# 120

*Digital Weight Indicator*
*Version 2.0*

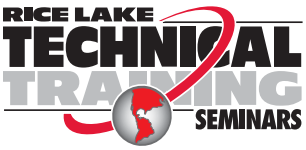
# Installation Manual


RICE LAKE WEIGHING SYSTEMS
Commitment Beyond Measurement®
ISO 9001 REGISTERED

76699

# Contents






*Technical training seminars are available through Rice Lake Weighing Systems. Course descriptions and dates can be viewed at www.ricelake.com or obtained by calling 715-234-9171 and asking for the training department.*


Version 2.02, April 2008

# About This Manual

This manual is intended for use by service technicians responsible for installing and servicing *120* digital weight indicators. This manual applies to indicators using Version 2.02 of the *120* software.

Configuration and calibration of the indicator can be accomplished using the indicator front panel keys, the EDP command set, or Version 3.0 or later of the Revolution™ configuration utility. See Section 3.1 on page 7 for information about configuration methods.

**Warning** *Some procedures described in this manual require work inside the indicator enclosure. These procedures are to be performed by qualified service personnel only.*

Authorized distributors and their employees can view or download this manual from the Rice Lake Weighing Systems distributor site at **www.ricelake.com**.

The *Operator Card* included with this manual provides basic operating instructions for users of the *120*. Please leave the *Operator Card* with the indicator when installation and configuration are complete.

# 1.0 Introduction

The *120* is a single-channel digital weight indicator housed in a durable plastic enclosure. The indicator front panel consists of a large (.8 in, 20 mm), six-digit, seven-segment LED display and five-button keypad. Features include:

- Drives up to four 350Ω or eight 700Ω load cells
- Supports 4- and 6-wire load cell connections
- Electronic data processing (EDP) port for full duplex, RS-232 communications at up to 38400 bps
- Printer port for output-only RS-232 and 20 mA current loop communications at up to 9600 bps

The *120* is NTEP-certified for Classes III and III L at 6,000 divisions. See Section 7.8 on page 36 for detailed specifications.

## 1.1 Operating Modes

The *120* supports the following modes of operation:

### Normal (weighing) mode

Normal mode is the "production" mode of the indicator. The indicator displays gross or net weights as required, using the LED annunciators described in Section 1.3 on page 2 to indicate scale status and the type of weight value displayed. Once configuration is complete and a legal seal is affixed to the back of the indicator, this is the only mode in which the *120* can operate. See Section 1.4.1 on page 3 for more information about normal mode operations.

### Panel mode

Panel mode allows the time, date, consecutive number, and consecutive number start-up value to be set without entering configuration mode. To enter panel mode, press and hold the **GROSS/NET** key until the *TIME* menu is shown. See Section 1.4.2 on page 4 for more information about panel mode.

### Configuration mode

Most of the procedures described in this manual require the indicator to be in configuration mode, including configuration and calibration.

To enter configuration mode, remove the large fillister head screw from the enclosure backplate. Insert a screwdriver or a similar tool into the access hole and press the setup switch once. The indicator display changes to show the word *CONFIG*.

### Test mode

Test mode provides a number of diagnostic functions for the *120* indicator. Like setup mode, test mode is entered using the setup switch. See Section 7.7 on page 35 for more information about entering and using test mode.

## 1.2 Front Panel Keypad

Figure 1-1 shows the *120* keypad and LED annunciators.

The symbols shown under the keys (representing up, down, enter, left, right) describe the key functions assigned in configuration and panel modes. In these modes, the keys are used to navigate through menus, select digits within numeric values, and increment/decrement values. See Section 3.1.3 on page 8 for information about using the front panel keys in configuration mode.

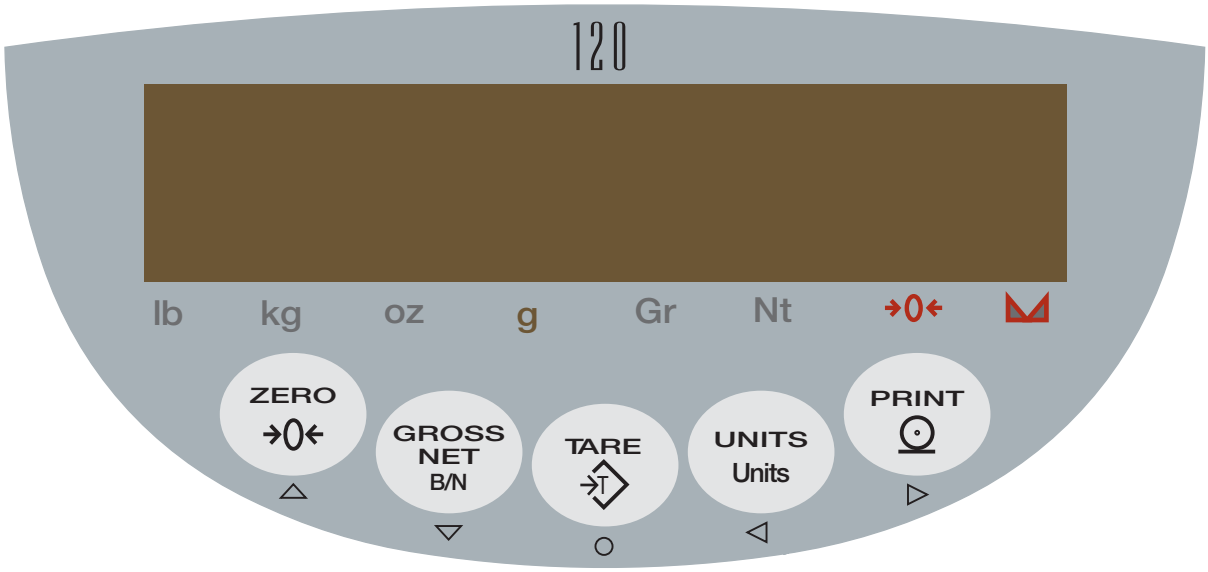



*Figure 1-1. 120 Front Panel*

## 1.3 LED Annunciators

The *120* display uses a set of eight LED annunciators to provide additional information about the value being displayed:

- GR (gross) and NT (net) annunciators are lit to show whether the displayed weight is a gross or net weight.
- Center of zero ( →0← ): Gross weight is within ±0.25 graduations of zero. This annunciator lights when the scale is zeroed.
- Standstill ( ◺ ◿ ): Scale is at standstill or within the specified motion band. Some operations, including tare functions and printing, can only be done when the standstill symbol is shown.
- LB. KG. OZ. and G annunciators indicate the units associated with the displayed value: lb=pounds, kg=kilograms, oz=ounces, g=grams.

  The displayed units can also be set to short tons (tn), metric tons (t), or NONE (no units information displayed). The *lb* and *kg* LEDs function as primary and secondary units annunciators for some combinations of primary and secondary units. If neither primary nor secondary units are lb, kg, oz, or g, the *lb* annunciator is lit for primary units, *kg* for secondary units.

Table 1-1 on page 3 shows which annunciators are used for all combinations of configured primary and secondary units. For example:

- If the primary unit is pounds (lb) and the secondary unit is kilograms (kg), the *lb* LED is lit for primary units, *kg* for secondary units.
- If the primary unit is pounds (lb) and the secondary unit is short tons (tn), the *lb* LED is lit for primary units, *kg* for secondary units. There is no LED for short tons, so the *kg* LED is used as the secondary units annunciator.
- If the primary unit is short tons (tn) and the secondary unit is pounds (lb), the *lb* LED is lit for primary units (tn), and *kg* is lit for secondary units (lb). Because there is no LED for short tons, the *lb* and *kg* LEDs are used as primary and secondary units annunciators.

See Section 3.2.2 on page 12 for more information about configuring primary and secondary display units.

| Primary Unit | Secondary Unit | | | | | | |
|---|---|---|---|---|---|---|---|
| | lb | kg | oz | g | tn | t | none |
| lb | lb / lb | lb / kg | lb / oz | lb / g | lb / kg | | |
| kg | kg / lb | kg / kg | kg / oz | kg / g | lb / kg | | |
| oz | oz / lb | oz / kg | oz / oz | oz / g | oz / kg | | |
| g | g / lb | g / kg | g / oz | g / g | g / kg | | |
| tn | lb / kg | lb / kg | lb / oz | lb / g | lb / lb | lb / kg | lb / kg |
| t | | | | | lb / kg | lb / lb | lb / kg |
| none | | | | | lb / kg | lb / kg | lb / lb |

*Table 1-1. Units Annunciators, Showing Primary / Secondary LEDs Used for All Configurations*

## 1.4 Indicator Operations

### 1.4.1 Weighing Mode Operations

Basic *120* operations are summarized below:

#### Toggle Gross/Net Mode

Press the **GROSS/NET** key to switch the display mode from gross to net, or from net to gross. If a tare value has been entered or acquired, the net value is the gross weight minus the tare.

Gross mode is shown by the *GROSS* annunciator; net mode is shown by the *NET* annunciator.

#### Toggle Units

Press the **UNITS** key to switch between primary and secondary units. The units LED to the right of the display is lit.

#### Zero Scale

1. In gross mode, remove all weight from the scale and wait for the standstill annunciator (◺ ◿).
2. Press the **ZERO** key. The center of zero ( →0← ) annunciator lights to indicate the scale is zeroed.

#### Acquire Tare

1. Place container on scale and wait for the standstill annunciator (◺ ◿).
2. Press the **TARE** key to acquire the tare weight of the container. The indicator switches to net mode.

#### Remove Stored Tare Value

1. Remove all weight from the scale and wait for the standstill annunciator (◺ ◿).
2. Press the **TARE** key. The indicator switches to gross mode, indicating the tare value has been removed.

#### Print Ticket

1. Wait for the standstill annunciator (◺ ◿).
2. Press the **PRINT** key to send data to the serial port.

### 1.4.2 Panel Mode Operations

The following operations are available by placing the indicator in panel mode:

- Set time
- Set date
- Set consecutive number
- Set consecutive number start-up value

To enter panel mode, press and hold the **GROSS/NET** key until the *TIME* menu is displayed. Use the navigation keys to move around the menu; to change a value, use the navigation keys to select the digit and increment or decrement its value. Press the **Enter** (**TARE**) key to set the value and return to the menu level above. Figure 1-2 shows the structure of the panel mode menu.

**Note:** *To enter a 2 digit month, the lower digit must be a "1" then the upper digit is incremented to "1". The lower digit can then be changed to 0, 1 or 2 as required.*

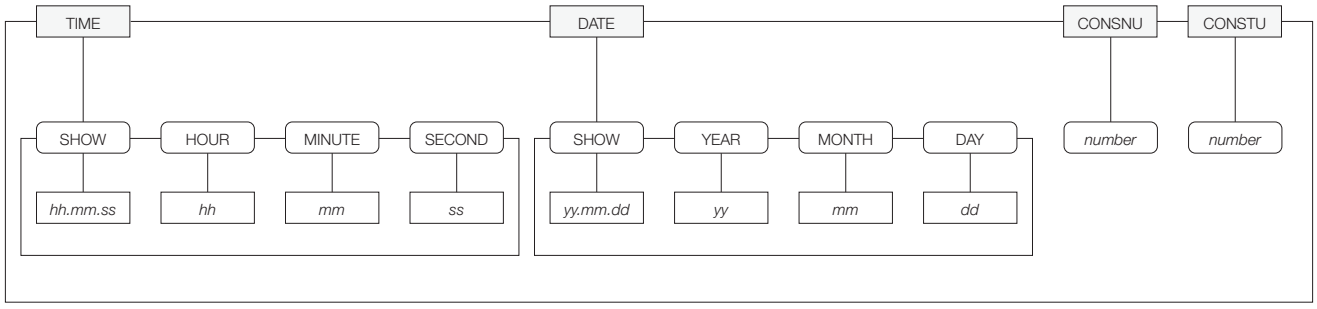



*Figure 1-2. Panel Mode Menu Structure*

# 2.0 Installation

This section provides information for connecting load cell and serial communications cables to the *120* indicator.

## 2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the *120* to ensure all components are included and undamaged. The shipping carton should contain the indicator with attached tilt stand, this manual, and a parts kit. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

The parts kit contains the items listed below:

- Capacity and identification labels
- Load cell connector (PN 82505)
- 9V power supply adapter (PN 78611 for 115 VAC units, PN 78612 for 230 VAC units)

## 2.2 Enclosure and Connectors

The back of the *120* enclosure provides a 3-pin power connection, 9-pin D-sub connector for communications, and an available 6-pin connector or load cell cord grip connector for load cell connection (see Figure 2-1).

The setup switch, used for placing the indicator into configuration mode, is located in the recess on the underside of the enclosure. The setup switch is protected by a cover plate and secured with a fillister head screw (not shown in Figure 2-1).

