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# Advanced Force Measurement

# Model 9840

## Digital Process Monitor

## User Manual 15-197 Rev A

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# INTRODUCTION

The Model 9840 is a CE compliant and versatile precision instrument intended for the digital readout of strain gage sensors such as load cells and torque cells. Optical encoders are also supported.

Here is a quick listing of its features:

- **OPTION ~ TEDS** Template 33 Plug & Play Feature

- Full bi-polar **6 digit display** (±999,999) using two line, 20 character, vacuum fluorescent display for clear, precise indication of measured quantities and limit status.

- **No** knobs or dials. **No** internal jumpers. All adjustment and calibration is done using user-friendly front panel menus. **Keylock** option to prevent accidental or unauthorized changes to the unit's setup.

- Measure **load** and **gross** weight in pounds, kilograms, Newtons, PSI, MegaPascals, kilo-pounds, kilo-Newtons, metric tons, mV/V, or grams. User defined base area for PSI and MPa. Tare at any time. The sum of the loads on both channels is also available.

- Measure **torque** and **gross** torque in Pound-Inches, Newton-Meters, Ounce-Inches, or mV/V. Tare at any time. The sum of the torques on both channels is also available.

- Capture the load **peak** and **valley**, display in pounds, kilograms, Newtons, PSI, MegaPascals, kilo-pounds, kilo-Newtons, metric tons, mV/V, or grams. Reset at any time.

- Capture the torque **peak** and **valley**, display in Pound-Inches, Newton-Meters, Ounce-Inches, or mV/V. Reset at any time.

- **OPTION ~** Measure **position** and **velocity** with optional encoder input. Display in English units, metric units, or in percent of a user defined base length. Reset at any time.

- **OPTION ~** Four contact closure **Limit** switches. You can set which signal drives the limit (load, torque, peak, valley, position, or velocity), normally open / normally closed, set point, and manual reset (latched) or automatic reset (not latched).

- **OPTION ~ Print** current readings of load, torque, peak, valley, position[OPT], and velocity[OPT] using the currently selected units at the touch of one button.

- **Automatic identification** of calibrated cells with auto-id feature.
  **Note:** Auto ID is now Plug & Play. It does not require a power-cycle for a sensor to be identified!

- **Calibration** for cells using manufacturer's milli-volt per Volt calibration factor, 6 point mass and milli-volt per Volt, 2 or 5 point known mass, 6 point torque and milli-volt per Volt, 2 or 5 point known torque, or internal precision shunt calibration. A back panel switch allows you to choose between two values used for the shunt calibration so there is no need to open the unit.

- **Analog output** of any signal (load, torque, peak, valley, position[OPT], and velocity[OPT]) with user defined scale factor and offset. Large, buffered ± 10.00 volt output. The Model 9840 is standard with one Analog output channel. A Second Analog output channel is available[OPT].

- Remote operation using standard **RS232 ASCII** command set.

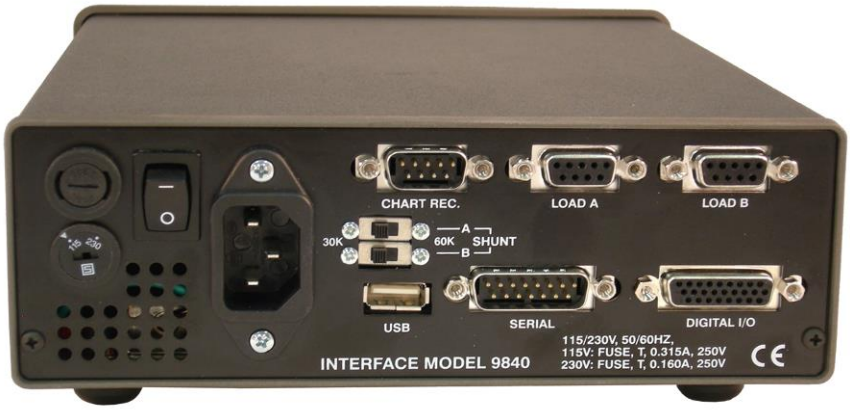
- Back panel **digital inputs** for tare, peak and valley reset, position reset[OPT], and display hold[OPT] / print[OPT]. Other functions available as custom programmed options.

# QUICK START

This section will help you get your Model 9840 set up and operating in just a couple of minutes.

The back panel is shown below. You will need to make at least two connections here. First be sure that the power switch is off (the lower part of the rocker should be pressed in). Connect the AC power line and plug it in.

**MODEL 9840 BACK PANEL**




Next connect a load or torque cell to the 9 pin female connector labeled “Load A”. You should use the cabling supplied with your Model 9840 and Interface load or torque cell. If you do not have a factory supplied cable see Appendix B for the recommended cell connection.

You are now ready to turn on the power. Each time power is applied to the Model 9840 you will see a sequence of 6 messages appear on the front display. For example,

| # | Message | Meaning |
|---|---|---|
| 1 | Interface X.Y.Z | This is the version number. |
| 2 | Serial # 12345 | This is the serial number. |
| | Option # 114236 | This is the option number. |
| 3 | Last ID A LD90437 | The serial number of the load cell on Ch A. |
| | Last ID B TQ12030 | The serial number of the torque cell on Ch B |
| 4 | Ch A Max 4.00Lb | Maximum rated load of the sensor on channel A. |
| | Ch B Max 4.00LbI | Maximum rated torque of the sensor on channel B. |
| 5 | Ch A Cal 4.00000 mVv | The mV/V constant used with the load cell on channel A. |
| | Ch B Cal 4.00000 mVv | The mV/V constant used with the torque cell on channel B. |
| | | *Note: If either of these sensors was calibrated by 5 –Point Mass, then 4 mV/V constants will be displayed here.* |
| 6 | Ch A Exc 5.00 Volt | Excitation voltage used with the load cell on channel A. |
| | Ch B Exc 10.00 Volt | Excitation voltage used with the torque cell on channel B. |

Each of these messages will be displayed for about 3 seconds. After that the front display will start showing the current readings from the sensor.

**MODEL 9840 FRONT PANEL**




The example above shows that LoadA is -0.0006 Lb. The second line of the display shows TorqB with 0.23 NM. The "T" TEDS[OPT] annunciator indicates presence or non presence of a TEDS[OPT] sensor. If it is on solid, a TEDS[OPT] sensor is attached . If it is blinking a non TEDS[OPT] sensor is attached. The "T" is not displayed when the TEDS[OPT] feature is turned off.

To change what item is being displayed press the leftmost button. This will cycle through the list of items (load A, peak A, valley A, gross A, load B, peak B, valley B, gross B, channel A+B[OPT], pos[OPT], velocity[OPT], and lim[OPT]). If a torque cell is loaded on either channel, the display will show torque rather than load for the appropriate channel. Channel A+B will only appear when both channels are attached to sensors of the same type: load or torque.

The rightmost button will change the units that are being used. Repeated presses of this button will cycle through the list of units available for the currently displayed item. For example, with Load A showing you would see Lb, kg, N, PSI, MPa, Klb, kN, t, mV/V, grams, and then back to Lb. With Torq A, you will see LbI, NM, OzI, and mV/V.

Switching from a load to a torque cell and back will automatically reset Analog, Limit[OPT], and Filter Window settings to zero and/or disabled for that particular channel. See information under each of these options for details on how they work.

## OPTION ~ TEDS TEMPLATE 33 (BRIDGE SENSOR) SUPPORT

The Model 9840 will now support TEDS Template 33 equipped sensors. It is true plug n play. No power cycle is required when a TEDS enabled sensor is attached. The calibration data immediately gets loaded. The following units are supported from the TEDS Template 33:

| Physical Measurand Case: | Physical Unit | Cell Type |
|---|---|---|
| 4 | N | Load |
| 5 | lb | Load |
| 10 | Nm | Torque |
| 11 | oz-in | Torque |
| 12 | Pa | Load |
| 13 | psi | Load |
| 14 | Kg | Load |
| 15 | G | Load |

All TEDS Template 33 parameters can be read through the front panel or RS-232. On the front panel a “T” TEDS annunciator is automatically enabled when the TEDS is turned on. It occupies the first character on both display lines. It is on solid when a supported TEDS Template 33 sensor is attached, otherwise it will blink. It is associated with the channel of the selected item. TEDS and AutoID are enabled/disabled through the System Options menu on the front panel or via RS-232 command.

**Note:** If TEDS and Auto ID are both enabled, a supported TEDS sensor will override Auto ID and the TEDS parameters will be loaded. Also, if TEDS is off and Auto ID is on, a TEDS sensor can be used as an Auto ID sensor. This is because they both contain the 8 byte Tag ID.

## RUN MODE

The Model 9840 has three modes of operation, Run mode, Setup mode, and System Calibration mode. At power-on it will be in Run mode after the cycling through the startup menu.

The second line of the display can show the status of the 4 contact closure limit switches[OPT], show another display[OPT], show text, or be blank.

To change what item is being displayed press the leftmost button. This will cycle through the list of items (Load A, Peak A, Vall A, Grs A, Load B, Peak B, Vall B, Grs B, Ch A+B, Pos[OPT], Vel[OPT], and Limits[OPT]). If a torque cell rather than a Load Cell is attached, Torq A or B will replace Load A or B. Channel A+B[OPT] will only appear when both channels are attached to sensors of the same type: load or torque.

The rightmost button will change the units that are being used. Repeated presses of this button will cycle through the list of units available for the currently displayed item. For example, with Load showing you would see Lb, kg, N, PSI, MPa, Klb, kN, t, mV/V, grams, and then back to Lb. Torq will show LbI, NM, OzI and mV/V.

The table below summarizes the options. Whether the user sees torque or load for each channel depends upon the cell type that was calibrated or selected for that channel.

| | |
|---|---|
| Load A/B | Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams. |
| Peak A/B (Load) | Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams. |
| Valley A/B (Load) | Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams. |
| Gross A/B (Load) | Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams. |
| Channel A+B[OPT] (Ld) | Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams. |
| Torq A/B | Pound-Inches, Newton-Meters, Ounce-Inches, mV/V. |
| Peak A/B (Torque) | Pound-Inches, Newton-Meters, Ounce-Inches, mV/V. |
| Valley A/B (Torque) | Pound-Inches, Newton-Meters, Ounce-Inches, mV/V. |
| Gross A/B (Torque) | Pound-Inches, Newton-Meters, Ounce-Inches, mV/V. |
| Channel A+B[OPT] (Tq) | Pound-Inches, Newton-Meters, Ounce-Inches, mV/V. |
| Position[OPT] | Inches, Centimeters, Percent of Base Length. |
| Velocity[OPT] | Inches per Minute, Centimeters per Minute. |
| Limits[OPT] | Shows state of each switch, 1 for on, 0 for off, dash for disabled, asterisk for source error. |

All of these measurements are acquired by the Model 9840 at all times with torque measurements acquired when a torque cell is attached to a channel and load measurements acquired when a load cell is attached. The display just selects which particular item you wish to see and what units are used to display or print this data.

The buttons have the functions indicated by the upper set of labels (Item, Tare, Reset, View, Esc, and Unit. The Print function[OPT] is implemented using the Esc button). Each of these is described below.

## Item Button

The **Item** button cycles through the list of different items that can be displayed (Load A, Peak A, Vall A, Grs A, Load B, Peak B, Vall B, Grs B, Ch A+B, Pos[OPT], Vel[OPT], Limits[OPT]). Torq A or B will substitute for Load A or B when appropriate. Use the **Unit** button to change the units that are used for the currently displayed item. Ch A+B[OPT] is only available when the cells on both channels are of the same type (load or torque).

## Tare Button

The **Tare** button sets the current load or torque to zero for channel A, channel B, or channels A **and** B. A submenu will allow you to select what channel you want to tare. It does not matter what is being displayed when you press this button. The load or torque is always reset to zero. A single channel unit will automatically set Load A or Torque A to zero.

## Reset Button

The **Reset** button brings up a list of things that you might want to set to zero:

If this is a 2-channel unit, the following menu will appear:
> *Reset Ch A + Ch B*[OPT] will reset the peak and valley for channels A and B.
> *Reset Ch A Only* will reset the peak and valley for channel A.
> *Reset Ch B Only* will reset the peak and valley for channel B.
> *Reset Position* [OPT] will reset the position to zero.
> *Reset Limits* [OPT] will reset any limits that require manual resetting.

For a single channel unit, the following menu will appear:
> *Reset Peak+Vall* will reset the peak and valley measurements.
> *Reset Peak Only* will reset the peak measurement.
> *Reset Vall Only* will reset the valley measurement.
> *Reset Position* [OPT] will reset the position to zero.
> *Reset Limits* [OPT] will reset any limits that require manual resetting.

Pressing either the "**+**" button or the "**>**" button will scroll forward through this list. Pressing either the "**-**" button or the "**<**" button will scroll backward through the list. Pressing "**Enter**" will reset the currently displayed item. Pressing "**Esc**" will return to Run Mode without resetting anything. Note that all menu lists on the Model 9840 start with the "**>**" symbol and that the **Esc** button will always back out of a menu without making any changes.

## View Button

The **View** button switches between two virtual displays stored in the memory. Each of these displays will remember the units you have selected for each item, and which item is currently being shown. This may save you from scrolling through the list of items if there are two particular results that you often use. For instance you might set the display to show Load in Lb, press **View**, and then set the display for Peak in PSI. Repeated presses of the **View** button will now switch back and forth between Load in Lb and Peak in PSI with a single button push. If you choose to have the second line show a display, then the **View** button toggles between the lines currently being activated. The activated line will have a ">" symbol to the left of it.

## Esc Button

The **Esc** button allows the user to escape from system menus. When depressed, the display will revert to the next higher level menu. If the **Esc** button is pressed when in the highest level menu, the display reverts to the Run Mode showing sensor data. In run mode, If the Display Hold[OPT] option is ordered, the **Esc** button will hold the data.

## Esc Button / Display Hold OPT

If Display Hold option is purchased, when the **Esc** button is pressed during Run Mode operation, the reading on the display will hold/freeze. It will release/unfreeze upon another push of the **Esc** button.

## Esc Button / Print Function OPT

If the Print option is purchased, enabled and assigned via System Setup Options menu selection, when the **Esc** button is pressed during Run Mode operation, the unit will print data. See Setup Mode information for the use of the **Esc** button during setup.

If the **Esc** button is set to print, it will send a set of data to the printer. This will contain the current readings of load, peak, valley, position OPT, velocity OPT, and limit OPT status. The units used for printing will be the units last selected on the numerical display.

The printer must be a serial printer that supports ESC/P protocol. Many Epson printers with serial ports are known to be compatible.

