating that it has been stored. Note: if a Test Report Option menu item has been activated, (example – Cylinder Break Type) the indicator will automatically prompt you to enter a Break Type in order to store results. To store results, press <1> key to scroll through Break Type options, press <ENTER> to select type and store.
- 3) Peak Load RS-232. This function transmits only the current peak load value of the test to a computer. It requires a serial cable and software provided by customer to function. This option is installed in firmware version 0.1B or older.

### 3.5 UTILITY MENU

Press <UTILS> key, use <ARROW> keys to scroll through menu options, press <NUMBER> key to select item.

- 1) Clear Results. Used to clear stored test results from memory. Note: If stored test results are important, print or transfer test data before clearing, as cleared data is not retrievable.

Press <1> key to clear results. Press <1> again or press <ESC> key to exit option without clearing results and return to option menu.

- 2) Set Date/Time. At prompt, use <NUMBER> keys to set **month**, press <ENTER> to accept. Press <NUMBER> keys to set **day**, press <ENTER> to accept. Use <NUMBER> keys to set **year**, press <ENTER> to accept. Use <NUMBER> keys to set **hours**, press <ENTER> to accept. Use <NUMBER> keys to set **minutes**, press <ENTER> to accept and return to option menu.

3) Check Transducer. Displays active output of the transducer through digital calibration channel in use. To check both the transducer cable and transducer voltage output, apply a test load with the machine in a normal manner. It is not necessary to fail the test sample. The A/D number displayed on the right hand side of the screen should increase in value as a small load is applied, indicating that both the transducer and its cable are functioning correctly. Press <ESC> to exit function and return to menu.

4) Check Digital I/O Diagnostic. The digital I/O diagnostic displays the status of all input and output bits. The outputs can be turned ON/OFF by pressing <1>. The display of the I/O is binary coded.

5) Install Defaults. Installing defaults does not affect any of the calibration information or test data stored in memory. It is used to reset the digital to original factory settings as shipped. Example: digital displays a "Printer Not Ready" message caused by activating the Auto Print function without a printer connected to the digital. Default function can be used to reset printer option and free display. The Install Defaults function is password protected. Call the factory for instructions on use.

6) S Trak Address. Used only with optional Concrete Tracker software program to set transfer address of digital to receiving computer. Operating instructions are supplied with program option.

7) Supervisor. Used by laboratory supervisor to lock out and deny access to menu options to prevent the changing of established settings. The following menus can be locked; Set Up and F1. The following menus will remain open for operation when lock out function is activated; Specimen ID #, Store function, Print function and Utility.

Supervisor function is password protected. Call the factory for password number code. Digitals are shipped with function turned OFF. However, displayed code setting reads ON for deactivated and OFF for activated.

**How to set:** Press <7>. Use <NUMBER> keys to enter password and press <ENTER> key. Display returns to menu.

8) Rate Set Up. Used to adjust the internal averaging time interval of the rate of load display to filter or smooth out the erratic jumping of the displayed load rate values when testing low strength specimens during the beginning stages of a test. The option does not affect or change the live screen update interval at which the rate of load values are actively displayed. It only adjusts the internal time interval over which they are collected and averaged.

The option has two setting values of Load Threshold and Time Seconds. Load Threshold is the load value set point at which the rate of load will begin to be actively displayed on the indicator. Time Seconds is the time interval over which the rate of load is averaged.

**How to set:** Press <8> key. Use the <NUMBER> keys to set a start point load value. Press <ENTER> to accept. Time Seconds, use <NUMBER> keys to set value, press <ENTER> to

accept. Normal settings are 200 lbs. and 20 seconds. Press <ESC> to return to test indicating screen.

### **3.6 CALIBRATION MENU**

The calibration menu is Password protected and should only be entered by a calibration technician with a load cell system, with cells equal to or exceeding the capacity of the testing machine the LXI Indicator is installed on.

If you have inadvertently pressed the calibration key, press the <ENTER> key. The indicating screen will display “Wrong Password” and automatically return to the normal indicating screen.

If you do not have the password code, contact Test Mark Industries.

## 4.0 TEST SETUP OPERATION

This section describes how to set up the digital for a test with a manually operated machine.