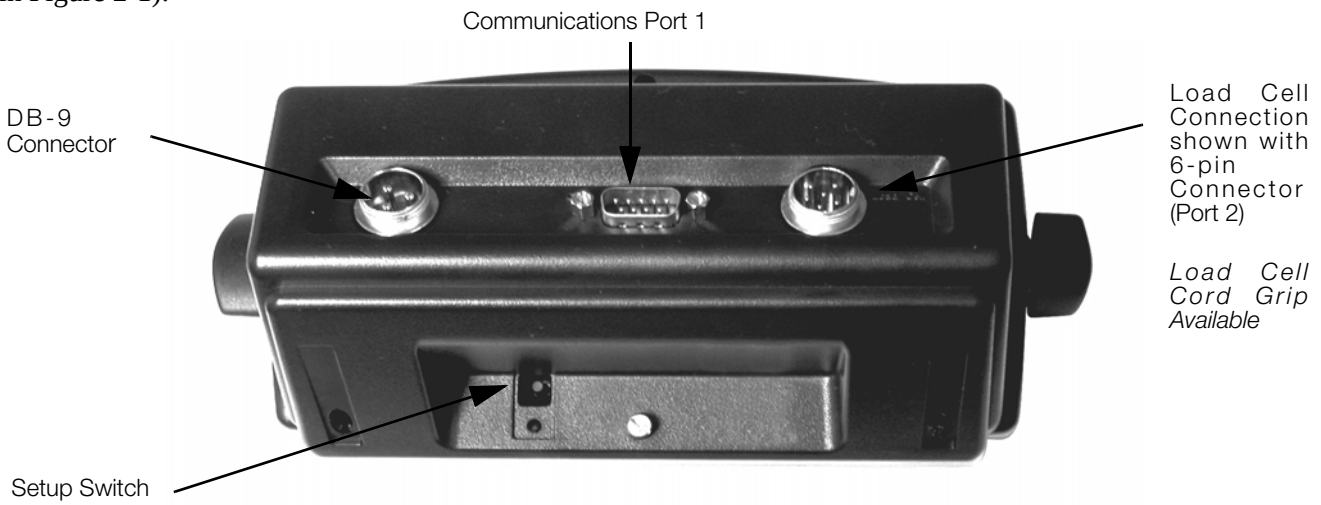



*Figure 2-1. Back View of 120 Enclosure, Showing Load Cell DB-9 Connector, Communications Connectors and Setup Switch Location*

### 2.2.1 Serial Communications

The serial communications cable attaches to the male D-Sub connector, Port 1 (see Figure 2-1 on page 5). Port 1 provides connections for the EDP (Electronic Data Processing) port and the printer port. Table 2-1. shows the pin assignments for Port 1.

The EDP port supports RS-232 communications only; the printer port provides either active 20 mA output or RS-232 transmission. Both ports are configured using the SERIAL menu. See Section 3.0 on page 7 for configuration information.

| Port 1 Pin | Port | Function |
|---|---|---|
| 1 | Printer | RS-232 TxD |
| 2 | EDP | RS-232 TxD |
| 3 | | RS-232 RxD |
| 4 | — | *not used* |
| 5 | EDP/Printer | RS-232 Ground / –20 mA OUT |
| 6 | *N/C* | *not used* |
| 7 | | |
| 8 | | |
| 9 | Printer | +20 mA OUT |

*Table 2-1. Serial Connector (Port 1) Pin Assignments*

### 2.2.2 Load Cells

Load cell wires can be wired up one of two ways depending upon which indicator model is purchased. Refer to the 6-pin connector instructions or the load cell cord grip plug instructions to connect to the load cell wires.

#### 6-Pin Connector

The load cell or junction box cable attaches to the round 6-pin connector, Port 2 (see Figure 2-1 on page 5). Table 2-2 shows the pin assignments for Port 2.

| Port 2 Pin | Function |
|---|---|
| 1 | +SIG |
| 2 | +EXC |
| 3 | +SENSE * |
| 4 | –EXC |
| 5 | –SENSE * |
| 6 | –SIG |
| * For 4-wire connections, short pin 2 to pin 3, pin 4 to pin 5. | |

*Table 2-2. Load Cell Connector (Port 2) Pin Assignments*

#### Load Cell Cord Grip Plug

For models having the load cell cord grip, route cable through the load cell cord grip and tighten the cord grip. Next, remove connector J1 from the CPU board which is located in the lower right side of the CPU board. The connector plugs into a header on the board. Wire the load cell cable from the load cell or junction box to connector J1 as shown in Table 2-3.

| J1 | Function |
|---|---|
| 1 | –EXC |
| 2 | –SEN |
| 3 | –SIG |
| 4 | +SIG |
| 5 | +SEN |
| 6 | +EXC |

*Table 2-3. J1 Pin Assignments with Load Cell Cord Grip*

## 2.3 Enclosure Disassembly

**Caution** *Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working inside the indicator enclosure.*

If the indicator enclosure must be opened for maintenance, do the following:

1. Disconnect power to the unit. Remove tilt stand.
2. Remove two fillister head screws and the setup switch cover plate from back of enclosure.
3. Loosen self-tapping screw at top center of back of enclosure.
4. Lift up the forward edge of the rubber feet on bottom of enclosure for access to two additional self-tapping screws. Loosen both screws.
5. Press down on top of back half of the enclosure to release tabs. Open enclosure by separating the housing at the top of the indicator. (CPU board is mounted to front half of enclosure; power, communications, and load cell connections all connect to the bottom of the CPU board.)
6. Reverse steps to reassemble enclosure.

## 2.4 Replacement Parts

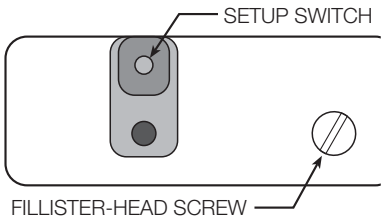
Table 2-4 lists replacement parts for the *120* indicator.

| PN | Description |
|---|---|
| 78609 | CPU Board |
| 78610 | Switch panel membrane |
| 15799 | 9-pin socket for D-sub communications cable |
| 15774 | Shell for D-sub communications cable |
| 83429 | Setup switch cover plate |
| 83430 | Fillister head screw |
| 83432 | Self-tapping screw (enclosure) |
| 83431 | Rubber foot |
| 83428 | Tilt stand wing knob |
| 78949 | Optional wall-mount tilt stand |
| 78611 | 9V power supply adapter for 115V units |
| 78612 | 9V power supply adapter for 230V units |

*Table 2-4. Replacement Parts*

# 3.0 Configuration

To configure the *120* indicator, the indicator must be placed in setup mode. The setup switch is accessed by removing the left fillister head screw on underside of the enclosure and removing the rectangular switch cover plate. Switch position is changed by inserting a screwdriver into the access hole and pressing the switch.




When the indicator is placed in setup mode, the word *CONFIG* is shown on the display. The CONFIG menu is the first of nine main menus used to configure the indicator. Detailed descriptions of these menus are given in Section 3.2. When configuration is complete, return to the CONFIG menu and press the △ (**ZERO**) key to exit setup mode, then replace the setup switch access screw.

## 3.1 Configuration Methods

The *120* indicator can be configured by using the front panel keys to navigate through a series of configuration menus or by sending commands or configuration data to the EDP port. Configuration using the menus is described in Section 3.1.3. Configuration using the EDP port can be accomplished using the EDP command set described in Section 5.0 or by using the *Revolution III* configuration utility.

### 3.1.1 Revolution Configuration

The *Revolution III* configuration utility provides the preferred method for configuring the *120* indicator. Revolution runs on a personal computer to set configuration parameters for the indicator. When Revolution configuration is complete, configuration data is downloaded to the indicator.

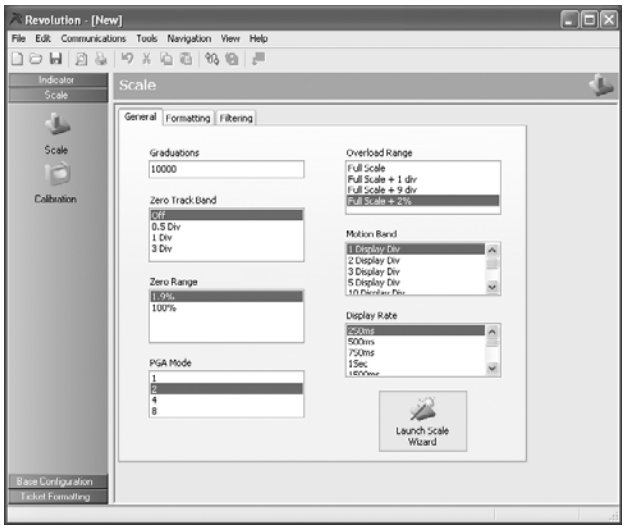



*Figure 3-1. Sample Revolution Configuration Display*

*Revolution III* supports both uploading and downloading of indicator configuration data. This capability allows configuration data to be retrieved from one indicator, edited, then downloaded to another.

To use *Revolution III*, do the following:

1. Install *Revolution III* (Version 3.1 or later) on an IBM-compatible personal computer running Windows® 98 or later. Minimum system requirements include a processor speed of at least 166MHz, 32MB of memory (64MB recommended, required for NT4, 2000, XP), and at least 40MB of available hard disk space for installation.
2. With both indicator and PC powered off, connect the PC serial port to the RS-232 pins on the indicator EDP port.
3. Power up the PC and the indicator. Use the setup switch to place the indicator in setup mode.
4. Start the *Revolution III* program.

Figure 3-1 shows an example of one of the Revolution configuration displays.

*Revolution III* provides online help for each of its configuration displays. Parameter descriptions provided in this manual for front panel configuration can also be used when configuring the indicator using Revolution: the interface is different, but the parameters set are the same.

### 3.1.2 EDP Command Configuration

The EDP command set can be used to configure the *120* indicator using a personal computer, terminal, or remote keyboard. Like Revolution, EDP command configuration sends commands to the indicator EDP port; unlike Revolution, EDP commands can be sent using any external device capable of sending ASCII characters over a serial connection.

EDP commands duplicate the functions available using the indicator front panel and provide some functions not otherwise available. EDP commands can be used to simulate pressing front panel keys, to configure the indicator, or to dump lists of parameter settings. See Section 5.0 on page 23 for more information about using the EDP command set.

### 3.1.3 Front Panel Configuration

The *120* indicator can be configured using a series of menus accessed through the indicator front panel when the indicator is in setup mode. Table 3-1 summarizes the functions of each of the main menus.

| Menu | | Menu Function |
|---|---|---|
| CONFIG | Configuration | Configure load cell sensitivity, grads, zero tracking, zero range, motion band, overload, sample rate, and digital filtering parameters. |
| FORMAT | Format | Set format of primary and secondary units, display rate. |
| CALIBR | Calibration | Calibrate indicator. See Section 4.0 on page 21 for calibration procedures. |
| SERIAL | Serial | Configure EDP and printer serial ports. |
| PROGRM | Program | Set power-up mode, regulatory mode, and consecutive number values. |
| P FORMT | Print Format | Set print format used for gross and net tickets. See Section 5.0 for more information. |
| TIME | Time | Display and set time |
| DATE | Date | Display and set date |
| VERSION | Version | Display installed software version number. |

*Table 3-1. 120 Menu Summary*

Four front panel keys are used as directional keys to navigate through the menus in setup mode. The **UNITS** (◁) and **PRINT** (▷) keys scroll left and right (horizontally) on the same menu level; **ZERO** (△) and **GROSS/NET** (▽) move up and down (vertically) to different menu levels. The *TARE* key (○) serves as an Enter key for selecting parameter values within the menus. A label under each of these keys identifies the direction provided by the key when navigating through the setup menus.

To select a parameter, press ◁ or ▷ to scroll left or right until the desired menu group appears on the display, then press ▽ to move down to the submenu or parameter you want. When moving through the menu parameters, the default or previously selected value appears first on the display.

To change a parameter value, scroll left or right to view the values for that parameter. When the desired value appears on the display, press ○ to select the value and move back up one level.

**NOTE:** *You must press ○ to save the selected value. The 120 does not automatically save the last-displayed value.*

To edit numerical values, press ○ (rightmost digit will flash), then use the navigation keys to select the digit and to increment or decrement the value (see Figure 3.2). When done, press ○ again to save the edited value.

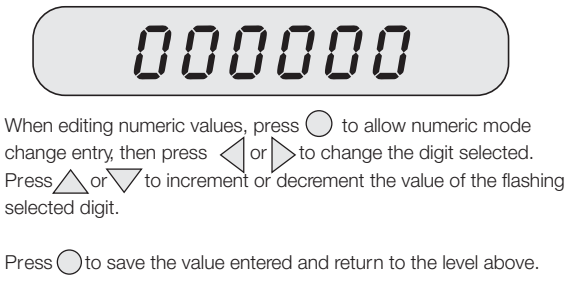



*Figure 3-2. Editing Procedure for Numeric Values*

## 3.2 Menu Structures and Parameter Descriptions

The following sections provide graphic representations of the *120* menu structures. In the actual menu structure, the settings you choose under each parameter are arranged horizontally. To save page space, menu choices are shown in vertical columns. The factory default setting appears at the top of each column.

Most menu diagrams are accompanied by a table that describes all parameters and parameter values associated with that menu. Default parameter values are shown in bold type.

