

# 520

*Digital Weight Indicator  
Version 1.11*

# Installation Manual



**REVOLUTION**  
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Version 1.11, May 22, 2013

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# About This Manual

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This manual is intended for use by service technicians responsible for installing and servicing IQ plus® 710 digital weight indicators.

This manual applies to indicators using Version 1.11 of the 520 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 17 for information about configuration methods.



Authorized distributors and their employees can view or download this manual from the Rice Lake Weighing Systems website at [www.rlws.com](http://www.rlws.com).

The *Operator Card* included with this manual provides basic operating instructions for users of the 520. Please leave the *Operator Card* with the indicator when installation and configuration are complete.

## Safety

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### Safety Symbol Definitions



**WARNING** Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death, and includes hazards that are exposed when guards are removed.



**CAUTION** Indicates a potentially hazardous situation that, if not avoided may result in minor or moderate injury.



**Important** Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

### Safety Precautions



Do not operate or work on this equipment unless you have read and understand the instructions and warnings in this manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals. Proper care is your responsibility.



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

### General Safety

---



*Failure to heed may result in serious injury or death.*

**DO NOT** allow minors (children) or inexperienced persons to operate this unit.

**DO NOT** operate without all shields and guards in place.

**DO NOT** jump on the scale.

**DO NOT** use for purposes other than weight taking.

**DO NOT** place fingers into slots or possible pinch points.

**DO NOT** use any load-bearing component that is worn beyond 5% of the original dimension.

**DO NOT** use this product if any of the components are cracked.

**DO NOT** exceed the rated load limit of the unit.

**DO NOT** make alterations or modifications to the unit.

**DO NOT** remove or obscure warning labels.

**DO NOT** use near water.

*Before opening the unit, ensure the power cord is disconnected from the outlet.*

*Keep hands, feet and loose clothing away from moving parts.*

# 1.0 Introduction

---

The 520 is a single-channel digital weight indicator housed in a panel mount enclosure. The front panel bezel can be sealed to a NEMA 4X/IP65 rating. The front panel consists of a 5-button keypad; a large, seven-digit, 14-segment, vacuum fluorescent display; two-character dot-matrix annunciator field; and 16-character dot-matrix prompt field. Features include:

- Drives up to 8 350Ω or 16 700Ω load cells
- Supports 4- and 6-wire load cell connections
- Three configurable digital inputs
- Four digital outputs
- Electronic data processing (EDP) port for full duplex RS-232 or half duplex RS-485 communications at up to 19200 bps
- Printer port for full duplex RS-232 and simplex 20 mA current loop communications at up to 19200 bps
- Optional DeviceNet™ interface for communications network with Allen-Bradley® controllers<sup>1</sup>
- Optional Remote I/O Interface for communication with Allen-Bradley PLC® and SLC™ controllers<sup>2</sup>
- Optional Ethernet/IP interface for Allen-Bradley PLC and other Ethernet/IP master devices
- Optional Profibus® DP interface for network communications<sup>3</sup>
- Optional Ethernet TCP/IP interface for 10-Base T network communications
- Optional BCD interface for 5 VDC TTL
- Optional analog output module provides 0–10 VDC or 4–20 mA tracking of gross or net weight values
- Available in 115 VAC and 230 VAC versions

## 1.1 Operating Modes

The 520 has four modes of operation:

### Normal mode

Normal mode is the weighing mode of the indicator. The indicator displays gross or net weights as required, using the secondary display to indicate scale status and the type of weight value displayed.

### Setup mode

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

To enter setup 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 520 indicator. Like setup mode, test mode is entered using the setup switch. See Section 12.13 on page 86 for more information about entering and using test mode.

### Front Panel Setup mode

Front panel setup mode is used to change setpoint and/or checkweigh values and to set the time and date. See Section 1.3.8 on page 4 for more information about entering front panel setup mode.

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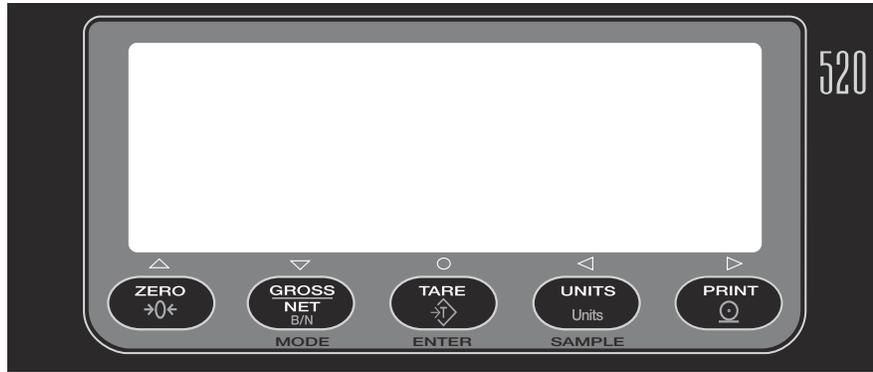


Figure 1-1. 520 Front Panel

## 1.2 Front Panel Display

Figure 1-1 shows the 520 front panel keys and the key functions assigned in normal mode.

The 520 display is divided into three areas (see Figure 1-2):

- The primary display consists of seven large, 14-segment digits used to display weight data.
- A two-digit annunciator shows the units associated with the displayed value: lb=pounds, kg=kilograms, oz=ounces, T=short tons, t=metric tons, LT=long tons, g=grams, GN=grains. The units can also be set to NONE (no units information displayed).

The 16-digit secondary display is used to display the weighing mode (Gross/Brutto or Net), status indicators, including standstill (▲▲) and center of zero (▶◀), Bar Graph and Checkweigh.

The symbols shown over the keys in Figure 1-1 (representing up, down, enter, left, right) describe the key functions assigned in setup mode. In setup mode, the keys are used to navigate through menus, select digits within numeric values, and increment/decrement values. See Section 3.1.3 on page 18 for information about using the front panel keys in setup mode. In count mode, the displayed value is PC (Piece Count).

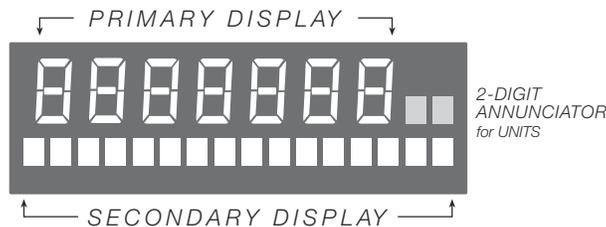


Figure 1-2. 520 Front Panel Display Areas

## 1.3 Indicator Operations

Basic 520 operations are summarized below:

### 1.3.1 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. If no tare has been entered or acquired, the display remains in gross mode.

Gross mode is indicated by the letters *GR* (or *BR* for Brutto in OIML mode) on the secondary display; net mode is indicated by the letters *NT*.

When piece count mode is enabled, the **GROSS/NET** key toggles between **Gross/Net/Piece Count**.

### 1.3.2 Toggle Units

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

### 1.3.3 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 (▶◀) annunciator lights to indicate the scale is zeroed.

### 1.3.4 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.
3. Display shifts to net weight and shows the letters **NT** on the secondary display.

### 1.3.5 Remove Stored Tare Value

1. Remove all weight from the scale and wait for the standstill annunciator (  ).
2. Press the **TARE** key (or, in OIML mode, the **ZERO** key). Display shifts to gross weight and shows the letters **GR** on the secondary display.

### 1.3.6 Keyed Tare

1. Hold the **TARE** key for three seconds to display the current tare value.
2. Use the **RIGHT** and **LEFT** keys to select which digit to change. Use the **UP** and **DOWN** keys to decrement the value.
3. Press **ENTER** to accept the value.



**Note** A keyed tare will show “PT” next to the value when printed.

### 1.3.7 Print Ticket

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

### 1.3.8 Front Panel Setup

Hold the **UNITS** key for three seconds to enter front panel setup mode. Use front panel setup to change setpoint and/or checkweigh values and to set the time and date.

### 1.3.9 Display or Change Setpoint Value

To display a setpoint value, enter front panel setup mode. Press **DOWN** or **ENTER** and the first available setpoint number is displayed. The **LEFT/RIGHT** keys toggle through each setpoint that is operator accessible. Press **ENTER** to display the setpoint value.



**Note** Setpoint Value and Preact Value can be accessible from the front panel in weigh mode.

To change the setpoint value, use the **UP/ DOWN** keys to increment/decrement the decimal value of the flashing digit. Press **ENTER** to move to the decimal point entry. **LEFT/RIGHT** keys adjust the decimal point placement. Press the **ENTER** key to accept the displayed value and return to the next value or setpoint number prompt.



**Note** Some indicator configurations may not allow setpoint values to be changed through the front panel or may require a password to display or change the setpoint value.

### 1.3.10 Turn Setpoint On or Off

To turn a setpoint off at the front panel, enter front panel setup mode. Press **DOWN** or **ENTER** and the first available setpoint number is displayed. The **LEFT/ RIGHT** keys toggle through each setpoint that is operator accessible. Press **DOWN** to turn the setpoint off and back on. Press **ENTER** to display and edit the setpoint value.



**Note** Some indicator configurations may not allow setpoints to be turned off through the front panel or may require a password to turn the setpoint on and off.

### 1.3.11 Display or Change Checkweigh Value

To display a checkweigh value, enter front panel setup mode. Press **DOWN** or **ENTER** and the first available checkweigh value is displayed. The **LEFT/RIGHT** keys toggle through each checkweigh value that is operator accessible. Press **ENTER** to display the checkweigh value.

To change the checkweigh value, use the **UP/DOWN** keys to increment/decrement the decimal value of the flashing digit. Press **ENTER** to sequence to the decimal point entry. **LEFT/RIGHT** keys adjust the decimal point placement. Press the **ENTER** key to accept the displayed value and return to the next value or checkweigh value prompt. See Section 7.0 on page 47 for more information on checkweigh mode.



**Note**

- Some indicator configurations may not allow checkweigh values to be changed through the front panel or may require a password to display or change the checkweigh value.
- Setpoints remain configured but do not function while in checkweigh mode.

### 1.3.12 Set Date

In front panel setup mode use the arrow keys to toggle to **Date**. Press **DOWN** or **ENTER** to enter the date in the format configured for the indicator: **MMDDYY**, **DDMMYY**, or **YYMMDD**.

### 1.3.13 Set Time

In front panel setup mode use the arrow keys to toggle to **Time**. Press **DOWN** or **ENTER** to enter the time in 24-hour format, then press the **ENTER** key.

### 1.3.14 Display Accumulator

The accumulator must be enabled before use in either normal mode or setpoint operations. Once enabled, weight (net weight if a tare is in the system) is accumulated whenever a print operation is performed using the **PRINT** key, digital input, or serial command. The scale must return to zero (net zero if a tare is in the system) before the next accumulation.