Step 1: Turn digital unit on. For machines with the digital mounted on the load frame, ON/OFF switch is located on the digitals bottom rear left hand corner, or on the front face of the console as labeled. Allow the digital to warm up for 5 minutes before beginning an actual test.

Step 2: Press <SETUP> key to verify that all menu item options are correctly set.

- 1) Display Units – Set engineering units
- 2) Specimen Type – Set specimen type and dimensions
- 3) Sample Break – See set up menu section for instructions
- 4) Test Report Option – Set option item OFF/ON as required for test documentation on display screen or for hard copy test report documentation
- 5) Load Cell – Verify displayed number of active calibration channel, if 2 or more channels are installed in digital.

Step 3: Auto Store – If required, press <F1> key to turn option ON. Test results will be stored in memory automatically at the end of each test.

Step 4: Clear results if your test documentation program requires clearing stored test results from memory before storing new test data. NOTE: If stored test results are IMPORTANT, print or transfer data before clearing as clear data is non-retrievable,.

Press <UTILS> key, press <1> key to enter function. Press <1> key to clear or <ESC> to exit without clearing results.

Step 5: Set hydraulic loading control valve to its Retract position and turn hydraulic pump on. Insert and center test specimen in testing machine.

Step 6: Specimen ID number – if required, press <ID #> key and input desired test specimen ID number. Press <ENTER> key to set.

Step 7: To start test, use hydraulic load control valve to advance the machines piston to the desired starting position, normally a point when an air gap of 1/16” (1.5 mm) or less is between the top of the test specimen and bottom of upper test platen. Place valve in Hold position. Press <TARE> key to remove all residual load on indicator. An “R” in the lower left hand corner of display indicates digital is “Ready” to start test.

Step 8: Begin testing. Many ASTM test procedures permit a higher rate of loading or preload to be applied to a test specimen at the beginning of a test, if permitted by test procedure.

Shift control valve to Full Advance position. Indicator screen will display a “T” for test in progress, while top line indicates a rapid increase in the live load being applied to the test specimen. When desired preload value is reached, shift control valve to Metered position.

The third line of the display screen is now indicating the current live rate of load being applied to the test specimen. To adjust and set to required rate of load, slowly turn knob on control valve clockwise to decrease rate of load and counter clockwise to increase load rate. All rate changes are updated live on the screen.



Once the rate of load has been established continue to monitor the display screen making any necessary adjustments to load rate control as needed.

Note: Because of the compressive nature of the materials used in pad caps, it may be difficult to set and maintain a controlled rate of load with applied live load values of less than 20,000 lbs (88 kN) when testing concrete cylinders.

Step 9: End of test – as the test specimens ultimate load value is being approached both the displayed live load and rate of load values will begin to decrease due to cracking in the test specimen. . Make no adjustments in the rate of load when this occurs. When the test specimens indicated live load decreases below the set Sample Break percentage value, the screen will automatically change and display the following test data information on each line of the display screen. When change occurs, shift control valve to Retract position.

#### **4.1 NORMAL DISPLAYED INFORMATION**

Line 1: Displays residual live load value  
 Line 2: Displays “Peak” stress value xxxx psi  
 Line 3: Displays peak load value xxxxxx lbs.  
 Line 4: Displays “D” for test done and type of specimen

#### **4.2 DISPLAYED INFORMATION WITH AVERAGE RATE OF LOAD CALCULATION OPTION ACTIVATED**

Line 4: Display “D” for test done and AVG xx psi/sec

Now, complete test documentation by manually noting test results, print or store them before starting a new test. When the <TARE> key is pressed, displayed test results are lost.

Note: The display screens normal operating procedure at the end of the test will be affected by the activation of various menu option items. Their activation will cause the screen to display additional test data on line 4, or prompt you to input additional information before the final test results will be displayed and stored to memory. Simply input information as requested at screen prompt and final test results will then be displayed and stored to memory as required.

An example of this is testing and storing data for Beams – Third Point Loading to ASTM C-78. When STORE function is activated, screen will display prompt asking you to select 1) Break – Middle 3<sup>rd</sup> or 2) Break – Not Middle. When 2) Not Middle is selected, a prompt will ask you to input the average distance between line of fracture and nearest support, as required in Section 8.2 of ASTM C-78. Use <NUMBER> keys to input distance and press <ENTER> to store and display test results on screen.