### 3.2.1 Configuration Menu

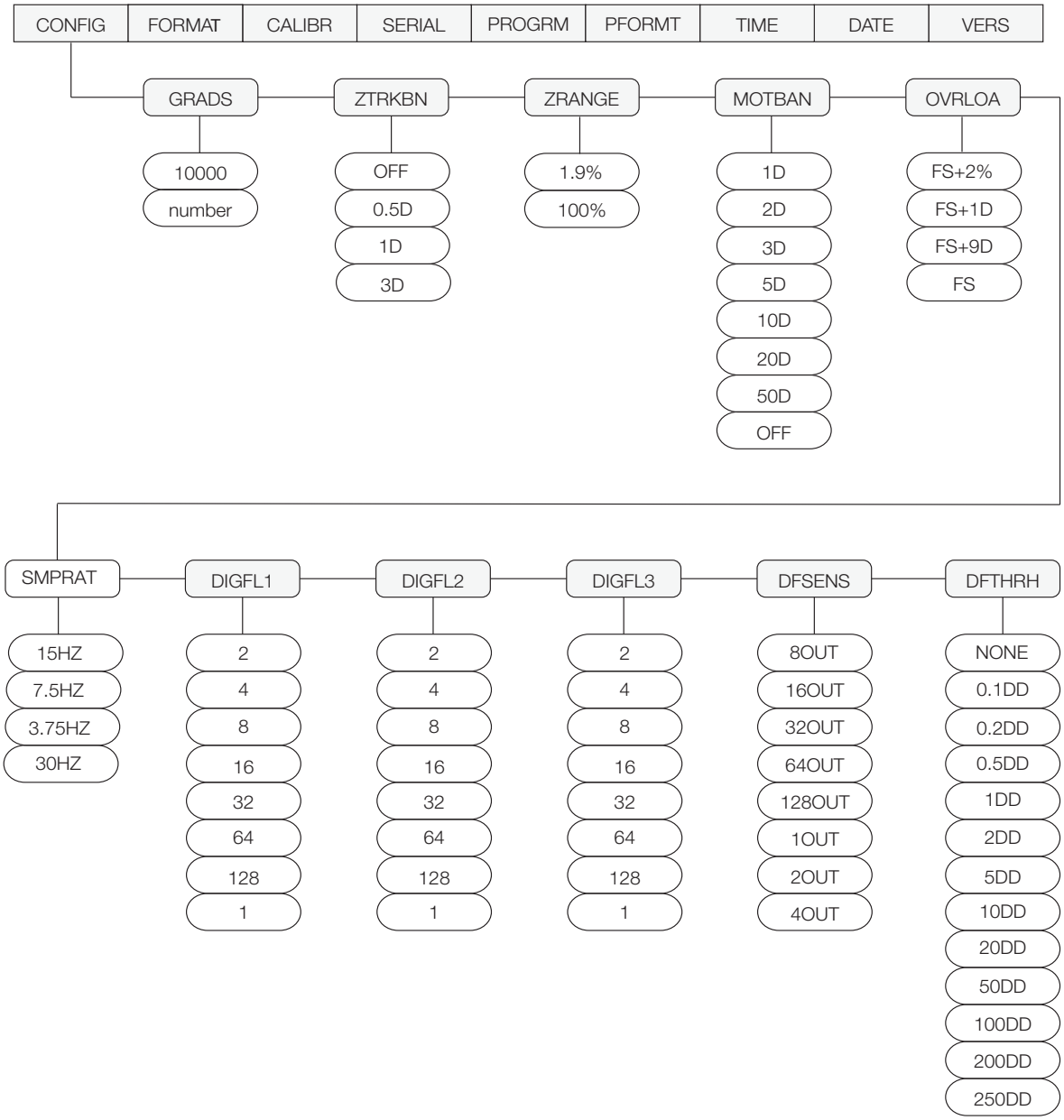



*Figure 3-3. Configuration Menu*

| *CONFIG Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| *Level 2 submenus* | | |
| GRADS | **10000**<br>*number* | Graduations. Specifies the number of full scale graduations. The value entered must be in the range 1–100 000 and should be consistent with legal requirements and environmental limits on system resolution.<br>To calculate GRADS, use the formula, GRADS = *Capacity* / *Display Divisions*.<br>Display divisions for primary and secondary units are specified on the FORMAT menu. |
| ZTRKBN | **OFF**<br>0.5D<br>1D<br>3D | Zero track band. Automatically zeroes the scale when within the range specified, as long as the input is within the configured zero range (ZRANGE parameter). Selections are ± display divisions. Maximum legal value varies depending on local regulations. |
| ZRANGE | **1.9%**<br>100% | Zero range. Selects the range within which the scale can be zeroed. The 1.9% selection is ± 1.9% around the calibrated zero point, for a total range of 3.8%. Indicator must be at standstill to zero the scale. Use 1.9% for legal-for-trade applications. |
| MOTBAN | **1D**<br>2D<br>3D<br>5D<br>10D<br>20D<br>50D<br>OFF | Motion band. Sets the level, in display divisions, at which scale motion is detected. If motion is not detected for 1 second or more, the standstill symbol lights. Some operations, including print, tare, and zero, require the scale to be at standstill. Maximum legal value varies depending on local regulations.<br>If OFF is selected, ZTRKBN should also be set to OFF. |
| OVRLOA | **FS+2%**<br>FS+1D<br>FS+9D<br>FS | Overload. Determines the point at which the display blanks and an out-of-range error message is displayed. Maximum legal value varies depending on local regulations. |
| SMPRAT | **15HZ**<br>7.5HZ<br>3.75HZ<br>30HZ | Sample rate. Selects measurement rate, in samples per second, of the analog-to-digital converter. Lower sample rate values provide greater signal noise immunity. |
| DIGFL1<br>DIGFL2<br>DIGFL3 | **2**<br>4<br>8<br>16<br>32<br>64<br>1 | Digital filtering. Selects the digital filtering rate used to reduce the effects of mechanical vibration from the immediate area of the scale.<br>Choices indicate the number of A/D conversions that are averaged to obtain the displayed reading. A higher number gives a more accurate display by minimizing the effect of a few noisy readings, but slows down the settling rate of the indicator. See Section 7.6 on page 34 for more information on digital filtering. |
| DFSENS | **8OUT**<br>16OUT<br>32OUT<br>64OUT<br>128OUT<br>2OUT<br>4OUT | Digital filter cutout sensitivity. Specifies the number of consecutive readings that must fall outside the filter threshold (DFTHRH parameter) before digital filtering is suspended. If NONE is selected, the filter is always enabled. |

*Table 3-2. Configuration Menu Parameters*

| *CONFIG Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| DFTHRH | **NONE**<br>0.1DD<br>0.2DD<br>0.5DD<br>1DD<br>2DD<br>5DD<br>10DD<br>20DD<br>50DD<br>100DD<br>200DD<br>250DD | Digital filter cutout threshold. Specifies the filter threshold, in display divisions. When a specified number of consecutive scale readings (DFSENS parameter) fall outside of this threshold, digital filtering is suspended. If NONE is selected, the filter is always enabled. |

*Table 3-2. Configuration Menu Parameters (Continued)*

### 3.2.2 Format Menu

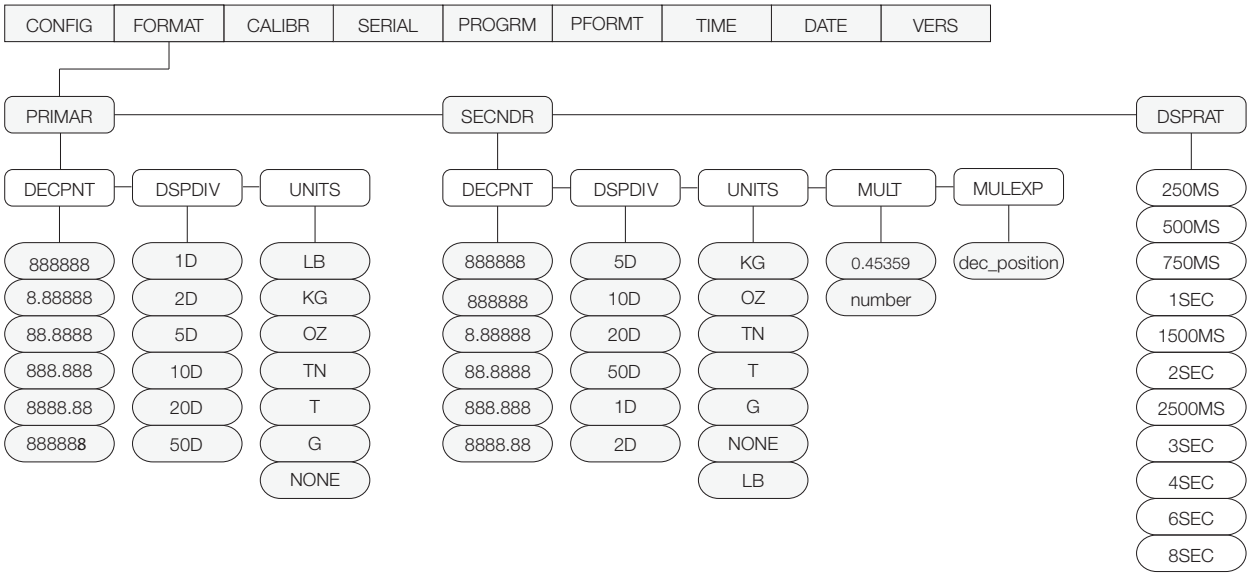



*Figure 3-4. Format Menu*

| *FORMAT Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| ***Level 2 submenus*** | | |
| PRIMAR | DECPNT<br>DSPDIV<br>UNITS | Specifies the decimal position, display divisions, and units used for the primary units. See Level 3 submenu parameter descriptions. |
| SECNDR | DECPNT<br>DSPDIV<br>UNITS<br>MULT<br>MULEXP | Specifies the decimal position, display divisions, units, and conversion multiplier used for the secondary units. See Level 3 submenu parameter descriptions. |
| DSPRAT | **250MS**<br>500MS<br>750MS<br>1SEC<br>1500MS<br>2SEC<br>2500MS<br>3SEC<br>4SEC<br>6SEC<br>8SEC | Display rate. Sets the update rate for displayed values. Values are in milliseconds (MS) or seconds (SEC). |

*Table 3-3. Format Menu Parameters*

| *FORMAT Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| ***Level 3 submenus*** | | |
| **Primary Units (PRIMAR Parameter)** | | |
| DECPNT | **888888**<br>8.88888<br>88.8888<br>888.888<br>8888.88<br>88888.8 | Decimal point location. Specifies the location of the decimal point or dummy zeroes in the primary unit display. Value should be consistent with local legal requirements. |
| DSPDIV | **1D**<br>2D<br>5D<br>10D<br>20D<br>50D | Display divisions. Selects the minimum division size for the primary units displayed weight. |
| UNITS | **LB**<br>KG<br>OZ<br>TN<br>T<br>G<br>NONE | Specifies primary units for displayed and printed weight. Values are: LB=pound; KG=kilogram; OZ=ounce; TN=short ton; T=metric ton; G=gram. |
| **Secondary Units (SECNDR Parameter)** | | |
| DECPNT | **88888.8**<br>888888<br>8.88888<br>88.8888<br>888.888<br>8888.88 | Decimal point location. Determines the location of the decimal point or dummy zeros in the secondary unit display. |
| DSPDIV | **5D**<br>10D<br>20D<br>50D<br>1D<br>2D | Display divisions. Selects the value of minimum division size of the displayed weight. |
| UNITS | **KG**<br>OZ<br>TN<br>T<br>G<br>LB<br>NONE | Specifies secondary units for displayed and printed weight. Values are: KG=kilogram; OZ=ounce; TN=short ton; T=metric ton; G=gram; LB=pound. |
| MULT | **0.45359**<br>*number* | Multiplier. Specifies the conversion factor by which the primary units are multiplied to obtain the secondary units. The default is 0.45359, which is the conversion factor for changing pounds to kilograms. Use the MULEXP parameter to shift the decimal position of the multiplier. See Section 7.5 on page 33 for a list of multipliers.<br>To toggle between primary and secondary units, press the UNITS key. |
| MULEXP | *dec_position* | Multiplier decimal shift. Specifies a divisor used to shift the decimal position in the secondary units multiplier value. Use the left and right arrow keys to shift the decimal point within the displayed MULT value. |

*Table 3-3. Format Menu Parameters (Continued)*

### 3.2.3 Calibration Menu

See Section 4.0 on page 21 for calibration procedures.

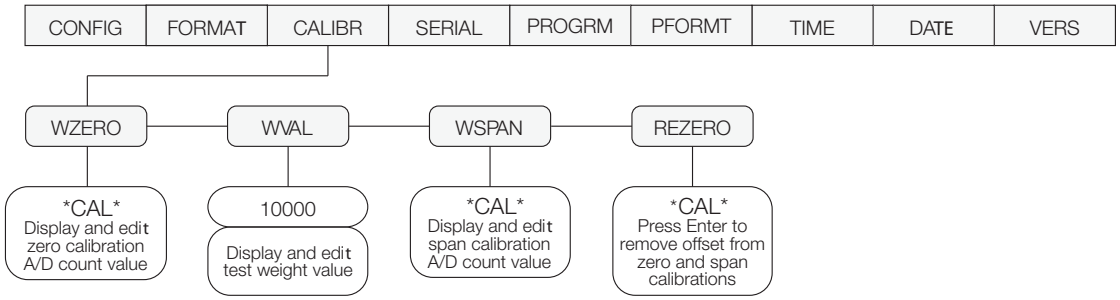



*Figure 3-5. Calibration Menu*

| *CALIBR Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| ***Level 2 submenus*** | | |
| WZERO | — | Display and edit the zero calibration A/D count value.<br>*DO NOT adjust this value after WSPAN has been set!* |
| WVAL | **10000**<br>*test_weight* | Display and edit the test weight value. |
| WSPAN | — | Display and edit the span calibration A/D count value. |
| REZERO | — | Press Enter to remove an offset value from the zero and span calibrations.<br>Use this parameter only after WZERO and WSPAN have been set. See Section 4.1 on page 21 for more information about using this parameter. |

*Table 3-4. Calibration Menu Parameters*

### 3.2.4 Serial Menu

See Section 7.2 on page 29 for information about the *120* serial data format.