1. Press and hold the **G/N** key for three seconds to display the accumulated value if accumulator is enabled.
2. Press the **UP** key to clear the accumulator or the **PRINT** key to print the accumulator.



**Note** The **PRINT** key only performs one accumulation. Weight must return to zero before another accumulation is allowed.

### 1.3.15 Count Display Mode

Count mode is entered by pressing the **MODE (GROSS/NET)** key from normal weighing mode when count mode is enabled. In count display mode, the display shows the number of parts rather than weight. The annunciator at the right side of the LCD display reads piece count (PC). Pressing the **PRINT** key sends the CFMT print format data string to the serial port.

If a sample weight has not yet been acquired, the indicator switches automatically to sample acquisition mode (see Section 6.0 on page 46).

### 1.3.16 Peak Hold Mode

The peak hold function is used to determine, display, and print the greatest net weight read during a weighing cycle.

A weighing cycle ends when the print command is given, or when the peak net weight is manually cleared by the **ZERO** or **PRINT** key. Peak hold tracks only net weight and operates independently of the display. For example, if the indicator is displaying gross weight, but **AUTO** peak hold is active, the display remains in gross, but the net peak weight is automatically printed when standstill is achieved at net zero.



**Note** Setpoint, time and date, and checkweigh value changes from weigh mode (press and hold the **UNITS** key), accumulator display (press and hold the **G/N** key), keyed tare display (press and hold the **TARE** key), and password entry front panel entry modes timeout after 10 seconds if there is no activity.

## 2.0 Installation

This section describes procedures for connecting load cells, digital I/O, and serial communications cables to the 520 indicator. Instructions for field installation of the analog output option and replacement of the CPU board are included, along with assembly drawings and parts lists for the service technician.



- *Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working inside the indicator enclosure.*
- *This unit uses double pole/neutral fusing which could create an electric shock hazard. Procedures requiring work inside the indicator must be performed by qualified service personnel only.*
- *The supply cord serves as the power disconnect for the 520. The power outlet supplying the indicator must be installed near the unit and be easily accessible.*

### 2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the 520 to ensure all components are included and undamaged. The shipping carton should contain the indicator, this manual, and a parts kit. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

#### 2.1.1 Stainless Steel Panel Mount Model Parts Kit

The following items are found in the stainless steel panel mount model parts kit:

- Capacity label (PN 94422).
- Four 8-32NC x 1/4 machine screws (PN 71522).
- Seven 10-32NFx machine screws (PN 82425).
- One 8-32NC hex kep nut (PN 14626).
- One welded clinching bracket (PN 69787).
- One 7-position screw terminal (PN 71343)
- Two 10-position screw terminals (PN 71344).
- One 1/4-28NF slotted, drilled fillister head (PN 42640).
- One three-position terminal block (PN 15888).
- One stainless steel backing plate (PN 82426).

#### 2.1.2 Desktop Model Parts Kit

The following items are found in the desktop model parts kit:

- Two 8-32NC hex kep nut (PN 14626)
- Two No. 8, Type A lock washers (PN 15134)
- Two 1/4 x 1/2 x 1/32 nylon washers (PN 32394)
- Two 1/4 - 20, 2-prong black knobs (PN 68403)
- Capacity label (PN 42350)
- One 7-position screw terminal (PN 71343)
- Two 10-position screw terminals (PN 71344).

### 2.2 Panel Mount Installation

Use the dimensions shown in Figure 2-1 on page 7 to lay out the panel cutout for the stainless steel panel mount enclosure. Use the dimensions shown in Figure 2-2 on page 7 to lay out the panel cutout for the desktop model enclosure. See Figure 2-3 on page 8 and Figure 2-4 on page 8 for enclosure dimensions.

#### Stainless Steel Panel Mount Installation

Once the cutout has been prepared, slide the enclosure into the cutout from the front of the panel. Slide the clinching bracket around the enclosure from inside the panel. Secure the bracket to the enclosure using the four 3/16" screws provided in the parts kit (PN 45386), then use the five 5/8" screws (PN 71523) to secure the clinching bracket to the panel door.

#### Desktop Panel Mount Installation

Once the cutout has been prepared, slide the enclosure into the cutout from the front of the panel. Secure the clinching brackets to the enclosure, then use the four screws from the parts kit (PN 78425) to secure the clinching brackets to the panel door.

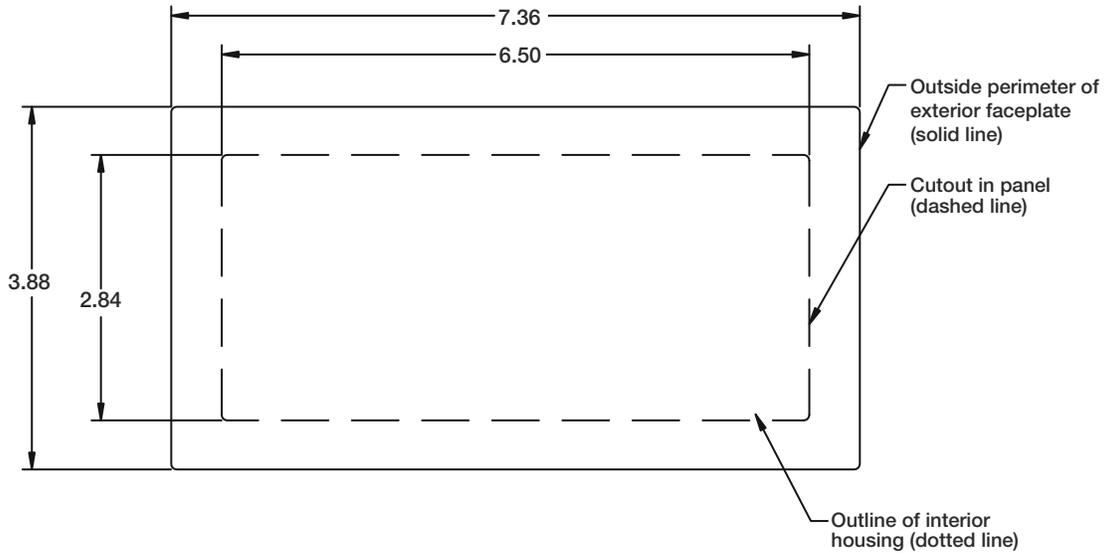


Figure 2-1. 520 Stainless Steel Panel Mount Cut Out

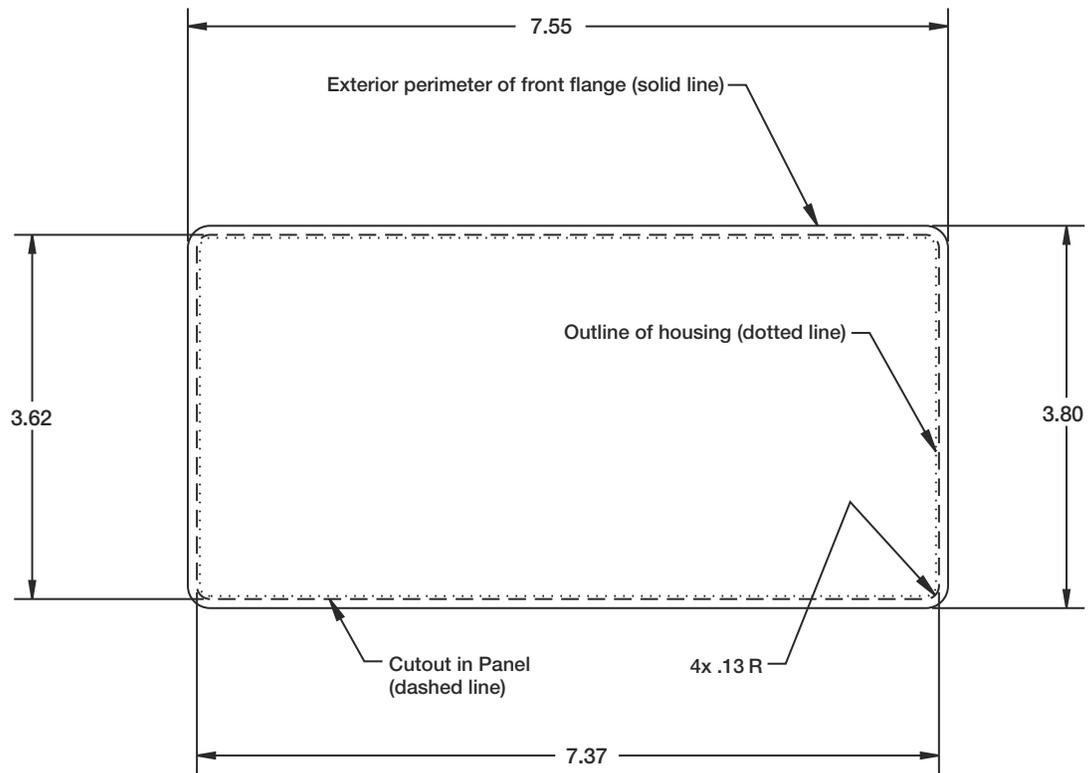


Figure 2-2. 520 Desktop Model Panel Mount Cut Out

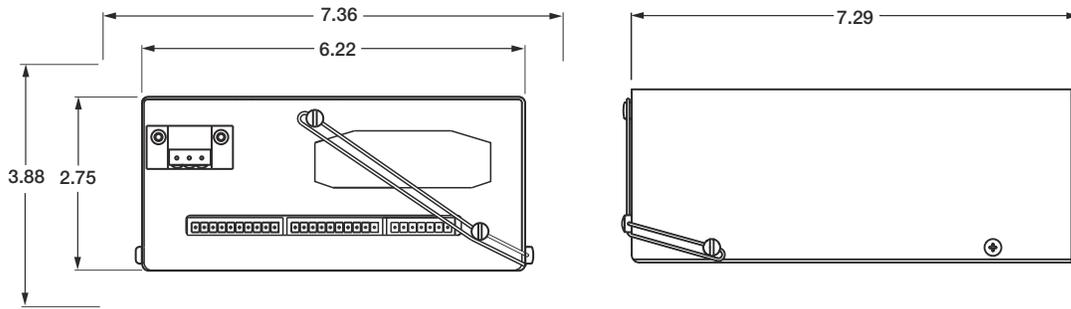


Figure 2-3. 520 Stainless Steel Panel Mount Dimensions

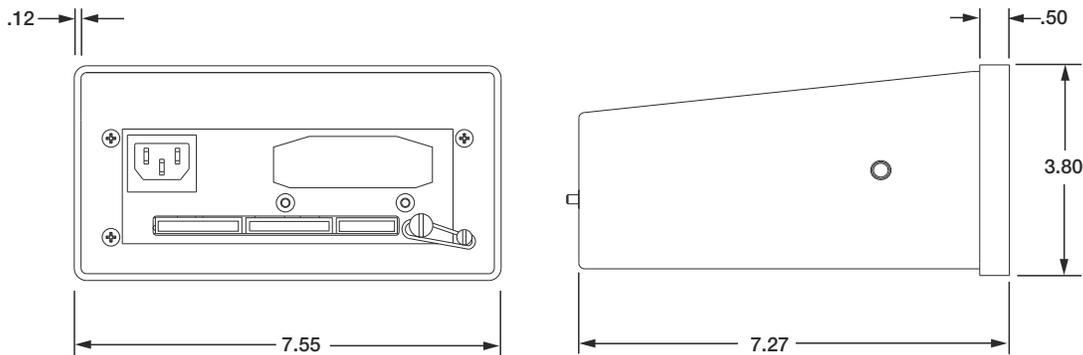


Figure 2-4. 520 Desktop Dimensions

## 2.3 Enclosure Disassembly

Enclosure disassembly is not required to make connections for load cells, serial communications, or digital I/O. These connectors are all externally mounted on the back of the indicator.

