interface

FORCE MEASUREMENT SOLUTIONS®

Model 9840-400 Digital Process Monitor

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CONTENTS

INTRODUCTION

The Model 9840 is a 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 7.0 inch, 800 x 480 resolution TFT LCD resistive touch screen display for clear, precise indication of measured quantities and limit status.
- **No** knobs or dials. **No** internal jumpers. All adjustment and calibration are done using two user-friendly front panel touchscreens
- 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 Channels A and B or any other combination 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 Channels A and B or any other combination 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.
- **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 or torque and milli-volt per Volt, 2 or 5-point known mass or 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 item (load, torque, peak, valley, Usum) with user defined scale factor and offset. Large, buffered ± 10.00 Volt output. The Model 9840 is standard with two Analog output channels. Two more Analog Output Channels are available[OPT].
- Remote operation using standard **RS232 ASCII** or **USB SERIAL ASCII** command set.

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 ("O" symbol on rocker pressed in). Connect the AC power line and plug it in.

MODEL 9840 BACK PANEL

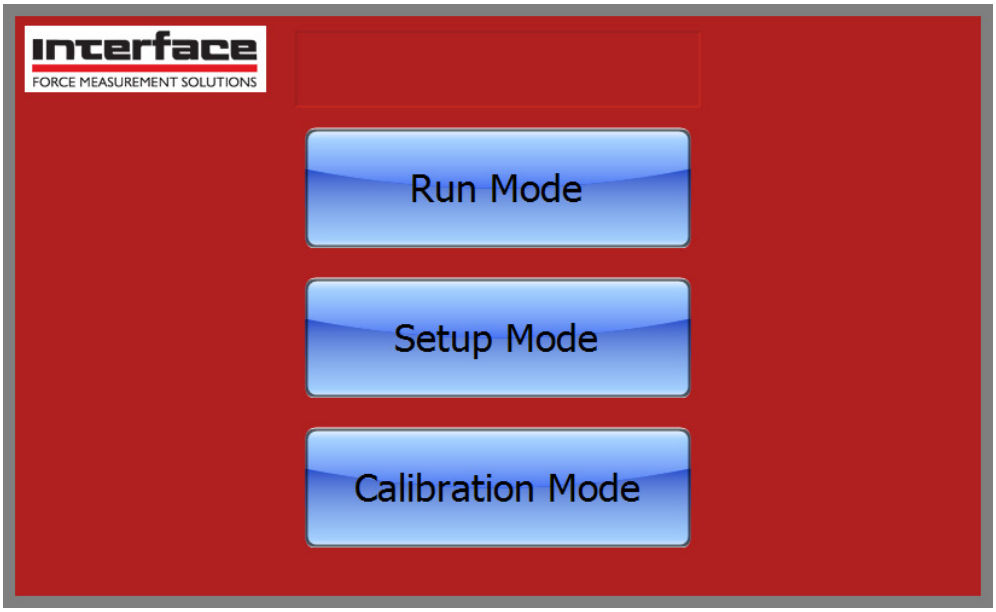
Next connect a load or torque cell to the 9-pin female connector labeled "Load 1". You should use the cabling supplied with your Model 9840 and Interface load or torque cell. If you do not have a factory supplied cable, see Appendix B for the recommended cell connection.

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

#	Message	Meaning
1	Version X.Y.Z	This is the version number.
	Serial # 12345	This is the serial number.
2	Option # 114236	This is the option number.
	Touch Screen Vx.y.z	This is the version number for the touch screen.

Each message will be displayed for about 2 seconds. After that the screen will start showing the Main Menu where one of three modes (Run Mode, Setup Mode, Calibration Mode) of operation can be selected, as shown below.

MODEL 9840 Main Menu



Run Mode will bring the unit to a screen with 4 displays depicting all 4 channels simultaneously in their default state of Load A through Load D shown in pounds (Lb). The example below shows Load A is 0.00116 mvV and Load B is -0.00399 mvV on the top row. The second row of the display shows Load C is 0.00067 mvV and Load D is -0.01952 mvV. 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 to that specific channel. If it is blinking a non TEDS[OPT] sensor is attached. The “T” is not displayed when the TEDS[OPT] feature is turned off.

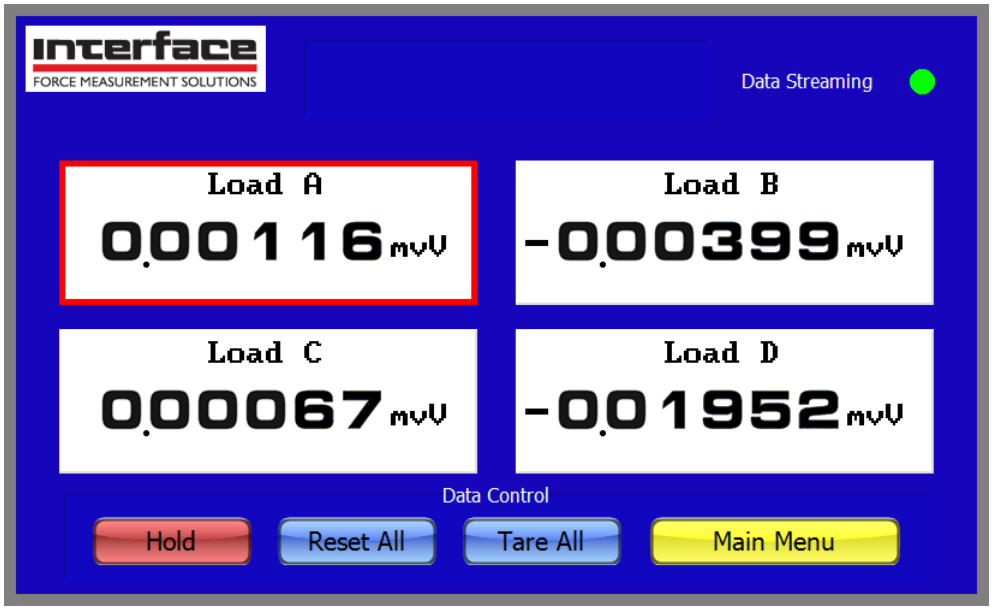
To change the Item or Unit of any of the displays select the display to be changed on the left screen (when selected there will be a red ring around it) press the Up/Down Item arrows on left side of the right screen to cycle through the item options active for that channel. The rightmost Up/Down arrow buttons on the right screen will cycle through the units that can be used. For example, with the Item “Load A” showing you would see Lb, kg, N, PSI, MPa, Klb, kN, t, mV/V, grams, and then back to Lb. If a Torque Cell is active the unit options would be LbI, NM, OzI, and mV/V.