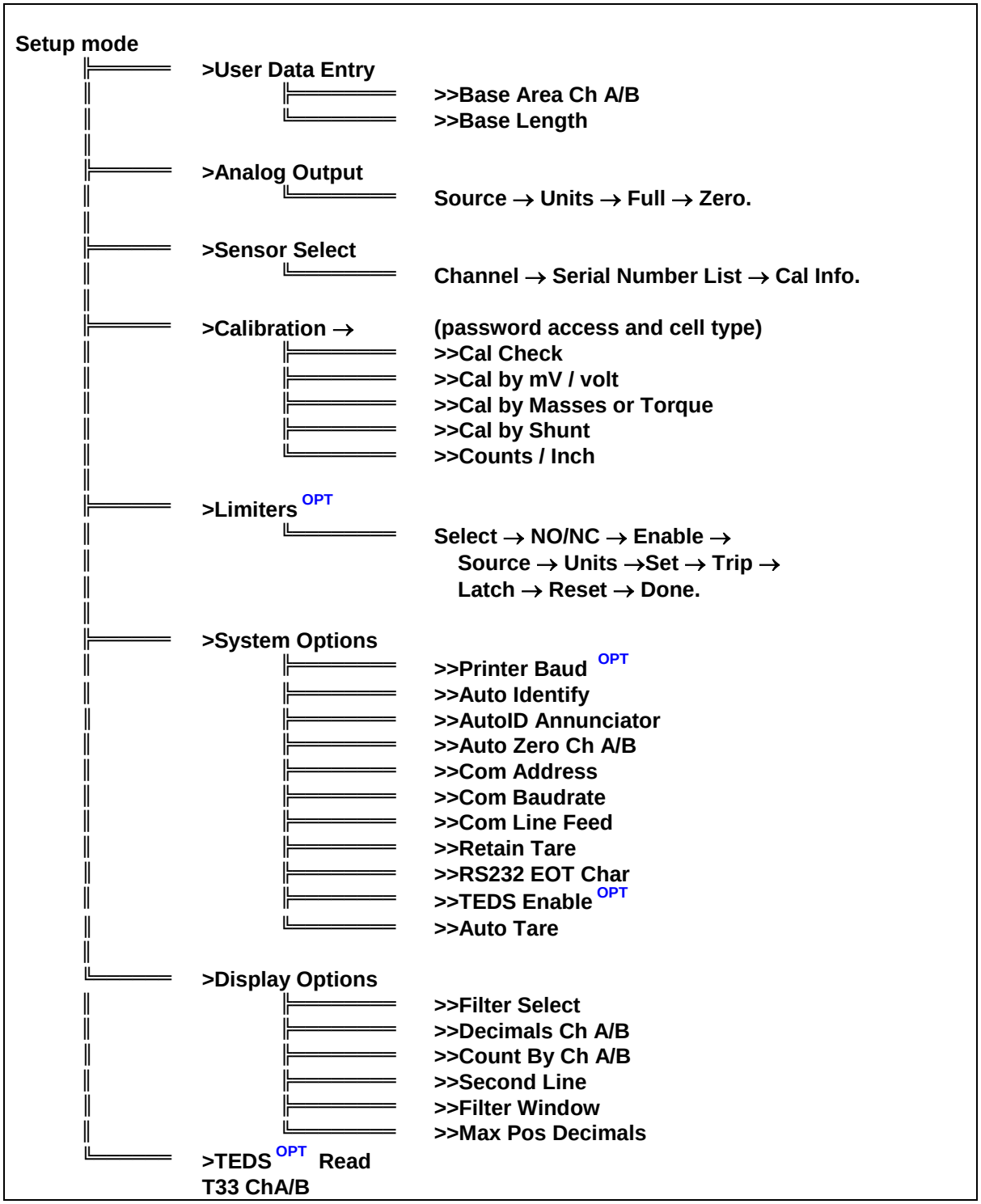
Appendix B gives the pin assignments on the serial connector.

## Unit Button

The **Unit** button cycles through the list of units that are available for the item that is currently being displayed.

## SETUP MODE SUMMARY

The table below summarizes the setup mode menus. Detailed information about each individual item is presented in the following sections.



## SETUP MODE

Setup mode is used to change the setup of the Model 9840. To enter setup mode press the two end buttons at the same time ("<" and ">"). The row of four buttons will now function as indicated by the lower set of labels (Plus, Minus, Enter, and Escape).

If the optional keylock is in the locked position you will see ">Setup is Locked" when you try to enter setup mode. This prevents accidental or unauthorized changes to the setup of the unit.

To exit from setup mode and return to run mode press the escape button (Esc). When you are entering numerical data or selecting options from a sub-menu the escape button will back you out without making any changes.

The main menu in setup mode contains the following 6 entries which will be described in detail in the following sections. Note that all main menu items begin with the "**>**" symbol and that all submenu items begin with the "**>>**" symbol.

- **> User Data Entry** -- allows you to set any common math options such as the base area used to display load in PSI or the base length used to display position in percent.
- **> Analog Output** -- is used to select the source and scaling for the standard analog output channel.
- **> Sensor Select** -- lets you manually set which load or torque cell calibration data is used. If you use auto-id cells you will never need this menu.
- **> Calibration** -- provides access to calibration for cells or optical encoders.
- **> Limits** OPT -- allows you to set the source and options for the 4 contact closure switches.
- **> System Options** -- contains entries to set the printer OPT baud rate , enable or disable automatic sensor identification, enable or disable automatic load or torque zeroing, set the serial communications address, baud rate, line feed, and RS232 options, and choose whether or not to retain the most recent tare value through power down.
- **> Display Options** -- lets you choose the filtering that is applied to the load or torque measurements, an optional window of data incrementation on which to turn the filter off, the number of decimal digits that are shown on the display and on the print, the count by values for channels A and B (1, 2, 5, 10, or 20), and whether the second line of the display shows the limit switch status, a blank line, another display, or text.
- **> TEDS** OPT **Read T33** – Reads all TEDS Template 33 parameters.

The Plus or Right button ("**+**" or "**>**") will scroll forward through this menu. The Minus or Left button ("**-**" or "**<**") will scroll backward through this menu. The **Enter** button selects the currently displayed menu item. The **Esc** button will return you to Run Mode.

## Entering Numerical Data

At times you will need to enter numerical data into the Model 9840. The method is consistent in all cases. A number is presented on the left side of the display with an underline cursor.

- **Left** ( "**<**" ) moves the cursor left one position. If you are on the leftmost digit a new zero will be added. Thus 10.000 will become 010.00 where the cursor has moved from the tens place to the hundreds place.
- **Right** ( "**>**" ) moves the cursor right one position. If you are at the far right a new decimal will be added if there is room. Thus 12.34 will become 12.340 where the cursor has moved from the tenths to the hundredths place.
- **Plus** ( "**+**" ) increments the digit above the cursor. Thus 12.34 becomes 13.34. Note that 9 will "wrap around" to 0.
- **Minus** ( "**-**" ) decrements the digit above the cursor. Thus 12.34 becomes 11.34. Note that 0 will "wrap around" to 9.
- **Plus** *and* **Minus** (both "**+**" and "**-**" at the same time). This will change the sign of the number. Thus 12.34 becomes -12.34. Note that cursor position does not matter when you change the sign.
- **Enter** accepts the currently displayed number.
- **Esc** escapes from numerical entry and discards any changes that have been made.

## Entering Alphanumeric Data

When entering cell serial numbers, the option of using numbers and/or letters from A to Z is available. This works in the same way as entering numerical data with the exception that no decimal point exists in the display.

## >User Data Entry

This menu is used to enter numerical constants used by the math options. These constants are listed in a submenu that works exactly like the main setup mode menu. Typical items in this submenu are:

### *>>Base Area Ch A/B*

This is the area in square inches that is used to calculate load in pounds per square inch (PSI) or Mega Pascals (MPa).

### *>>Base Length*

This is the length in inches that is used to calculate position in percent.

## >Analog Output

This menu is used to set up the standard analog output. Instead of a submenu there is a series of selections. Pressing escape at any time will leave the analog output unchanged and return you to the setup mode main menu. Note that when you change a cell type (from load to torque or back again) these settings must be reset for the new cell. If the unit is a 2-channel unit and the Analog Output B[OPT] option has been enabled, the first option asks the user for the Analog Output channel. Select A or B. Then begin selecting the following settings.

1. **Source:** -- This entry allows you to scroll through a list (using the left/right or plus/minus buttons) to select the source of the data that will drive the analog output. The standard list will include load or torque, peak, valley, gross, position, and velocity. Channel A+B is an option which, if chosen, will appear only if the cells on both channels are of the same type. Press enter to select the displayed item.
2. **Units:** -- This entry allows you to scroll through the list of available units for the data source you have chosen in the previous step.
3. **Full** -- This entry specifies the value of source data (in the selected units) that will cause the Model 9840 to output positive full scale analog voltage (+10.0 volts).
4. **Zero** -- This entry specifies the value of source data (in the selected units) that will cause the Model 9840 to output zero analog voltage (0.0 volts).

Once you have entered these 4 selections the analog output is setup. The Model 9840 is shipped with one Analog output channel standard. A second analog output channel, Analog Output B[OPT] is available.

### OPTION ~ 4-20MA Output

This option allows the user to output with current (milliamps) rather than voltage. It operates similarly to Analog Output using the same submenus, but, in this case, the Full and Zero data entered control the distribution of output in milliamps from the unit given certain inputs to the cell. Particularly, the number entered for Zero will set the corresponding input in Lbs to output 12 milliamps (the mid-point between four and twenty milliamps) and the unit will extrapolate other output values between 4 and 20 milliamps.

If this option is enabled, the following steps will set up the unit: follow the instructions for Analog Output until "Source:" is displayed. Toggle through until the "Load A" is on the display. Press the enter button to bring up the "Lb" menu. Press the enter button again and the "4.0000 Lb Full" menu will be displayed. This is where the maximum Lbs for the cell should be entered. Press enter and the "0.0000 Lb Zero" menu will be displayed. This is where the offset from zero (the value in lbs that will give a 12 milliamp) should be entered. Press the enter button to return to the Analog Output menu and then press the escape button to return to the normal display.

Example outputs with varying Full and Zero Values (assuming a 4.00 Lb calibrated cell with 10V excitation):

1. Full = 4.0000 Lb  Zero = 0.0000 Lb

| (Input) mV/V | (Output) Volt | (Output) MA |
|---|---|---|
| | | |
| 4 | 10v | 20mA |
| 3 | 7.5v | 18mA |
| 2 | 5.0v | 16mA |
| 1 | 2.5v | 14mA |
| 0 | 0v | 12mA |
| -1 | -2.5v | 10mA |
| -2 | -5.0v | 8mA |
| -3 | -7.5v | 6mA |
| -4 | -10.0v | 4mA |

2. Full = 4.0000 Lb Zero = 4.0000 Lb

| (Input) mV/V | (Output)Volt | (Output) MA |
|---|---|---|
| | | |
| 4 | 0v | 12mA |
| 3 | -2.5v | 10mA |
| 2 | -5.0v | 8mA |
| 1 | -7.5v | 6mA |
| 0 | -10.0v | 4mA |
| -1 | -10.0v | 4mA |
| -2 | -10.0v | 4mA |
| -3 | -10.0v | 4mA |
| -4 | -10.0v | 4mA |

3. Full = 2.0000 Lb Zero = 0.0000 Lb

| (Input) mV/V | (Output) Volt | (Output) MA |
|---|---|---|
| | | |
| 4 | 10.0v | 20mA |
| 3 | 10.0v | 20mA |
| 2 | 10.0v | 20mA |
| 1 | 5.00v | 16mA |
| 0 | 0v | 12mA |
| -1 | -5.0v | 8mA |
| -2 | -10.0v | 4mA |
| -3 | -10.0v | 4mA |
| -4 | -10.0v | 4mA |

4. Full = 2.0000 Lb Zero = 2.0000 Lb

| (Input) mV/V | (Output) Volt | (Output) MA |
|---|---|---|
| | | |
| 4 | 10.0v | 20mA |
| 3 | 5.0v | 16mA |
| 2 | 0v | 12mA |
| 1 | -5.00v | 8mA |
| 0 | -10.00v | 4mA |
| -1 | -10.0v | 4mA |
| -2 | -10.0v | 4mA |
| -3 | -10.0v | 4mA |
| -4 | -10.0v | 4mA |

## >Sensor Select

This menu is used to manually select load or torque cell calibration data from a list stored in the Model 9840. When you select this menu on a 2-channel unit, you are asked to select Channel A or B. The cell serial number of the selected channel is displayed. Use either the left/right or plus/minus buttons to page through the list. The escape button will return to the setup mode main menu without changing the cell that is selected. The enter button will select the currently displayed cell and briefly display the rated load or torque, last calibration date, and excitation voltage.

To add new cells to this list use the Calibration entry on the setup mode main menu described below.

If you are using a TEDS[OPT] sensor and TEDS is enabled you will not be able to change the sensor. This ensures TEDS calibration data will be used when a TEDS sensor is plugged in.

If you are using auto-id load cells this menu will allow you to see which cell is selected but will not allow you to change the selection. This ensures that the correct calibration information is always used when you use Auto-ID load cells.

If the selected cell is of a different type (load or torque) than that previously displayed on the channel, the display item and units will change accordingly.

## Sensor Delete

The Model 9840 can store calibration data for 25 (Optionally 28) different cells. To delete a cell from this list choose ">Sensor Select" from the setup mode main menu. Press the left/right or plus/minus keys until the serial number of the cell you wish to delete is displayed. (You may need to shut off auto-id and/or TEDS[OPT] Enable if either is on, see the System Options menu for details). Then press both the plus and minus keys at the same time. The Model 9840 will ask "Delete Sensor?" to be sure that you intend to delete this calibration data. Pressing Enter will delete the cell data from the list. Pressing Escape will return to the cell select without changing the list.

## >Calibration

This menu is used to access all methods of calibration that are supported by the Model 9840. Selecting calibration from the setup mode main menu will bring up a password entry field. Successful entrance of the password (888) will bring up a submenu which asks for the cell type. Toggle through either **Load or Torque** and press enter when appropriate. Another submenu will appear listing the various types of calibration. This submenu is used exactly like the main menu. Press left/right or plus/minus to change the menu item. Press escape to return to the setup mode main menu. Press enter to select the displayed menu item.

If you are re-calibrating a cell, the Model 9840 will recognize it using either the auto-id or a manually entered serial number. Any time you overwrite existing cell calibration data you will first be warned with the "Overwrite Data?" message. Pressing enter will overwrite; pressing escape will cancel the calibration. Another method of overwriting existing data is to delete the sensor first and then calibrate.