### Stainless Steel Panel Mount Model Disassembly

To remove the enclosure cover of the 520 panel mount model indicator, loosen and remove four Phillips head screws on outside of indicator (see Figure 2-9 on page 15).

### Desktop Model Disassembly

To remove the enclosure cover of the 520 desktop model indicator, loosen and remove four Phillips head screws on back of indicator. Slide the enclosure off of the interior tray assembly of the indicator (see Figure 2-10 on page 16).



**WARNING** The 520 has no on/off switch. Before opening the unit, ensure the power cord is disconnected from the power outlet.

## 2.4 Cable Connections

The 520 has three external connectors, a terminal connector for the power cord (the desktop has inlet connector), and a cutout for installed options. Enclosure disassembly is not required to make connections to load cells, communications, digital inputs, and digital outputs. These connectors are all externally mounted on the back of the indicator.

Cable connections for installed options use a cable assembly with a cover plate over the backplate cutout. See Table 2-1 for option card addendum part numbers.

Option	Addendum Part Number
BCD	76127
Remote I/O	69950
DeviceNet	69949
Profibus DP	69948
Ethernet	72117

Table 2-1. Option Card Addendum

### 2.4.1 Load Cells

To attach cable from a load cell or junction box, route the cable to the external J6 connector. Wire the load cell cable from the load cell or junction box to connector J6 as shown in Table 2-2. If using 6-wire load cell cable (with sense wires), open the enclosure cover (see Section 2.3) and remove jumpers JP1 and JP2 before reinstalling connector J6. For 4-wire installation, leave jumpers JP1 and JP2 on.

Connector	Pin	Function
J6	1	+SIG
	2	-SIG
	3	+SENSE
	4	-SENSE
	5	+EXC
	6	-EXC
	7	SHIELD

For 6-wire load cell connections, remove jumpers JP1 and JP2.

Table 2-2. J6 Pin Assignments

### 2.4.2 Panel Mount Parts Kit, PN 82427

Power connections to the 520 Panel Mount are shown below. **This only applies to the panel mount.**

Part number 15888 is used to connect AC power to balloon number 12 of Figure 2-9 on page 15.

Attach the wires per the diagram shown below.

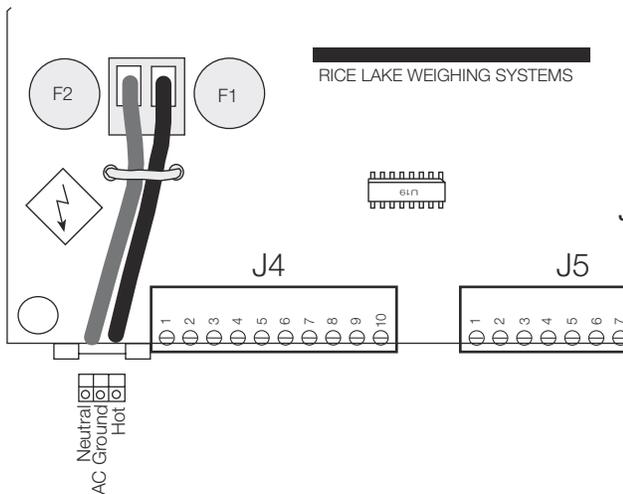


Figure 2-5. AC Power Cord Connection Location

### 2.4.3 Serial Communications

Attach serial communications cables to external connector J5. Connector J5 provides connections for the EDP (Electronic Data Processing) port, printer port, 20 mA current loop transmit signals, and RS-485 signals. Table 2-4 shows the pin assignments for connector J5.

### 2.4.4 Condec UMC2000 Conversion Connections

See Table 2-3 for information on load cell connections when replacing the Condec UMC2000 indicator with the 520 desktop model indicator.



**Note** Pin-outs and connectors for serial communications and BCD are the same for both units.

UMC2000	520 Desktop
1	5
2	2
3	1
4	6
5	3
6	4

Table 2-3. Load Cell Pin-outs

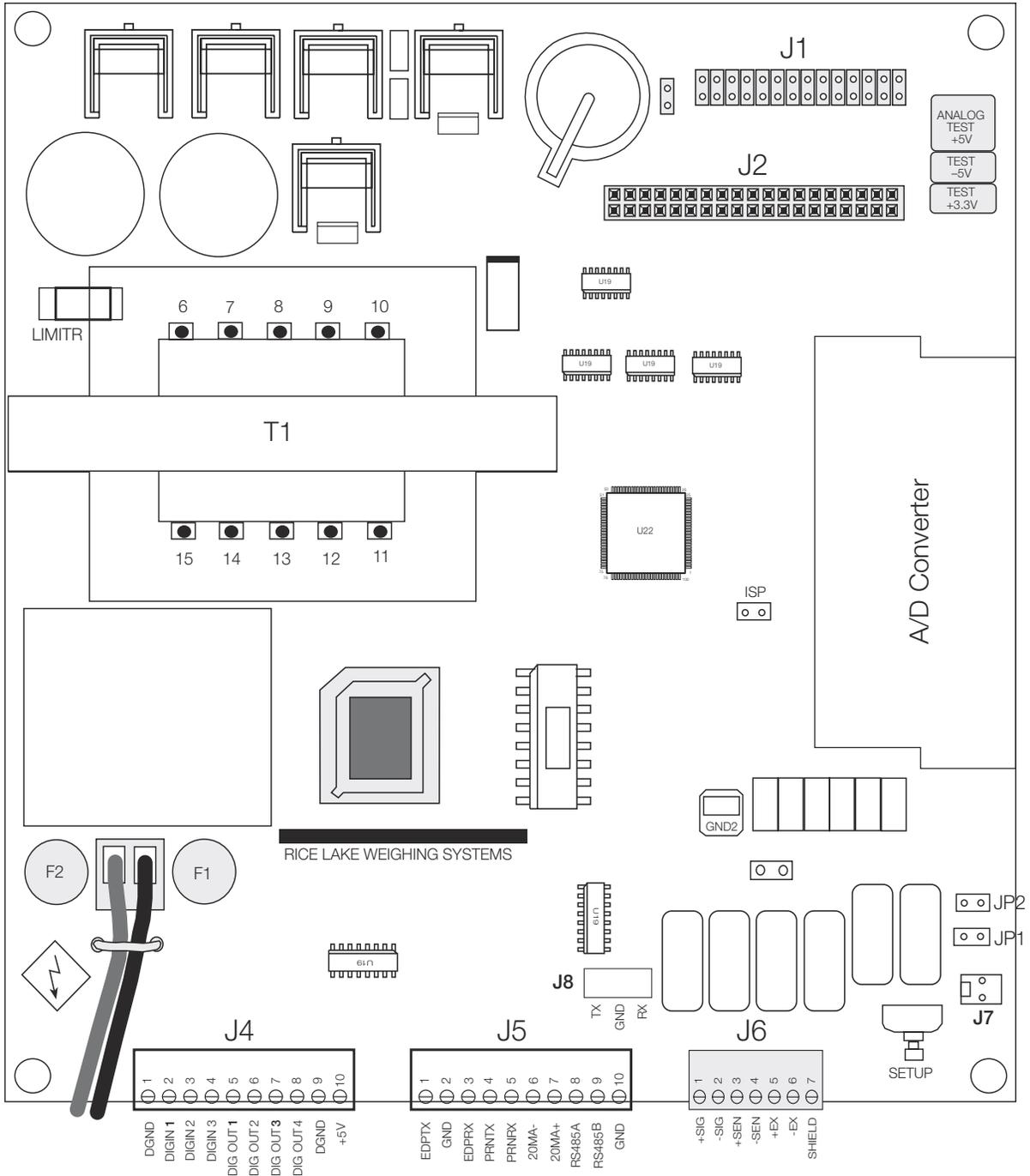


Figure 2-6. 520 CPU and Power Supply Board

The EDP port supports RS-232 or RS-485 communications; the printer port provides active 20 mA output and full-duplex RS-232 communications. Both ports are configured using the SERIAL menu. See Section 3.0 on page 17 for configuration information.

Connector	Pin	Signal
J5	1	EDP TxD
	2	GND
	3	EDP RxD
	4	Printer TxD
	5	Printer RxD
	6	-20 mA TxD
	7	+20 mA TxD
	8	RS-485A
	9	RS-485B
	10	GND

Table 2-4. J5 Pin Assignments

### 2.4.5 Ethernet Communications

Communications port J8 on the 520 CPU board is a special internal connection to the EDP port for RS-232 communications at up to 19200 bps. J8 can be used for wiring the Ethernet option card (PN 71986) to the 520 indicator.

Connector	Pin	Signal
J8	1	TXD
	2	GND
	3	RXD

Table 2-5. J8 Pin Assignments (Ethernet)

### 2.4.6 Digital I/O

Digital inputs can be set to provide many indicator functions, including all keypad functions. Digital inputs are active (on) with low voltage (0 VDC), inactive (off) at 5 VDC. Use the DIG IN menu to configure the digital inputs.

Digital outputs are typically used to control relays that drive other equipment. Outputs are designed to sink, rather than source, switching current. Each output is a normally open collector circuit, capable of sinking 250 mA when active. Digital outputs are wired to switch relays when the digital output is active (low, 0 VDC) with reference to a 5 VDC supply.

Use the SETPTS menu to configure digital outputs.

Table 2-6 shows the pin assignments for connector J4.

Connector	Pin	Signal
J4	1	GND
	2	DI1
	3	DI2
	4	DI3
	5	DO1
	6	DO2
	7	DO3
	8	DO4
	9	GND
	10	+5V

Table 2-6. J4 Pin Assignments (Digital I/O)

## 2.5 Analog Output Card Installation

To install or replace the analog output option card, open the 520 enclosure. See Table 2-1 on page 8 for option card addendum part numbers.

Mount the analog output card on its standoffs in the location shown in Figure 2-7 on page 12 and plug the card input into connector J2 on the 520 board. Connect the output cable to the analog output card as shown in Table 2-7. Set the mode select jumper for voltage or current output.