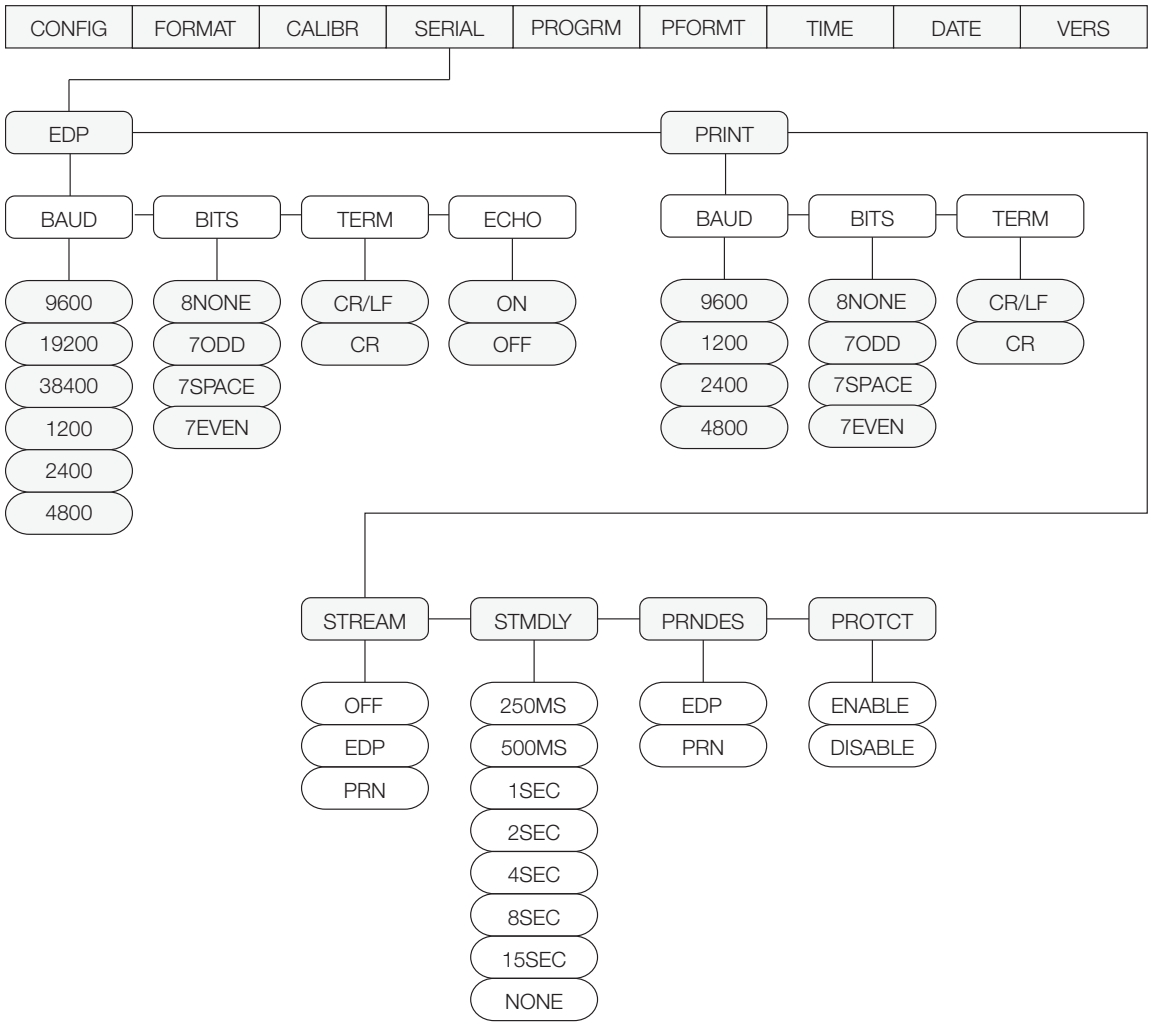



*Figure 3-6. Serial Menu*

| *SERIAL Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| ***Level 2 submenus*** | | |
| EDP | BAUD<br>BITS<br>TERM | Specifies settings for baud rate, data bits, termination characters, and end-of-line delay used by the EDP port. |
| PRINT | BAUD<br>BITS<br>TERM | Specifies settings for baud rate, data bits, termination characters, and end-of-line delay used by the printer port. |
| STREAM | **OFF**<br>EDP<br>PRN | Selects the serial port used for continuous transmission. See Section 7.2 on page 29 for information about the *120* continuous data format. |

*Table 3-5. Serial Menu Parameters*

| *SERIAL Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| STMDLY | **250MS**<br>500MS<br>1SEC<br>2SEC<br>4SEC<br>8SEC<br>15SEC<br>NONE | Stream delay. Specifies the delay, seconds (SEC) or milliseconds (MS), inserted between stream frames. |
| PRNDES | **EDP**<br>PRN | Print destination. Selects the port for data transmission when the PRINT key is pressed or the KPRINT EDP command is sent. |
| PROTCT | **ENABLE**<br>DISABL | EDP port protection. Select ENABLE to secure the EDP port from configuration changes. |
| ***Level 3 Submenus*** | | EDP Port |
| BAUD | **9600**<br>19200<br>38400<br>1200<br>2400<br>4800 | Baud rate. Selects the transmission speed for the EDP port. |
| BITS | **8NONE**<br>7ODD<br>7EVEN<br>7SPACE | Selects number of data bits and parity of data transmitted from the EDP port. |
| TERM | **CR/LF**<br>CR | Termination character. Selects termination character for data sent from the EDP port. |
| ECHO | **ON**<br>OFF | Echo. Specify whether serial commands sent to the indicator are echoed. |
| ***Level 3 Submenus*** | | Printer Port |
| BAUD | **9600**<br>1200<br>2400<br>4800 | Baud rate. Selects the transmission speed for the printer port. |
| BITS | **8NONE**<br>7ODD<br>7EVEN<br>7SPACE | Selects number of data bits and parity of data transmitted from the printer port. |
| TERM | **CR/LF**<br>CR | Termination character. Selects termination character for data sent from the printer port. |

*Table 3-5. Serial Menu Parameters (Continued)*

### 3.2.5 Program Menu

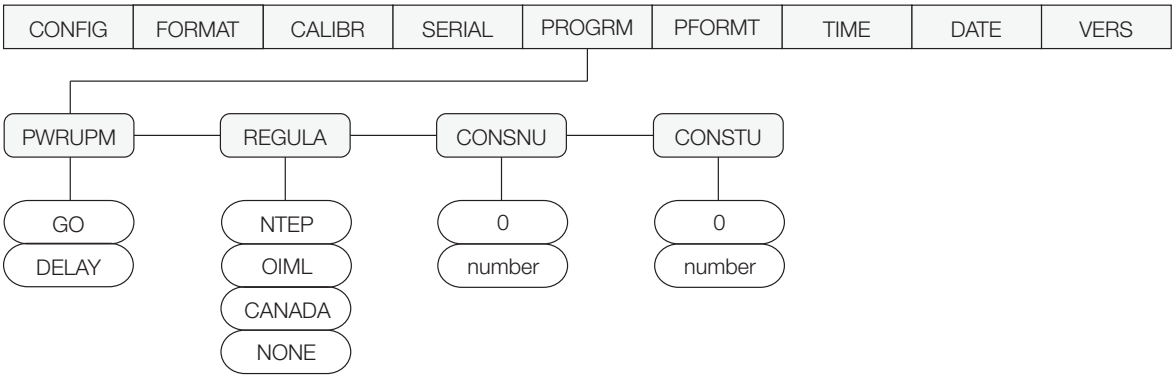



*Figure 3-7. Program Menu*

| *PROGRM Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| *Level 2 submenus* | | |
| PWRUPM | **GO**<br>DELAY | Power up mode. In GO mode, the indicator goes into operation immediately after a brief power up display test.<br>In DELAY mode, the indicator performs a power up display test, then enters a 30-second warm up period. If no motion is detected during the warm up period, the indicator becomes operational when the warm up period ends; if motion is detected, the delay timer is reset and the warm up period repeated. |
| REGULA | **NTEP**<br>OIML<br>CANADA<br>NONE | Regulatory mode. Specifies the regulatory agency having jurisdiction over the scale site.<br>• OIML, NTEP, and CANADA modes allow a tare to be acquired at any weight greater than zero. NONE allows tares to be acquired at any weight value.<br>• OIML, NTEP, and CANADA modes allow a tare to be cleared only if the gross weight is at no load. NONE allows tares to be cleared at any weight value.<br>• NTEP and OIML modes allow a new tare to be acquired even if a tare is already present. In CANADA mode, the previous tare must be cleared before a new tare can be acquired.<br>• NONE, NTEP and CANADA modes allow the scale to be zeroed in either gross or net mode as long as the current weight is within the specified ZRANGE. In OIML mode, the scale must be in gross mode before it can be zeroed; pressing the ZERO key in net mode clears the tare. |
| CONSNU | **0**<br>*number* | Consecutive numbering. Allows sequential numbering for print operations. The consecutive number value is incremented following each print operation.<br>The initial value of this parameter is set to the start up value specified on the CONSTU parameter. Changing either CONSTU or CONSNU immediately resets the consecutive number used for printing. |
| CONSTU | **0**<br>*number* | Consecutive number start up value. Specifies the initial consecutive number (CONSNU) value used when the indicator is powered on. |

*Table 3-6. Program Menu Parameters*

### 3.2.6 Print Format Menu

See Section 6.0 on page 27 for information about custom print formatting.

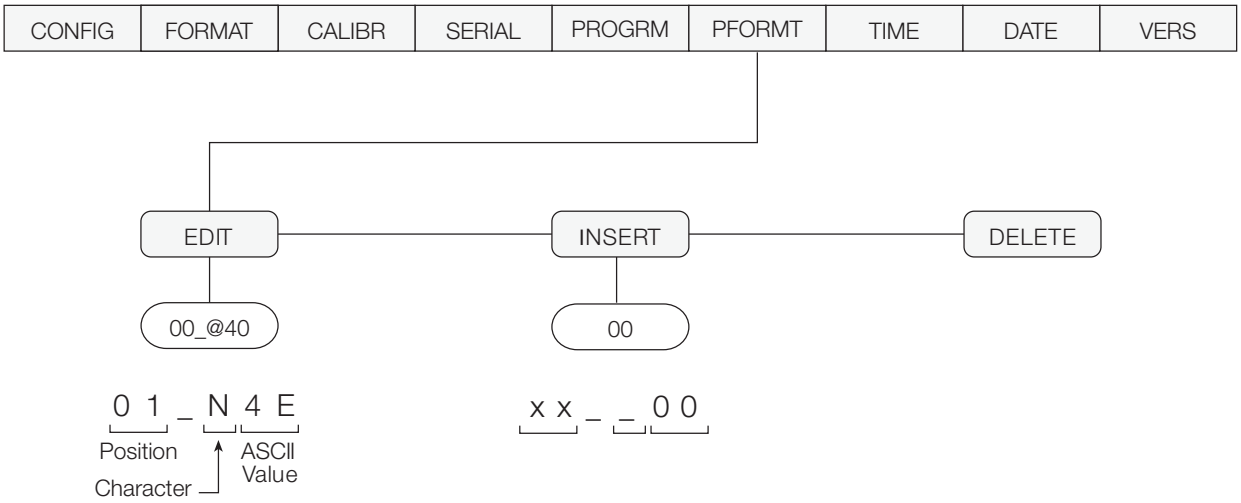



*Figure 3-8. Print Format Menu*

### 3.2.7 Time Menu

Time can also be set by the operator in panel mode. See Section 1.4.2 on page 4.

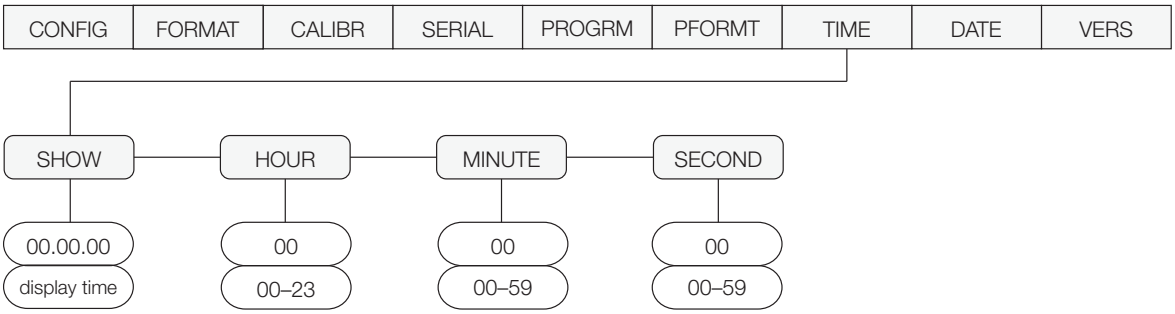



*Figure 3-9. Time Menu*

| *TIME Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| ***Level 2 submenus*** | | |
| SHOW | *HH.MM.SS* | Displays current time in HH.MM.SS format |
| HOUR | *hour (HH)* | Set hour using 24-hour format |
| MINUTE | *minute (MM)* | Set minute |
| SECOND | *second (SS)* | Set second |

*Table 3-7. Time Menu Parameters*

### 3.2.8 Date Menu

Date can also be set by the operator in panel mode. See Section 1.4.2 on page 4.