If a cell with a new serial number (or new auto-id) is calibrated the data is added as a new entry in the cell list.

Cells must be calibrated for the channel on which they will be used.

If TEDS[OPT] is enabled and a TEDS[OPT] sensor is plugged into a channel, the user will not be allowed to calibrate that channel.

**Note:** All calibrations can be performed using positive or negative values! For multipoint calibrations this will allow for nonlinear calibrations across zero. The sign of a number is changed by pressing both "**+**" and "**-**" at the same time during number entry.

### *>>Cal Check*

Selecting this item will run a calibration check on the cell attached to Channel A or B. The Model 9840 will measure the shunt value of the cell and compare it to the shunt value that was recorded when the cell was last calibrated. The rated load or torque and last calibration date for the cell are displayed followed by the currently measured shunt value and the shunt value that was recorded when the cell was calibrated.

Note that the Model 9840 has a switch on the back panel that allows you to select either a 30K shunt or a 60K shunt. Be sure that this switch is set correctly for the cell that you are using.

Since this shunt check electronically applies approximately half the rated load or torque, it is important that the cell is not loaded when this check is run. If you see the "Cell Overloaded" message, remove any load or torque on the cell and try the check again.

### *>>Cal by milli-volt per Volt (2 or 6 Point)*

This item is used to calibrate a cell using the manufacturer's milli-volt per Volt calibration factor (the second point of a two point calibration that automatically sets the first point at zero) or a series of six milli-volt per Volt points with corresponding masses (usually listed on the load cell calibration certificate) or torques. Before you enter in the desired information, another menu will ask you if you want to calibrate by milli-volt per Volt or 6 point milli-volt per Volt. Pressing the arrow keys will allow you toggle between milli-volt per Volt and 6 point milli-volt per Volt modes. You will then be asked for the channel, the cell serial number, the current date, the calibration unit, the cell's maximum rated load or torque, and the desired excitation voltage (5.0 or 10.0 volts). If milli-volt per Volt calibration was selected, you are then prompted to enter the manufacturer's milli-volt value. If 6 point milli-volt per Volt calibration was selected, you are prompted for each mass or torque and milli-volt per Volt value. A piece-wise linear interpolation is then performed between adjacent points. One of these points should be zero mass and zero milli-volts per volt. Enter each of these selections as prompted or press the escape button at any time to return to the setup mode main menu without changing the calibration. The cell should not be under load or torque when this calibration method is used since a shunt value will be measured and recorded for later use with "Cal Check" feature described above. The "No Masses Ready" or "No Torque Ready" message is intended to remind you of this fact. This general sequence of prompts and user responses also applies to the 5 point mass or torque calibration.

### *>>Cal by Masses or Torque (2 or 5 Point)*

These items are used to calibrate a load or torque cell using known masses or torques. The appropriate choice will be available depending on which cell type was chosen at the beginning of calibration: a load cell will show Masses as an option and a torque cell will show Torque as an option. Before you enter in the desired information, another menu will ask if you want to calibrate by ***2*** or ***5 Point***. You will then be asked for the channel, the cell serial number, the date, the calibration unit, the cell's maximum rated load or torque, and the desired excitation voltage (5.0 or 10.0 volts). You are then prompted to enter the value of the first mass or torque. The "Mass 1 Ready?" or "Torque 1 Ready?" message will wait while you actually hang the mass or set the torque. When the Model 9840 is reading the cell it will display the "Reading..." message for about 10 seconds. During this time it is important that the masses or torque are not disturbed since all the readings taken are averaged together to obtain the calibration data. The second mass/torque is then entered and read. If *5 Point* calibration was selected, masses/torque three through five will be entered and read. One of these readings should be at zero. A "No Masses Ready?" or "No Torque Ready" reading is also required. During this reading, a shunt check value is recorded.

### *>>Cal by Shunt Val*

This item is used to calibrate a cell using the manufacturer's shunt calibration factor expressed in pounds or pound-inches. You will be asked for the channel, the cell serial number, the date, the calibration unit, the cell's maximum rated load or torque, the desired excitation voltage (5.0 or 10.0 volts), and the shunt calibration constant. The Model 9840 will then automatically perform the shunt calibration of the cell using its internal precision shunt resistor. Note that there is a back panel switch that allows you to select either a 30K or 60K resistor for shunt measurements (see Appendix B for a circuit diagram). Be sure to select the appropriate value for your cell. During this calibration the "Reading..." message will be displayed. Do not disturb the cell while it is being read. Like the "Cal by milli-volt per Volt" option, the cell should be free of load or torque during this calibration.

### *>>Counts per Inch*

This entry allows you to set the number of counts per inch that the quadrature encoder input will use.

## >Limits OPT

This menu is used to set up the 4 contact closure switches. Instead of a submenu there are a series of selections. Pressing Enter will accept the displayed entry. Pressing Escape will return to the setup mode main menu without changing the limit setup. Note that changing a cell type on a channel will automatically erase limits that were set for that channel. These limits must then be reset by the user.

1. **Select Limit X** -- The first selection chooses which of the limits you want to set up (1-4). Use the left/right or plus/minus buttons to change the number. Press enter to accept the displayed number. Press escape to return to the setup mode main menu.
2. **Normally Open / Closed** -- This selection determines if the switch contacts are open or closed when the limit is de-activated.

3. **Enabled / Disabled** -- Choosing enable allows the limit to operate as specified by the following selections. Choosing disable places the limit in its "normal" state and completes the limit setup.
4. **Source:** -- This selection allows you to scroll through a list (use either the left/right or plus/minus buttons) to select the source of the data that will drive the limit. The standard list will include load or torque, peak, valley, position, and velocity. Press enter to select the displayed item.
5. **Units:** -- This entry allows you to scroll through the list of available units for the data source you have chosen in the previous step.
6. **Set** -- This is the numerical value of the source at which the limit will be activated (set point). It is specified in the units you chose in the previous step.
7. **Trip if *source* < / > Set** -- Choosing source>set means that the limit will be activated when the source becomes larger than the set point. Choosing source<set means the limit will be activated when the source becomes less than the set point.
8. **Latching on/off** -- Selecting latching off means that the limit will be de-activated automatically when the source passes the reset point (see next selection). Selecting latching on means that once the limit is activated you must manually reset it using the Reset button. If you select latching on then the limit setup is done.
9. **Rst** -- This selection determines the numerical value of the source at which the limit will be deactivated (reset point). If you selected "source>set" in step 7 then the limit is deactivated when the source is less than the reset point. If you selected "source<set" in step 7 then the limit is deactivated when the source is greater than the reset point.

**Notes:**

The Set and Reset conditions for each limit are evaluated independently. If both conditions are met then Reset will take priority over Set.

Limit status may show an asterisk if the limit is enabled but there is an error in the signal source. For example, if the limit source is load but there are no load cells currently calibrated, or the load cell has a rating of 0.0 Lb, or a milli-volt per Volt constant of zero. Another example would be if the limit source is position and zero has been entered for the encoder counts-per-inch constant. Limits that are in this error condition will be forced to the off position as if they were disabled.

## >System Options

This menu contains some system wide parameters that are seldom changed. These are listed in a submenu that works exactly like the setup mode main menu.

### *>>Printer Baud* *OPT*

The front panel Esc button (used to implement printing) and the RS232 print commands will use this baud rate for communication with your printer. This setting has no effect on units that are not equipped with the printing option. 57.6 K baud is commonly used on older serial printers (Epson Stylus II), 230.4 K baud is used on more recent serial printers (Epson Stylus Color 600, Color 800).

## >>Auto Identify

This allows you to turn automatic cell identification on or off. Usually you can leave auto-id on even if you never use automatic cell identification. In order to use this function you must either have an auto-id equipped cell or use an in-line auto-id module attached to your cell cable.
**Note:** If TEDS is also on, it will override Auto Identify if a supported TEDS [OPT] sensor is attached! Also if TEDS is turned off, a TEDS enabled sensor can be used as an Auto ID snesor. This is because they both contain an 8 byte Tag ID.

## >>Autoid Annunciator

This allows you to turn the AutoID Annunciator "t" on or off. When on and an AutoID is on and a recognized AutoID cell is attached a solid "t" will show up on the first character for that channels item. The "t" will blink if a non-recognized or non AutoID is attached.
Note: The TEDS [OPT] "T" annunciator will override the auto-ID annunciator if TEDS is enabled.

## >>Auto Zero Ch A/B

This menu lets you enable or disable auto zeroing for measurements on Channel A or B. When enabled, this function will tare the load or torque to zero any time that it has remained within 10 counts of zero on the display for 10 seconds.

## >>Com Address

This item allows you to set the address of this unit used for the RS232 ASCII command set. Valid values are 1 through 254. If the RS232 multi-drop option is installed you must be sure that all the attached units have different addresses to prevent data collisions.

## >>Com Baudrate

This sets the baud rate for the RS232 ASCII command set. Available values are: 300, 600, 1200, 2400, 4800, 9600, and 19.2k. Note that the "Special" entry is reserved for future use.

## >>Com Line Feed

This controls whether a line feed is added to each carriage return that is sent out by the Model 9840 when the RS232 ASCII command set is being used.

## >>Retain Tare

This controls whether the most recent tare value is retained through power down of the unit and used again immediately on power up. Choosing this option will retain tare on channel A in a single channel unit and both channels A and B in a two-channel unit.

### *>>RS232 EOT Char*

The end of transmission character is a non-visible character (hexadecimal 0x04) that is sent at the end of each response by the unit to an RS232 command. The character is sent after the last carriage-return line-feed returned by the unit with one exception: when the user is viewing channel values with the RS232 command @123V(item)(unit)(repeat) and sets the value of repeat to 2 (streaming output), the character is sent immediately prior to the streaming output that the unit will send. The user can turn this option on or off.

### *>>TEDS [OPT] Enable*

If TEDS option is enabled, this menu will turn TEDS mode on or off. When on, a TEDS enabled sensor will automatically load its calibration information into the M9840 when attached. Also, a solid "T" will show up on the first character on a channels item if a TEDS sensor is attached. It will blink if a TEDS sensor is not attached. The "T" will not be displayed at all if TEDS mode is off! Also as described earlier, if TEDS is on it will override AUTO ID if a TEDS enabled sensor is plugged in.

### *>>Auto Tare*

The Auto Tare can be turned on or off in this menu. When on it will perform and automatic Tare when an auto-id or TEDS enabled sensor is attached if those features are enabled.

## >Display Options

This menu contains options that effect how load or torque, peak, and valley are displayed and printed. These are listed in a submenu that works exactly like the setup mode main menu.

### *>>Filter Select*

There are two types of filters available on the Model 9840: Type I, and Type II. Type I filters are good for removing most kinds of noise but may leave some jitter on the end digits. Type II filters are more advanced and are optimized for the typical industrial environment. Both filter types allow you to select from 4 levels of filtering with Level 1 being the least filtering and Level 4 being the most filtering.

The settling time for each of the 4 levels of filtering is shown in the table below

| Level | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Settling Time (seconds) | <1 | 2 | 10 | 30 |
| Read Rate (per second) | 60 | 60 | 30 | 10 |

## >>Decimals Ch A/B

This lets you set the maximum number of digits to the right of the decimal that are displayed or printed for load or torque, peak, and valley. When large cells are selected the number of decimal digits shown may be limited, for example a 100 Lb cell will allow 3 digits, while a 1000 Lb cell will only allow 2 digits. Also if a number is too large to fit on the display some decimal digits may be dropped (the display will “auto-range”). The number of digits shown for position data depends only on the number of counts per inch of the encoder and is not affected by this setting.

## >>Count By Ch A/B

This allows you to choose the smallest unit of counting for the display of load or torque, peak, and valley. Counting by 1, 2, 5, 10, and 20 are the options.

Note that the operation of the analog outputs and the limits is not effected by the settings of “decimal point” or “smallest count”. Thus if you set a limit to be activated at 10.001 Lbs, and have “smallest count” set for 20, the limit is activated at 10.001 Lbs even though the display is only showing 10.000.

## >>Second Line

This option allows you to choose what you want to have displayed on the second line. You can select limits, select a display [OPT], select text, or leave the line blank. Changing the type of cell attached to the unit from load to torque or back will reset the display such that both the top and bottom line will revert to the new cell type and its initial display - Load for a load cell, and Torq for a torque cell - for the channel on which the cell type was changed.

A display selection for the second line on a single channel unit is not a standard option. It is a standard option with a two channel unit. The Limits [OPT] option includes the second display line turned on to display status.

## >>Filter Window

This option allows you to enable and set, or disable, a window to be used to turn the filters on or off. If there is a sudden change in the measurement that exceeds this set window, the filter is turned off and immediately turned back on so that this change of data will be visible to the user rather than filtered out. To turn the window on, press enter under the Filter Window option and toggle between on and off using the > and < buttons. Once the window is turned on, pressing enter and will display the current window's value and units (0 and Lbs or LbI, respectively). Press enter again and you will be asked to set the units (toggle buttons take you through the list). Press enter once more and you reach the screen to set the value of the window. Once the value is set, press enter and you will return to the Filter Window option.

To change the window, simply repeat the steps above. Instead of 0 and Lbs. in the current window display, you will see the most recently entered values. Turning the window off resets the window value to 0 and Lbs (or LbI for torque).

Note that changing a cell type on a channel will automatically disable the filter window for that channel, reset the units to Lb or LbI, and set the window value to 0. The window must then be reset and re-enabled by the user.

### *>>Max Pos Decimals*

This option allows you to choose the maximum amount of decimal points to be displayed for the position item. This applies to the front panel and RS-232.

## >TEDS [OPT] Read T33

If TEDS is enabled this menu will be present. It will scroll through all TEDS Template 33 parameters for the selected channel of an attached TEDS sensor. The menu list is:
Ch A/B Mfg ID:
Ch A/B Model Number:
Ch A/B Version Letter:
Ch A/B Version Number:
Ch A/B Serial Number:
Ch A/B Phy Measureand:
Ch A/B Min Phy Value:
Ch A/B Max Phy Value:
Ch A/B Precision Sel:
Ch A/B Minimum Output:
Ch A/B Maximum Output:
Ch A/B Bridge Type:
Ch A/B Bridge Imp:
Ch A/B Resonse Time:
Ch A/B Excitation(Nom)
Ch A/B Excitation(Min)
Ch A/B Excitation(Max)
Ch A/B Cal Date:
Ch A/B Cal Initials:
Ch A/B Cal Period:
Ch A/B Meas Loc ID:

## Digital Inputs

There are 4 digital inputs available on the Model 9840. They are accessible on the Digital I/O connector on the back panel (pins 9 - 16). These inputs are individually opto-isolated and include current limiting resistors. An input voltage anywhere from +4 to +22 volts DC may be used to obtain the "on" state. See Appendix B for a full description of the Digital I/O connector.