The full list of Items with its respective units can be found in the table on page 11 in the Run Mode section. If a torque cell is loaded on any channel, the display will show torque

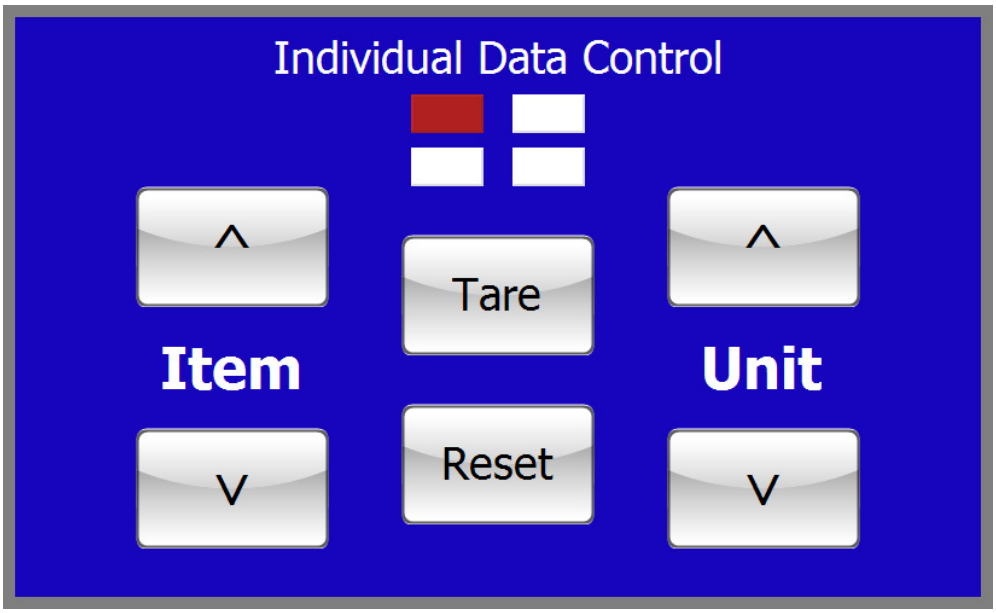
rather than load for that appropriate channel. Channel A+B, as well as any other sum, will only appear when both channels are attached to sensors of the same type: load or torque.

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

MODEL 9840 Left Run Screen



MODEL 9840 Right Run Screen



OPTION ~ TEDS TEMPLATE 33 (BRIDGE SENSOR) SUPPORT

The Model 9840 will now support TEDS Template 33 equipped sensors. It is a true plug and 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 touch screen or Serial. If the annunciator is turned on, a “T” TEDS annunciator is displayed when the TEDS is turned on. It appears in the top right of each display. 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. If TEDS is turned off and AutoID is turned on, the annunciator will be a “t”, indicating that Tag IDs can still be read. TEDS and AutoID are enabled/disabled through the System Options menu on the touch screen or via serial command.

Note: If TEDS and Auto ID are both enabled, a supported TEDS sensor will override AutoID 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

Selecting Run Mode from the Main Menu will bring you to the Run Mode screen depicting 4 displays of channel information. A display is active when it is indicated with a red ring around it. There is also a highlighted red rectangle with three white rectangles in the center of the right screen which corresponds to the relative position of that display to the other 3 on the left screen. Once a display is active, the value can be manipulated using various control buttons visible on both screens. Below is a description of how each of the available buttons operate.

Tare Button

The **Tare** button on the right screen sets the current load or torque to zero for the channel associated with the currently selected display item. The **Tare All** button on the left screen will do this for all four channels at once.

Reset Button

The **Reset** button on the right screen resets the current peak and valley for the channel associated with the currently selected display item. The **Reset All** button on the left screen will reset the peak and valley for all four channels at once.

Main Menu

The **Main Menu** button allows the user to return to the Main Menu, where the user can navigate to the Setup menu, the Calibration mode, or back to the Run Mode.

Display Hold/Continue

When the **Hold** button is pressed during Run Mode operation, the readings on the displays will hold/freeze. The “Data Streaming” identifier in the top right of the left screen will go from green to red indicating that the display is not updating its information in real time. Additionally, the **Hold** button will change color from red to green and will now say **Continue**. Pressing the **Continue** button will unfreeze the displays and the Data Streaming identifier will switch back to green.

Item Buttons

The **Item** buttons allow navigation through the list of different items that can be displayed. Not all items are available at the same time. Torque items will substitute for Load items when appropriate. Sums are only available when cells on all channels are of the same type (load or torque). Use the **Unit** buttons to change the units that are used for the currently displayed item.

Unit Buttons

The **Unit** buttons allow navigation through the list of units that are available for the item that is currently selected.

The table below summarizes the unit options for each item. 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/C/D	Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams.
Peak A/B/C/D (Load)	Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams.
Valley A/B/C/D (Load)	Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams.
Gross A/B/C/D (Load)	Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams.
Channel A+B (Ld)	Pounds, Kilograms, Newtons, PSI, MegaPascals, Kilo-Pounds, Kilo-Newtons, Metric Tons, mV/V, grams.
Torq A/B/C/D	Pound-Inches, Newton-Meters, Ounce-Inches, mV/V.
Peak A/B/C/D (Torque)	Pound-Inches, Newton-Meters, Ounce-Inches, mV/V.
Valley A/B/C/D (Torque)	Pound-Inches, Newton-Meters, Ounce-Inches, mV/V.
Gross A/B/C/D (Torque)	Pound-Inches, Newton-Meters, Ounce-Inches, mV/V.
Channel A+B (Tq)	Pound-Inches, Newton-Meters, Ounce-Inches, mV/V.
User Sums	Either load or torque units, depending on the constituent channels.

All these measurements are calculated 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 item you wish to see and what units are used to display or print this data.