Use the ALGOUT menu to configure the analog output card when cabling is complete. See Section 12.12 on page 86 for analog output calibration procedures.

Pin	Signal
1	+ Current Out
2	- Current Out
3	+ Voltage Out
4	- Voltage Out

Table 2-7. Analog Output Card Pin Assignments

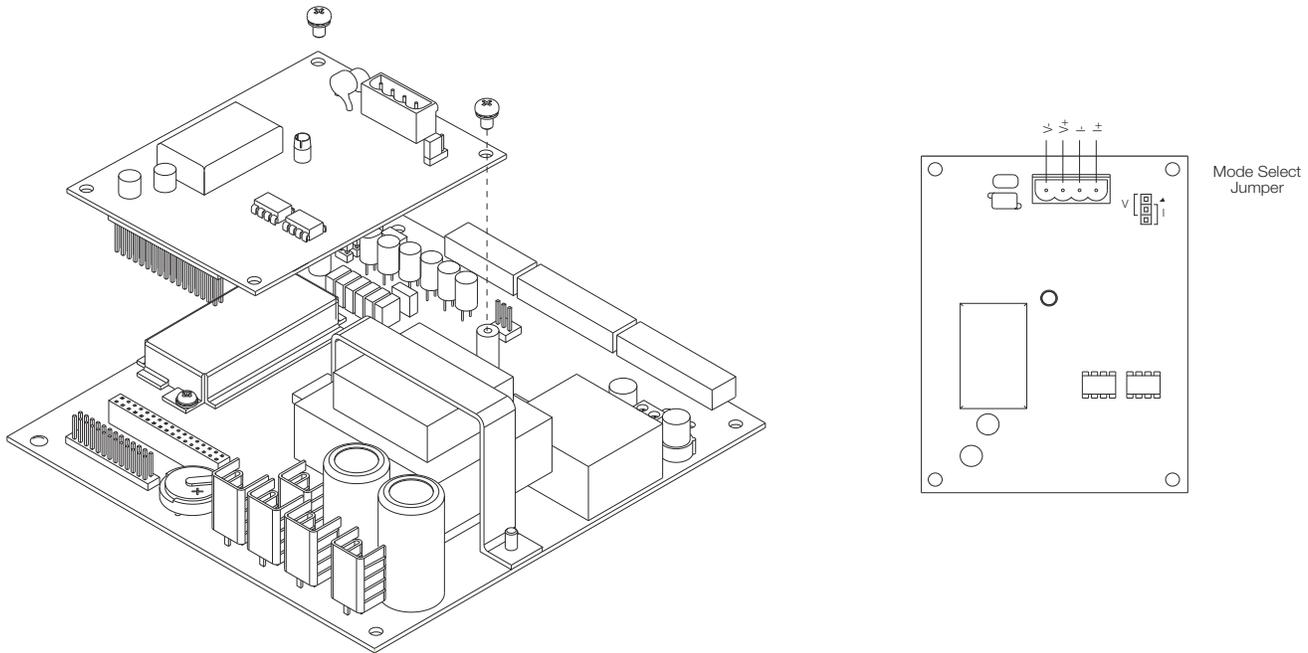


Figure 2-7. Analog Output Card Installation

## 2.6 CPU Board Removal

If you must remove the 520 CPU board, use the following procedure:

1. Disconnect power to the indicator.
2. Unplug connectors J6 (load cell cable), J5 (serial communications), and J4 (digital I/O). If an analog output board is installed, disconnect the analog output cable. See Figure 2-6 on page 10 for connector locations.
3. Unplug any installed option cards from the CPU board.
4. Remove brown and blue wire from J3 connector.
5. Unplug ribbon cable from J1.
6. Remove four Phillips head screws located in each corner of CPU board.
7. Carefully lift CPU board out of enclosure.

To replace the CPU board, reverse the above procedure. Be sure to reinstall cable ties to secure all cables inside the indicator enclosure.

## 2.7 Display Board Removal

If you must remove the 520 display board, use the following procedure:

1. Remove CPU board (see Section 2.6 above).
2. Remove four Phillips head screws in display board and carefully remove display board.

To replace the display board, reverse the above procedure. Be sure to reinstall cable ties to secure all cables inside the indicator enclosure.

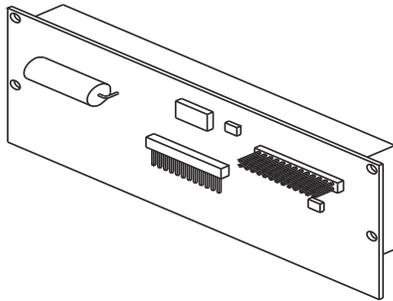
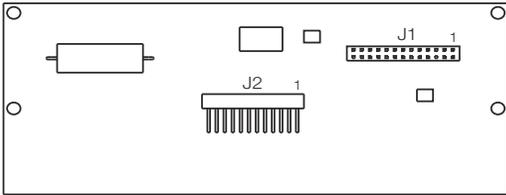


Figure 2-8. VFD Board

## 2.8 Battery Replacement

The lithium battery on the CPU board maintains the real-time clock and protects data stored in the system RAM when the indicator is not connected to AC power.

System RAM data includes prompts and keyboard locks. This information is lost if the battery loses power and the indicator is disconnected from AC power. To prevent loss of data, do the following:

- When battery voltage gets low, the indicator display shows *low bat*. Replace the battery when this warning is displayed. The battery should last seven years.
- Use the Revolution® configuration utility or EDP commands (see Section 9.1 on page 50) to store a copy of the indicator configuration on a PC before attempting battery replacement. If any data is lost, the indicator configuration can be restored from the PC.



### WARNING

*Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of unused batteries according to the manufacturer's instructions.*

## 2.9 Replacement Parts

Table 2-9 lists replacement parts common to both models of the 520, including all parts referenced in Figure 2-9 on page 15. Refer to Table 2-9 on page 16 for replacement parts specific to the desktop model.

Ref Number	PN	Description (Quantity)
1	41401	Enclosure (1)
1	68719	Faceplate gasket
2	68718	Membrane switch overlay
3	68717	Shroud
4	68716	Faceplate
5	75063	Board, assembly 115V
-	75064	Board, assembly 230V North America
-	75065	CPU board assembly, 230V European
7	42640	Screw, 1/4-28 NF x 1/4
8	15626	Cable, grip black PG9
9	15627	Locknut, black PCN9
10	14839	Screw, 6-32NC x 1/4
11	14822	Screw, 4-40NC x 1/4
12	69031	Power cord assembly
13	15631	Cable tie, 3 inch nylon
14	15134	Washer, lock no. 8, type A
15	45043	Ground wire, 4 inch w/no. 8 eye connector
16	14626	Kep nuts, 8-32NC hex (3)
17	14621	Kep nuts, 6-32NC hex (4)
18	16892	Earth ground label
-	50532	Bezel (1)
19	69091	Display ribbon cable
21	53308	Label roll, 1.25 x 1.25
22	69291	**CR1632 lithium coin battery
23	53307	Label, 4.000 x 2.875
24	54356	Screw, 8-32NC x 3/8
25	71001	Polycarbonate lens
-	45076	Bezel gasket (1)
27	71616	520 J1-J3 connector label
-	45484	**160 mA time-lag TR5 type fuse - 115V unit (Rev A, B, C, D)
-	68659	**315 mA time-lag TR5 type fuse-115V unit (Rev E and above) <sup>1</sup>
-	73001	**Fuse - 230V unit North American
-	45107	**Fuse - 230V unit European

\* Additional parts included in parts kit. See Section 2.1.1 on page 5 for additional parts information.



**\*\* To protect against the risk of fire, replace fuses only with same type and rating fuse. See Section 12.14 on page 87 for complete fuse specifications. There is a risk of explosion if battery is replaced by an incorrect type.**

Table 2-8. Panel Mount Replacement Parts

Revision E and higher boards use fuse 68659, 315mA to meet UL requirements.

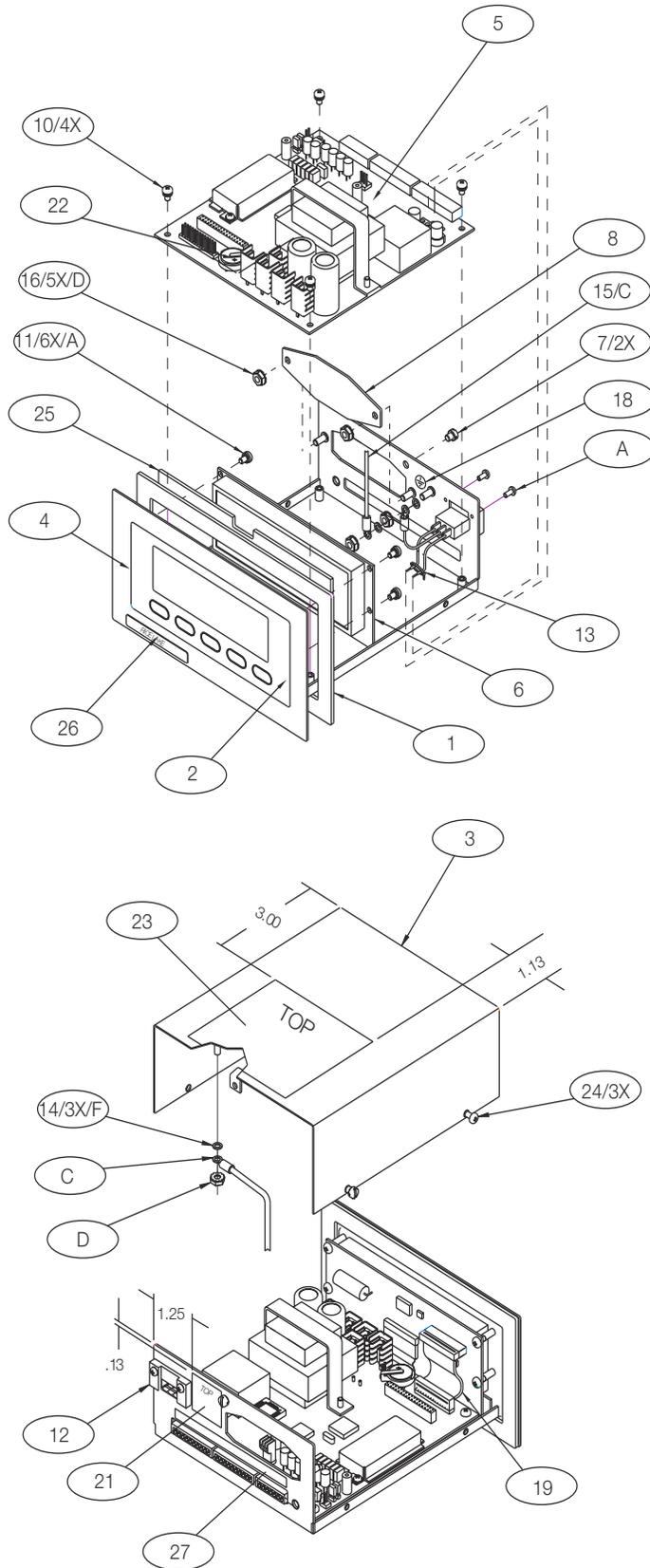


Figure 2-9. Stainless Steel Panel Mount Model Assembly

## 2.10 Replacement Parts (Desktop Model Specific)

Table 2-9 lists replacement parts specific to the 520 desktop model, including parts referenced in Figure 2-10 on page 16. Parts listed in Table 2-10 on page 16 are common to both models of the 520.