If you do not require isolation for your application you can use the +5 or +12 volt and GND available on the Digital I/O connector (pins 24-26).

These 4 inputs are called IN1 through IN4 and have the following standard functions:

**IN1** will Tare the Load or Torq to zero while it is in the On state.

**IN2** will Reset the Peak and Valley measurements while it is in the On state.

**IN3** will Reset the Position [OPT] measurement while it is in the On state.

**IN4** will send one set of measurements (load or torque, peak, valley, position [OPT], velocity[OPT], and limits [OPT]) to the serial printer when it transitions from Off to On if the Print option is enabled; or will hold/freeze the display if Display Hold [OPT] enabled.

Other functions may be assigned to these inputs by custom programming at the factory.

All the features and settings of the Model 9840 can be accessed remotely using the Remote ASCII command set. These commands fall into two groups: commands that are similar Run Mode pushbutton commands; and commands are similar to Setup Mode pushbutton commands.

Communications can be established via RS232/RS485 protocols through the serial port on the rear panel of the unit, or via USB communications through the USB port on the rear panel of the unit in conjunction with the USB driver installed on the host PC. The commands and command formats are the same for each method of communications.

Pinouts for the RS232/RS485 serial port communications are listed in Appendix B of this manual. For older computers, USB communication may require the installation of the USB driver located on the CD-ROM that accompanies this product. If the host PC can communicate with the Model 9840 via USB, no driver is needed.

## USB Driver

If the host PC cannot communicate with the Model 9840 via USB, install the USB driver that accompanies this product on CD-ROM. To install the USB Driver, place the CD in your CD-ROM drive. Select Run from your Windows Start menu. Type D:\USB_Driver\CDM_Setup.exe ("D" or the corresponding CD-ROM drive letter for your computer) in the box and hit Enter. You will be notified when the driver has finished installing.

If no CD-ROM was received, download and install the USB driver from http://www.ftdichip.com/Drivers/VCP.htm. You need to download and install driver version 2.04.06 or higher. Click on the download link 2.04.06 listed next to Windows XP and follow the download and install instructions.

## Communications Settings

The Model 9840 supports remote operation using a standard Remote interface consisting of ASCII characters and terminal emulation software package such as HyperTerminal or ProComm. The baud rate is set using the Com Baud rate item on the System Options menu. Supported rates are **300**, **600**, **1200**, **2400**, **4800**, **9600**, and **19.2k** baud. There must be **8 data** bits, **no parity**, and **1 stop** bit.

To support the multi-drop Remote option each unit is assigned a communications address, which is set using the Com Address item on the System Options menu.

## Communications Format

All the commands have the following format:

@123XYZ<CR>

The @ symbol initiates the command, all commands must begin with this symbol. The number 123 is the address of the Model 9840 which should respond to this command. This MUST be 3 digits so type 001 for unit one, and 026 for unit twenty-six. The command itself will be a sequence of letters such as the XYZ shown above. If the command requires a number as one of its parameters the number must be followed by the pound sign "**#**". Numbers that are less than one should include a leading zero so you should type 0.123# to enter one hundred-twenty three thousandths. Commands are not processed until a carriage return <CR> is sent.

No Model 9840 will respond to address 000. All Model 9840s will respond to address 255. Throughout the rest of this section we will assume that you are using address 123.

Whenever a Model 9840 executes a remote command it will issue an "acknowledge" that includes the address and any required data.

# RS232 RUN MODE COMMAND SUMMARY

| @(addr) | | |
|---|---|---|
| H | | Hello fetches unit description |
| ? | | Get item and unit numbers |
| FV | | View item and unit settings |
| FS | (item)(unit) | Set displayed item and unit |
| FA | | Alternate display, like view button |
| F1 | | Switches view pointer to display line 1 (upper) |
| F2 | | Switches view pointer to display line 2 (lower), or virtual display if line 2 is disabled |
| V | (item)(unit)(repeat) | Get Value of an item and unit |
| P | (repeat) | Print [OPT] a set of readings |
| R | (tare)(peak)(vall)(pos) | Reset readings |
| X | | Freeze [OPT] display |
| T | (hold)(text) | Place text on display |

# RS232 RUN MODE COMMANDS

The commands listed in this section mirror (and in some cases extend) the functions that are available from the front panel of the Model 9840 when it is in Run Mode.

Each entry will include the name of the command, followed by a short description that includes the command format, an example that shows what you would type (shown in plain font) and what the Model 9840 would return (shown in italics).

## Hello Command (H)

This command fetches the model, version, and serial number of any unit at the specified address.

**Example:**

`@123H`

**Acknowledge:**

*`@123 Interface Model 9840 Version 6.0.0 Serial #-980500 Option # 457977664`*

## Question Mark Command (?)

This command returns a list of item numbers and unit numbers that are available on the Model 9840 that is addressed. These numbers are used as arguments for the many of the commands shown below**.

**Example:**
@123?
**Acknowledge:**
*@123 These are the Item numbers:*

| | | | |
|---|---|---|---|
| *00 – Load A* | *01 – Peak A* | *02 – Vall A* | *03 – Load B* |
| *04 – Peak B* | *05 – Vall B* | *09 – Pos* | *10 – Vel* |
| *13 – Limits* | *14 – Grs A* | *15 – Grs B* | *16 – Ch A+B* OPT |

***Alternatively torque units may be displayed or a combination of both depending upon which cell is loaded on which channel:*

| | | | |
|---|---|---|---|
| *17 – Torque A* | *18 – Peak A* | *19 – Vall A* | *20 – Gross A* |
| *21 – Torque B* | *22 – Peak B* | *23 – Vall B* | *24 – Gross B* |
| *25 – Ch A+B* OPT | | | |

*These items are for value display purposes only:*

| | | |
|---|---|---|
| *50 – Cell* AB* | *51 – Peak AB* | *52 – Vall AB* |

**Note: If the channel is set as a load channel, the cell type implied is a LOAD CELL; if the channel is configured as a torque channel, the cell type implied is a TORQUE CELL.*

*These are the units for Load, Peak, and Valley:*

| | | | |
|---|---|---|---|
| *00 – Lb* | *01 – kg* | *02 – N* | *03 – PSI* |
| *04 – MPa* | *05 – Klb* | *06 – kN* | *07 – t* |
| *08 – mVv* | *09 – g* | | |

*These are the units for Torque:*

| | | | |
|---|---|---|---|
| *00 – LbI* | *01 – NM* | *02 – OzI* | *03–mVv* |

*These are the units for Position* OPT*:*

| | | |
|---|---|---|
| *00 – In* | *01 – Cm* | *02 – %* |

*These are the units for Velocity* OPT*:*

| | |
|---|---|
| *00 – I/M* | *01 – C/M* |

## Front Panel Display Command (F)

This command is used to set the front panel display of the Model 9840 to a desired combination of item and unit. There are five subcommands: Front panel View (FV), Front panel Set (FS), Front panel Alternate (FA), Front panel pointer control to line 1 (F1), and Front panel pointer control to line 2 (F2).

### *Front Panel View Command (FV)*

The Front panel View (FV) command just tells you what is currently on the display, and what will be displayed when the View button on the front panel is pressed.

**Example:**
@123FV
**Acknowledge:**
*@123 Active Display shows Load A in Lb*
*Other Display shows Peak A in Lb*

## *Front Panel Set Command (FS)*

The Front panel Set (FS) command allows you to specify the item number and unit number for what is currently on the front panel display. The format is FS (item number)(unit number), where the first item and unit numbers are 2 digits each and may be found using the question mark command (?).

**Example:**
`@123FS0200`
**Acknowledge:**
*`@123 Active Display shows Vall A in Lb`*
*`Other Display shows Peak A in Lb`*

## *Front Panel Alternate Command (FA)*

The Front panel Alternate (FA) command allows you to switch between the currently displayed item and unit and the alternate item and unit just as if you had pressed the View button.

**Example:**
`@123FA`
**Acknowledge:**
*`@123 Active Display shows Peak A in Lb`*
*`Other Display shows Vall A in Lb`*

## *Front Panel Pointer Control to Line 1 (F1)*

The Front Panel Pointer Control to Line 1 (F1) assigns the view pointer control to display line 1 (upper line of the display) and shows what is on the display. This allows the operator to know which line will be configured or accessed.

**Example:**
`@123F1`
**Acknowledge:**
*`@123 Active Display shows Load A in Lb`*
*`Other Display shows Peak A in Lb`*

## *Front Panel Pointer Control to Line 2 (F2)*

The Front Panel Pointer Control to Line 2 (F2) assigns the view pointer control to display line 2 (lower line of the display, or the virtual display line if line 2 is disabled) and shows what is on the display. This allows the operator to know which line will be configured or accessed.

**Example:**
`@123F2`
**Acknowledge:**
*`@123 Active Display shows Peak A in Lb`*
*`Other Display shows Load A in Lb`*

## Value Command (V) for one or both channels

The value command for one channel is used to read the numerical value of a desired item and unit without altering the front panel display. The format is V(item number)(unit number)(repeat), where the item and unit numbers can be found using the question mark command (see above), and the repeat number must be 0,1, or 2. Choosing repeat 1 will command the Model 9840 to send you the desired value once. Choosing repeat 2 will command the Model 9840 to send the value at approximately 3 second intervals. Choosing repeat 0 will turn off any values that are being sent by a repeat 2 command. **Note**: when choosing to view Limits, use "00" for the unit part of the command.

**Example:**
`@123V01021`
**Acknowledge:**
*`@123 Peak A 55.676 N`*

**Example 2:**
`@123V00002`
**Acknowledge 2:**
*`@123 Load A 120.45 Lb`*
*`@123 Load A 125.29 Lb`*
*`.....`*
*`@123 Load A 137.81 Lb`*

The value command for both channels is similar to the command for one channel with the following exceptions:

The item numbers available for two channel value display are 50 (Cells AB), 51 (Peak AB), and 52 (Valley AB).

The format is V(item number)(unit number channel A) (unit number channel B)(repeat), where the item must be 50, 51, or 52 and unit numbers can be found using the question mark command (see above). Make sure to use the proper unit numbers for the proper cell type. A unit number of 08 for a torque cell will result in an unusable argument message.

The repeat number is exactly like the one channel command. It must be 0, 1, or 2. Choosing repeat 1 will command the Model 9840 to send you the desired value once. Choosing repeat 2 will command the Model 9840 to send the value at approximately 3 second intervals. Choosing repeat 0 will turn off any values that are being sent by a repeat 2 command.
**Example 1:**
`@123V5000002`
**Acknowledge 2:**
*`@123 Load A 120.45 Lb      Torq B 120.45 LbI`*
*`@123 Load A 125.29 Lb      Torq B 137.81 LbI`*
*`.....`*
*`@123 Load A 128.29 Lb      Torq B 146.81 LbI`*

## OPTION ~ Print Command (P)

If the print option is purchased, the print command will fetch a full set of readings (like pressing the front panel Esc button). These will be in the units that are currently selected on the numerical display. The format is P(repeat number), where the repeat number must be 0, 1, 2, or 3. Repeat 1 will return 1 set of readings to the RS232 terminal. Repeat 2 will return a set of readings approximately every three seconds (like the value command). Repeat 0 will turn off printing that was started with repeat 2. Repeat 3 will send one set of readings to the serial printer attached to the Model 9840 instead of to the RS232 terminal.

**Example:**
`@123P1`
**Acknowledge:**
```
@123 Load A 45.625 Lb
     Peak A 82.396 Lb
     Vall A  -0.005 Lb
     Load B 32.415 Lb
     Peak B 47.483 Lb
     Vall B -0.0001 Lb
     Pos    3.500 In
     Vel    0.0 I/M
     Grs A 45.625 Lb
     Grs B 32.415 Lb
      Ch A+B 78.040 Lb
     Limits 0 0 0 1
```

## Reset Tare, Peak, Valley or Position [OPT] Command (R)

This command allows you to reset the tare, peak, valley, or position readings. The format is R(tare A)(peak A)(valley A) (tare B)(peak B)(valley B)(position select), where the selects are either a 0 (don't reset) or a 1 (reset). Thus you can reset any combination of these readings with a single command.

**Example:**
`@123R1000000`
**Acknowledge:**
```
@123 Reset - Tare A
```

**Example 2:**
`@123R0111000`
**Acknowledge 2:**
```
@123 Reset - Peak A Valley A Tare B
```

## OPTION ~ Display Hold / Freeze Display Command (X)

In Run Mode, the freeze display command will freeze and unfreeze the run mode numerical display and the values sent from the unit for RS232 output using either the remote Value or Print command. Send the command once to freeze the display and output at the current value. Send again to return display and output to actual reading from sensor

## Text Display Command (T)

This command allows you to put a line of text on the front panel display of the Model 9840. The format is T (text), where text is the message that you want to display. The text is limited to the number of characters that can be shown on the front panel display.

**Example:**
`@123TStress Test Ready`
**Acknowledge:**
*@123 Text Displayed - Stress Test Ready*

## RS232 SETUP MODE COMMAND SUMMARY

| | | | |
|---|---|---|---|
| **@(addr)** | | | |
| **U** | | | **User Data Entry** |
| | **V** | | **View current settings** |
| | **A** | **(channel)(number) #** | **Set Base Area** |
| | **L** | **(number) #** | **Set Base Length** |
| **A** | | | **Analog Output** |
| | **V** | | **View current settings** |
| | **S** | **(item)(unit)(full)#(zero)#** | **Set analog output** |
| **S** | | | **Sensor Select** |
| | **A** | | **View current sensor on A** |
| | **B** | | **View current sensor on B** |
| | **V** | | **View current sensors** |
| | **S** | **(channel)(serial number)#** | **Select sensor by S/N** |
| | **D** | **(serial number)#** | **Delete sensor by S/N** |
| | **T** | **(channel)** | **View TEDS OPT T33 data** |
| **C** | | | **Calibration** |
| | **C** | | **Shunt Check load cell** |
| | **B** | **(see text for format)** | **Begin load cell calibration** |
| | **E** | | **Escape load cell calibration** |
| | **V** | **(mv/v constant)#** | **Calibrate by mV/V - 1 pt.** |
| | **MV6** | **(see text for format)** | **Calibrate by mV/V - 6 pt.** |
| | **M** | **(see text for format)** | **Calibrate by Mass 2&5 pt.** |
| | **T** | **(see text for format)** | **Calibrate by Torque 2&5 pt.** |
| | **S** | **(shunt value Lb)#** | **Calibration by Shunt Value** |
| | **I** | | **Encoder counts per Inch** |
| | | **V** | **View counts/inch** |
| | | **S(number)#** | **Set counts/inch** |
| **L(lim)** | | | **Limits OPT** |
| | **V** | | **View current settings** |
| | **S** | **(see text for format)** | **Setup limit** |
| | **E** | | **Escape from limit setup** |
| | **R** | | **Manual reset for latch** |
| **O** | | | **System Options** |
| | **V** | | **View current settings** |
| | **P** | **(baud rate code)** | **Printer OPT baud rate** |
| | **I** | **(0 or 1)** | **Auto-Identify load cells** |

| | | | | |
|---|---|---|---|---|
| | N | (0 or 1) | Autoid Annunciator |
| | Z | (channel)(0 or 1) | Auto-Zero load |
| | A | (new address)# | Com Address |
| | B | (baud rate code) | Com Baud Rate |
| | L | (0 or 1) | Com Linefeed |
| | T | (0 or 1) | Retain Tare |
| | E | (0 or 1) | End of Transmission Char. |
| | D | (0 or 1) | TEDS [OPT] Enable |
| | U | (0 or 1) | Auto Tare |
| D | | | Display Options |
| | V | | View current settings |
| | F | (type)(level) | Filter select |
| | W | (see text for format) | Filter Window |
| | D | (channel)(number digits) | Decimal digits max |
| | P | (number digits) | Position digits max |
| | C | (channel)(countby code) | Smallest count |
| | 2 | (B, L, T, or D [OPT]) | 2nd line shows a blank line, limits, text, or a display. |
| | T | (text) | Set the text displayed on 2nd line. |

# RS232 SETUP MODE COMMANDS

The commands in this section allow you to change the setup of the Model 9840. You will notice that these commands form a menu which approximately duplicates the Setup Mode menu used during setup of the Model 9840 from the front panel. There are additional commands that are for RS232 use only.