SETUP MODE SUMMARY

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

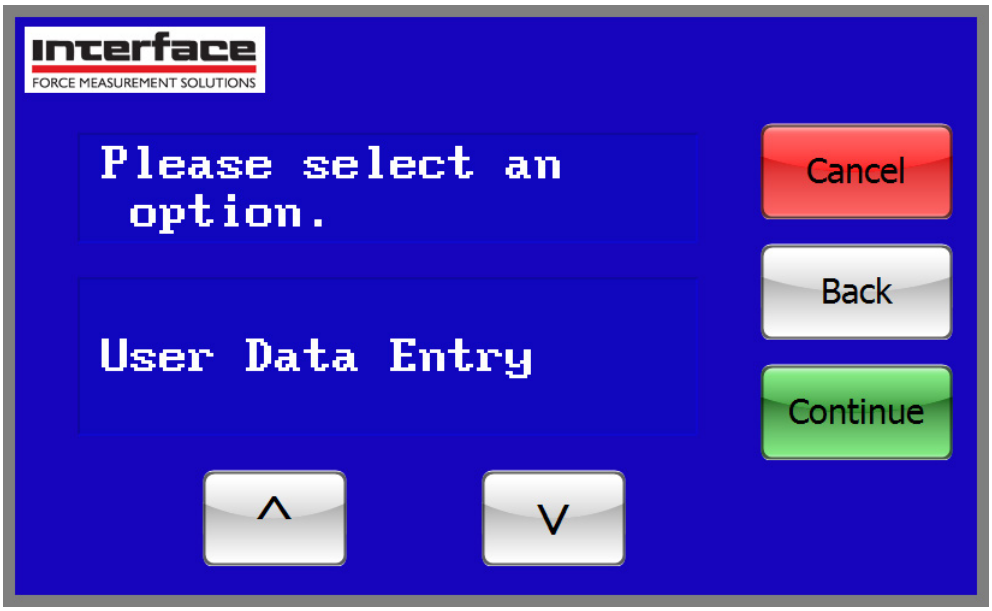
Setup mode

- **>User Data Entry**
  - **>>Base Area Entry → Channel**
- **>Analog Output**
  - **Channel → Source → Units → Full → Zero.**
- **>Sensor Select**
  - **>>View Calibration on Channel A**
  - **>>View Calibration on Channel B**
  - **>>View Calibration on Channel C**
  - **>>View Calibration on Channel D**
  - **>>View Sensor Data → Sensor**
  - **>>Select Sensor Data → Channel → Sensor**
  - **>>Delete Sensor Data → Sensor**
  - **>>View TEDS [OPT] → Channel**
- **>System Options**
  - **>>Auto Identify**
  - **>>AutoID Annunciator**
  - **>>Auto Zero Channel → Channel**
  - **>>Com Address**
  - **>>Com Baudrate → Baudrate**
  - **>>Com Line Feed**
  - **>>Retain Tare**
  - **>>EOT Char**
  - **>>TEDS Enable [OPT]**
  - **>>Auto Tare**
  - **>>Serial Cmd Select → USB/Serial**
- **>Display Options**
  - **>>Filter Select → Type → Level**
  - **>>Filter Window → Channel → Unit → Value**
  - **>>Decimal Select → Channel**
  - **>>Count by Select → Channel → Increment**
  - **>>Select User Sums → Sum → Channel Select**

SETUP MODE

Setup mode is used to change the setup of the Model 9840. To enter setup mode press the Setup Mode button from the Main Menu Screen.

MODEL 9840 Setup Screen



For this menu and its sub-menus, the down button navigates forward through the list, and the up button navigates backwards.

To exit from setup mode and return to the Main Menu press the **Back** button for each sub menu that has been entered, or just hit the **Cancel** button once. When you are entering numerical data or selecting options from a sub-menu the **Back** button will back you out to the previous menu/sub-menu without making any changes. The **Continue** button enters you into the displayed sub-menu option or, following a data entry, advances you to the following input screen.

The main Setup Mode menu contains the following entries which will be described in detail in the following sections.

- **> User Data Entry** -- allows you to set any common math options such as the base area used to display load in PSI in percent.
- **> Analog Output** -- is used to select the source and scaling for the standard analog output channel.
- **> Sensor Select** -- Lets you manually view current or set new load/torque cell calibration data with each channel, view/delete saved calibration data, and view any TEDS [OPT] data.
- **> System Options** -- contains entries to enable or disable automatic sensor identification and annunciation, enable or disable automatic load or torque zeroing, set the serial communications address, baud rate, line feed, serial options and preference, and choose whether or not to retain the most recent tare value through power down and auto tare while at zero value.
- **> Display Options** -- lets you choose the filtering that is applied to the load or torque measurements, an optional window of data incrimination on which to turn the filter off, the number of decimal digits that are shown on the display and on the print, the channel count by values (1, 2, 5, 10, or 20), and the user sums setting.

Entering Numerical Data

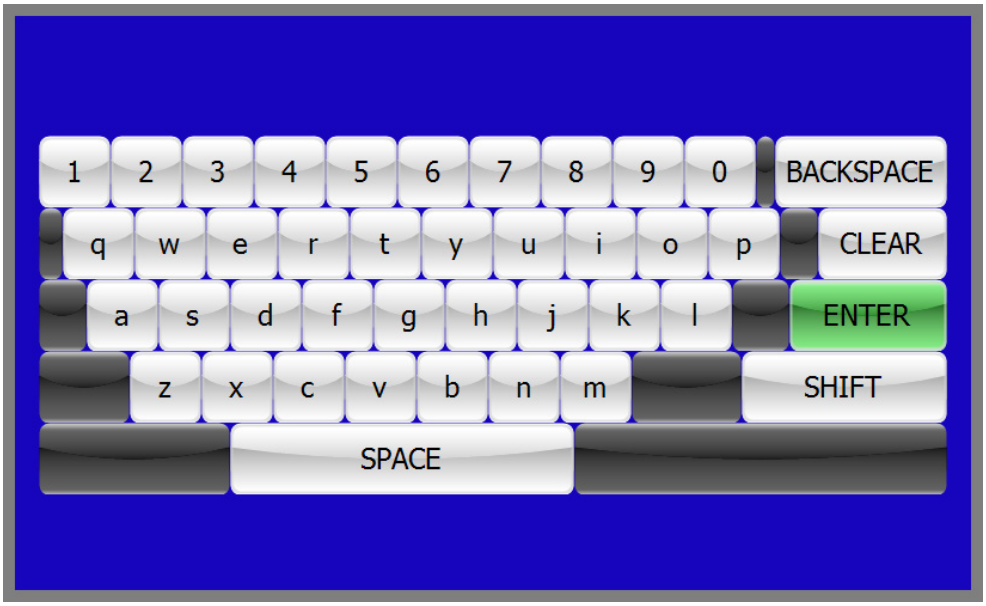
At times you will need to enter numerical data into the Model 9840. The method is consistent in all cases. The keypad which is always present on the right touch screen (except the Run Mode) will be used to type a number into the left screen when prompted to do so. Hitting a number "**0-9**" on the right screen will make it appear on the far right of the number entry box on the left screen. Any new numbers entered will push previous digits to the left. Hitting the decimal point "**.**" will place it at the far right of the number, and hitting the negative sign "**-**" at any time will toggle the sign of the number. **Cancel** will bring you back to the main menu screen. **Backspace** will delete the previous digits typed, including the decimal, from the most recent entry and on until the entry box is empty. **Clear** will delete all existing characters currently occupying the entry box. **Enter** will store the number and either save it or bring you to the next part of the setup, depending on what kind of data is being entered.
Note: While the left screen has a numerical entry box present, the button normally called "Continue" changes in size and becomes a second "Enter" button that behaves the same way as the Enter button on the keypad screen.

MODEL 9840 Keypad Screen

Entering Alphanumeric Data

When entering data into an entry box that accepts both numbers and letters, a keyboard will appear on the right screen. This allows the user to use any alphanumeric string as the serial number. The **Backspace**, **Clear** and **Enter**, buttons all function in the same ways as described for the keypad screen. There is also a **Shift** button that toggles all keyboard letters between upper and lowercase and a **Space** button.

MODEL 9840 Alphanumeric Screen



>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 Entry

This is the area in square inches that is used to calculate load in pounds per square inch (PSI) or Mega Pascals (MPa). A different area can be set for all four channels.

>Analog Output

This menu is used to set up the standard analog output. Instead of a submenu there is a series of selections. Pressing **Back** at any time will step you back to the previous setup entry where it can be edited or accepted once more with the **Continue** button. Setup data will only be saved when the setup is finished. Note that when you change a cell type (from load to torque or back again) these settings must be reset for the new cell.