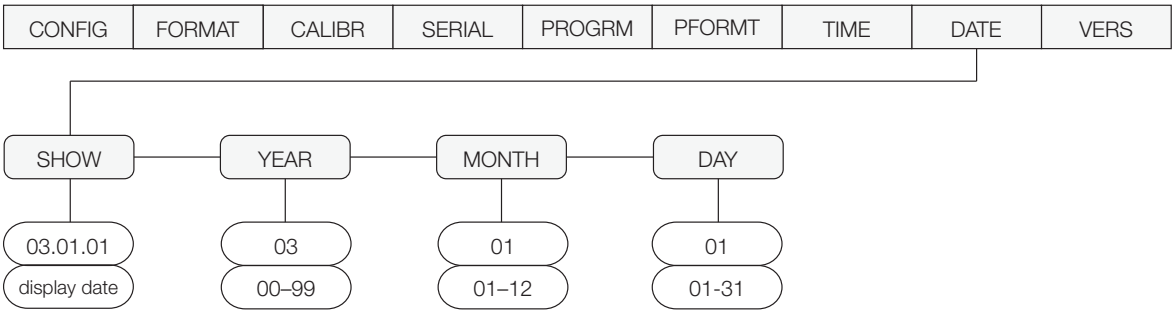



*Figure 3-10. Date Menu*

| *DATE Menu* | | |
|---|---|---|
| **Parameter** | **Choices** | **Description** |
| ***Level 2 submenus*** | | |
| SHOW | *YY.MM.DD* | Displays current date in YY.MM.DD format |
| YEAR | *year (YY)* | Set year (two digits, 00–99) |
| MONTH | *month (MM)* | Set month |
| DAY | *day (DD)* | Set day |

*Table 3-8. Date Menu Parameters*

### 3.2.9 Version Menu

The VERS menu is used to check the software version installed in the indicator. There are no parameters associated with the Version menu: when selected, the indicator displays the installed software version number. and the indicator model

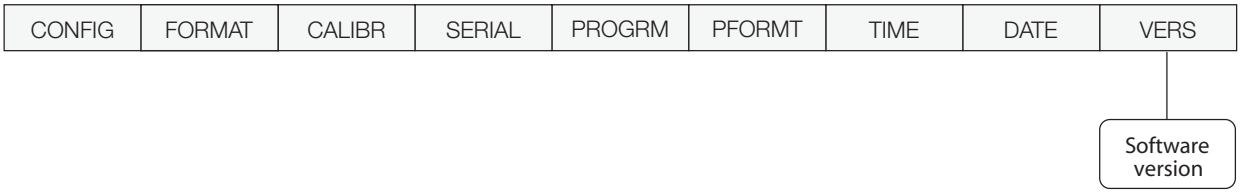



*Figure 3-11. Version Menu*

# 4.0 Calibration

The *120* can be calibrated using the front panel, EDP commands, or the Revolution™ configuration utility. Each method consists of the following steps:

- Zero calibration
- Entering the test weight value
- Span calibration
- Optional rezero calibration for test weights using hooks or chains.

The following sections describe the calibration procedure for each of the calibration methods.

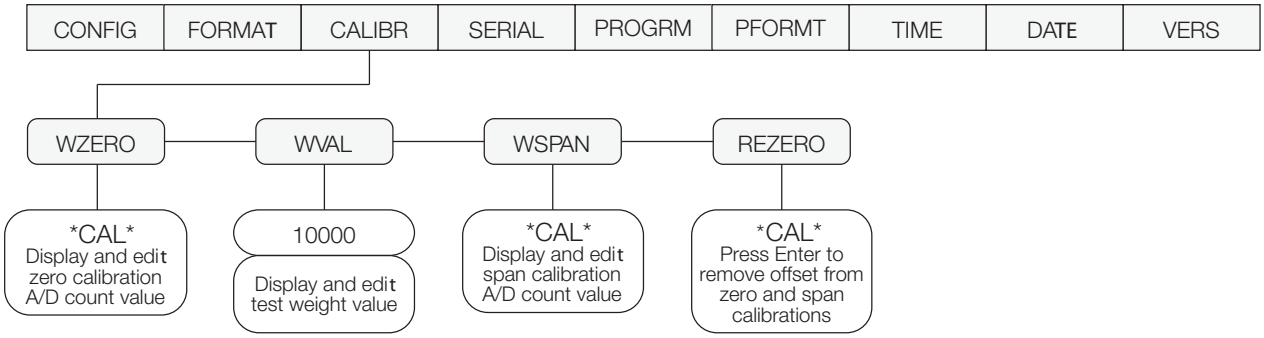



*Figure 4-1. Calibration (CALIBR) Menu*

## 4.1 Front Panel Calibration

To calibrate the indicator using the front panel, do the following:

1. Place the indicator in configuration mode (display reads *CONFIG*) and remove all weight from the scale platform. If your test weights require hooks or chains, place the hooks or chains on the scale for zero calibration.
2. Press ▷ until the display reads *CALIBR* (see Figure 4-1). Press ▽ to go to zero calibration (*WZERO*).
3. With *WZERO* displayed, press ○ to calibrate zero. The indicator displays **CAL** while calibration is in progress then the display goes to (*WVAL)*.
4. With *WVAL* displayed, place test weights on the scale and press ▽ to show the test weight value. Use the procedure shown in Figure 4-2 to enter the actual test weight, then press ○ to save the value and go to span calibration (*WSPAN*).
5. With *WSPAN* displayed, press ○ to calibrate span. The indicator displays **CAL** while calibration is in progress, then the display goes to (*REZERO)*.
6. The *REZERO* function is used to remove a calibration offset when hooks or chains are used to hang the test weights.

**Note:** *If no other apparatus was used to hang the test weights during calibration, remove the test weights and go to Step 7.*

   - If hooks or chains were used during calibration, remove these and the test weights from the scale. With all weight removed, press ○ to rezero the scale. This function adjusts the zero and span calibration values. The indicator displays **CAL** while the zero and span calibrations are adjusted.

7. Press △ until the display reads *EXIT Y,* then press ○ to exit configuration mode.

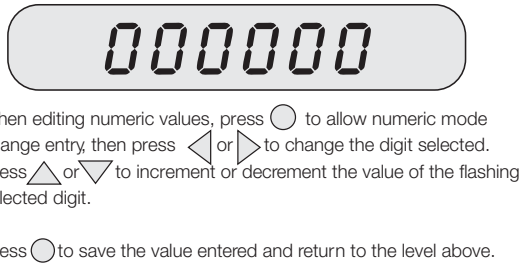



*Figure 4-2. Editing Procedure for Numeric Values*

## 4.2 EDP Command Calibration

To calibrate the indicator using EDP commands, the indicator EDP port must be connected to a terminal or personal computer. See Section 2.2.1 on page 5 for EDP port pin assignments; see Section 5.0 on page 23 for more information about using EDP commands.

Once the indicator is connected to the sending device, do the following:

1. Place the indicator in configuration mode (display reads *CONFIG*) and remove all weight from the scale platform. If your test weights require hooks or chains, place the hooks or chains on the scale for zero calibration.
2. Send the WZERO EDP command to calibrate zero. The indicator displays **CAL** while calibration is in progress.

   **NOTE:** *During EDP command calibration, the *CAL* message remains on the display. The OK response is returned when calibration is complete.*

3. Place test weights on the scale and use the WVAL command to enter the test weight value in the following format:

   WVAL=*nnnnnn*<CR>

4. Send the WSPAN EDP command to calibrate span. The indicator displays **CAL** while calibration is in progress.
5. To remove an offset value, clear all weight from the scale, including hooks or chains used to hang test weights, then send the REZERO EDP command. The indicator displays **CAL** while the zero and span calibrations are adjusted.
6. Send the KUPARROW EDP command to exit configuration mode.

# 5.0 EDP Commands

The *120* indicator can be controlled by a personal computer or remote keyboard connected to the indicator EDP port. Control is provided by a set of EDP commands that can simulate front panel key press functions, display and change setup parameters, and perform reporting functions. The EDP port provides the capability to print configuration data or to save that data to an attached personal computer. This section describes the EDP command set and procedures for saving and transferring data using the EDP port.

## 5.1 The EDP Command Set

The EDP command set includes key press commands, mode commands, reporting commands, the RS special function command, and parameter setting commands.

The indicator responds to most EDP commands by sending the message *OK*. The *OK* response verifies that the command was received and has been executed. (Pressing **ENTER** after processing a valid EDP command repeats the previous command.) If the command is unrecognized or cannot be executed, the indicator responds with *??*.

The following sections list the commands and command syntax used for each of these groups.

### 5.1.1 Key Press Commands

Key press EDP commands (see Table 5-1) simulate pressing the front panel indicator keys. These commands can be used in both configuration and weighing mode.

| Command | Function |
|---|---|
| KZERO | In weighing mode, press the ZERO key |
| KGROSSNET | In weighing mode, press the GROSS/ NET key |
| KTARE | In weighing mode, press the TARE key |
| KUNITS | In weighing mode, press the UNITS key |
| KPRINT | In weighing mode, press the PRINT key |

*Table 5-1. Key Press EDP Commands*

### 5.1.2 Reporting Commands

Reporting commands (Table 5-2) send specific information to the EDP port. These commands can be used in both configuration mode and normal mode.

| Command | Function |
|---|---|
| DUMPALL | List all parameter values |
| VERSION | Write *120* software version |

*Table 5-2. EDP Reporting Commands*

| Command | Function |
|---|---|
| P | Write current displayed weight with units identifier |
| RS | Reset software |

*Table 5-2. EDP Reporting Commands*

### 5.1.3 The RS Command

The RS (reset configuration) command can be used to restore all configuration parameters to their default values. Before issuing this command, the indicator must be placed in test mode (press and hold setup switch for approximately three seconds to enter test mode).

This command is equivalent to using the DEFLT function on the TEST menu. See Section 7.7 on page 35 for more information about test mode and using the TEST menu. **NOTE:** All load cell calibration settings are lost when the RS command is run.

### 5.1.4 Parameter Setting Commands

Parameter setting commands allow you to display or change the current value for a particular configuration parameter (Tables 5-3 through 5-8).

Current configuration parameter settings can be displayed in either configuration mode or normal mode using the following syntax:

*command*<ENTER>

Most parameter values can be changed in configuration mode only. Use the following command syntax when changing parameter values:

*command=value*<ENTER>

where *value* is a number or a parameter value. Use no spaces before or after the equal (=) sign. If you type an incorrect command or value, the display reads *??*. Changes to the parameters are saved as they are entered but typically do not take effect until you exit configuration mode.