#### **4.3 HOW TO PRINT TEST REPORTS OR X-Y GRAPHS**

The following describes how to print test reports or X-Y graphs of current test, or print test results stored in memory.

Step 1: Install and turn printer on.  
 Step 2: Press <PRINT> key  
 Step 3: Use <ARROW> key to scroll through PRINT menu options.

Step 4: Press <NUMBER> key for options. Follow screen prompts as requested.

See Print Menu sections for full details.

#### **4.4 HOW TO DOWNLOAD STORED TEST RESULTS TO A REMOTE PC**

The optional transfer cable and Wincom or Wincom Plus CD program is required to transfer test results to a remote PC.

Step1: Connect the data transfer cable to the DB-9 pin RS-232 SER port on back of digital, and to either COM1 or COM2 serial port on PC.

Step 2: Install and set up Wincom or Wincom Plus in your receiving computer. Wincom Plus CD will show you instructions manually when installed on the PC.

Step 3: Press <PRINT> key. Use <ARROW> key to scroll to 5) Computer Transfer. Press <5> key.

Step 4: Press <ENTER> key to transfer stored test results.

Note: Data is transferred over an RS-232 port. RS-232 is specified for transfer distance of approximately 50 feet (15.24 m). Cable runs over 200 feet (60.96 m) have been installed and have worked successfully. Much of this is dependent on the equipment's environment.

## 5.0 CALIBRATION

### 5.1 How to Calibrate Analog Transducers on Manually Operated Machines

Step 1: Turn on the system and allow it to run for 10 minutes before calibrating.

Step 2: Use Setup Menu to select and set type of Engineering Unit load value for calibration. Press <SETUP> key, press <1> Display Units menu. From menu item option list, press individual item <NUMBER> key to toggle through unit options. When desired unit type is displayed press <ESC> to exit menus.

Step 3: The LXI can store up to six calibration channels. If only one channel is active, i.e. (LCO), continue to step 4.

If two or more calibration channels are installed, access them through the setup menu. Press <SETUP> key, use <ARROW> key to scroll to load cell menu. Press <5> to toggle through active channels. When desired channel number is displayed, press <ESC> key to exit menu.

Step 4: Press <CAL> key to enter calibration menu. Enter password with <NUMBER> key and press <ENTER> key. Call Test Mark Industries if you have lost the password.

Step 5: The number of the current activated calibration channel is displayed, Load Cell No), press <ENTER> to accept or use <NUMBER> key to input the number of required calibration channel. Press <ENTER> to accept.

Step 6: Full Scale Range, press <ENTER> key to accept displayed value of calibration channel. To change scale range, use <NUMBER> keys to input required value. Press <ENTER> to accept. Range should be put in current active units.

Note: If only one calibration channel is active, Full Scale Range is normally set at capacity of machine.

Step 7: Resolution or minimum load counting increment, press <ENTER> to accept displayed value. To change resolution value, use <NUMBER> keys to input required value. Press <ENTER> to accept. "Value Saved"

If you decide to exit the Calibration Menu at this time, the values entered for Full Scale and Resolution will be saved.

Step 8: press <1> key to enter Calibration mode. Press <2> key to edit the current calibration points or <EC> to exit.

#### **Please read. Required information before entering calibration mode.**

The program will enter the calibration mode if <1> is pressed in step 8. During this mode, the technician can take up to 10 calibration point readings (a minimum of 2 points is required). The first calibration point must be at zero. It may be beneficial to set a few more calibration readings in areas of greatest inaccuracy. The top line of the display will indicate how many calibration readings have been taken. As the calibration points are entered, write down the corresponding load or displacement value. After all 10 calibration points have been taken, or you press the

<STORE> key when using less than 10 points, the LXI automatically switches to engineering load value input mode. Input the load or displacement value corresponding to each calibration point stored. The calibration points are stored sequentially, in order, i.e. the first point (ZERO) is followed by the second, third and so forth. Once an engineering unit load value has been entered for each calibration point stored, the unit will automatically save the calibration.

Step 9: If you are ready to perform calibration press <1> key to enter calibration mode. Now, place the machine in a zero load point by floating the machines piston. Use the Control Valve to advance the machines piston until there is a minimal air gap of 1/32" (.03 mm) or less between the top of the load cell calibration device and the bottom of the machines top crosshead. Place control valve in Hold position, press <ENTER> to take zero reading. The top line of the display will indicate PT1 point has been taken.