1. **Channel:** -- This asks the user for the Analog Output channel. By default, A and C are selectable. These channel designations do not prevent you from using any source item with the selected Analog Output channel; using Load A with Analog Output C is possible.
2. **Source:** -- This entry allows you to scroll through a list (Using the up and down 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, A+B/C+D and the four user sums (All summed items options, will only appear only if the cells on the summed channels are of the same type).
3. **Units:** -- This entry allows you to scroll through the list of available units for the data source you have chosen in the previous step.
4. **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).
5. **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).

>Sensor Select

This menu is used to view, select, and delete sensor calibration data on a specific channel or browse through the list of load and torque cell calibration data stored within the Model 9840. It also allows viewing of TEDS data on a selected channel.

>>View Cal on Ch A/B/C/D

The first four menu options allow the user to view the calibration data on the specified channel. The data will populate a scrollable list navigable with the up and down arrows.

>>View Sensor Data

This option allows the user to view any saved sensor data on the unit. After selecting the option, the user can scroll using the up and down arrows to find the serial number of the data they wish to view. Upon selection, the data of the selected sensor will populate a list similar to the above option

>>Select Sensor Data

This option allows the user to change the calibration data a channel is currently using. The user will be asked to scroll to find the channel they wish to change the data for, then the sensor serial number of the data they wish to use.

>>Delete Sensor Data

The unit allows up to 32 individual sensor data to be saved. If one needs to be deleted, this option allows the user to scroll to select a serial number of the data that they wish to be deleted.
Note: There is no double conformation or undo feature while deleting a sensors data. Once a sensor serial number has been scrolled to and visible on the left screen hitting the **Continue** button on the left screen or **Enter** button in the right will delete all stored information for that sensor.

>>View TEDS[OPT]

After selecting a channel, a list of the TEDS data on that channel will be displayed. The unit will show the user both the Basic TEDS and TEDS33 if the device is attached. Otherwise, the unit will tell the user there is no TEDS on this channel.

>System Options

This menu contains some system wide parameters that are seldom changed. These parameters pertain to how the Model 9840 reads and interprets data as well as how it communicates with a connected computer via the USB or RS232 Serial port on the back.

>>Auto Identify

This allows you to turn automatic cell identification on or off. AutoID can be left in the "On" state even if it is never used, without adversely affecting the Model 9840 normal operation. In order to use this function you must either have an AutoID equipped cell or use an in-line auto-id module attached to your cell cable. If the TEDS [OPT] is not included or is turned off, a TEDS enabled sensor will be treated as if it was an AutoID sensor. This is because they both contain an 8 byte Tag ID.
Note: If the TEDS [OPT] is included and set to "On", it will override Auto Identify when a supported TEDS [OPT] sensor is attached!

>>AutoID Annunciator

This allows you to turn the AutoID Annunciator "t", seen in the top right corner of the four displays of the Run Mode screen, on or off. When on in conjunction with AutoID the "t" will blink until an AutoID equipped cell is attached, at which point the "t" will go solid.
Note: The TEDS [OPT] "T" annunciator will override the auto-ID annunciator for both its blinking and solid states if TEDS is enabled. If an AutoID is attached during this case the blinking "T" will still turn to a solid "t" to indicate it as an AutoID and not a TEDS.

>>Auto Zero Channel

This menu lets you enable or disable auto zeroing for measurements on any channel. 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.
Note: The 10 count value follows the decimal point setting found in the Display sub-menu. If a channel is set to 3 decimals the 10 count will be 0.010 (Units) similarly a decimal setting of 4 will incur a count below 0.0010 (Units).

>>Com Address

This item allows you to set the address of this unit used for the Serial commands. Valid values are 001 through 254.

>>Com Baudrate

This sets the baud rate for the RS232 ASCII command set. Available values are: 300, 600, 1200, 2400, 4800, 9600, 19.2k, 38.4k, 57.6k, and 230.4k. If communications are done over USB the baud rate is set automatically rendering this setting irrelevant.

>>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 Serial commands are 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. Switching “On” this setting will retain the tare on all channels.

>>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 a Serial command. The character is sent after the last carriage-return line-feed is returned by the unit with just one exception: when the user is viewing channel values with the Serial 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 TEDS33 enabled sensor will automatically load its calibration information into the M9840 after attachment.

>>Auto Tare

The Auto Tare can be turned on or off in this menu. When on, it will perform an automatic tare when an AutoID or TEDS enabled sensor is attached.

>>Serial Cmd Select

The source of serial commands can be toggled in this menu. The user can select RS232 or USB.

>Display Options

This menu contains options that effect how cell data is treated for displaying purposes on both touch screen and communication terminal window.

>>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

>>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 temporarily turned off to allow the displayed reading to correct itself with the actual reading. This enables the user to see the sudden change in measured data rather than being filtered out.

To turn a window on for a specific channel, use the **Continue** button to progress through the different steps. First select the channel you wish to add a filter window to, and choose to turn “On”. You will then be asked if you wish to use the previously saved window value (0.0000 Lb or LbI default for Load/Torque cell). “Yes” will complete the setup with the displayed value, save it and exit you out of the filter window setup. “No” will advance you further, in order to enter a new value. Select the unit first then the numerical value. Hitting either **Enter** button will complete the filter window setup with the newly set value.

To change the window, simply repeat the steps above. Instead of 0 and Lbs or LbI on the “old window” display, you will see the most recently entered value.

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.

>>Decimal Select

This lets you set the maximum number of digits to the right of the decimal, for each channel, that are displayed or printed for any of the item selections. 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”).

>>Count by Select

This allows you to choose the smallest unit of counting for the display of the chosen channel item. Counting by choices include: 1, 2, 5, 10, and 20.