If the optional Keylock is installed and locked you will not be to alter the setup until the unit has been unlocked. The acknowledgement will indicate this fact:
*@123 Setup is Locked - use Keylock to unlock*

## User Data Entry Command (U)

This command is used to view or set the options in the user data entry menu, namely the base area (used to calculate load in PSI, or MPa) and base length (used to calculate position in %). This command has three subcommands: User data View (UV), User data Area (UA), and User data Length (UL).

### *User Data View Command (UV)*

The User data View (UV) command has the format UV.

**Example:**

```
@123UV
```

**Acknowledge:**

```
@123 Base Area Ch A is 1.00000 sq-in
     Base Area Ch B is 0.50000 sq-in
     Base Length is 3.0000 in
```

### *User Data Area Command (UA)*

The User data Area (UA) command is used to set the base area. The format is UA(channel)(number)#.

**Example:**

```
@123UAA1.0025#
```

**Acknowledge:**

```
@123 Base Area Ch A is 1.0025 sq-in
```

### *User Data Length Command (UL)*

The User data Length (UL) command is used to set the base length. The format is UL(number)#

**Example:**

```
@123UL2.5#
```

**Acknowledge:**

```
@123 Base Length is 2.5000 in
```

## Analog Output Command (A)

This command is used to view or set the analog output of the Model 9840. There are two subcommands Analog View (AV) and Analog Set (AS).

### *Analog Output View Command (AV)*

The Analog View (AV) command has the format AV. It will return the current settings of the analog output.

**Example:**

```
@123AV
```

**Acknowledge:**

```
@123 Analog Output A is Load A in Lb
     10.0 Volts indicates 1000 Lb
     0.0  Volts indicates 0.00 Lb
```

### *Analog Output Set Command (AS)*

The Analog Set (AS) command is used to change the settings of the analog output. The format is AS(item number)(unit number)(full scale)#(zero scale)#, where the item and unit numbers are used to determine the signal source for the analog output, the full scale number indicates what signal level is assigned to full scale analog output of 10.0 volts, and the zero scale number indicates the signal level assigned to zero volts analog output. Note that when you change a cell type (from load to torque or back again) these settings must be reset for the new cell.

**Example:**

```
@123AS090010.0#5.0#
```

**Acknowledge:**

```
@123 Analog Output is Pos[OPT] in In
     10.0 Volts indicates 10.00 In
      0.0 Volts indicates 5.00 In
```

## Sensor Command (S)

This command is used to view or select calibration data from the list of calibrated load cells maintained by the Model 9840. There are 4 subcommands, Sensor View (SV), Sensor List (SL), Sensor Select (SS), and Sensor Delete (SD).

### *Sensor View Channel A or B Command (SA or SB)*

The Sensor View Channel A or B (SA or SB) command has the format SA or SB. It returns information about the cell currently loaded on channel A (SA) or channel B(SB) including the serial number, the maximum load rating, the milli-volt per Volt calibration constant, the excitation voltage used, the latest date of calibration, and the shunt value recorded during that calibration. No other cells are listed.

**Example:**
@123SA
**Acknowledge:**
```
@123 This is the list of cell calibration data:
     Ch A = S/N 123456, 100.00 Lb       , 3.00150 mV/v,
            10.00 V   ,  Cal on Oct27-99,  49.532 Lb  Shunt
```

## Sensor View Command (SV)

The Sensor View (SV) command has the format SV. It returns information about the currently selected cell including the serial number, the maximum load rating, the milli-volt per Volt calibration constant, the excitation voltage used, the latest date of calibration, and the shunt value recorded during that calibration. All other cells currently in the unit are listed as well.

**Example:**
@123SV
**Acknowledge:**
```
@123 This is the list of cell calibration data:
     Ch A = S/N 123456, 100.00 Lb       , 3.00150 mV/v,
            10.00 V   ,  Cal on Oct27-99,  49.532 Lb  Shunt
     unused S/N  13368,  10.00 Lb       , 3.00121 mV/v,
            10.00 V,     Cal on Oct27-99, 4.9292 Lb  Shunt
     unused S/N  63220, 100.00 Lb      , 2.99984 mV/v,
            10.00 V   , Cal on Oct27-99, 49.381 Lb  Shunt
     Ch B = S/N  89991, 1000.0 Lb      , 4.50015 mV/v,
             5.00 V   , Cal on Oct27-99, 486.45 Lb  Shunt
```

## Sensor Select Command (SS)

The Sensor Select (SS) command is used to select the calibration data for a stored cell using the cell serial number. The format is SS(channel)(serial number)#.

**Example:**
@123SSA13368#
**Acknowledge:**
```
@123 This is the list of load cell calibration data:
     unused S/N 123456, 100.00 Lb , 3.00150 mV/v, 10.00 V,
49.532 Lb  Shunt
     Ch A = S/N  13368,  10.00 Lb , 3.00121 mV/v, 10.00 V,
4.9292 Lb  Shunt
     unused S/N  63220, 100.00 Lb , 2.99984 mV/v, 10.00 V,
49.381 Lb  Shunt
     Ch B = S/N  89991, 1000.0 Lb , 4.50015 mV/v,  5.00 V,
486.45 Lb  Shunt
```

## *Sensor Delete Command (SD)*

The Sensor Delete (SD) command is used to remove the calibration data for a stored cell from the list. The format is SD(serial number)#.

**Example:**

```
@123SD13368#
```

**Acknowledge:**

```
@123  Deleted Sensor S/N 13368
     Ch A = S/N 123456, 100.00 Lb , 3.00150 mV/v, 10.00 V,
49.532 Lb  Shunt
     unused S/N  63220, 100.00 Lb , 2.99984 mV/v, 10.00 V,
49.381 Lb  Shunt
     Ch B = S/N  89991, 1000.0 Lb , 4.50015 mV/v,  5.00 V,
486.45 Lb  Shunt
```

## *Sensor View TEDS [OPT] T33 Command (ST)*

The Sensor View TEDS (ST) T33 command is used to view an attached TEDS Template 33 sensor.

**Example:**

```
@123STB
```

**Acknowledge:**

```
@ 123
Channel B TEDS
1) Mfg ID: 59
2) Model Number: 0
3) Version Letter:
4) Version Number: 1
5) Serial Number: 31448
6) Physical Measurand Case: 5 (Lb)
7) Minimum Physical Value: 0
8) Maximum Physical Value: 15
9) Full Scale Electric Value Precision: 2 (32 Bits)
10) Minimum Electrical Output: 0 mV/V
11) Maximum Electrical Output: 3.10684 mV/V
12) Bridge Type: 2 (Full)
13) Bridge Impedance: 350.0 Ohms
14) Bridge Response Time: .001 mSecs
15) Excite Level Nominal: 10.0 Volts
16) Excite Level Minimal: 5.0 Volts
17) Excite Level Maximum: 15 Volts
18) Calibration Date: 04/06/06
19) Calibration Initials: KM
20) Calibration Period: 365
21) Measurement Location ID: 1
```

## Calibration Command (C)

This command has 8 subcommands. Calibration Check (CC) is used to run a shunt calibration check on a cell. Calibration Begin (CB) starts the calibration of a new or existing cell. Calibration by milli-volt per Volt may be done using one point (CV) which runs a calibration using the cell milli-volt per Volt constant or 6 point which uses cell manufacturer supplied mass and milli-volt per Volt data (CMV6). Calibration by Masses (CM) does a two or five point mass calibration. Calibration by Torque (CT) does a two or five point torque calibration. Calibration by Shunt (CS) does calibration based on the shunt value of the cell. Calibration Escape (CE) cancels a calibration that is underway. Calibration counts per Inch View (CIV) displays the current setting of the encoder counts per inch constant, and Calibration counts per Inch Set (CIS) lets you set the encoder counts per inch constant.

Cells must be calibrated for the channel on which they will be used.

**Note:** All calibrations can be performed using positive or negative values! For multipoint calibrations this will allow for nonlinear calibrations across zero.

### *Calibration Check Command (CC)*

The Calibration Check (CC) command runs a calibration check on the currently selected cell. Note that the load cell should not be under load or torque when this check is run. During the 10 second shunt calibration the front panel will show “RS232 Cal Check”. After the 10 seconds the unit will return to run mode and send the acknowledge line shown below. This indicates both the current reading of the shunted cell and the reading that was recorded when this cell was last calibrated.

**Example:**

```
@123CCA
```

**Acknowledge:**

```
@123 Cal Check Ch A, S/N 123456
     Shunt Value is 49.532 Lb
      Cal Value was 49.531 Lb
```

### *Calibration Begin Command (CB)*

The Calibration Begin (CB) command is a 4 part command used to start a calibration by any method. You must issue a CB command before trying calibration by milli-volt per Volt, masses, or shunt (CV, CM, CT or CS). While the Model 9840 is being calibrated using the remote commands, the front panel will show “RS232 CAL STARTED”. Pressing the front panel Esc button will cancel the calibration and issue a warning to the RS232 terminal. If any remote commands other than calibration commands are issued, the calibration will also be canceled. The acknowledgement will indicate if this is a “New Cell” or if you are going to “Overwrite” existing data. If you do not wish to overwrite use the CE command to stop this calibration. Another method of overwriting existing data is to delete the sensor first and then calibrate. The CB1 Command has been modified to accept the cell type but is still usable by older software.

The format for the CB commands is:

For backward compatibility:
CB1(space)(channel)(serial number)#

Alternatively, to delineate between a Load and a Torque Cell:
CB1(cell type)(channel)(serial number)#

CB2(space)(month)(day)(year)
CB3(space) (excitation)(calibration unit)
CB4(space)(rated load)#

where cell type is 0 for load and 1 for torque, channel is A or B, serial number is the serial number of the cell, not exceeding 8 characters, month, day, and year are 2 digit numbers to represent the current date, excitation should be a 0 for 5.00 volts or a 1 for 10.00 volts, and calibration unit is the desired unit for this calibration, and rated load is the maximum load or torque rating for the cell.

**Example 1:**
`@123CB1 A123456#`
**Acknowledge 1:**
*`@123  Calibrate Begin 1 Command – New`*
*`      Load Cell S/N: 123456 – Channel A`*

**Example 1A:**
`@123CB11A123456#`
**Acknowledge 1:**
*`@123  Calibrate Begin 1 Command – New`*
*`      Torque Cell S/N: 123456 – Channel A`*

**Example 2:**
`@123CB2 042298`
**Acknowledge 2:**
*`@123  Calibrate Begin 2 Command – New`*
*`      Cal Date: Apr22-98`*
**Example 3:**
`@123CB3 100`
**Acknowledge 3:**
*`@123  Calibrate Begin 3 Command – New`*
*`      Excitation Voltage: 10.0 V, Calibration Unit: Lb`*
**Example 4:**
`@123CB4 1000.0#`
**Acknowledge 4:**
*`@123  Calibrate Begin 4 Command – New`*
*`      Rated Load: 1000.0 Lb`*

## *Calibration Escape Command (CE)*

The Calibrate Escape (CE) command is used to cancel a calibration that was started with the Calibrate Begin (CB) command. This format is CE.

**Example:**

```
@123CE
```

**Acknowledge:**

```
@123 Calibrate Command - Canceled, Calibration NOT Changed
```

## *Calibrate by Milli-volt per Volt Command for One Point (CV)*

The Calibrate by milli-volt per Volt (CV) command is used to calibrate a load cell using its milli-volt per Volt calibration constant. You must have already started a calibration using the CB command for this command to function. The format is CV(milli-volt per Volt constant)# Note that a shunt check calibration will also be run at this time and so it is important that the load cell is not under load when this command is entered. Note that this command works for torque cell calibration as well.

**Example:**

```
@123CV4.5002#
```

**Acknowledge:**

```
@123 Calibrate Command - Reading for Shunt Check...
```

[10 seconds delay]

```
@123 Calibrate Command Completed
     Ch A = S/N 123456, 1000.0 Lb      , 4.50020 mV/v,
            10.00 V   , Cal on Oct27-99, 553.26 Lb  Shunt
     unused S/N  63220, 100.00 Lb      , 2.99984 mV/v,
            10.00 V   , Cal on Oct27-99, 49.381 Lb  Shunt
     Ch B = S/N  89991, 1000.0 Lb      , 4.50015 mV/v,
             5.00 V   , Cal on Oct27-99, 486.45 Lb  Shunt
```

## *Calibrate by Milli-volt per Volt Command for Six Points (CMV6)*

The Calibrate by milli-volt per Volt for six points (CMV6) command is used to calibrate a load cell using 6 points of mass and milli-volt per Volt each. You must have already started a calibration using the CB command for this command to function. The format is CMV6. Note that a shunt check calibration will also be run at the end of the calibration and so it is important that the load cell is set at 0 (or no masses) when the final command is entered.