Step 10: Continue and load the machine to the required load point, press <ENTER> to set value of calibration load point and save it in non-volatile memory. Write down the corresponding engineering unit load value for each calibration point set. Repeat this step until all readings are taken.

Step 11: Press <STORE> to exit the calibration mode if fewer than 10 calibration points are used. The program will automatically proceed for Step 10 to Step 11 after the 10<sup>th</sup> reading is set.

Step 12: Use <NUMBER> keys to input the corresponding engineering unit load value for each calibration point. Press <ENTER> after each point to set. After all values have been entered, the program will automatically generate the corresponding scale factors, store them to permanent memory, and exit the program returning you to the normal indicating screen.

### **Done. Ready to verify calibration.**

To verify calibration accuracy, load machine to specific load points and compare the reading on the LXI Indicator with those of the load cell standard.

## **5.2 HOW EDIT CAL FUNCTIONS**

The LXI Indicator has the ability to edit or adjust an individual calibration point in order to make span adjustments to the calibration curve without having to repeat steps 9 through 12.

Example: If the first load value set point is reading high as compared to the value reading on your standard, you can adjust the value of the original set point by lowering it 1 or 2 resolution counts, which will adjust the calibration curve between zero and the first set point.

To use Edit Cal, enter calibration program and advance through screens. When option item Edit Cal is displayed, press <2> key to enter program. First set point PT1 "0" will be displayed. Press <ENTER> key to accept ZERO set point value. To adjust load value set point, use <NUMBER> keys to input desired value. Press <ENTER> to accept.

Follow this procedure for each set point you wish to adjust. Pressing <ENTER> at each displayed set point advances you through the program. When last set point is accepted the indicator will automatically return to the indicating screen. Now, once again verify calibration accuracy.

### **5.3 PROBLEMS WITH THE CALIBRATION**

The calibration will have to be repeated if there is a mistake (i.e. incorrect number input) made during the calibration mode.

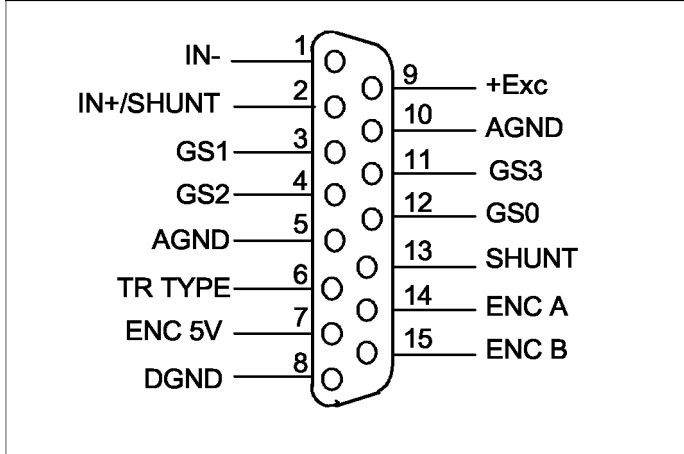
### **5.4 WHAT OCCURS DURING CALIBRATION**

The calibration procedure allows up to ten (10) calibration points to be entered. Each successive pair of points is connected by a straight line and the slope of each line is the calibration scale factor used for that region. This results in a piecewise linear function which maximizes accuracy.

## 6.0 ELECTRICAL/MECHANICAL DATA

### 6.1 USER CONNECTIONS

#### DB15 Female



Analog Transducer Pin Designation

#### Load/Position Channel Connections

##### Analog-Load Input

##### Analog Excitation:

pins 9 & 10 (+Exc & AGND)  
 9 Vdc (standard)  
 4.5 Vdc (option)

**Analog Inputs:** pins 1 & 2 (+/- IN)

##### Analog Input Range:

up to 2.5 mv/v Tie pin 3 to pin 12  
 up to 4.5 mv/v Tie pin 4 to pin 12  
 +/- 5 V No Connection  
 User definable Tie <25 ppm/C resistor  
 between pin 11 & pin 12.  
 Gain = 1 + 50000/Rg.

Analog shield connects to AGND.