Ref Number	PN	Description (Quantity)
1	41401	Enclosure (1)
2	77198	Membrane switch overlay
3	77192	Enclosure
4	77193	Interior tray
—	15438	Power cord (NEMA 15-5)
—	72512	Power cord (ECC 7/7)
7	14857	8-32NC Phillips panhead screw (3)
8	71217	Drilled fillister head screw
15	40672	Ground wire, 9 in w/no. 8 eye connector
28	78745	AC input connector
29	78747	Blue wire assembly
30	78748	Brown wire assembly
31	32394	Nylon washer
32	68403	2 prong black knob
35	78856	Bushing
36	77195	Tilt stand

\* Additional parts included in parts kit. See Section 2.1.2 on page 6 for additional parts information for the 520 desktop model.

Table 2-9. Desktop Model Replacement Parts

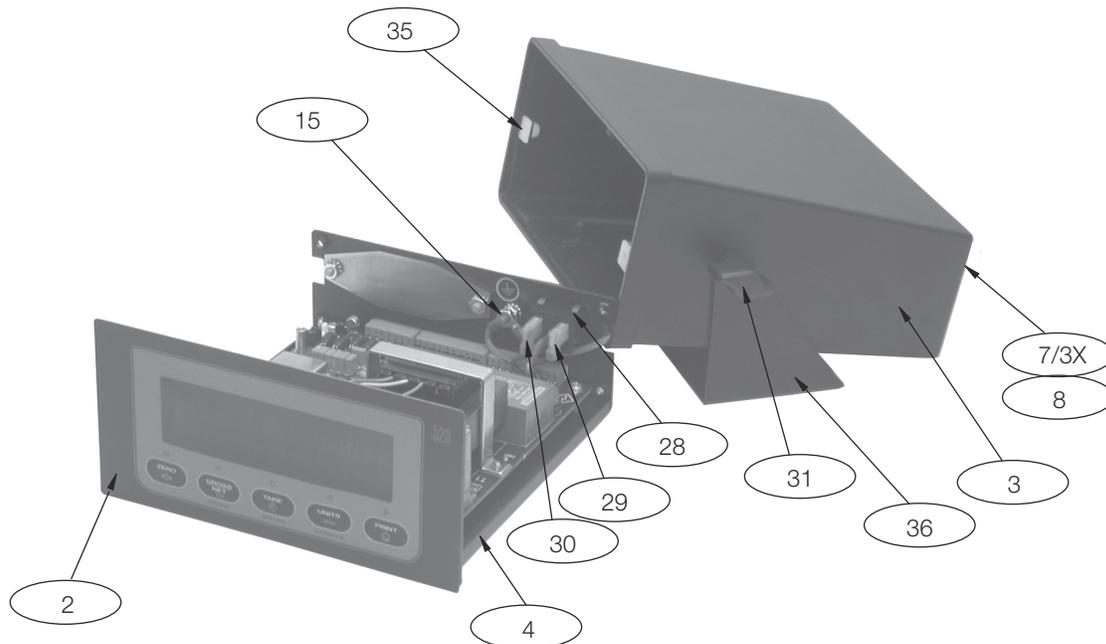


Figure 2-10. Desktop Model Assembly

## 3.0 Configuration

To configure the 520 indicator, the indicator must be placed in setup mode. The setup switch is accessed by removing the large fillister head screw on the enclosure backplate. 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 ten top-level menus used for configuring 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  $\Delta$  (ZERO) key to exit setup mode, then replace the setup switch access screw.

### 3.1 Configuration Methods

The 520 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 either the EDP command set described in Section 9.0 or Version 3.0 or later of the Revolution<sup>®</sup> configuration utility.

#### 3.1.1 Revolution Configuration

The Revolution configuration utility provides the preferred method for configuring the 520 indicator. Revolution runs on a personal computer to set configuration parameters for the indicator (see Section 5.0 on page 44). When Revolution configuration is complete, configuration data is downloaded to the indicator (see Section 5.3 on page 45). Figure 3-1 shows an example of one of the Revolution configuration displays.

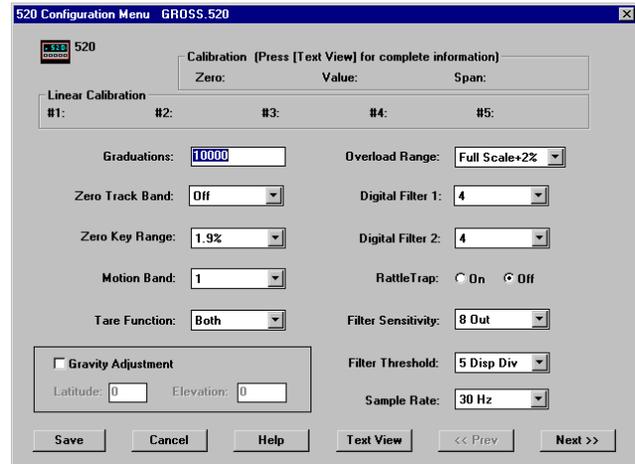


Figure 3-1. Sample Revolution Configuration Display

#### 3.1.2 EDP Command Configuration

The EDP command set can be used to configure the 520 indicator using either a personal computer or terminal. 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 9.0 on page 50 for more information about using the EDP command set.

### 3.1.3 Front Panel Configuration

The 520 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
FORMAT	Format
CALIBR	Calibration
SERIAL	Serial
PROGRM	Program
PFORMAT	Print Format
SETPTS	Setpoints
DIG IN	Digital Input
ALGOUT	Analog Output
VERSION	Version

Table 3-1. 520 Menu Summary

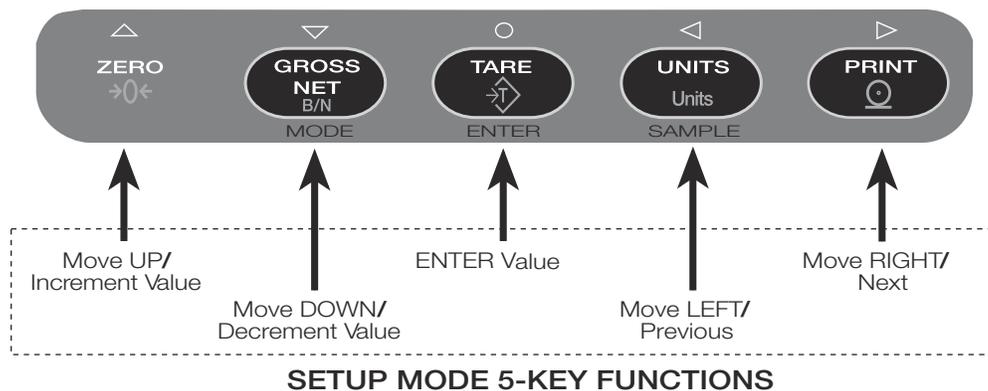
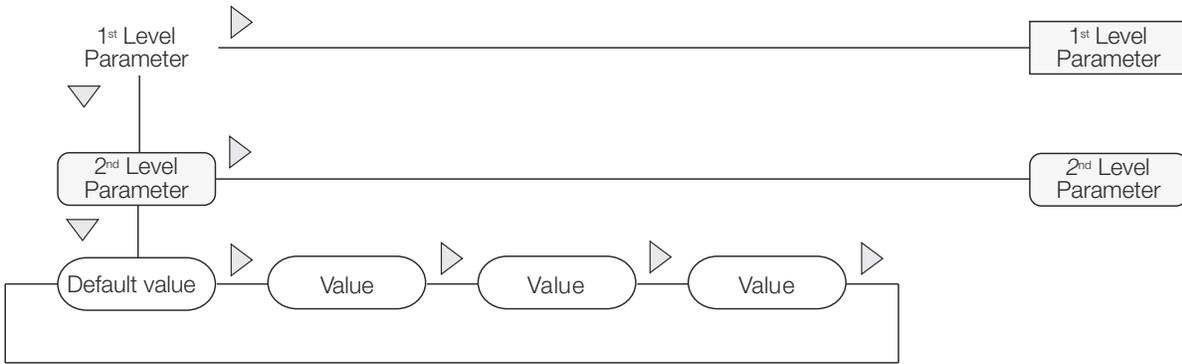


Figure 3-2. Five-Key Keypad Functions in Setup Mode

Four front panel keys are used as directional keys to navigate through the menus in setup mode (see Figure 3-2). 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 menu. A label over each of these keys identifies the direction provided by the key when navigating through the setup menus.



When moving through values below the first menu level, press  $\triangle$  to return to the level above. Press  $\circ$  or  $\nabla$  to move to the next parameter on the level above.

Figure 3-3. Setup Mode Menu Navigation

To select a parameter, press  $\triangleleft$  or  $\triangleright$  to scroll left or right until the desired menu group appears on the display, then press  $\nabla$  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  $\circ$  to select the value and move back up one level. To edit numerical values, use the navigation keys to select the digit and to increment or decrement the value.



When editing numeric values, press  $\triangleleft$  or  $\triangleright$  to change the digit selected. Press  $\triangle$  or  $\nabla$  to increment or decrement the value of the selected digit. If a decimal point is required in value, press  $\circ$  to view and move decimal point. Press  $\triangleleft$  or  $\triangleright$  to move decimal position. Press  $\circ$  to save the value entered and return to the level above.

Figure 3-4. Editing Procedure for Numeric Values

## 3.2 Menu Structures and Parameter Descriptions

The following sections provide graphic representations of the 520 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 and is bolded. Parameters shown surrounded by a dotted-line box only appear under the special circumstances explained under each box.

Most menu diagrams are accompanied by one or more tables that describe all parameters and parameter values associated with that menu option. Default parameter values are shown in bold type.