**Example:**

```
@123CMV6
```

**Acknowledge:**

```
@123 Calibrate by milli-volt per Volt - 6 Point
   Ready for Mass CMVM1 command
```

## *Calibrate by mV/V Mass and Volt Commands (CMVM and CMVV)*

The Calibration by mV/V Mass (CMVM) and Volt (CMVV) commands can have up to seven parts each: CMVM1 through CMVM6 and CMVM0; and CMVV1 through CMVV6 and CMVV0. You must have already started a calibration using the CB and CMV6 commands for any of these commands to function. To input the first mass issue the Calibration by mV/V Mass 1 (CMVM1) command. The mass is entered using the following format: CMVM1(mass value)#. Entering this command will result in the unit prompting the user for the first milli-volt per Volt command.

**Example:**
`@123CMVM15.0005#`
**Acknowledge:**
*@123 Calibrate Mass 1 Command entered*
*Ready for mV/V Value CMVV1 or CE command*

The CE or Calibration Escape command will, if entered, end this calibration without calibrating the unit. The unit will remain calibrated according to the most recent calibration or, if this is the first calibration of the unit, the unit will remain un-calibrated.

At this point the unit is prompting the user for the first milli-volt per Volt value of the calibration. The mV/V value is entered using the Calibration by mV/V Volt Command with the following format: CMVV1(mV/V value)#.

**Example:**
`@123CMVV11.9926#`
**Acknowledge:**
*@123 Calibrate mV/V 1 Command entered*
*Ready for Mass Value CMVM2 or CE command*

The unit will continue to prompt the user for mass and milli-volt per Volt values until the six points have been entered. Then the user will see the following acknowledgement:

*@123 Calibrate mV/V 6 Command entered*
*Ready for Mass Value CMVM0 or CE command*

The user must now enter the CMVM0 command to finish the calibration. Note the load cell should have no masses on it at this point since a shunt calibration is run.

**Example:**
`@123CMVM0`
**Acknowledge:**
*@123 Calibrate Command – Reading for Shunt Check…*
[10 seconds delay]
*@123 Calibrate Command Completed*
*Ch A = S/N 123456, 1000.0 Lb , 4.50020 mV/v,*
*4.50020 mV/v,*
*4.50020 mV/V,*
*4.50020 mV/V,*
*4.50020 mV/V*
*5.00 V , Cal on Oct27-99, 553.26 Lb Shunt*

## *Calibrate by mV/V Torque and Volt Commands (CMVT and CMVV)*

The Calibration by mV/V Torque (CMVT) and Volt (CMVV) works exactly like the Calibrate by mV/V Mass and Volt commands. These commands can have up to seven parts each: CMVT1 through CMVT6 and CMVT0; and CMVV1 through CMVV6 and CMVV0. You must have already started a calibration using the CB and CMV6 commands for any of these commands to function. To input the first torque issue the Calibration by mV/V Torque 1 (CMVT1) command. The torque is entered using the following format: CMVT1(torque value)#. Entering this command will result in the unit prompting the user for the first milli-volt per Volt command.

**Example:**
`@123CMVT15.0005#`
**Acknowledge:**
*@123 Calibrate Torque 1 Command entered*
*Ready for mV/V Value CMVV1 or CE command*

The CE or Calibration Escape command will, if entered, end this calibration without calibrating the unit. The unit will remain calibrated according to the most recent calibration or, if this is the first calibration of the unit, the unit will remain un-calibrated.

At this point the unit is prompting the user for the first milli-volt per Volt value of the calibration. The mV/V value is entered using the Calibration by mV/V Volt Command with the following format: CMVV1(mV/V value)#.

**Example:**
`@123CMVV11.9926#`
**Acknowledge:**
*@123 Calibrate mV/V 1 Command entered*
*Ready for Torque Value CMVT2 or CE command*

The unit will continue to prompt the user for mass and milli-volt per Volt values until the six points have been entered. Then the user will see the following acknowledgement:

*@123 Calibrate mV/V 6 Command entered*
*Ready for Torque Value CMVT0 or CE command*

The user must now enter the CMVT0 command to finish the calibration. Note the torque cell should have no torque on it at this point since a shunt calibration is run.

**Example:**
`@123CMVT0`
**Acknowledge:**
*@123 Calibrate Command – Reading for Shunt Check…*
[10 seconds delay]
*@123 Calibrate Command Completed*
*Ch A = S/N 123456, 1000.0 LbI , 4.50020 mV/v,*
*4.50020 mV/v,*
*4.50020 mV/V,*
*4.50020 mV/V,*
*4.50020 mV/V*
*5.00 V , Cal on Oct27-99, 553.26 LbI Shunt*

## *Calibrate by Masses Command (CM)*

The Calibrate by Masses (CM) command tells the unit that you are doing a calibration by 2 point mass or by 5 point mass. The format is CM(number of masses).

**Example:**
`@123CM5`
**Acknowledge:**
*@123 Calibrate by Mass – 5 Point*
*Ready for CMP1 command*

## *Calibrate by Masses Point Command (CMP)*

The Calibration by Masses Point (CMP) command can have up to six parts: CMP1 through CMP5 and CMP0. You must have already started a calibration using the CB and CM commands for any of these commands to function. To read the first mass issue the Calibration Mass Point 1 (CMP1) command. The format is CMP1(mass)#. This will cause the Model 9840 to read 10 seconds of data from the load cell. These readings are averaged to obtain the first calibration mass reading. The example uses 0.0 Lb for the first mass. Be sure you have placed the mass on the load cell before entering this command since reading will begin immediately.

**Example:**
`@123CMP10.0#`
**Acknowledge:**
*@123 Calibrate Mass 1 Command – Reading...*
[10 seconds delay]
*Calibrate Mass 1 Command – Ready for CMP2 or CE command*

The Calibrate Mass 2 (CMP2) command has the format CMP2(mass)#. This command can only be issued after the CMP1 command has completed. The example uses 500 Lb for the second calibration mass. Be sure you have placed the mass on the load cell before entering this command since reading will begin immediately

**Example:**
`@123CMP2500#`
**Acknowledge:**
*@123 Calibrate Mass 2 Command – Reading...*
[10 seconds delay]
*Calibrate Mass 2 Command – Ready for CMP3 or CE command*

Masses three through five are done in a similar manner. The Calibrate Mass Point 0 (CMP0) command completes the 2 or 5 point mass calibration. Remove the masses from the load cell before entering this command since it will perform the shunt calibration measurement that is recorded for use with the calibration check command. The format is CMP0.

**Example:**
@123CMP0
**Acknowledge:**
*@123 Calibrate Command - Reading for Shunt Check...*
[10 seconds delay]
*@123 Calibrate Command Completed*
*Ch A = S/N 123456, 100.00 Lb , 3.00150 mV/v,*
*3.00230 mV/v,*
*3.00238 mV/v,*
*3.00353 mV/v,*
*10.00 V , Cal on Oct27-99, 49.532 Lb Shunt*
*unused S/N 13368, 10.00 Lb , 3.00121 mV/v,*
*10.00 V, Cal on Oct27-99, 4.9292 Lb Shunt*
*unused S/N 63220, 100.00 Lb , 2.99984 mV/v,*
*10.00 V , Cal on Oct27-99, 49.381 Lb Shunt*
*Ch B = S/N 89991, 1000.0 Lb , 4.50015 mV/v,*
*5.00 V , Cal on Oct27-99, 486.45 Lb Shunt*

## *Calibrate by Torque Command (CT)*

The Calibrate by Torque (CT) command tells the unit that you are doing a calibration by 2 or 5 point torque. The format is CT(number of torques).

**Example:**
@123CT5
**Acknowledge:**
*@123 Calibrate by Torque – 5 Point*
*Ready for CTP1 command*

## *Calibrate by Torque Point Command (CTP)*

The Calibration by Torque Point (CTP) command can have up to six parts: CTP1 through CTP5 and CTP0. You must have already started a calibration using the CB and CT commands for any of these commands to function. To read the first torque, issue the Calibration Torque Point 1 (CTP1) command. The format is CTP1(torque)#. This will cause the Model 9840 to read 10 seconds of data from the torque cell. These readings are averaged to obtain the first calibration torque reading. The example uses 0.0 LbI for the first mass. Be sure you have placed the torque on the cell before entering this command since reading will begin immediately.

**Example:**
@123CTP10.0#
**Acknowledge:**
*@123 Calibrate Torque 1 Command - Reading...*
[10 seconds delay]
*Calibrate Torque 1 Command - Ready for CTP2 or CE command*

The Calibrate Torque 2 (CTP2) command has the format CTP2(torque)#. This command can only be issued after the CTP1 command has completed. The example uses 500 LbI for the second calibration torque. Be sure you have placed the torque on the cell before entering this command since reading will begin immediately.

**Example:**
`@123CTP2500#`
**Acknowledge:**
*@123 Calibrate Torque 2 Command – Reading...*
[10 seconds delay]
*Calibrate Torque 2 Command – Ready for CTP3 or CE command*

Torques three through five are done in a similar manner. The Calibrate Torque Point 0 (CTP0) command completes the 2 or 5 point torque calibration. Remove the torque from the cell before entering this command since it will perform the shunt calibration measurement that is recorded for use with the calibration check command. The format is CTP0.

**Example:**
`@123CTP0`
**Acknowledge:**
*@123 Calibrate Command – Reading for Shunt Check...*
[10 seconds delay]
*@123 Calibrate Command Completed*
*Ch A = S/N 123456, 100.00 LbI , 3.00150 mV/v,*
*3.00230 mV/v,*
*3.00238 mV/v,*
*3.00353 mV/v,*
*10.00 V , Cal on Oct27-99, 49.532 LbI Shunt*
*unused S/N 13368, 10.00 Lb , 3.00121 mV/v,*
*10.00 V, Cal on Oct27-99, 4.9292 Lb Shunt*
*unused S/N 63220, 100.00 Lb , 2.99984 mV/v,*
*10.00 V , Cal on Oct27-99, 49.381 Lb Shunt*
*Ch B = S/N 89991, 1000.0 Lb , 4.50015 mV/v,*
5.00 V , Cal on Oct27-99, 486.45 Lb Shunt

## *Calibrate by Shunt Command (CS)*

The Calibrate by Shunt (CS) command is used to calibrate the cell using the shunt calibration factor expressed in pounds (or pound-inches for a torque cell). This command will only function if you have already issued a Calibrate Begin (CB) command. Note that the cell should not have any load or torque on it for this command to operate correctly. The format is CS(shunt value in Lb or LbI)#. The example shows calibration of a load cell using a shunt value of 553.26 Lb.

**Example:**
@123CS553.26#
**Acknowledge:**
*@123 Calibrate Shunt Command - Reading...*
[10 seconds delay]
*@123 Calibrate Command - Reading for Shunt Check...*
[10 seconds delay]
*@123 Calibrate Command Completed*
*Ch A = S/N 123456, 1000.0 Lb , 4.50014 mV/v,*
*10.00 V , Cal on Oct27-99, 553.26 Lb Shunt*
*unused S/N 63220, 100.00 Lb , 2.99984 mV/v,*
*10.00 V , Cal on Oct27-99, 49.381 Lb Shunt*
*Ch B = S/N 89991, 1000.0 Lb , 4.50015 mV/v,*
*5.00 V , Cal on Oct27-99, 486.45 Lb Shunt*

### *Calibrate Counts-Per-Inch Command (CI)*

This command has two subcommands, a view command (CIV) and a set command (CIS).

The Calibration counts per Inch View (CIV) command displays the current setting of the encoder counts per inch constant.
**Example:**
@123CIV
**Acknowledge:**
*@123 Encoder is 32000 counts per inch*

The Calibration counts per Inch Set (CIS) command allows you to change the current setting of the encoder counts per inch constant.
**Example:**
@123CIS64000#
**Acknowledge:**
@123 Encoder is 64000 counts per inch

## OPTION ~ Limits Command (L)

This command allows you to view or set the 4 contact closure limit switches on the Model 9840. There are three subcommands Limit View (LiV), Limit Set (LiS), and Limit Reset (LiR). Note that changing a cell type on a channel will automatically erase limits that were set for that channel. They must then be reset by the user.

### *Limit View Command (LiV)*

The Limit View (LiV) command is used to view the current settings of one of the limits. The format is L(limit number)V.

**Example:**
@123L1V
**Acknowledge:**
*@123 Lim 1 NO Enabled Load A Lb Set 20.00 Trip>Set Latch Off Reset 1.000*

This line indicates that Limit 1 is a normally open switch (NO) rather than a normally closed switch (NC). The limit is Enabled rather than Disabled. The signal driving this limit is Load in Lb. The limit will be turned on when the load exceeds 20.00 Lb. It is not a Latching limit (latching requires a manual reset). The limit will automatically reset when the load is less than 1.00 Lb. Torque can be substituted for load for an appropriate cell.

## *Limit Set Command (LiS)*

The Limit Set (LiS) command is broken up into 4 separate commands. They have the following format:

L(limit number)SA(space) (normal position)(enable)(item number)(unit number)

L(limit number)SB(space) (setpoint number)#

L(limit number)SC(space) (< or >)(latching)

L(limit number)SD(space) (reset point number)#

The limit number chooses which limit (1-4) you want to setup. The normal position should be set to 0 for normally open or 1 for normally closed. The enable should be set to 0 for disabled or 1 for enabled. If the limit is disabled the rest of this command may be omitted (see example 3). The item and unit numbers indicate which signal is to drive this limit. The set point number indicates the signal level at which the limit is to be activated. The < or > sign indicates whether you want the limit to be activated when the signal is greater than the set point (>) or less than the set point (<). The latching should be set to 0 for latching off or 1 for latching on. If latching on is selected the rest of the command may be omitted (see example 2). Latching on will require a manual reset once the limit has been activated. The reset point indicates the signal level at which the limit should be de-activated.

If you want to enable a limit without otherwise changing its settings you can enter L(limit number)SA(space)(normal position)1# instead of entering the full setup string (see example 4).

**Example 1:**
`@123L1SA 010000`
**Acknowledge 1:**
*`@123  Limit Setup Command A – Ready for Command B`*

**Example 2:**
`@123L1SB 50.0#`
**Acknowledge 1:**
*`@123  Limit Setup Command B – Ready for Command C`*

**Example 3:**
`@123L1SC >0`
**Acknowledge 3:**
*`@123  Limit Setup Command C – Ready for Command D`*

**Example 4:**
@123L1SD 10.0#
**Acknowledge 4:**
*@123 Lim 1 NO Enabled Load A Lb Set 50.00 Trip>Set Latch Off Reset 10.00*

**Example 5:**
@123L1SA 10
**Acknowledge 5:**
*@123 Lim 1 NO Disabled Load A Lb Set 50.00 Trip>Set Latch Off Reset 10.00*

**Example 6:**
@123L1SA 11#
**Acknowledge 6:**
*@123 Lim 1 NC Enabled Load A Lb Set 50.00 Trip>Set Latch Off Reset 10.00*

## *Limit Setup Escape (LE)*

The Limit Escape (LE) command is used to cancel a limit setup that was started with the Limit Set (LiS) command. This format is LE.