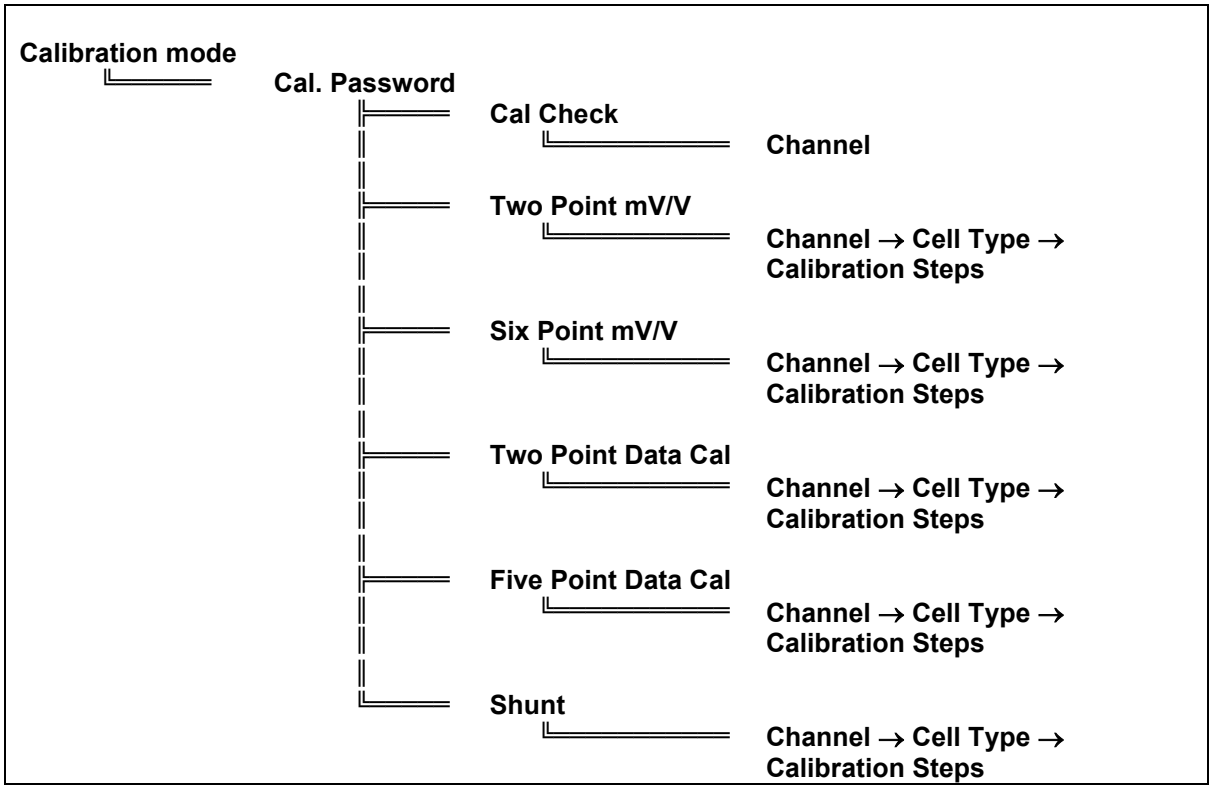
Note that the operation of the analog outputs and the limits is not affected by the settings of “decimal point” or “smallest count”. Thus, if you set a limit to be activated at 10.001 Lbs, and have “smallest count” set for 20, the limit is activated at 10.001 Lbs even though the display is only showing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

>>Select User Sums

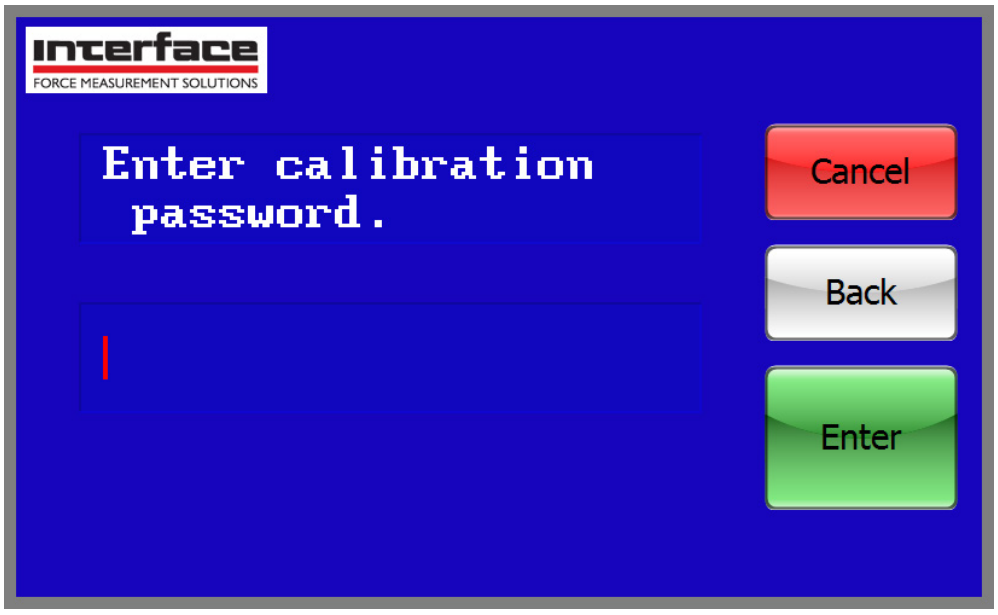
This setting provides up to four different User Sum combinations: Usum1, Usum2, Usum3 and Usum4. These combinations can be used as an item selection with a user designated unit. Each User Sum is any combination of the four channels summed together and displayed on the touchscreen, or serial terminal.
Note: These sums will only appear in the item lists if all selected channels for that Sum are of the same cell type (Load or Torque).

CALIBRATION MODE SUMMARY

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



MODEL 9840 Calibration Mode Password Screen



Once past the password screen, the Calibration Mode Menus will appear and have the same structural layout as the Setup Mode Menus.

CALIBRATION MODE

This menu is used to access all methods of calibration that are supported by the Model 9840. Selecting Calibration Mode from the Main Menu Screen will bring up a password entry Screen for the left screen (see above) and an alphanumeric keyboard for the right screen. Successful key in of the password (888) followed by either of the **Enter** buttons will bring up a sub-menu which offers a calibration check for one channel at a time, and various cell calibration options to select from. No matter which calibration style is selected, all calibrations will start with the same basic question before diverting to its unique calibration process. These common setting include, in this order: channel, cell type, serial number (manually entered by user), current month, day and year, excitation level (5.0V or 10.0V), unit and lastly the rated load of the cell.

If you are re-calibrating a cell, the Model 9840 will recognize it using either the AutoID 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 proceed with the overwrite; pressing **Back** will undo the serial number entry and prompt the user for a serial number again. Pressing either **Cancel** button with exit you entirely from the calibration menu back to the Main Menu Screen. Both the **Back** and **Cancel** button will abort the calibration process ad no data will have been saved. Another method of overwriting existing data is to delete the sensor first in the Setup – Sensor Select menu, and then perform a new calibration under the same sensor serial number.

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

Cells should be calibrated on the channel of which they are intended to be used on, but that does not prevent a user, if they so choose, from selecting a sensor calibrated on channel A and using it on channel D, for example.

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 the “**-**” button during number entry.

>>Cal Check

Selecting this item will run a calibration check on the cell attached to the selected channel. 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. It is important to ensure that for this check to be accurate on all non AutoID and TEDS[OPT] enabled devices, the same cell that was used to perform the calibration matches the cell serial number assigned to the channel being checked. After the check is complete, 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.

>>Two Point mV/V

This calibration options 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). After completing the basic questions that are commonly asked in all the calibration styles for the Model 9840, the final question is specifically related to the two point mv/V cal process. The user will be prompted to enter the milli-volt per Volt cal constant (usually listed on the load cell calibration certificate), that information combined with the rated load entered earlier make the second point. The now two points together will determine the linear line of travel for the entire range of the cell. 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 the "Cal Check" feature described above. The final "No Masses Ready" or "No Torque Ready" message screen is intended to remind you of this fact. Hitting **Enter** will finalize the entries just made, and a calibration will be performed. Once complete the user will be able to review the calibration results listed in the same manner as the "View Cal" selection under the Sensor Select menu within the Setup Mode.