### 3.2.1 Configuration Menu

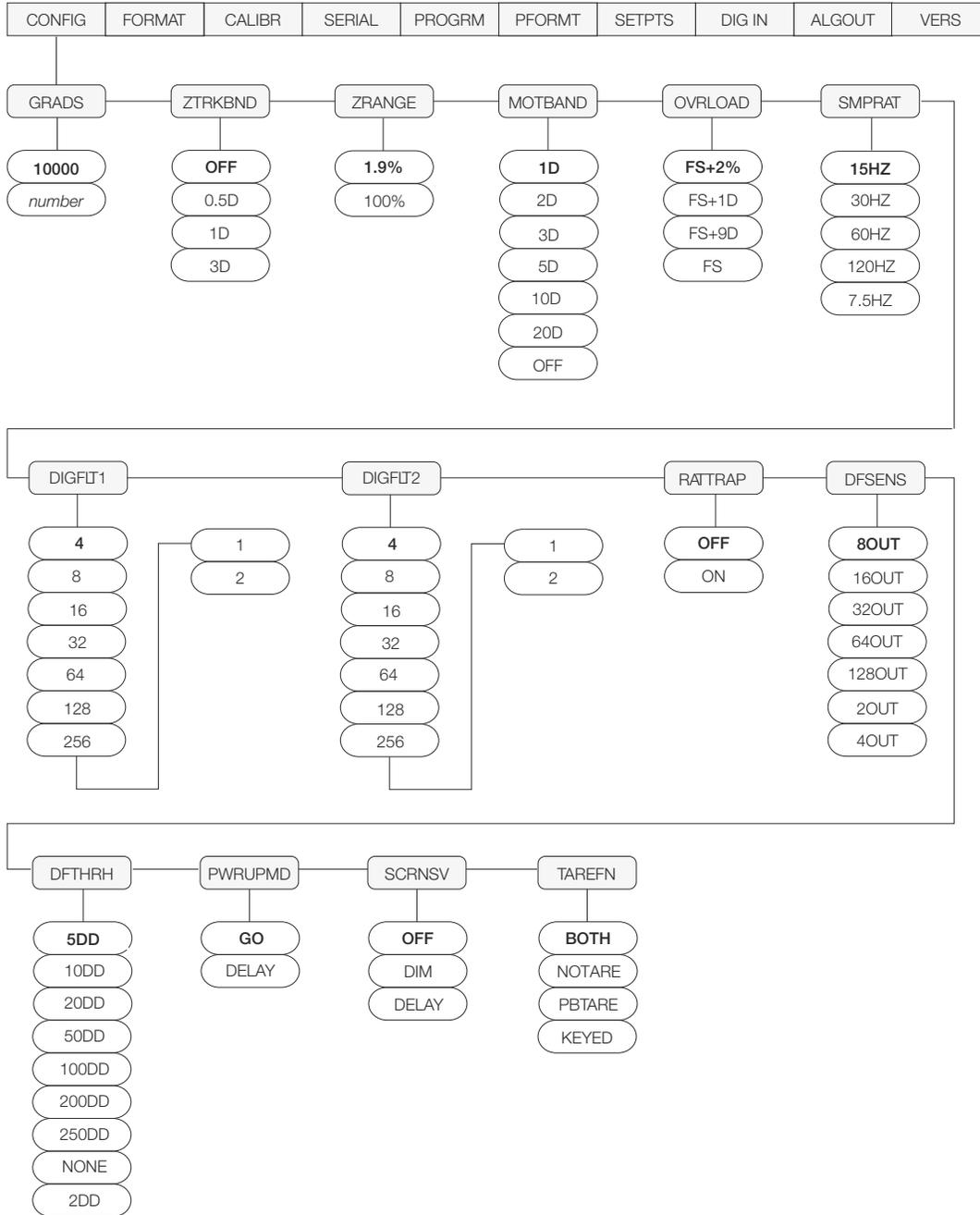


Figure 3-5. Configuration Menu

CONFIG Menu		
Parameter	Choices	Description
<i>Level 2 submenus</i>		
GRADS	<b>10000</b> <i>number</i>	Specifies the number of full scale graduations.  The value entered must be in the range 1–9 999 999 and should be consistent with legal requirements and environmental limits on system resolution.  To calculate GRADS, use the formula, $GRADS = Capacity / Display Divisions$ .  Display divisions for primary and secondary units are specified on the FORMAT menu.
ZTRKBND	<b>OFF</b> 0.5D 1D 3D	Automatically zeroes the scale when within the range specified, as long as the input is within the ZRANGE and scale is at standstill. Selections are ± display divisions. Maximum legal value varies depending on local regulations.
ZRANGE	<b>1.9%</b> 100%	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.
MOTBAND	<b>1D</b> 2D 3D 5D 10D 20D OFF	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.  If this parameter is set to OFF, the standstill annunciator does not light; operations normally requiring standstill (zero, tare, print) are performed regardless of scale motion. If OFF is selected, ZTRKBND must also be set to OFF.
OVRLOAD	<b>FS+2%</b> FS+1D FS+9D FS	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	<b>15HZ</b> 30HZ 60HZ 120HZ 7.5HZ	Sample rate. Selects measurement rate, in samples per second, of the analog-to-digital converter. Lower sample rate values provide greater signal noise immunity. If instability occurs, use lower sample rate to reduce signal noise.
DIGFLT1 DIGFLT2	<b>4</b> 8 16 32 64 128 256 1 2	Selects the digital filtering rate used to reduce the effects of mechanical vibration from the immediate area of the scale.  Choices indicate the number of A/D conversions per update 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.
RATTRAP	<b>OFF</b> ON	Enables RATTLETRAP® digital filtering. RATTLETRAP is most effective at filtering repeating vibrations caused by mechanical noise from nearby machines but may increase settling times over standard digital filter selections.
DFSSENS	<b>8OUT</b> 16OUT 32OUT 64OUT 128OUT 2OUT 4OUT	Digital filter cutout sensitivity. Specifies the number of consecutive readings that must fall outside the filter threshold (DFTHR parameter) before digital filtering is suspended.

Table 3-2. Configuration Menu Parameters

CONFIG Menu		
Parameter	Choices	Description
DFTHRH	5DD 10DD 20DD 50DD 100DD 200DD 250DD NONE 2DD	Digital filter cutout threshold. Specifies the filter threshold, in display divisions. When a specified number of consecutive scale readings (DFSSENS parameter) fall outside of this threshold, digital filtering is suspended. If NONE is selected, the filter is always enabled.
PWRUPMD	GO DELAY	Power up mode. In GO mode, the indicator goes into operation immediately after a brief power up display test.  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.
SCRNSV	OFF DIM DELAY	Screen saver mode. Possible values are:  OFF: Display remains at brightest setting. Use for bright environments. DIM: Display is dimmed to half brightness. Use for darker environments. DELAY: Display is dimmed after an interval of about 15 minutes if no key is pressed and no scale motion is detected. Display is restored to full brightness and the screen saver timer restarted by any key press or scale motion.
TAREFN	BOTH NOTARE PBTARE KEYED	Enables or disables push-button and keyed tares. Possible values are:  BOTH: Both push-button and keyed tares are enabled NOTARE: No tare allowed (gross mode only) PBTARE: Push-button tares enabled KEYED: Keyed tare enabled

Table 3-2. Configuration Menu Parameters (Continued)

### 3.2.2 Format Menu

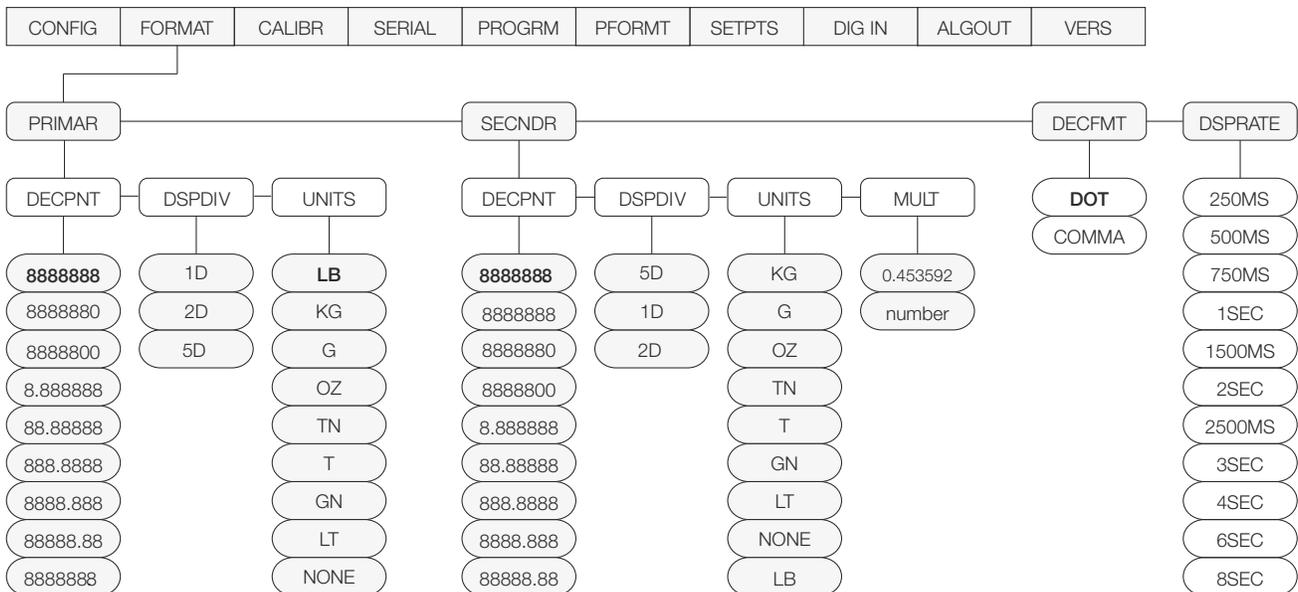


Figure 3-6. Format Menu

<i>FORMAT Menu</i>		
<b>Parameter</b>	<b>Choices</b>	<b>Description</b>
<b>Level 2 submenus</b>		
PRIMAR	DECPNT DSPDIV UNITS	Specifies the decimal position, display divisions, and units used for the primary units. See Level 3 submenu parameter descriptions.
SECNDR	DECPNT DSPDIV UNITS MULT	Specifies the decimal position, display divisions, units, and conversion multiplier used for the secondary units. See Level 3 submenu parameter descriptions.
DECFMT	<b>DOT</b> COMMA	Specifies whether decimal numbers are displayed using a period (DOT) or comma as the decimal symbol.
DSPRATE	<b>250MS</b> 500MS 750MS 1SEC 1500MS 2SEC 2500MS 3SEC 4SEC 6SEC 8SEC	Display rate. Sets the update rate for displayed values. Values are in milliseconds (MS) or seconds (SEC).
<b>Level 3 submenus</b>		
<b>Primary Units (PRIMAR Parameter)</b>		
DECPNT	<b>8888888</b> 8888880 8888800 8.888888 88.88888 888.8888 8888.888 88888.88 888888.8	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	<b>1D</b> 2D 5D	Display divisions. Selects the minimum division size for the primary units displayed weight.
UNITS	<b>LB</b> KG G OZ TN T GN LT NONE	Specifies primary units for displayed and printed weight. Values are: LB=pound; KG=kilogram; G=gram; OZ=ounce; TN=short ton; T=metric ton; GN=grain; LT=long ton.  NOTE: 230 VAC indicators are configured with KG for both primary and secondary units.