For example, to set the motion band parameter to 5, type the following:

*MOTBAND=5D*<ENTER>

| Command | Description | Values |
|---|---|---|
| GRADS | Graduations | *1–100 000* |
| ZTRKBND | Zero track band | OFF, 0.5D, 1D, 3D |
| ZRANGE | Zero range | 1.9%, 100% |
| MOTBAND | Motion band | 1D, 2D, 3D, 5D, 10D, 20D, 50D, OFF |
| OVRLOAD | Overload | FS+2%, FS+1D, FS+9D, FS |
| SMPRAT | Sample rate | 15HZ, 7.5HZ, 3.75HZ, 30HZ |
| DIGFLTR1<br>DIGFLTR2<br>DIGFLTR3 | Digital filtering | 1, 2, 4, 8, 16, 32, 64, 128 |
| DFSENS | Digital filter cutout sensitivity | 2OUT, 4OUT, 8OUT, 16OUT, 32OUT, 64OUT, 128OUT |
| DFTHRH | Digital filter cutout threshold | NONE, 0.1DD, 0.2DD, 0.5DD, 1DD, 2DD, 5DD, 10DD, 20DD, 50DD, 100DD, 200DD, 250DD |

*Table 5-3. CONFIG EDP Commands*

| Command | Description | Values |
|---|---|---|
| PRI.DECPNT | Primary units decimal position | 8.88888, 88.8888, 888.888, 8888.88, 88888.8, 888888 |
| PRI.DSPDIV | Primary units display divisions | 1D, 2D, 5D, 10D, 20D, 50D |
| PRI.UNITS | Primary units | LB, KG, OZ, TN, T, G, NONE |
| SEC.DECPNT | Secondary units decimal position | 8.88888, 88.8888, 888.888, 8888.88, 88888.8, 888888 |
| SEC.DSPDIV | Secondary units display divisions | 1D, 2D, 5D, 10D, 20D, 50D |
| SEC.UNITS | Secondary units | LB, KG, OZ, TN, T, G, NONE |
| SEC.MULT | Secondary units multiplier | *0.00000–9999.99* |
| DSPRATE | Display rate | 250MS, 500MS, 750MS, 1SEC, 1500MS, 2SEC, 2500MS, 3SEC, 4SEC, 6SEC, 8SEC |

*Table 5-4. FORMAT EDP Commands*

| Command | Description | Values |
|---|---|---|
| WZERO | Zero calibration | — |
| WVAL | Test weight value | *test_weight_value* |
| WSPAN | Span calibration | — |
| REZERO | Rezero | — |
| LC.CD | Set deadload coefficient | *value* |
| LC.CW | Set span coefficient | *value* |

*Table 5-5. CALIBR EDP Commands*

| Command | Description | Values |
|---|---|---|
| EDP.BAUD | EDP port baud rate | 1200, 2400, 4800, 9600, 19200, 38400 |
| EDP.BITS | EDP port data bits/parity | 8NONE, 7ODD, 7SPACE, 7EVEN |
| EDP.TERM | EDP port termination character | CR/LF, CR |
| EDP.ECHO | EDP port echo | ON, OFF |
| PRN.BAUD | Printer port baud rate | 1200, 2400, 4800, 9600 |
| PRN.BITS | Printer port data bits/parity | 8NONE, 7ODD, 7SPACE, 7EVEN |
| PRN.TERM | Printer port termination character | CR/LF, CR |
| STREAM | Streaming port | OFF, EDP, PRN |
| STMDLY | Stream delay | NONE, 250MS, 500MS, 1SEC, 2SEC, 4SEC, 8SEC, 15SEC |
| PRNDEST | Print destination | EDP, PRN |
| PROTCT | EDP port protection | ENABLE, DISABLE |

*Table 5-6. SERIAL EDP Commands*

| Command | Description | Values |
|---|---|---|
| PWRUPMD | Power up mode | GO, DELAY |
| REGULAT | Regulatory compliance | NTEP, OIML, CANADA, NONE |
| CONSNUM | Consecutive number | *0–999 999* |
| CONSTUP | Consecutive number start-up value | *0–999 999* |

*Table 5-7. PROGRM EDP Commands*

| Command | Description | Values |
|---|---|---|
| WWPF | Print characters of format string | See Section 6.0 on page 27 for detailed information |
| WPF | Print hex values of format string | |

*Table 5-8. PFORMT EDP Commands*

## 5.2 Saving and Transferring Data

Connecting a personal computer to the *120* EDP port allows you to save indicator configuration data to the PC or to download configuration data from the PC to an indicator. The following sections describe the procedures for these save and transfer operations.

### 5.2.1 Saving Indicator Data to a Personal Computer

Configuration data can be saved to a personal computer connected to the EDP port. The PC must be running a communications program such as PROCOMMPLUS®. See Section 2.2.1 on page 5 for information about serial communications wiring and EDP port pin assignments.

When configuring the indicator, ensure that the values set for the BAUD and BITS parameters on the SERIAL menu match the baud rate, bits, and parity settings configured for the serial port on the PC. Set the PRNDES parameter to EDP.

To save all configuration data, place the indicator in configuration mode and send the DUMPALL EDP command to the indicator. The *120* responds by sending all configuration parameters to the PC as ASCII-formatted text.

### 5.2.2 Downloading Configuration Data from PC to Indicator

Configuration data saved on a PC or floppy disk can be downloaded from the PC to an indicator. This procedure is useful when a number of indicators with similar configurations are set up or when an indicator is replaced.

To download configuration data, connect the PC to the EDP port as described in Section 5.2.1. Place the indicator in configuration mode and use the PC communications software to send the saved configuration data to the indicator. When transfer is complete, calibrate the indicator as described in Section 4.0 on page 21.

**NOTES:**

- Calibration settings are included in the configuration data downloaded to the indicator. If the receiving indicator is a direct replacement for another *120* and the attached scale is not changed, recalibration is not required.
- When downloading configurations that include changed serial communications settings, edit the data file to place the serial communications changes at the end of the file. Communication between the PC and indicator will be lost once the indicator receives settings for baud rate (BAUD parameter) or data bits and parity (BITS parameter) that do not match those configured for the PC.

# 6.0 Print Formatting

The *120* print format can be edited to specify the format of the printed output when the **PRINT** key is pressed or when a KPRINT EDP command is received.

Each print format can be customized to include up to 300 characters of information, such as company name and address, on printed tickets. You can use the indicator front panel (PFORMT menu), EDP commands, or the Revolution configuration utility to customize the print format.

## 6.1 Print Formatting Commands

Table 6-1 lists commands you can use to format the print format. Text included in the format string must be enclosed in quotation marks (hex 22). Text characters can include any ASCII character that can be printed by the output device.

| Command | Description |
|---|---|
| @G | Gross weight in displayed units |
| @N | Net weight in displayed units |
| @T | Tare weight in displayed units |
| @C | Consecutive number |
| @M | Conditional net and tare weights.<br>Use the @M command in pairs to enclose the @N and @T commands. If no tare is in the system, net and tare weights are not printed. |
| @t | Time |
| @d | Date |
| @L*nn* | New line (*nn* = number of termination characters [CR/LF or CR] ) |
| @S*nn* | Space (*nn* = number of spaces)* |
| Gross, net, and tare weights are 9 digits in length, including sign (10 digits with decimal point), followed by a space and a two-digit units identifier. Total field length with units identifier is 12 (or 13) characters. | |
| ID and consecutive number (CN) fields are 1–6 characters in length, as required. | |

*Table 6-1. Print Format Commands*

The default *120* print format is shown below:

@G <CR> @M @T <CR> @N @M <CR>

**NOTE:** *The 300-character limit of the print format string includes the output field length of the print formatting commands, not the command length. For example, if the indicator is configured to show a decimal point, the @G command generates an output field of 13 characters: the 10-character weight value (including decimal point), one space, and a two-digit units identifier.*

## 6.2 Customizing Print Formats

The following sections describe procedures for customizing the print format using the EDP port or the front panel (PFORMT menu).

### 6.2.1 Using the EDP Port

With a personal computer, terminal, or remote keyboard attached to the *120* EDP port, you can use the EDP command set to customize the print format string.

To view the current setting of the print format, type WWPF (to enter ASCII text) or WPF (to enter hex values) then press **ENTER**. The indicator responds by sending the current configuration for the print format:

Use the WWPF or WPF EDP command followed by an equals sign (=) and zero (0) to edit the print format string.

The following example shows the commands used to define a print format string for an Eltron LP-2742 printer.

**NOTE:** *The N, AxxxxxxN, Bx, and P1 commands used in the example are all Eltron printer-specific commands.*

```
WWPF=0
N
A0,0,0,3,1,2,N,"Blue Hills Transfer Co. @d @t @C"
A8,50,0,5,1,1,N,"@G"
@M A8,120,0,5,1,1,N,"@T"
A8,190,0,5,1,1,N,"@N"@M
B8,260,0,3,3,7,100,B,"@G"
P1
```

**NOTE:** *After entering the WWPF=0 or WPF=0 command, you must begin entering the print format. If no data is entered, the command times out, resulting in a blank format.*

### 6.2.2 Using the Front Panel

If you have no access to equipment for communication through the EDP port or are working at a site where such equipment cannot be used, you can use the PFORMT menu (see Figure 6-1) to customize the print format. Using the PFORMT menu, you can edit the print format string by changing the hex values of the ASCII characters in the format string.

To edit a print format, do the following:

1. In setup mode, use the navigation keys to go to the PFORMT menu. Press ▽ to show the EDIT submenu.
2. Press ▽ again to show the print format string. Use the ◁ and ▷ keys to scroll through the format. The number position of each character is shown in the two digits at the left of the display, hex 00–BF.
3. To **edit** a character, press ○ while the character is displayed. The rightmost digit flashes, indicating that it can be changed. Use the △ and ▽ keys to increment or decrement the value, or use the ◁ key to move to the next digit. Press ○ to save any changes and advance to the next character in the string.
4. If done, press △ to return to the EDIT submenu.
5. To **insert** one or more characters, display the character position *after* which characters are to be inserted. Press △ to return to the EDIT submenu, then press ▷ to show the INSERT parameter. Press ○ to insert one character; repeat presses to add more characters. Each press of the ○ key adds a character at the location last shown under EDIT submenu and shifts all subsequent characters to the right. Inserted characters are assigned hex value 00 (null).

   To edit inserted characters, return to the EDIT submenu and make changes as described under step 3.
6. To **delete** one or more characters, display the character to be deleted. Press △ to return to the EDIT submenu, then press ▷ twice to show the DELETE parameter. Press ○ to delete one character; repeat presses to delete more characters. Each press of the ○ key deletes a character, starting at the location last shown under EDIT submenu, then moving left to preceding characters. Each deletion shifts all subsequent characters to the left.

**NOTE:** *Some characters cannot be displayed on the 120 front panel (see the ASCII character chart on page 31) and are shown as blanks. The 120 can send or receive any ASCII character; the character printed depends on the particular ASCII character set implemented for the receiving device.*

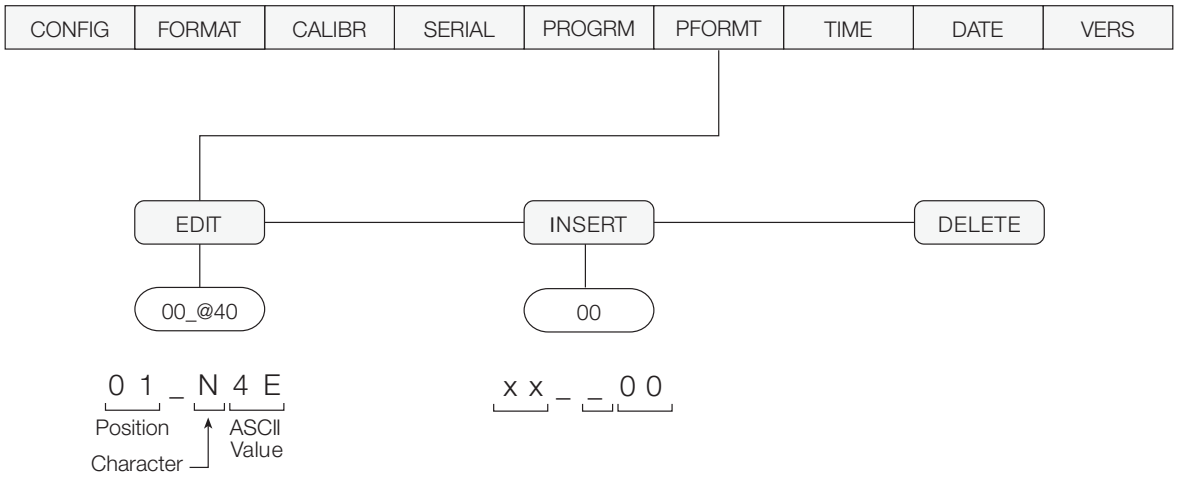



*Figure 6-1. PFORMT Menu, Showing Alphanumeric Character Entry Procedure*

# 7.0 Appendix

## 7.1 Error Messages

| Error Message | Description | Solution |
|---|---|---|
| _ _ _ _ _ _<br>(bottom LED segments lit) | Display overflow (negative) | Negative weight value too large to be displayed (< –99999) |
| _ _ _ _ _ _<br>(middle LED segments lit) | Overload | Weight value exceeds scale capacity |
| _ _ _ _ _ _<br>(top LED segments lit) | Display overflow (positive) | Positive weight value too large to be displayed (> 999999) |

*Table 7-1. 120 Error Messages*

## 7.2 Continuous Output (Stream) Format

Figure 7-1 shows the continuous output format sent to the *120* EDP or printer port when the STREAM parameter (SERIAL menu) is set to either EDP or PRN.

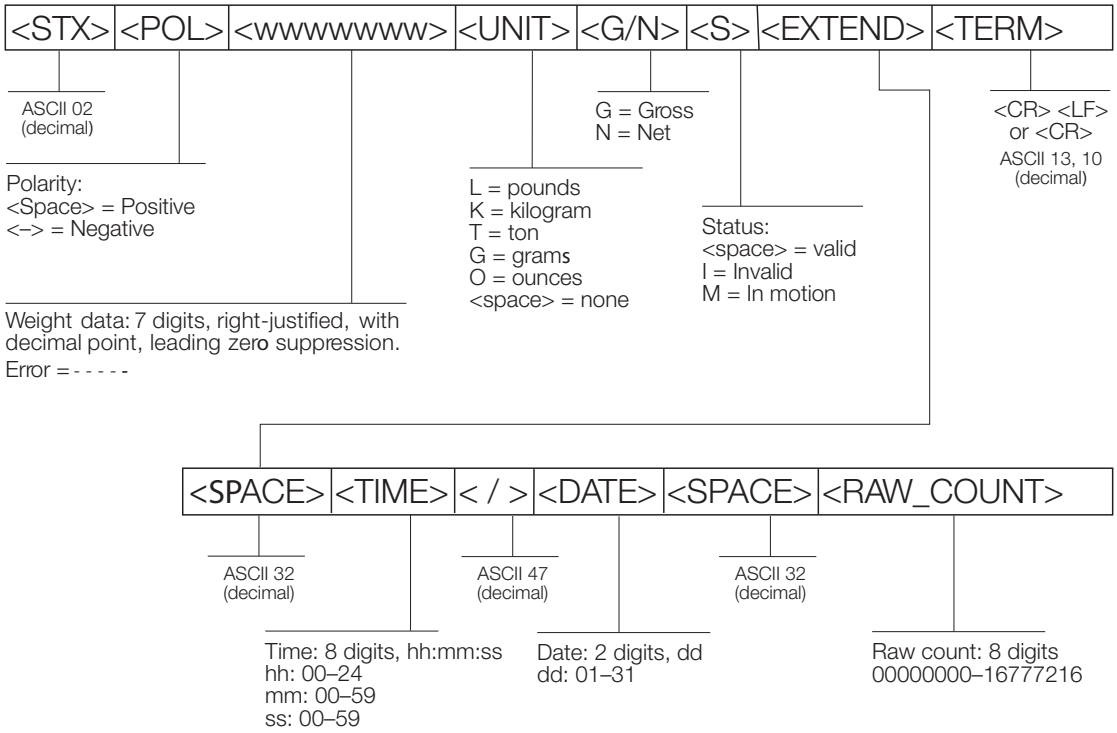



*Figure 7-1. Continuous Output Data Format*

## 7.3 Front Panel Display Characters

Figure 7-2 shows the 7-segment LED character set used to display alphanumeric characters on the *120* front panel.