>>Six Point mV/V

This calibration process is a series of six milli-volt per Volt points with corresponding masses or torques (usually listed on the load cell calibration certificate). After completing the basic data entry for the Model 9840, it will begin a series of entries for mass and milli-volt per Volt starting with, "Mass value 1" and "mv/V value 1". Typically these first values entered are always zero since the 6 point calibration process does not automatically set the zero point as it does in the two point cal. Going forward it will perform a piece-wise linear interpolation between equally spaced adjacent points. The mass values are auto filled based off the total rated load entered earlier in this calibration process, the user can adjust these values if needed. Following each mass value entry a milli-volt per Volt value will be entered, creating a new point.

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 the "Cal Check" feature described above. The final "No Masses Ready" or "No Torque Ready" message screen is intended to remind you of this fact. Hitting **Enter** will finalize the entries just made, and a calibration will be performed. Once complete the user will be able to review the calibration results listed in the same manner as the "View Cal" selection under the Sensor Select menu within the Setup Mode.

>>Two Point Data Cal

This calibration option is used to calibrate a load or torque cell using known masses or torques. After getting through the basic data entry described above, you are then prompted to enter the value of the first mass or torque (typically a "no load" zero value). The "Mass 1 Ready?" or "Torque 1 Ready?" message will wait while you apply the mass or torque value entered in the previous step. Once applied hitting **Enter** will command the Model 9840 to take its reading and 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 applied to the cell, the Model 9840 will auto fill in this value based off the previously entered total rated load of the cell and the amount of points the calibration requires. This auto filled value is completely adjustable. Once all points are read, a "No Masses Ready?" or "No Torque Ready" reading is also required. During this reading, a shunt check value is recorded. It is essential that the cell not be under load or torque when this step is performed.

>>Five Point Data Cal

Similar to the Two Point Data Cal above, this calibration option is used to calibrate a load or torque cell using known masses or torques. The process will be the same as the Two Point Data Cal but with added point measurement readings to total five. One of the readings, usually the first, should still be zero and at the end of the point measurement process a shunt check is performed designated by the "No Masses Ready?" or "No Torque Ready" screen appearing.

>>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, after the basic data described above, for 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 all the calibrations when a shunt check is performed, the cell should be free of load or torque during this calibration.

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 hold/freeze the display if Display Hold OPT enabled.

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 three groups: those similar to the Run Mode touchscreen commands; similar to the Setup Mode touchscreen commands; and similar to the Calibration Mode touchscreen commands.

Communications can be established via RS232 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 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 for the Model 9840 is in "Com Baudrate" within the Systems Options of the Setup Menu. Supported rates are **300**, **600**, **1200**, **2400**, **4800**, **9600**, **19.2k, 38.4k, 57.6k,** and **230.4k** baud. There must be **8 data** bits, **no parity**, and **1 stop** bit. USB Communications does not require this setting to function.

To support the multi-drop Remote option each unit is assigned a communications address, which is set using "Com Address" within the Systems Options of the Setup 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
╠	HT		Hello fetches extended 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
╠	F	(number)	Switches view pointer to specified display
╠	V	(item)(unit)(repeat) …	Get Value of an item and unit
╠	P	(repeat)	Print OPT a set of readings
╠	R	(tare)(pk)(val)…(pos)	Reset readings
╠	X		Freeze OPT display
╚	T	(hold)(text)	Place text on display

SERIAL RUN MODE COMMANDS

The commands listed in this section mirror (and in some cases extend) the functions that are available from the touch screen of the Model 9840 for Run or Setup 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 8.0.1 Serial #12345 Option #
1056779
```

Hello Touch Screen Command (HT)

This command operates the same as the hello command, but also appends the touch screen version number.

Example:

```
@123HT
```

Acknowledge:

```
@ 123 Interface Model 9840 Version 8.0.1 Serial #12345 Option #
      1056779 Touch Screen V1.0.3
```

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 many of the commands shown below** (The USum 1 through USum 4 are available only after being set in Display Options of the Setup Menu).

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   14 - Grs A    15 - Grs B
      16 - Ch A+B[OPT] 26 - Load C   27 - Peak C   28 - Vall C
      29 - Load D   30 - Peak D   31 - Vall D   32 - Grs C
      33 - Grs D    42 - USum 1   43 - USum 2   44 - USum 3
      45 - USum 4
      These items are for value display purposes only:
      50 - Cell* AB   51 - Peak AB    52 - Vall AB

      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
```

*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.

**If a channel is configured as a torque cell alternative torque item and unit selections will be displayed, and the load cell item choices will not be available to the user for that specific channel. Below are the torque item numbers that may be seen included in the Item Numbers list:

```
      17 - Torq A   18 - Peak A     19 - Vall A     20 - Grs A
      21 - Torq B   22 - Peak B     23 - Vall B     24 - Grs B
      25 - Ch A+B[OPT] 34 - Torq C     35 - Peak C     36 - Vall C
      37 - Torq D   38 - Peak D     39 - Vall D     40 - Grs C
      41 - Grs D

      These are the units for Torque:
      00 - LbI   01 - NM    02 - OzI   03-mVv
```

Front Panel Display Command (F)

This command is used to set the front panel display of the Model 9840 Run Mode to a desired combination of items and units. There are four subcommands: Front panel View (FV), Front panel Set (FS), Front panel Alternate (FA), and Front panel pointer control to line n (Fn). For reference of the Front Panel Commands, The displays are indexed 1 through 4 from left to right, top to bottom.

Front Panel View Command (FV)

The Front panel View (FV) command tells you what is currently being displayed in Run Mode and which channel is selected as the active display which will always be seen on the first listed line.

Example:

```
@123FV
```
Acknowledge:
```
@ 001 Active Display shows Load A in kg  [1]
      Other Display shows  Load B in Lb  [2]
      Other Display shows  Load C in Lb  [3]
      Other Display shows  Load D in Lb  [4]
```

Front Panel Set Command (FS)

The Front panel Set (FS) command allows you to specify the item number and unit number of the active display. The format is FS (item number)(unit number), where the item and unit numbers are 2 digits each and may be found using the question mark command (?). After entering, the terminal will show the new info of the active display in a list with the three others.

Example:
```
@123FS0200
```
Acknowledge:
```
@ 001 Active Display shows Vall A in Lb  [1]
      Other Display shows  Load B in Lb  [2]
      Other Display shows  Load C in Lb  [3]
      Other Display shows  Load D in Lb  [4]
```

Front Panel Alternate Command (FA)

The Front panel Alternate (FA) command allows you to switch to the next display and set that as the active one. This action will increment to the next in line each time it is entered and will start over going from display 4 back to display 1 if necessary. Below shows the outcome when Display 1 was active and the FA command was sent.