*Table 3-3. Format Menu Parameters*

<i>FORMAT Menu</i>		
Parameter	Choices	Description
<b>Secondary Units (SECNDR Parameter)</b>		
DECPNT	<b>888888.8</b> 8888888 8888880 8888800 8.888888 88.88888 888.8888 8888.888 88888.88	Decimal point location. Determines the location of the decimal point or dummy zeroes in the display.
DSPDIV	<b>5D</b> 1D 2D	Display divisions. Selects the value of minimum division size of the displayed weight.
UNITS	<b>KG</b> G OZ TN T GN LT NONE LB	Specifies primary units for displayed and printed weight. Values are: LB=pound; KG=kilogram; G=gram; OZ=ounce; TN=short ton; T=metric ton; GN=grain; LT=long ton.
MULT	<b>0.453592</b> <i>Enter other choices via keyboard</i>	Multiplier. Specifies the conversion factor by which the primary units are multiplied by to obtain the secondary units. The default is 0.453592, which is the conversion factor for changing pounds to kilograms. See Section 12.11 on page 85 for a list of multipliers.  To toggle between primary and secondary units, press the UNITS key.

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

### 3.2.3 Calibration Menu

See Section 4.0 on page 40 for calibration procedures.

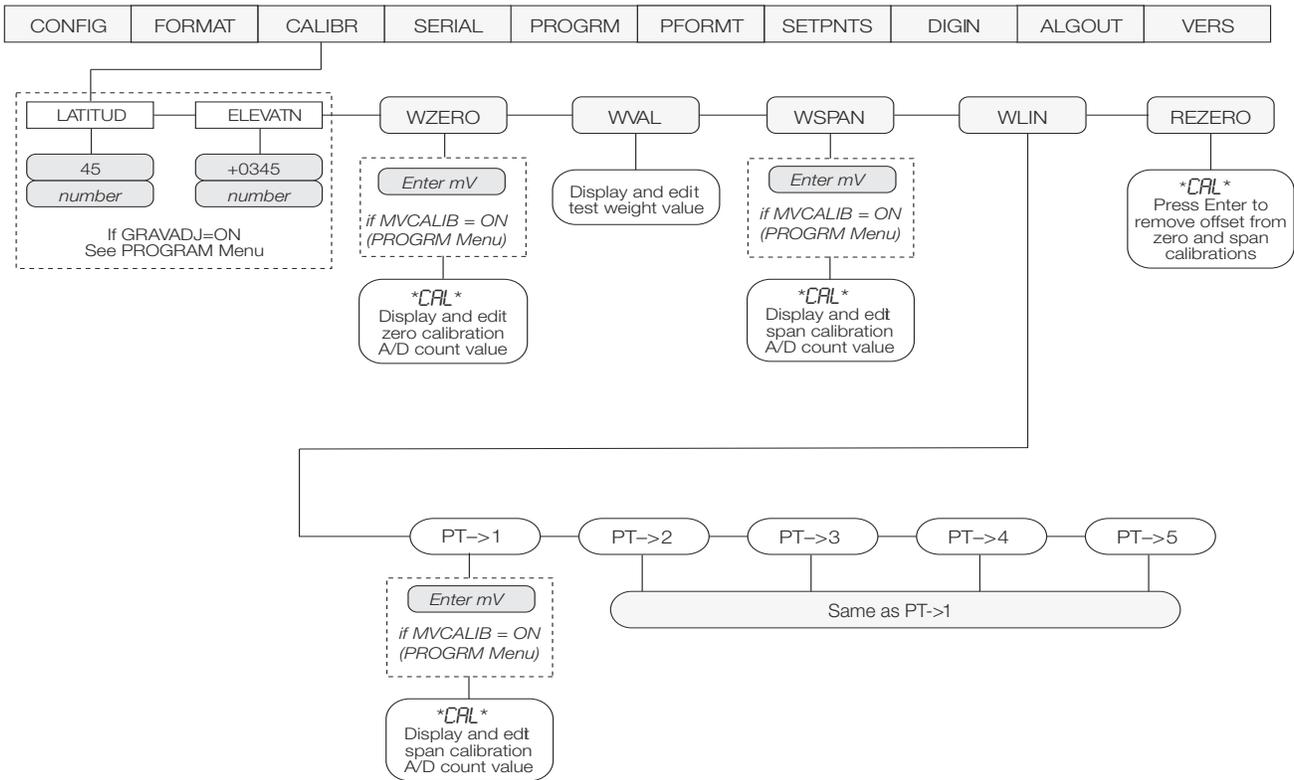


Figure 3-7. Calibration Menu

<i>CALIBR Menu</i>		
<b>Parameter</b>	<b>Choices</b>	<b>Description</b>
<b>Level 2 submenus</b>		
LATITUD	<b>45</b> 0-90	Press ENTER to display and edit the latitude for gravity adjustment to calibration.
ELEVATN	<b>+0345</b> - 9999 - +9999	Press ENTER to display and edit the elevation for gravity adjustment to calibration.
WZERO	—	Press ENTER to calibrate zero and display A/D count. Press ENTER again to move to next selection.  For millivolt calibration, press ENTER to display and edit the millivolt value at zero weight. Press ENTER again to display raw A/D count. Press ENTER a third time to move to WVAL.
WVAL	—	Press ENTER to display and edit the test weight value. Press ENTER again to move to WSPAN.
WSPAN	—	Press ENTER to calibrate the span and display A/D count. Press ENTER again to move to next selection.  For millivolt calibration, press ENTER to display and edit the millivolt value at span. Press ENTER again to display raw A/D count. Press ENTER a third time to move to WLIN.
WLIN	PT->1 — PT->5	Press ENTER to display and edit test weight value. Pressing ENTER again will calibrate and display the raw A/D value. Pressing ENTER a third time will move to the next calibration point.  For millivolt calibration, press ENTER to display and edit the test weight value. Press ENTER again to display and edit the millivolt value for that weight. Press ENTER a third time to calibrate and display the raw A/D value. Press ENTER the fourth time to move to the next point.
REZERO	—	Press ENTER to remove an offset value from the zero and span calibrations if hooks or chains are being used during calibration.  Always use this parameter after WZERO and WSPAN have been set to re-capture a new zero value. See Section 4.1 on page 41 for more information about using this parameter.

*Table 3-4. Calibration Menu Parameters*

### 3.2.4 Serial Menu

See Section 12.6 on page 76 for information about 520 serial data formats.

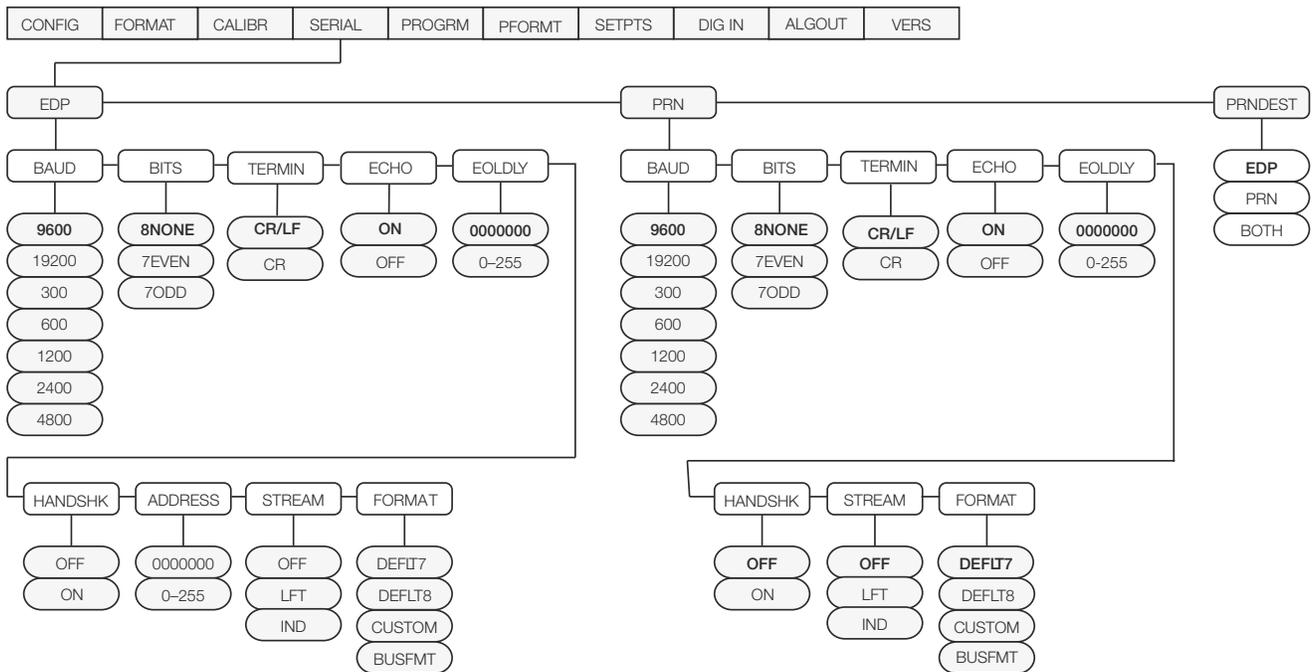


Figure 3-8. Serial Menu

SERIAL Menu		
Parameter	Choices	Description
<b>Level 2 submenus</b>		
EDP	<b>BAUD</b> BITS ECHO TERMIN EOLDLY HANDSHK ADDRESS STREAM FORMAT	Configure the EDP port. See Level 3 submenu parameter descriptions.
PRN	<b>BAUD</b> BITS ECHO TERMIN EOLDLY HANDSHK STREAM FORMAT	Configure the printer port. See Level 3 submenu parameter descriptions.
PRNDEST	<b>EDP</b> PRN BOTH	Print destination. Selects the port for data transmission when the PRINT key is pressed or the KPRINT EDP command is sent.