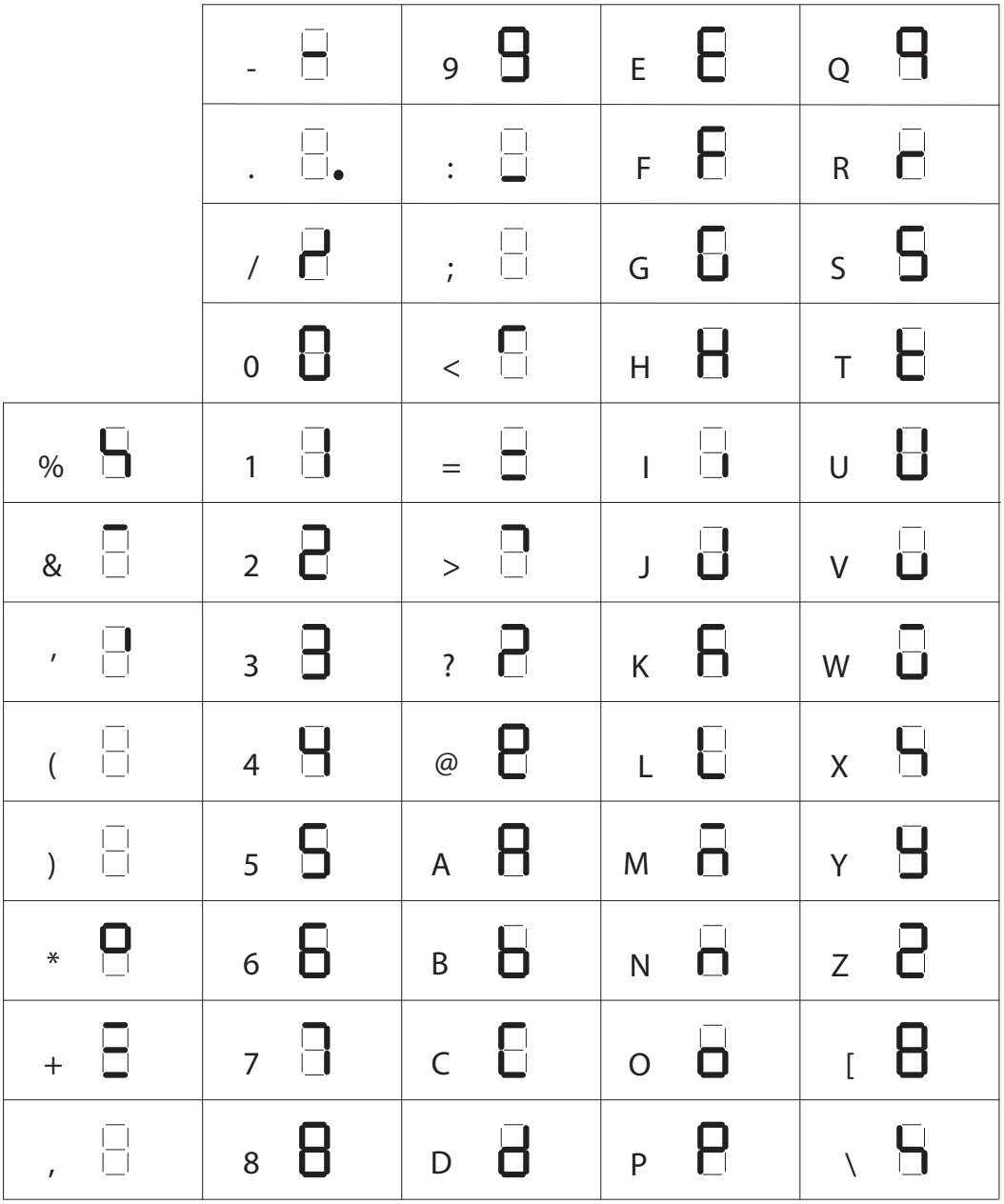



*Figure 7-2. 120 Display Characters*

## 7.4 ASCII Character Chart

Use the decimal values for ASCII characters listed in Tables 7-2 and 7-3 when specifying print format strings on the *120* PFORMT menu. The actual character printed depends on the character mapping used by the output device.

The *120* can send or receive any ASCII character value (decimal 0–255), but the indicator display is limited to numbers, upper-case, unaccented letters, and a few special characters.

| Control | ASCII | Dec | Hex | ASCII | Dec | Hex | ASCII | Dec | Hex | ASCII | Dec | Hex |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ctrl-@ | NUL | 00 | 00 | space | 32 | 20 | @ | 64 | 40 | ` | 96 | 60 |
| Ctrl-A | SOH | 01 | 01 | ! | 33 | 21 | A | 65 | 41 | a | 97 | 61 |
| Ctrl-B | STX | 02 | 02 | “ | 34 | 22 | B | 66 | 42 | b | 98 | 62 |
| Ctrl-C | ETX | 03 | 03 | # | 35 | 23 | C | 67 | 43 | c | 99 | 63 |
| Ctrl-D | EOT | 04 | 04 | $ | 36 | 24 | D | 68 | 44 | d | 100 | 64 |
| Ctrl-E | ENQ | 05 | 05 | % | 37 | 25 | E | 69 | 45 | e | 101 | 65 |
| Ctrl-F | ACK | 06 | 06 | & | 38 | 26 | F | 70 | 46 | f | 102 | 66 |
| Ctrl-G | BEL | 07 | 07 | ’ | 39 | 27 | G | 71 | 47 | g | 103 | 67 |
| Ctrl-H | BS | 08 | 08 | ( | 40 | 28 | H | 72 | 48 | h | 104 | 68 |
| Ctrl-I | HT | 09 | 09 | ) | 41 | 29 | I | 73 | 49 | i | 105 | 69 |
| Ctrl-J | LF | 10 | 0A | * | 42 | 2A | J | 74 | 4A | j | 106 | 6A |
| Ctrl-K | VT | 11 | 0B | + | 43 | 2B | K | 75 | 4B | k | 107 | 6B |
| Ctrl-L | FF | 12 | 0C | , | 44 | 2C | L | 76 | 4C | l | 108 | 6C |
| Ctrl-M | CR | 13 | 0D | - | 45 | 2D | M | 77 | 4D | m | 109 | 6D |
| Ctrl-N | SO | 14 | 0E | . | 46 | 2E | N | 78 | 4E | n | 110 | 6E |
| Ctrl-O | SI | 15 | 0F | / | 47 | 2F | O | 79 | 4F | o | 111 | 6F |
| Ctrl-P | DLE | 16 | 10 | 0 | 48 | 30 | P | 80 | 50 | p | 112 | 70 |
| Ctrl-Q | DC1 | 17 | 11 | 1 | 49 | 31 | Q | 81 | 51 | q | 113 | 71 |
| Ctrl-R | DC2 | 18 | 12 | 2 | 50 | 32 | R | 82 | 52 | r | 114 | 72 |
| Ctrl-S | DC3 | 19 | 13 | 3 | 51 | 33 | S | 83 | 53 | s | 115 | 73 |
| Ctrl-T | DC4 | 20 | 14 | 4 | 52 | 34 | T | 84 | 54 | t | 116 | 74 |
| Ctrl-U | NAK | 21 | 15 | 5 | 53 | 35 | U | 85 | 55 | u | 117 | 75 |
| Ctrl-V | SYN | 22 | 16 | 6 | 54 | 36 | V | 86 | 56 | v | 118 | 76 |
| Ctrl-W | ETB | 23 | 17 | 7 | 55 | 37 | W | 87 | 57 | w | 119 | 77 |
| Ctrl-X | CAN | 24 | 18 | 8 | 56 | 38 | X | 88 | 58 | x | 120 | 78 |
| Ctrl-Y | EM | 25 | 19 | 9 | 57 | 39 | Y | 89 | 59 | y | 121 | 79 |
| Ctrl-Z | SUB | 26 | 1A | : | 58 | 3A | Z | 90 | 5A | z | 122 | 7A |
| Ctrl-[ | ESC | 27 | 1B | ; | 59 | 3B | [ | 91 | 5B | { | 123 | 7B |
| Ctrl-\ | FS | 28 | 1C | < | 60 | 3C | \ | 92 | 5C | \| | 124 | 7C |
| Ctrl-] | GS | 29 | 1D | = | 61 | 3D | ] | 93 | 5D | } | 125 | 7D |
| Ctrl-^ | RS | 30 | 1E | > | 62 | 3E | ^ | 94 | 5E | ~ | 126 | 7E |
| Ctrl-_ | US | 31 | 1F | ? | 63 | 3F | _ | 95 | 5F | DEL | 127 | 7F |

*Table 7-2. ASCII Character Chart (Part 1)*

| ASCII | Dec | Hex | ASCII | Dec | Hex | ASCII | Dec | Hex | ASCII | Dec | Hex |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ç | 128 | 80 | á | 160 | A0 | | 192 | C0 | α | 224 | E0 |
| ü | 129 | 81 | í | 161 | A1 | | 193 | C1 | β | 225 | E1 |
| é | 130 | 82 | ó | 162 | A2 | | 194 | C2 | Γ | 226 | E2 |
| â | 131 | 83 | ú | 163 | A3 | | 195 | C3 | π | 227 | E3 |
| ä | 132 | 84 | ñ | 164 | A4 | | 196 | C4 | Σ | 228 | E4 |
| à | 133 | 85 | Ñ | 165 | A5 | | 197 | C5 | σ | 229 | E5 |
| å | 134 | 86 | ª | 166 | A6 | | 198 | C6 | µ | 230 | E6 |
| ç | 135 | 87 | º | 167 | A7 | | 199 | C7 | τ | 231 | E7 |
| ê | 136 | 88 | ¿ | 168 | A8 | | 200 | C8 | Φ | 232 | E8 |
| ë | 137 | 89 | | 169 | A9 | | 201 | C9 | Θ | 233 | E9 |
| è | 138 | 8A | ¬ | 170 | AA | | 202 | CA | Ω | 234 | EA |
| ï | 139 | 8B | 1/2 | 171 | AB | | 203 | CB | δ | 235 | EB |
| î | 140 | 8C | 1/4 | 172 | AC | | 204 | CC | ∞ | 236 | EC |
| ì | 141 | 8D | ¡ | 173 | AD | | 205 | CD | φ | 237 | ED |
| Ä | 142 | 8E | « | 174 | AE | | 206 | CE | ∈ | 238 | EE |
| Å | 143 | 8F | » | 175 | AF | | 207 | CF | ∩ | 239 | EF |
| É | 144 | 90 | | 176 | B0 | | 208 | D0 | ≡ | 240 | F0 |
| æ | 145 | 91 | | 177 | B1 | | 209 | D1 | ± | 241 | F1 |
| Æ | 146 | 92 | | 178 | B2 | | 210 | D2 | ≥ | 242 | F2 |
| ô | 147 | 93 | | 179 | B3 | | 211 | D3 | ≤ | 243 | F3 |
| ö | 148 | 94 | | 180 | B4 | | 212 | D4 | ⌠ | 244 | F4 |
| ò | 149 | 95 | | 181 | B5 | | 213 | D5 | ⌡ | 245 | F5 |
| û | 150 | 96 | | 182 | B6 | | 214 | D6 | ÷ | 246 | F6 |
| ù | 151 | 97 | | 183 | B7 | | 215 | D7 | ≈ | 247 | F7 |
| ÿ | 152 | 98 | | 184 | B8 | | 216 | D8 | ° | 248 | F8 |
| Ö | 153 | 99 | | 185 | B9 | | 217 | D9 | • | 249 | F9 |
| Ü | 154 | 9A | | 186 | BA | | 218 | DA | | 250 | FA |
| ¢ | 155 | 9B | | 187 | BB | | 219 | DB | | 251 | FB |
| £ | 156 | 9C | | 188 | BC | | 220 | DC | | 252 | FC |
| ¥ | 157 | 9D | | 189 | BD | | 221 | DD | ² | 253 | FD |
| Pts | 158 | 9E | | 190 | BE | | 222 | DE | | 254 | FE |
| ƒ | 159 | 9F | | 191 | BF | | 223 | DF | | 255 | FF |

*Table 7-3. ASCII Character Chart (Part 2)*

## 7.5 Conversion Factors for Secondary Units

The *120* has the capability to mathematically convert a weight into many different types of units and instantly display those results with a press of the **UNITS** key.