Example:
```
@123FA
```
Acknowledge:
```
@ 001 Active Display shows Load B in Lb  [2]
      Other Display shows  Vall A in Lb  [1]
      Other Display shows  Load C in Lb  [3]
      Other Display shows  Load D in Lb  [4]
```

Front Panel Pointer Control to Line n (Fn)

The Front Panel Pointer Control to Line n (Fn) assigns the active display to one of the displays ranging from 1 to 4, the format is F(Display number). It then shows that selection as active followed by listing the other three displays. This allows the operator to know which display will be configured or accessed. The displays are indexed left to right, top to bottom.

Example:
```
@123F3
```
Acknowledge:
```
@ 001 Active Display shows Load C in Lb  [3]
      Other Display shows  Vall A in Lb  [1]
      Other Display shows  Load B in Lb  [2]
      Other Display shows  Load D in Lb  [4]
```

Value Command (V) for any channel

The value command for any of the channels 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 0.1 second intervals. Choosing repeat 0 will turn off any single value that is being sent by a repeat 2 command.
Note: when choosing to view Limits [OPT], use "00" for the unit part of the command.

This format can be repeated under the same V command to view up to four items at once. The format is V(item 1)(unit 1)(repeat 1)(item 2)(unit 2)(repeat 2)(item 3)(unit 3)(repeat 3)(item 4)(unit 4)(repeat 4), where same as above, item and unit numbers can be any from the question mark command.
Note: A repeat entered greater than 4 displayed items will result in a message informing the user and then will default to displaying the first four entered in the command.

Example:
`@123V01021`
Acknowledge:
`@ 123 Peak A 55.6576 N`

Example 2:
`@123V00002`
Acknowledge 2:
`@ 123 Load A 120.425 Lb`
`@ 123 Load A 125.219 Lb`
`.....`
`@ 123 Load A 137.861 Lb`

Example 3:
`@123V000010100103001`
Acknowledge 3:
`@ 123 Load A 123.325 Lb  Peak A 132.459 Lb  Load B 12.4322`

The following item numbers, found under the question mark command, are available as shortcuts for a joined channel A / channel B value display: 50 (Cells AB), 51 (Peak AB), and 52 (Valley AB). The format to use this command is V(item number)(unit number for channel A)(unit number for channel B)(repeat), where the item number must be 50, 51, or 52 and unit numbers can be found using the question mark command. Make sure to use the proper unit numbers with the proper cell type. The repeat number behaves exactly as above and must be 0, 1, or 2.

Example 4:
`@123V5000002`
Acknowledge 4:
`@ 123 Load A 120.425 Lb  Torq B 120.425 LbI`
`@ 123 Load A 125.289 Lb  Torq B 137.851 LbI`
`.....`
`@ 123 Load A 128.249 Lb  Torq B 146.821 LbI`

The joined value display format can also be repeated to view multiple items at once, with a repeat restriction of up to two entries. This results in the same outcome, viewing up to four individual items and units, but limited to Channel A and Channel B values.
Note: A repeat entered greater than 4 displayed items will result in a message informing the user and then will default to displaying the first four entered in the command.

Example 5:
`@123V50000025100002`
Acknowledge 5:
`@ 123 Load A 120.425 Lb  Torq B 130.455 LbI  Peak A 133.456 Lb Peak B 142.381 Lb`
`@ 123 Load A 125.249 Lb  Torq B 137.861 LbI  Peak A 133.456 Lb Peak B 142.381 Lb`
`.....`
`@ 123 Load A 128.259 Lb  Torq B 146.871 LbI  Peak A 134.968 Lb Peak B 151.126 Lb`

Repeat Value Clear (VC)

This command allows the user to stop all repeating values simultaneously in the event that multiple (or single) items are in repeat and a user does not wish to stop each individually with the V(item)(unit)(repeat 0) command.

Example:

`@123VC`

Acknowledge:

There is no text acknowledgement just an observation that the repeat has ceased.

OPTION ~ Print Command (P)

If the print option is purchased, the print command will fetch a full set of readings. 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. 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.
Note: A USum value will not appear if the user has not set it prior to this command.

Example:
```
@123P1
```
Acknowledge:
```
@ 001 Load A  9.60300 Lb
      Peak A  609.630 Lb
      Vall A -64.2910 Lb
      Load B  2.70999 Lb
      Peak B  4.09178 Lb
      Vall B -3.48975 Lb
      Grs A   12.5920 Lb
      Grs B   3.51286 Lb
      Ch A+B  12.3100 Lb
      Load C  2.18119 Lb
      Peak C  2.18119 Lb
      Vall C -5.32134 Lb
      Load D -5.70315 Lb
      Peak D  5.70447 Lb
      Vall D -5.70315 Lb
      Grs C   4.90926 Lb
      Grs D  -4.90610 Lb
      USum 1 -2.99213 Lb
      USum 2  11.7850 Lb
      USum 3  14.4960 Lb
      USum 4 -0.81190 Lb
```

Reset Tare, Peak or Valley Command (R)

This command allows you to reset the tare, peak, or valley 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:
```
@123R111111111111
```
Acknowledge:
```
@ 123 Reset - Tare A  Peak A  Valley A  Tare B  Peak B  Valley B
Tare C  Peak C  Valley C  Tare D  Peak D  Valley D
```
Example 2:
```
@123R100100100000
```
Acknowledge 2:
```
@ 123 Reset - Tare A  Tare B  Tare C
```

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

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 OPT
A			Analog Output
	V		View current settings
	S	(channel)(item)(unit)(full)#(zero)#	Set analog output
S			Sensor Select
	(ch)		View current sensor on ch
	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 OPT 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
	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
	S	(0 or 1)	Serial command Source
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 OPT digits max
	C	(channel)(countby code)	Smallest count

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 Serial 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 OPT (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
@ 123 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 OPT 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
@ 123 Ch A: Load A in Lb
      10.0 Volts indicates 1000 Lb
      0.0 Volts indicates 0.00 Lb
@ 123 Analog Output
@ 123 Ch C: Load B 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(channel)(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:

```
@123ASA090010.0#5.0#
```

Acknowledge:

```
@ 123 Analog Output
@ 123 Ch A: Pos OPT in In
      10.0 Volts indicates 10.00 In
      0.0 Volts indicates 5.00 In
@ 123 Analog Output
@ 123 Ch C: Load B in Lb
      10.0 Volts indicates 1000 Lb
      0.0 Volts indicates 0.00 Lb
```

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 3 subcommands, Sensor View (SV), Sensor Select (SS), and Sensor Delete (SD).