##### Encoder-Position Input (optional)

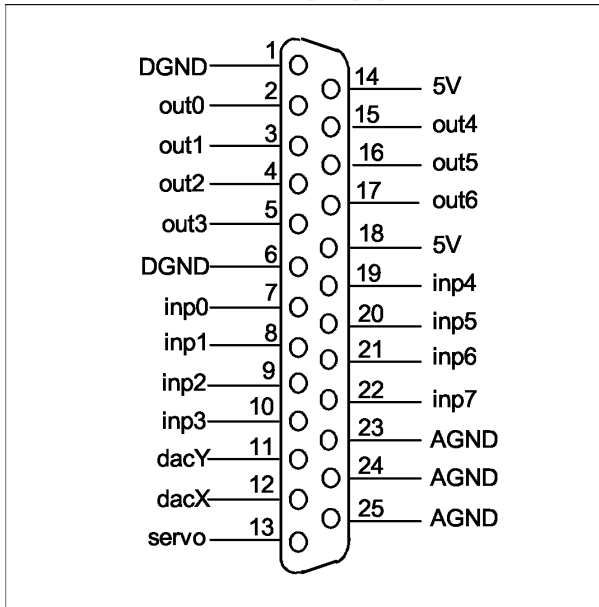
**Encoder Excitation:** pins 7 & 8

**Encoder Input:** pins 14 & 15

Encoder shield connects to DGND.

**Transducer Identification** (Contact Factory).

#### DB25 Male



Digital I/O Port Pin Designation

#### I/O Port Pin Designations

**Digital Inputs:** inp0-inp7. Normally High. To activate short to DGND

**Digital Outputs:** out0-out6. Connect positive terminal to 5V. Connect the negative terminal of device to digital output. Output is active when pulled low

##### Dual Analog Output option for X-Y Recorder (dacX & daxY)

Resolution: 14 bits  
 Range: 0-10V @ 5ma max.  
 Reference to AGND.

##### Servo Control Output option (servo)

Resolution: 12 bits  
 Range: +/- 10V @ 5 ma max.  
 Reference to AGND.

## 6.2 Printer Port

### Choose a Printer for the LXI Digital

Many printers are compatible with the LXI Digital. As new printers continue to increase in number, it is difficult to supply a current list of compatible models. TEST MARK does not test every printer for compatibility. Listed are guidelines to help select a compatible printer:

- Must have Centronics Parallel (or IEEE-1284) interface.
- Must use "PCL" emulation (example: PCL3 Enhanced, PCL4, PCL5). Check printer specifications.
- Choose inkjet or laser printers
- The printer must have this connector (36 pins):



- Do not use dual emulation printers (example: PCL and Postscript).
- Do not use "GDI" printers.
- Do Not Choose USB printers.

## 6.3 RS-232 Serial Port

The RS232 Serial Port is used to download test results to a remote AT compatible computer. This port requires a female DB9 connector. The cable and software used on the remote computer is proprietary and must be purchased from the factory.

## 7.0 TROUBLESHOOTING

### CORRECTING MINOR PROBLEMS

Some of the most common minor problems and their remedies are listed:

<b>PROBLEM</b>	<b>CAUSE</b>	<b>REMEDY</b>



## STATEMENT OF WARRANTY

Test Mark Industries warrants all new testing machines, testing apparatus and supplies manufactured by Test Mark Industries against defects in workmanship and materials for a period of 24 months from the original date of shipment, provided the equipment has been properly installed, maintained and operated in accordance with installation and operating instructions. This limited and exclusive remedy does not cover normal wear and tear. The Test Mark Industries manufactured product must be free from accident, damage by fire, water or act of God to be eligible for warranty.

Test Mark Industries will repair, replace or credit at Test Mark Industries' option defective product or component parts. When repair can be accomplished by exchange of a component part, the customer may be required to remove the part of modular component and install the exchanged part.

Warranty does not cover expenses, either direct or indirect, that may arise from the use or the inability to use Test Mark Industries products, or the secondary owner in the event of resale.

Products not manufactured by Test Mark Industries will carry the warranty of the original manufacturer. Under no circumstances shall Test Mark Industries be liable for any injury, loss, or damages, whether direct or indirect, incidental or consequential, arising out of the use of, or inability to use the products described herein.

This exclusion of liability for loss or damages, whether direct or indirect, incidental or consequential, shall apply to all claims whether sounding in contract, warranty, tort including both negligence and strict liability, or any other basis of liability.