**Example:**
@123LE
**Acknowledge:**
*@123 Limit Setup Command Canceled*

## *Limit Reset Command (LiR)*

The Limit Reset (LiR) command is used to manually reset a latching limit that has been activated. The format is L(limit number)R.

**Example:**
@123L1R
**Acknowledge:**
*@123 Reset Limit 1*

## System Options Command (O)

The system Options command has 8 subcommands that are used to view or set the options that appear on the system options menu. Option View (OV) displays all the settings in the system options menu, Option Printer (OP) is used to set the printer baud rate, Option Auto ID (OI) is used to turn auto-identification of load cells on or off, Option Auto Zero (OZ) is used to turn auto-zeroing of load on or off, Option Com Address (OA) is used to change the communications address of the unit, Option Baud Rate (OB) is used to change the communications baud rate, Option Linefeed (OL) is used to turn the auto line feed option on or off, and OE which is used to turn the end of transmission character on or off. Each of these options is described below.

## *Option View Command (OV)*

The Option View (OV) command returns a list of the current settings of all the system options. The format is OV.

**Example:**
@123OV
**Acknowledge:**
*@123 Printer Baud Rate is 9600*
*Auto Identify is off*
*Auto Identify Annunciator is off*
*TEDS is on*
*Auto Tare is on*
*Auto Zero Channel A is off*
*Auto Zero Channel B is off*
*Com Address is 123*
*Com Baud Rate is 9600*
*Com Line Feed is off*
*Retain Tare is off*
*Freeze Display is off*
*RS232 End of Transmission Character is off*

## *Option Printer [OPT] Baud Rate Command (OP)*

The Option Printer Baud Rate (OP) command is used to select the printer baud rate. The format is OP(code) where the code is from the table shown at the right.

**Example:**
@123OP9
**Acknowledge:**
*@123 Printer Baud Rate is 230.4K*

| Option Printer Command | |
|---|---|
| Code | Baud Rate |
| 4 | 4800 |
| 5 | 9600 |
| 6 | 19.2K |
| 8 | 57.6K |
| 9 | 230.4K |

## *Option Auto-Identify Command (OI)*

The Option auto-Identify (OI) command is used to turn auto-identification of load cells on or off. The format is OI(0 or 1), where 0 turns auto-id off, and 1 turns auto-id on.

**Example:**
@123OI0
**Acknowledge:**
*@123 Auto Identify is off*

## *Option Auto-Identify Annunciator (ON)*

The Option Auto-Identify (ON) Annunciator command is used to turn the Auto-ID annunciator “t” on or off. The format is ON(0 or 1) where 0 & 1 turn the annunciator off and on, respectively. When on and an AutoID is on and a recognized AutoID cell is attached a solid “t” will show up on the first character for that channels item. The “t” will blink if a non-recognized or non AutoID is attached.
Note: The TEDS “T” annunciator will override the auto-ID annunciator if TEDS is enabled.

**Example:**
`@123ON1`
**Acknowledge:**
@ 123 Auto Identify Annunciator is On

## *Option TEDS [OPT] Enable Command (OD)*

The Option TEDS Enable (OD) command is used to turn TEDS on or off. The format is OD(0 or 1), where 0 turns TEDS off, and 1 turns TEDS on.

**Example:**
`@123OD1`
**Acknowledge:**
*`@ 123 TEDS Feature is Enabled`*

## *Option Auto-Tare (OU)*

The Option Auto-Tare (OD) command is used to turn Auto-Tare on or off. The format is OU(0 or 1), where 0 turns auto-tare off, and 1 turns auto-Tare on. Auto Tare when on will automatically perform a Tare when a recognized Auto-ID or TEDS sensor is attached.

**Example:**
`@123OU1`
**Acknowledge:**
*`@ 123 Auto Tare is On`*

## *Option Auto-Zeroing Command (OZ)*

The Option auto-Zero (OZ) command is used to turn auto-zeroing of load on or off. The format is OZ(channel)(0 or 1) where channel is A or B and 0 & 1 turn auto-zeroing off and on, respectively.

**Example:**
`@123OZA1`
**Acknowledge:**
*`@123 Auto Zero Channel A is on`*
*`Auto Zero Channel B is off`*

## *Option Com Address Command (OA)*

The Option com Address (OA) command is used to change the communications address assigned to this unit. The format is OA(new address)#. Note that valid addresses are 1 through 254.

**Example:**
`@123OA003#`
**Acknowledge:**
*`@123 Com Address is 003`*

## *Option Com Baud Rate Command (OB)*

The Option Com Baud Rate (OB) command is used to change the communications baud rate for this unit. The format is OB(code), where the baud rate codes are given in the table. Code 7 is a special baud rate that is reserved for future expansion. Note that the acknowledgement is given at the current baud rate and then the baud rate is changed.

**Example:**
`@123OB2#`
**Acknowledge:**
*`@123 Changing Communications Baudrate to 1200`*

| Option Baud Rate Command | |
|---|---|
| Code | Baud Rate |
| 0 | 300 |
| 1 | 600 |
| 2 | 1200 |
| 3 | 2400 |
| 4 | 4800 |
| 5 | 9600 |
| 6 | 19.2K |
| 7 | Special |

## *Option Linefeed Command (OL)*

The Option com Linefeed (OL) command turns on or off the generation of linefeed characters when the Model 9840 sends information to your RS232 terminal. The format is OL(0 or 1), where 0 turns linefeeds off, and 1 turns them on.

**Example:**
`@123OL1`
**Acknowledge:**
*`@123 Com Linefeed is on`*

## *Option Tare Retain Command (OT)*

The Retain Tare (OT) command enables and disables the retention of the current tare value in memory for use after the unit has been powered down and then powered back up. The format for the OT command is: OT(0 or 1), where 0 is disable and 1 is enable. Once enabled, the tare values are retained until this option is disabled. Disabling the tare retention option resets the tare values for both channels to 0.

**Example:**
`@123OT1`
**Acknowledge:**
*`@123 Retain tare is on`*

### *Option End of Transmission Character (OE)*

The end of transmission character is a non-visible character (hexadecimal 0x04) that is sent at the end of each response by the unit to an RS232 command. The character is sent after the last carriage-return line-feed returned by the unit with one exception: when the user is viewing channel values with the @123V(item)(unit)(repeat) and sets the value of repeat to 2 (streaming output), the character is sent immediately prior to the streaming output that the unit will send. The OE command enables or disables this character and its format is: OE(0 or 1), where 0 is disable and 1 is enable.

**Example:**
`@123OE1`
**Acknowledge:**
*`@123 RS232 EOT is on.`*

## Display Options Command (D)

The Display options command has 5 subcommands used to set options that effect the front panel display of the Model 9840.

### *Display View Command (DV)*

The Display View (DV) command is used to return the current values of all the display options. The format is DV.

**Example:**
`@123DV`
**Acknowledge:**
*`@123 Filter is Type II Level 2`*
*`Filter Window A is off (if on, the window value is shown)`*
*`Filter Window B is off (if on, the window value is shown)`*
*`Channel A shows 4 decimal digits`*
*`Channel B shows 4 decimal digits`*
*`Channel A counts by 1`*
*`Channel B counts by 1`*
*`Second line shows limit status`*
*`(if second line is Display, the text is shown here)`*
*`Position shows 5 decimal digits`*

### *Display Filter Command (DF)*

The Display Filter (DF) command sets the filter type and level. The format is DF(type)(level), where type is either 1 for type I filters, or 2 for type II filters, level must be 1, 2, 3, or 4 depending on the level of filtering desired. (4 is most filtering and slowest rise time).

**Example:**
`@123DF13`
**Acknowledge:**
*`@123 Filter is Type I Level 3`*

## *Display Decimal Command (DD)*

The Display Decimal (DD) command sets the maximum number of decimal digits that are shown for Load, Peak, and Valley. The format is DD(channel)(number), where channel is A or B and the number must be between zero and 5.

**Example:**
`@123DDA0`
**Acknowledge:**
*`@123 Channel A shows 0 decimal digits`*

## *Display Position Decimal Command (DP)*

The Display Position Decimal (DP) command sets the maximum number of decimal digits that are shown for the position. The format is DP(number). The number must be between zero and 5.

**Example:**
`@123DP4`
**Acknowledge:**
*`@123 position shows 4 decimal digits`*

## *Display Count By Command (DC)*

The Display Count by (DC) command sets the smallest number that the display will count by for the Load or Torq, Peak, and Valley measurements. The format is DC(channel)(code) where the code is selected from the table at the right.

**Example:**
`@123DCA3`
**Acknowledge:**
*`@123 Channel A counts by 10`*

| Display Count by Command | |
|---|---|
| Code | Count By |
| 0 | 1 |
| 1 | 2 |
| 2 | 5 |
| 3 | 10 |
| 4 | 20 |

## *Display Second Line Command (D2)*

The Display Second Line (D2) command is used to set the second line to be blank, or to show the limit status. The format is D2(B, L, D [OPT], or T), where B makes the line blank, L makes the line show limit status, D [OPT] makes the line show another display, and T makes the line show text.

**Example:**
`@123D2B`
**Acknowledge:**
*`@123 Second Line set to Blank`*

## *Display Second Line Text (DT)*

The Display Second Line Text (DT) command is used to select the text that would be displayed on the second line if text was set to go on the second line.

**Example:**
`@123DTModel 9840`
**Acknowledge:**
*`@123 Text Message – Model 9840`*

## *Display Filter Window Commands (DW)*

The Display Filter Window (DW) command set enables and disables the filter window and allows the user to enter the unit and value of the filter window to use. There are two commands used to enable and set the filter windows. The format to enable or disable the Filter Window is DW1(channel)(0 or 1) where channel is A or B, 1 enables the window and 0 disables the window. The format to set the window unit and value is DW2(channel)(window unit)(window value)# where window unit is the desired unit for the filtering window, and window value is the desired value of the window. The units available will depend on the sensor that is currently active for the channel. It is a good idea to issue the @123? command and find out what the active sensor is on the channel with the @123SA or @123SB commands to make sure that the appropriate unit will be entered. The window must be enabled before a value can be entered. Disabling the window sets this value to 0. The window, once enabled and set, will take effect immediately and will remain in effect until the window is disabled.

Note that changing a cell type on a channel will automatically disable the filter window for that channel, reset the units to Lb or LbI, and set the window value to 0. The window must then be reset and re-enabled by the user.

**Example:**
`@123DW1A1`
**Acknowledge:**
*`@123 Filter Window A is On`*

**Example:**
`@123DW2A000.0002#`
**Acknowledge:**
*`@123 Filter Window A Unit = Lb`*
*`@123 Filter Window A = 0.0002 Lb`*

## SYSTEM CALIBRATION MODE

The following procedure should be followed to calibrate the Model 9840 itself. This calibration requires the use of a precision milli-volt per Volt reference which will be attached on the load cell connector. The resulting scale factors are recorded in the non-volatile memory of the Model 9840.

*ATTENTION: System Calibration should ONLY be performed by trained, QUALIFIED TECHNICIANS utilizing the proper precision devices to ensure the most accurate performance of the unit.*

1. To enter system calibration mode, turn off the Model 9840. Hold down the two end buttons ("<" and ">") while turning power back on. As soon as the display comes on you can release the buttons.
2. The unit will go through its regular start up sequence but rather than entering run mode and showing the load in pounds a password prompt will be displayed. Enter the number 777 as the system calibration password.
3. The unit will now display "Unit mV / V Cal" to indicate that it is ready to be calibrated. *A two hour warm-up period with the milli-volt per Volt reference attached is recommended at this time if the unit has just been turned on or the milli-volt per Volt reference has just been attached.* Press any button to clear this display.
4. You are now prompted to enter the first of three milli-volt per Volt references. (We recommend using -3.0 milli-volt per Volt for the first and +3.0 milli-volt per Volt for the second and 0.0 milli-volt per Volt for the third point.) Set your reference and enter the appropriate number. As soon as you press "Enter" the Model 9840 will start reading the reference.
5. Next you are prompted for the second milli-volt per Volt value. Set your reference and enter the appropriate number. Again reading will start as soon as Enter is pressed.
6. When the read is complete, the unit will display "Calibration Done". Pressing any button at this time will place the unit back into its normal run mode.

# APPENDIX A -- MODEL 9840 SPECIFICATIONS

| **Transducer Interface** | |
|---|---|
| Excitation | 5VDC or 10 VDC software/auto selectable |
| Current Drive | 180 mA at 5VDC or 10 VDC |
| Push Button Shunt | Yes |
| Internal Shunt Resistor | (2) Shunt values selectable, 30K ohms and 60K ohms. Rear panel selectable |
| Calibration Method | Shunt, mV/V, Known Load |
| Push Button Tare | 100% of range--display and analog output |
| Sensitivity Adjust | 1mV/V to 4.5 mV/V |
| Accuracy | 0.01% of full scale +/- 1 digital count |
| CMRR | 115 dB |

| **Additional Transducer Channel** | |
|---|---|
| Auxiliary Channel | optional |

| **D/A Analog Output** | |
|---|---|
| Full Scale Output | +/- 10 VDC nominal +/- 0.5 VDC |
| Linearity | 0.02 % of full scale |
| Scaling | Gain and offset selected by software. |
| Frequency Response | Approx. 15 Hz (plus filtering) |
| Output Source | Any displayed quantity |
| Output Channels | 1 std, 2 optional |

| **Direct Analog Output** | |
|---|---|
| Full Scale Output | -/+ 8.14 VDC +/- 0.25 VDC |
| Linearity | 0.02 % of full scale |
| Scaling | Fixed with no tare, transducer channel only |
| Frequency Response | Approx. 1.5 kHz |

| **Peak/Hold** | |
|---|---|
| Peak/Valley/Hold | Digital 1/60 second capture |

| | |
|---|---|
| **Digital I/O** | |
| Digital Inputs | |
| Interface | 4 optically isolated inputs |
| Function | remote tare, peak/valley reset, position reset, print |
| Digital Outputs | |
| Function | 4 independent limits |
| Quad-Limits Setup | Front panel, latching or non-latching set points normally open/closed, enable/disable |
| Quad-Limits Output | 4 isolated solid state switches |
| Quad-Limits Source | Any displayed quantity |

| | |
|---|---|
| **Serial Interface** | |
| RS-232 Serial Setup/Output | Standard |
| RS-485 Serial Setup/Output | Standard |
| Multi-drop RS-232 | Optional |
| USB | Standard |

| | |
|---|---|
| **Printing** OPT | Optional |
| Interface Type | Serial |
| Quantities Printed | All displayed items |

| | |
|---|---|
| **Encoder Position Channel** | Optional |
| Encoder Type | Quadrature, 4X number of lines |
| Excitation | 12 VDC std., 5 VDC optional |
| Interface | Single ended or differential |
| Calibration | User adjustable counts/inch |

| | |
|---|---|
| **Auto Transducer Identification** | |
| Auto Identification and Setup | Yes, standard |

| | |
|---|---|
| **Push Buttons** | |
| Smart Push Buttons | 6 |
| Adjustments | Displayed item, displayed units, tare, peak/valley reset alternate view, print. Alternate functions for programming. |

| **Digital Display** | |
|---|---|
| Display Characters | 2 lines by 20 characters available |
| Display Update | > 4/Sec |
| Scaling | Automatic or manual |
| Maximum Display Count | ± 999,999 |
| Decimal Points. Selection | 0 to 5 software selectable. |
| Display Type | Vacuum fluorescent |
| Resolution | 24 bit |
| Software Filters | 8, software selectable |

| **Electrical Characteristics** | |
|---|---|
| Power Requirements | 115 VAC, 60 Hz, Optional 230 VAC, 50 Hz |
| Fuse Requirements | 115 VAC: Fuse, T, 0.315A, 250V<br>230 VAC: Fuse, T, 0.160A, 250V |
| Power Consumption | 12 W (unloaded) |
| Transducer Excitation Current | Shutdown mode when shorted to ground |
| Absolute Max Transducer Input | 30 VDC without damage |

| **Physical Characteristics** | |
|---|---|
| Package Size | 7.29” X 2.52 “ X 9.0” (W X H X D) |
| Case Material | Aluminum |
| Mounting Hardware | Available |

| **Environmental** | |
|---|---|
| Operating Temp | 0 C to 50 C |
| Storage Temp | -10 C to 60 C |
| Relative Humidity | 95 % without condensation |

The Model 9840 is CE compliant.