Sensor View Channel Command (SA, SB, SC, or SD)

The Sensor View Channel command has the format SA, SB, SC, or SD. It returns information about the cell currently loaded on channel A (SA), channel B (SB), channel C (SC), or channel D (SD) 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
      Ch C = Ch D = 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    ,  Cal on Oct27-99,   49.532 Lb  Shunt
      Ch A = S/N  13368,  10.00 Lb       , 3.00121 mV/v,
```

```
       10.00 V    ,  Cal on Oct27-99,   4.9292 Lb  Shunt
Ch C = Ch D = 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 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    ,  Cal on Oct27-99, 49.532 Lb  Shunt
      Ch C = Ch D = 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 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
      Ch C = S/N  13368,  10.00 Lb       , 3.00121 mV/v,
             10.00 V,     Cal on Oct27-99, 4.9292 Lb  Shunt
      Ch D = 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 Lbl 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 second 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
      Ch C = S/N  13368,  10.00 Lb       , 3.00121 mV/v,
             10.00 V,     Cal on Oct27-99, 4.9292 Lb Shunt
      Ch D = 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 C = Ch A = S/N 123456, 1000.0 Lb      , 4.50014 mV/v,
             10.00 V   , Cal on Oct27-99, 553.26 Lb  Shunt
      Ch D = 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 OPT 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:

```
@ 001 Auto Identify is on
      Auto Identify Annunciator is on
      TEDS is on
      Auto Tare is on
      Auto Zero Channel A is off
      Auto Zero Channel B is off
      Auto Zero Channel C is off
      Auto Zero Channel D is on
      Com Address is 001
      Com Baud Rate is    9600
      Com Line Feed is on
      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:
```
@ 001 Auto Zero Channel A is on
      Auto Zero Channel B is off
      Auto Zero Channel C is off
      Auto Zero Channel D is on
```

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. 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	38.4K
8	57.6K
9	230.4K

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
```

Option Serial Command Source (OS)

The 9840 can take serial commands from both its USB port and its serial DB9 port via RS232. This command allows the user to switch between those two methods

Example:
```
@123OS1
```
Acknowledge:
```
@ 123 Changing Communications Source to USB
```

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 1
      Filter Window A is Off
      Filter Window B is On
      Filter Window B =  0.0020 Lb
      Filter Window C is Off
      Filter Window D is Off
      Channel A shows 5 decimal digits
      Channel B shows 4 decimal digits
      Channel C shows 5 decimal digits
      Channel D shows 5 decimal digits
      Channel A counts by 10
      Channel B counts by  1
      Channel C counts by  1
      Channel D counts by  1
      User sum 1: Disabled!
      User sum 2: Disabled!
      User sum 3: Disabled!
      User sum 4: Disabled!
```

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 OPT 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 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
```

Display User Sums (DS)

The Display User Sums (DS) command is used to enable/disable and set up to four different possible User Sum combinations. The format is DS(sum index)(Ch. A) (Ch. B) (Ch. C) (Ch. D), where sum index is 1, 2, 3 or 4 dependent on which sum the user wishes to edit and the selections for channels are either a 0 (don't add) or a 1 (add). Thus you can add or remove any combination of these channels with a single command up to four times.

Example:
```
@123DS20101
```
Acknowledge:
```
@ 123 User sum 2: B+D
```

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, go to the Main Menu. Using the num pad on the right, enter the password “777”.
2. The unit will now enter a sub menu where you can select to calibrate an individual channel or all four at once. At this point, 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.
3. After selecting an option, 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. It requires 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.
4. 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.
5. When the read is complete, the unit will display the scale factors it generated. Pressing the cancel button at this time will place the unit back to the main menu, and pressing the back button will return you to the system calibration mode menu.

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

Touch Screen	(2) Resistive Touch Screen Displays
Adjustments	Displayed item, displayed units, tare, peak/valley reset alternate view, print. Alternate functions for programming.

Digital Display	
Display Characters	Touch Screen
Display Update	> 4/Sec
Scaling	Automatic or manual
Maximum Display Count	± 999,999
Decimal Points. Selection	0 to 5 software selectable.
Display Type	Touch Screen
Resolution	24 bit
Software Filters	8, software selectable

Electrical Characteristics	
Power Requirements	115 VAC, 60 Hz, Optional 230 VAC, 50 Hz
Fuse Requirements	Fuse: 115/230V, 50/60 Hz 115V: Fuse, T, 2.0A, 250V 230V: Fuse, T, 1.0A, 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	16.75” X 5.25” X 10.05” (W X H X D)
Weight	8.8 lbs., 4.0 kg
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

S

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 DATA OPT
8	AUTO ID/TEDS GND OPT
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 9 Female	
Pin	**Signal**
1	
2	RS-232 TX
3	RS-232 RX
4	
5	GND
6	
7	
8	
9	

Notes:

1. Pins 2, 3, and 5 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.

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 (+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

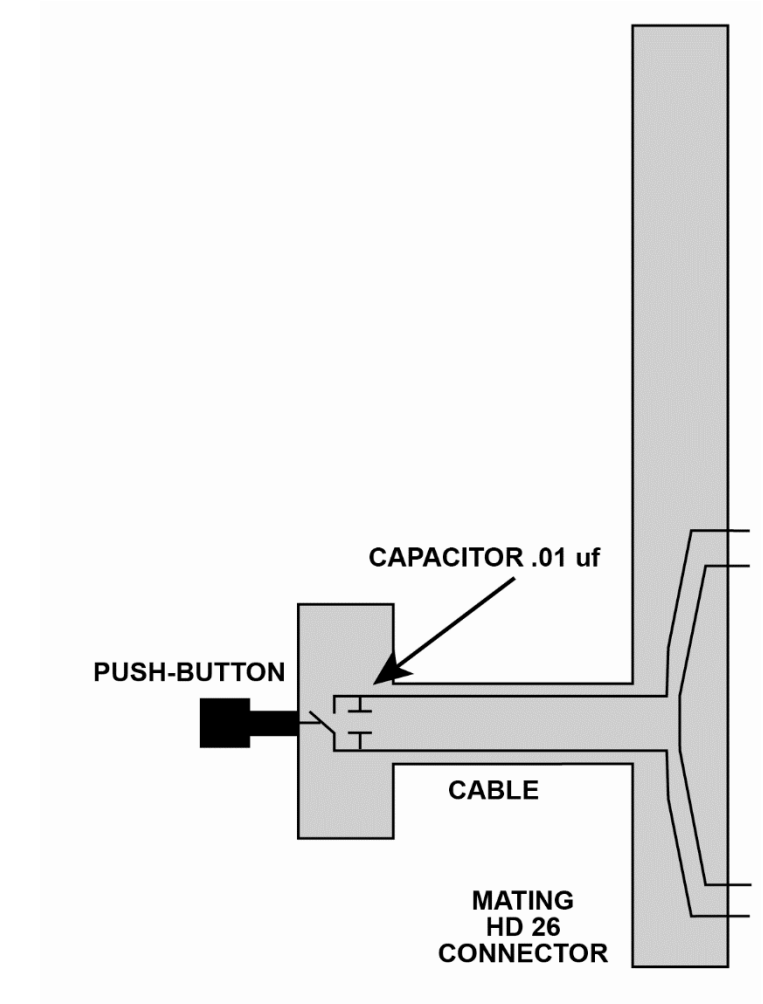
P/N CABLE 988278-010
Remote Actuation Push-Button Display Hold/Freeze Cable
(Cable shown is approximately 10 feet)

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.