Secondary units can be specified on the FORMAT menu using the SECNDR parameter, or by using EDP commands.

- To configure secondary units using the front panel menus, use the Table 7-4 to find the conversion multiplier for the MULT parameter. For example, if the primary unit is pounds and the secondary unit is short tons, set the MULT parameter to 000050.

  Next, use the MULEXP parameter to set the decimal point position. In the example above, the conversion factor for pounds to short tons is actually 0.0005 (2000 lb x 0.0005 = 1 tn). Use the ◁ and ▷ keys to shift the decimal point to show a value of 0.00050.

  Another example: If the primary unit is ounces and the secondary unit is grams, the conversion factor is 28.3495. To enter this value using the menus, first enter 283495 for the MULT parameter, then use the MULEXP parameter to adjust the decimal point to 28.3495.
- To configure secondary units using EDP commands, use the Table 7-4 to find the conversion value for the SEC.MULT and command. For example, if the primary unit is pounds and the secondary unit is short tons, send the following EDP command to set the multiplier for the secondary units.

  SEC.MULT= 0.00050<CR>
- Units of weight other than those listed in Table 7-4 cannot be directly specified as primary or secondary units on the *120* indicator. For unlisted units of weight, specify NONE on the UNITS parameter.

**NOTE:** Ensure that the secondary decimal point position is set appropriately for the scale capacity in the secondary units. If the converted value requires more digits than are available, the indicator display will overflow.

For example, if the primary units are short tons, secondary units are pounds, and the secondary decimal point is set to 8888.88, the indicator will overflow if 5 tons or more are applied to the scale. With 5 tons applied, and a conversion factor of 2000, the secondary units display needs five digits to the left of the decimal point to display the 10000 lb secondary units value.

| Primary Unit | *x Multiplier* | Secondary Unit |
|---|---|---|
| ounces (oz) | 28.3495 | grams |
| | 0.06250 | pounds |
| | 0.02835 | kilograms |
| pounds (lb) | 453.592 | grams |
| | 16.0000 | ounces |
| | 0.45359 | kilograms |
| | 0.00050 | short tons (tn) |
| | 0.00045 | metric tons (t) |
| short tons (tn) | 2000.00 | pounds |
| | 907.185 | kilograms |
| | 0.90718 | metric tons (t) |
| grams (g) | 0.03527 | ounces |
| | 0.00220 | pounds |
| | 0.00100 | kilograms |
| kilograms (kg) | 35.2740 | ounces |
| | 1000.00 | grams |
| | 2.20462 | pounds |
| | 0.00110 | short tons (tn) |
| | 0.00100 | metric tons (t) |
| metric tons (t) | 2204.62 | pounds |
| | 1000.00 | kilograms |
| | 1.10231 | short tons (tn) |

*Table 7-4. Conversion Factors*

## 7.6 Digital Filtering

The *120* uses averaged digital filtering to reduce the effect of vibration on weight readings. Adjustable threshold and sensitivity functions allow quick settling by suspending filter averaging, allowing the weight reading to jump to the new value. Digital filtering parameters are set using the CONFIG menu.

### 7.6.1 DIGFLx Parameters

The first three digital filtering parameters, DIGFL1, DIGFL2, and DIGFL3, are configurable filter stages that control the effect of a single A/D reading on the displayed weight. The value assigned to each parameter sets the number of readings received from the preceding filter stage before averaging.

The overall filtering effect can be expressed by adding the values assigned to the three filter stages:

*DIGFL1 + DIGFL2 + DIGFL3*

For example, if the filters are configured as DIGFL1=4, DIGFL2=8, DIGFL3=8, the overall filtering effect is 20 (4 + 8 + 8). With this configuration, each A/D reading has a 1-in-20 effect on the displayed weight value. Setting the filters to 1 effectively disables digital filtering.

### 7.6.2 DFSENS and DFTHRH Parameters

The three digital filters can be used by themselves to eliminate vibration effects, but heavy filtering also increases settling time. The DFSENS (digital filter sensitivity) and DFTHRH (digital filter threshold) parameters can be used to temporarily override filter averaging and improve settling time:

- DFSENS specifies the number of consecutive scale readings that must fall outside the filter threshold (DFTHRH) before digital filtering is suspended.
- DFTHRH sets a threshold value, in display divisions. When a specified number of consecutive scale readings (DFSENS) fall outside of this threshold, digital filtering is suspended. Set DFTHRH to NONE to turn off the filter override.

### 7.6.3 Setting the Digital Filter Parameters

Fine-tuning the digital filter parameters greatly improves indicator performance in heavy-vibration environments. Use the following procedure to determine vibration effects on the scale and optimize the digital filtering configuration.

1. In setup mode, set all three digital filters (DIGFL1, DIGFL2, DIGFL3) to 1. Set DFTHRH to NONE. Return indicator to normal mode.
2. Remove all weight from the scale, then watch the indicator display to determine the magnitude of vibration effects on the scale. Record the weight below which all but a few readings fall. This value is used to calculate the DFTHRH parameter value in Step 4.

   For example, if a heavy-capacity scale produces vibration-related readings of up to 50 lb, with occasional spikes to 75 lb, record 50 lb as the threshold weight value.
3. Place the indicator in setup mode and set the digital filters (DIGFL*x*) to eliminate the vibration effects on the scale. (Leave DFTHRH set to NONE.) Reconfigure as necessary to find the lowest effective values for the DIGFL*x* parameters.
4. With optimum values assigned to the DIGFL*x* parameters, calculate the DFTHRH parameter value by converting the weight value recorded in Step 2 to display divisions:

   *threshold_weight_value / DSPDIV*

   In the example in Step 2, with a threshold weight value of 50 lb and a display division value of 5lb: *50 / 5lb = 10DD*. DFTHRH should be set to 10DD for this example.
5. Finally, set the DFSENS parameter high enough to ignore transient peaks. Longer transients (typically caused by lower vibration frequencies) will cause more consecutive out-of-band readings, so DFSENS should be set higher to counter low frequency transients.

   Reconfigure as necessary to find the lowest effective value for the DFSENS parameter.

## 7.7 Test Mode

In addition to normal and setup modes, test mode provides a number of diagnostic functions for the *120*, including:

- Display raw A/D count
- Display digital filter raw counts
- Reset configuration parameters to default values
- Transmit test character (“U”) from serial port
- Display characters received by serial port

To enter test mode, press and hold the setup switch. After about three seconds, the test mode display automatically shifts to the first test menu function, *A/DTST*.

Figure 7-3 shows the Test Menu structure. Note that, because the Test Menu functions are all on a single menu level, the **GROSS/NET** (▽) key has no function. Press the **ZERO** (△) key to exit test mode.

Table 7-5 on page 35 summarizes the test menu functions.

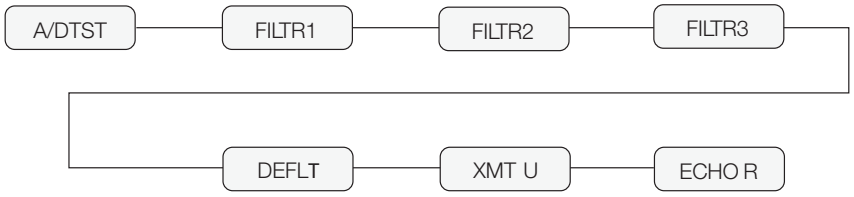



*Figure 7-3. Test Menu*

| **TEST Menu** | |
|---|---|
| Function | Description |
| A/DTST | Display A/D test<br>Press and hold Enter key to display raw count from A/D converter. |
| FILTR1<br>FILTR2<br>FILTR3 | Display filtered raw count for digital filters 1–3 |
| DEFLT | Default parameters<br>Press setup switch and Enter key at the same time to reset configuration and calibration parameters to factory default values. Load cells must be recalibrated before using the indicator (see Section 4.0 on page 21). |
| XMT U | Transmit “U”<br>Press and hold Enter key to send ASCII “U” characters (decimal 85) from the serial port. |
| ECHO R | Echo received characters<br>When Ready is displayed, press the Enter key to view characters received at serial port. The first two digits show the order of the character received (see diagram(.<br>01_N4E<br>Order Received<br>ASCII Value<br>Character |

*Table 7-5. Test Menu Functions*

## 7.8 Specifications

### Power

| | |
|---|---|
| Line Voltages | 115 or 230 VAC |
| Frequency | 50 or 60 Hz |
| Power Consumption | 15 mA @ 115 VAC (2 W)<br>8 mA @ 230 VAC (2 W) |
| Main Circuit | |
| Input Voltage | 8.0–12.0 VDC |
| Maximum Current | 250 mA |

### Analog Specifications

| | |
|---|---|
| Full Scale Input Signal | Up to 22.5 mV |
| Excitation Voltage | 5 ± 0.3 VDC,<br>4 x 350¾ or 8 x 700Ω load cells |
| Sense Amplifier | Differential amplifier with<br>4- and 6-wire sensing |
| Analog Signal Sensitivity | 0.15 mV/graduation minimum,<br>1.0 mV/grad recommended |
| Input Impedance | 200 M¾, typical |
| Noise (ref to input) | 0.3 µV p-p with digital filters at 4-4-4 |
| Internal Resolution | 1 677 000 counts |
| Display Resolution | 999 999 dd |
| Measurement Rate | Up to 30 measurements/sec |
| Input Sensitivity | 0.6 nV per internal count |
| System Linearity | Within 0.01% of full scale |
| Zero Stability | 150 nV/°C, maximum |
| Span Stability | 3.5 ppm/°C, maximum |
| Calibration Method | Software, constants stored in EEPROM |
| Common Mode Voltage | +1.5 to +3.5 V, referred to zero voltage |
| Common Mode Rejection | 130 dB minimum @ 50 or 60 Hz |
| Normal Mode Rejection | 90 dB minimum @ 50 or 60 Hz |
| IRFI Protection | Signal, excitation, and sense lines protected by capacitor bypass |

### Digital Specifications

| | |
|---|---|
| Microcomputer | Intel MCS-52 with 16K EEPROM @ 18.432 MHz |
| Digital Filters | 3 filters, software selectable |

### Environmental

| | |
|---|---|
| Operating Temperature | –10 to +40°C (legal);<br>–10 to +50°C (industrial) |
| Storage Temperature | –25 to +70°C |
| Humidity | 0–95% relative humidity |
| Altitude | 2000 m (6500 ft) maximum |

### Serial Communications

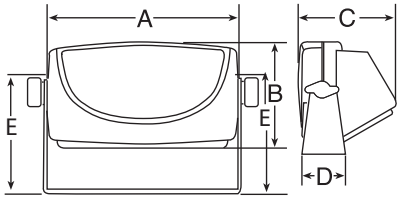
| | |
|---|---|
| EDP Port | Full duplex RS-232, 1200–38400 bps |
| Printer Port | Output-only RS-232 or active 20 mA current loop, 1200–9600 bps |
| Both Ports | 7 or 8 data bits; even, odd, space, or no parity |

### Operator Interface

| | |
|---|---|
| Display | 6-digit LED display. 7-segment, 0.8 in (20 mm) digits |
| LED annunciators | Gross, net, center of zero, standstill, lb/primary units, kg/secondary units, oz, g |
| Keyboard | 5-key flat membrane panel |

### Enclosure

Enclosure Dimensions




A=7.32” (1863 mm)
B = 6.06” (154 mm)
C = 3.74” (95 mm)
D = 1.65” (42 mm)
E = 4.76” (121 mm)

| | |
|---|---|
| Weight | 0.9 lb (0.4 Kg) |
| Rating/Material | ABS plastic |

### Certifications and Approvals

NTEP

CoC Number03-05999-010
Accuracy ClassIII/IIIL
$n_{max}$: 6 000

Measurement Canada

CE

| | |
|---|---|
| Approval | AM-5517 |
| Accuracy Class | III/IIIL<br>$n_{max}$: 6 000 |

OIML

| | |
|---|---|
| Approval | TC6736<br>$n_{max}$: 5 000 |

c UL us Power Adaptor

# 120 Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one year.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, *Protecting Your Components From Static Damage in Shipment*, available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

**THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NEITHER RLWS NOR DISTRIBUTOR WILL, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.**

**RLWS AND BUYER AGREE THAT RLWS'S SOLE AND EXCLUSIVE LIABILITY HEREUNDER IS LIMITED TO REPAIR OR REPLACEMENT OF SUCH GOODS. IN ACCEPTING THIS WARRANTY, THE BUYER WAIVES ANY AND ALL OTHER CLAIMS TO WARRANTY.**

**SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.**

**NO TERMS, CONDITIONS, UNDERSTANDING, OR AGREEMENTS PURPORTING TO MODIFY THE TERMS OF THIS WARRANTY SHALL HAVE ANY LEGAL EFFECT UNLESS MADE IN WRITING AND SIGNED BY A CORPORATE OFFICER OF RLWS AND THE BUYER.**



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