# APPENDIX B -- CABLES AND CONNECTORS

## Load Cell Connectors

| DB9 Female | |
|---|---|
| **Pin** | **Signal** |
| 1 | EXCITE - HI |
| 2 | SENSE - HI[1] |
| 3 | CELL OUTPUT - HI |
| 4 | CELL OUTPUT - LO |
| 5 | SENSE - LO [1] |
| 6 | EXCITE - LO |
| 7 | AUTO ID/TEDS [OPT] - A |
| 8 | AUTO ID/TEDS [OPT] - B |
| 9 | CHASSIS GND |

**Notes:**

1. If the sense lines are not used, SENSE - HI must be tied to EXCITE - HI and SENSE - LO must be tied to EXCITE - LO.

2. Incorrect wiring of these ports can cause damage to the internal circuitry of the unit. Please contact Interface if you have questions or need assistance with these configurations.

## Serial Port Connector

| DB 15 Male | |
|---|---|
| **Pin** | **Signal** |
| 1 | TXD |
| 2 | RXD |
| 3 | No Connect |
| 4 | SERIAL GND |
| 5 | TXD+ (Printer) |
| 6 | TXD- (Printer) |
| 7 | RXD- (RS485) |
| 8 | RXD+ (RS485) |
| 9 | No Connect |
| 10 | SERIAL GND |
| 11-13 | No Connect |
| 14 | TXD+ (RS485) |
| 15 | TXD- (RS485) |

**Notes:**

1. Pins 1 through 4 are used for RS232 ASCII command set communications. Use 8 data bits, no parity, 1 stop, and set the baud rate using the Com baud rate entry on the System Options menu.

2. The printer uses RS422 differential signaling on pins 5, 6 and 10. Baud rate for the printer is selectable using the Printer Baud entry on the System Options menu.

3. Pins 7, 8, 14 and 15 are used for RS485 ASCII command set communications. Use 8 data bits, no parity, 1 stop, and set the baud rate using the Com baud rate entry on the System Options menu.

# Digital I/O Connector

| High Density 26 Female | |
|---|---|
| **Pin** | **Signal** |
| 1 | LIM 1 A[1] |
| 2 | LIM 1 B[1] |
| 3 | LIM 2 A |
| 4 | LIM 2 B |
| 5 | LIM 3 A |
| 6 | LIM 3 B |
| 7 | LIM 4 A |
| 8 | LIM 4 B |
| 9 | ISO IN 1 - HI[2] |
| 10 | ISO IN 1 - LO[2] |
| 11 | ISO IN 2 - HI |
| 12 | ISO IN 2 - LO |
| 13 | ISO IN 3 - HI |
| 14 | ISO IN 3 - LO |
| 15 | ISO IN 4 - HI |
| 16 | ISO IN 4 - LO |
| 17 | KEYLOCK[3] |
| 18 | GND |
| 19 | ENCODER CHA-L[4] |
| 20 | ENCODER CHA |
| 21 | GND |
| 22 | ENCODER CHB-L |
| 23 | ENCODER CHB |
| 24 | GND |
| 25 | GND |
| 26 | +12 VDC<br>(+5 VDC optional[4]) |

**Notes:**

1. Limits are optically isolated solid state switches that can control AC or DC voltage. Peak blocking voltage is 350V, maximum continuous current is 120 mA.

2. Digital inputs are opto-isolated with internal current limiting resistors. Voltage range is +4 to +22 VDC on the “HI” input with respect to the “LO” input. Other voltage ranges are possible with added external resistors, contact Interface for details. If isolation is not required these inputs may be operated using the +12 VDC supplied on pin 26 and the GND on pin 24.

3. The keylock input will be in the “unlocked” state if left unconnected. Tie this pin to GND to “lock” it. When locked the setup of the Model 9840 cannot be changed (you cannot enter Setup mode).

4. The encoder inputs are intended for use with a +12 VDC quadrature encoder. For single ended signaling use the CHA and CHB pins, the CHA-L and CHB-L pins are provided for differential signals. The encoder can be supplied with the +12 VDC and GND available on pins 26 and 24.

The Model 9840 will also accept +5 VDC encoder inputs but these MUST be differential. Single ended +5 VDC inputs are not supported on the standard unit. Options for +5 VDC encoders are available. Pin 26 will supply +5 VDC for this option and must be ordered accordingly.

# OPTION ~ Remote Freeze Cable

### P/N CABLE 988278-010
### Remote Actuation Push-Button Display Hold/Freeze Cable
**(Cable shown is approximately 10 feet)**

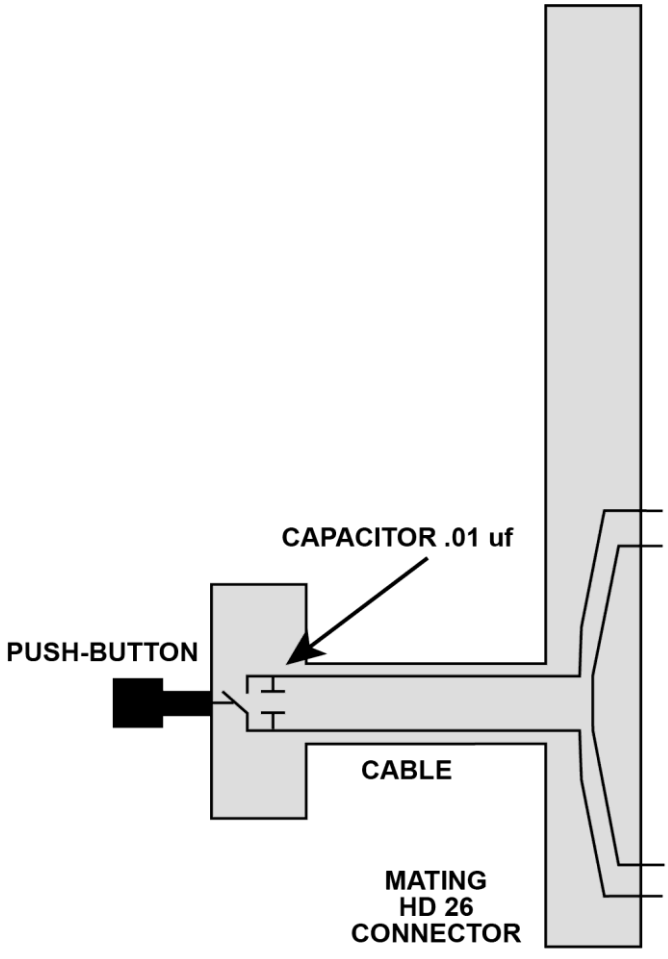
The cable to support the digital input for display **HOLD/FREEZE** actuation must connect to the 26 pin DIGITAL I/O connector located on the rear panel of the Model 9840.

The connection is to actuate digital input #4, signals ISO IN 4 – HI (pin 15) and ISO IN 4 – LO (pin16).

To accomplish this, signal ISO IN 4 – LO (pin16) is tied to GND, (pin 25).

A pushbutton switch is then installed across the signal ISO IN 4 – HI (pin 15) and the +12VDC (pin 26). In parallel with the pushbutton switch, a .01uf ceramic capacitor is installed for debouncing.






| High Density 26 Female | |
|---|---|
| **Pin** | **Signal** |
| 1 | LIM 1 A[1] |
| 2 | LIM 1 B[1] |
| 3 | LIM 2 A |
| 4 | LIM 2 B |
| 5 | LIM 3 A |
| 6 | LIM 3 B |
| 7 | LIM 4 A |
| 8 | LIM 4 B |
| 9 | ISO IN 1 – HI[2] |
| 10 | ISO IN 1 – LO[2] |
| 11 | ISO IN 2 – HI |
| 12 | ISO IN 2 – LO |
| 13 | ISO IN 3 – HI |
| 14 | ISO IN 3 – LO |
| 15 | ISO IN 4 – HI |
| 16 | ISO IN 4 – LO |
| 17 | KEYLOCK[3] |
| 18 | GND |
| 19 | ENCODER CHA-L[4] |
| 20 | ENCODER CHA |
| 21 | GND |
| 22 | ENCODER CHB-L |
| 23 | ENCODER CHB |
| 24 | GND |
| 25 | GND |
| 26 | +12 VDC (+5 VDC optional[4]) |

### Digital I/O Connector

1. The source and scaling of ANALOG - OUT is selected through the menus.
2. The HIGH BANDWIDTH - OUT is a buffered analog output permanently connected to the load cell channel.
3. If the 4-20 mA Option is purchased.

| DB9 Male | |
|---|---|
| **Pin** | **Signal** |
| 2 | ANALOG - OUT [1] |
| 3 | ANALOG - GND |
| 4 | HIGH BANDWIDTH - OUT [2] CHANNEL A |
| 5 | 4-20 mA – OUT [3] CHANNEL A |
| 6 | 2nd ANALOG-OUT[1] (Optional) |
| 7 | 4-20 mA – OUT [3] CHANNEL B |
| 8 | HIGH BANDWIDTH - OUT [2] CHANNEL B |
| 9 | No Connect |

## USB Connector

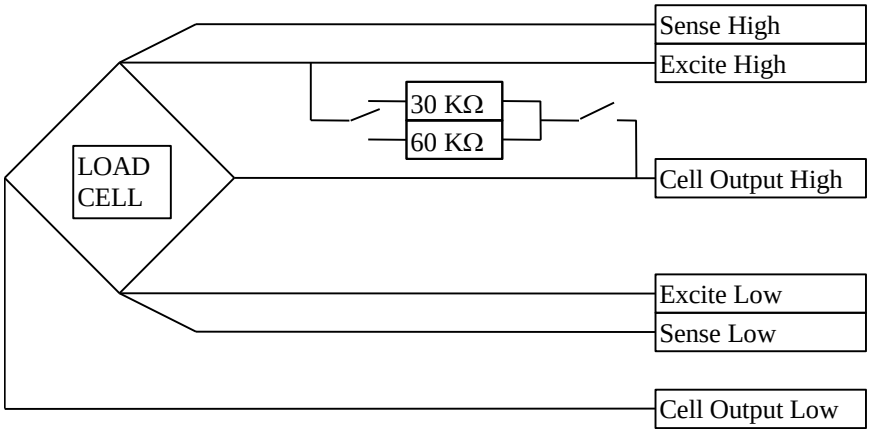
| Pin | Name | Description |
|---|---|---|
| 1 | VCC | +5 VDC |
| 2 | D - | Data – |
| 3 | D+ | Data + |
| 4 | GND | Ground |

## Precision Shunt Calibration Resistors

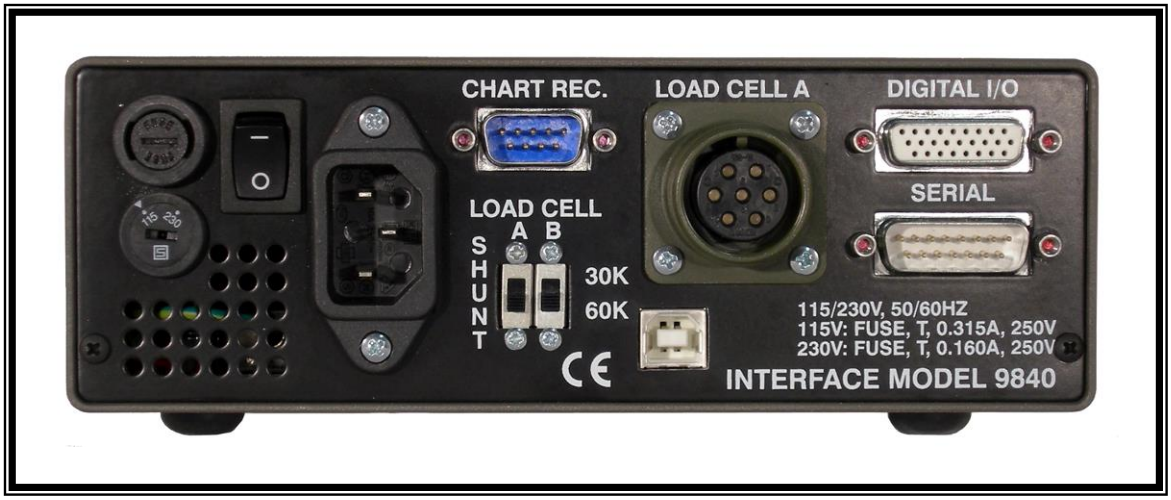
This diagram shows the connection of the precision internal shunt resistors.

The back panel switch (shown to the left of the two resistors) selects between 30 KΩ and 60 KΩ.

The shunt check relay (shown to the right of the two resistors) connects the selected resistor between the Excite High and the Cell Output High.




## OPTION ~ 7 Pin, Circular Load Cell Connector



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