Table 3-5. Serial Menu Parameters

<i>SERIAL Menu</i>		
Parameter	Choices	Description
<b>Level 3 Submenus</b>		EDP Port
BAUD	<b>9600</b> 19200 300 600 1200 2400 4800	Baud rate. Selects the transmission speed for the EDP port.
BITS	<b>8NONE</b> 7EVEN 7ODD	Selects number of data bits and parity of data transmitted from the EDP port.
TERMIN	<b>CR/LF</b> CR	Termination character. Selects termination character for data sent from the EDP port.
ECHO	<b>ON</b> OFF	Allows the echo to be turned on or off.
EOLDLY	<b>0000000</b> 0-255	End-of-line delay. Sets the delay period, in 0.1-second intervals, from when a formatted line is terminated to the beginning of the next formatted serial output. Value specified must be in the range 0-255, in tenths of a second (10 = 1 second).
HANDSHK	<b>OFF</b> ON	Specifies whether XON/XOFF flow control characters are used.
ADDRESS	<b>0000000</b> 0-255	Specifies the decimal indicator address for RS-485 connections. RS-232 communications is disabled if an address other than zero is specified for this parameter. RS-485 addresses must be in the range 0-255.
STREAM	<b>OFF</b> LFT IND	Specifies whether data is streamed from the EDP port.  OFF: Data is not streamed from the EDP port LFT (Legal-for-Trade): Data is streamed at the display update rate IND (Industrial): Data is streamed at the A/D update rate
FORMAT	<b>DEFLT 7</b> DEFLT 8 CUSTOM BUS FMT	Specifies whether the serial port sends data using the default stream format (using either 7 or 8 weight digits), a custom stream format (configured in STRMFMT; see Figure 3-10 on page 34), or is streamed to a network bus (Profibus, Remote I/O, DeviceNet). For more specific information on CUSTOM stream format, see Table 12-5 on page 77. BUS FMT is only used with serial bus options.
<b>Level 3 Submenus</b>		Printer Port
BAUD	<b>9600</b> 19200 300 600 1200 2400 4800	Baud rate. Selects the transmission speed for the printer port.
BITS	<b>8NONE</b> 7EVEN 7ODD	Selects number of data bits and parity of data transmitted from the printer port.
TERMIN	<b>CR/LF</b> CR	Termination character. Selects termination character for data sent from the printer port.
ECHO	<b>ON</b> OFF	Allows the Print Echo to be turned on or off.
EOLDLY	<b>0000000</b> 0-255	End-of-line delay. Sets the delay period, in 0.1-second intervals, from when a formatted line is terminated to the beginning of the next formatted serial output. Value specified must be in the range 0-255, in tenths of a second (10 = 1 second).

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

<i>SERIAL Menu</i>		
<b>Parameter</b>	<b>Choices</b>	<b>Description</b>
HANDSHK	<b>OFF</b> ON	Specifies whether XON/XOFF flow control characters are used.
STREAM	<b>OFF</b> LFT IND	Specifies whether data is streamed from the printer port and the configuration.  OFF: Data is not streamed from the printer port LFT (Legal-for-Trade): Data is streamed at the display update rate IND (Industrial): Data is streamed at the A/D update rate
FORMAT	<b>DEFLT 7</b> DEFLT 8 CUSTOM BUS FMT	Specifies whether the serial port sends data using the default stream format (using either 7 or 8 weight digits), a custom stream format (configured in STRMFMT; see Figure 3-10 on page 34), or is streamed to a network bus (Profibus, Remote I/O, DeviceNet). For more specific information on CUSTOM stream format, see Table 12-5 on page 77. BUS FMT is only used with serial bus options.

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

### 3.2.5 Program Menu

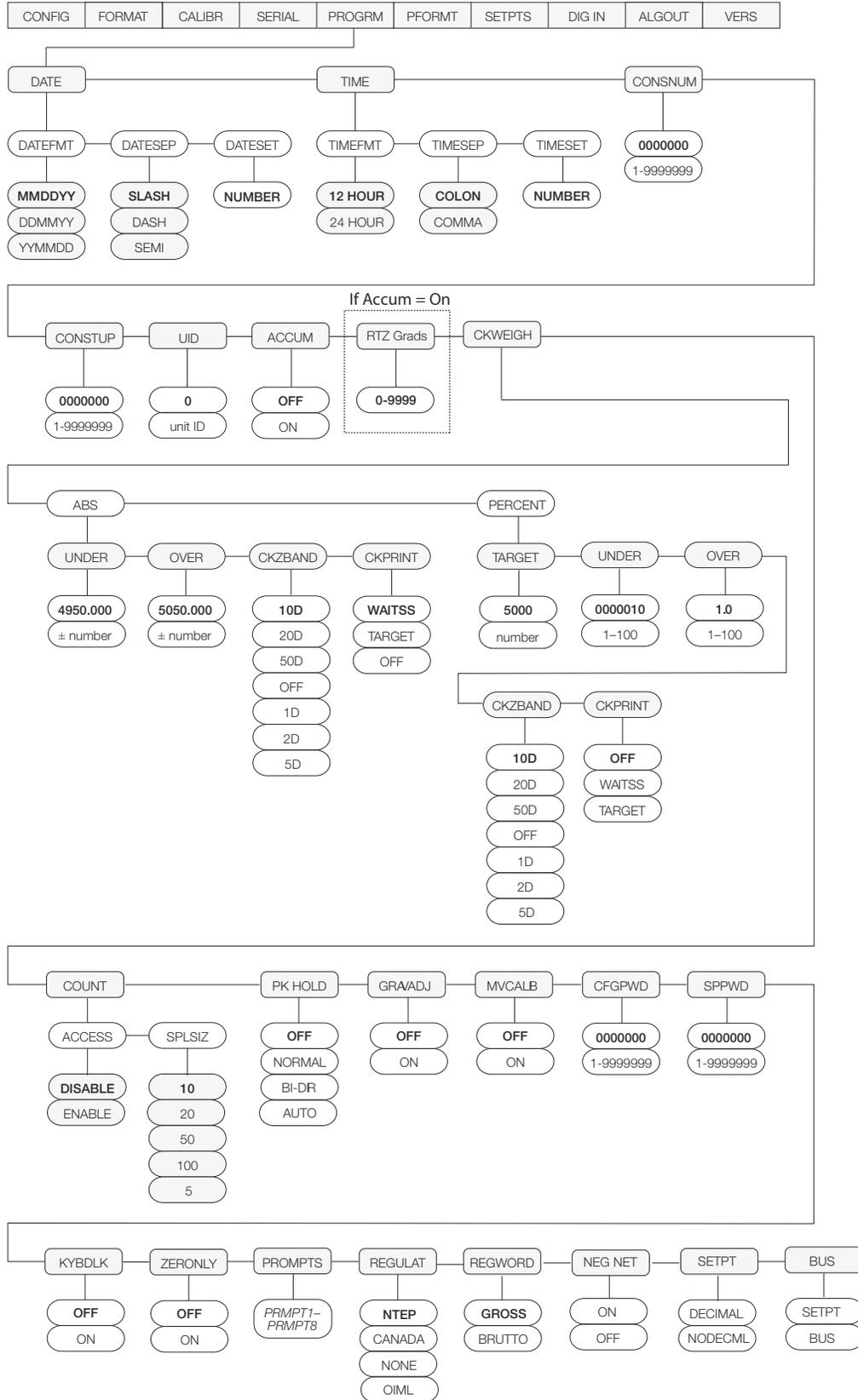


Figure 3-9. Program Menu

PROGRM Menu		
Parameter	Choices	Description
<b>Level 2 submenus</b>		
DATE	<b>DATEFMT</b> DATESEP DATESET	Allows selection of date format and date separator character. See Level 3 submenu parameter descriptions.  Use the DATESET parameter or the SD EDP command to set the date. See Section 9.0 on page 50 for information about using the EDP commands.
TIME	<b>TIMEFMT</b> TIMESEP TIMESSET	Allows selection of time format and separator character. See Level 3 submenu parameter descriptions.  Use the TIMESSET parameter or the ST EDP command to set the date. See Section 9.0 on page 50 for information about using the EDP commands.
CONSUM	<b>0000000</b> 1-9999999	Consecutive numbering. Allows sequential numbering for print operations. The consecutive number value is incremented following each print operation that includes <CN> in the ticket format. When the consecutive number is reset, it is reset to the value specified on the CONSTUP parameter, up to seven characters.
CONSTUP	<b>0000000</b> 1-9999999	Specifies the consecutive number start-up value used when the consecutive number is reset by sending the KCLRCN EDP command or a CLRCN digital input. Value specified must be in the range 0–9 999 999.
UID	<b>0</b> unit ID	Specifies the unit identification number. Value specified can be any alphanumeric value, up to seven characters.
ACCUM	<b>ON</b> <b>OFF</b>	Accumulator. Specifies whether the accumulator is enabled. If enabled, accumulation occurs whenever a print operation is performed.
RTZ GRADS	<b>0</b>	Return to zero grads allows a tolerance in grads in which the scale can Return To Zero+RTZ Grads to trigger the next accumulation.
CKWEIGH	<b>OFF</b> ABS PERCENT	Checkweigh. Specifies whether checkweigh is enabled and whether set for absolute or percent checkweigh. If set to a value other than OFF, setpoints are disabled. Digital output one will be active (ON) when the weight is within the UNDER range, digital output two will be active when the weight is in the ACCEPT range, and digital output three is active when the weight is within the OVER range (see Section 7.0 on page 47).
COUNT	<b>ACCESS</b> SPLSIZ	Specifies whether operator has access to piece count mode and the default sample size used for parts counting (see Section 6.0 on page 46). See Level 3 submenu parameter descriptions.
PK HOLD	<b>OFF</b> NORMAL BI-DIR AUTO	Peak hold function. Optional feature used to hold display of the highest net weight achieved during a weighing cycle (see Section 8.0 on page 49).
GRAVADJ	<b>OFF</b> ON	Gravity adjustment. Set LATITUD and ELEVATN parameters for the geographic location where the calibration is to take place (see Figure 3-7 on page 25 for these parameters). Compensates for the variance in gravitational pull from one location to another.
MVCALIB	<b>OFF</b> ON	Millivolt calibration. Allows entry of calibration values in mV.
CFGPWD	<b>0</b> 1-9999999	Configuration password. Specify a non-zero value to restrict access to all configuration menus.
SPPWD	<b>0</b> 1-9999999	Setpoint password. Specify a non-zero value to restrict access to the setpoint and checkweigh menus in operate mode.
KYBDLK	<b>OFF</b> ON	Keyboard lock. Specify ON to disable all front panel keys except SETUP.
ZERONLY	<b>OFF</b> ON	Zero key only. Specify ON to disable all front panel keys except ZERO in normal mode.  NOTE: Only the ZERONLY parameter can be specified as ON. Individual keys can be locked or unlocked using the KLOCK and KUNLOCK EDP commands (see Table 9-1 on page 50 for more information).

Table 3-6. Program Menu Parameters

<i>PROGRM Menu</i>		
<b>Parameter</b>	<b>Choices</b>	<b>Description</b>
PROMPTS	<i>PRMPT1– PRMPT8</i>	Specify prompts for use in setpoint names (up to 16 characters). Prompts are referenced by the NAME parameter under the SETPTS submenus; prompts appear in the secondary display area during setpoint execution for batch type setpoints.
REGULAT	<b>NTEP</b> CANADA NONE OIML	Regulatory mode. Specifies the regulatory agency having jurisdiction over the scale site. <ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul> <p>The value specified for this parameter affects the function of the front panel TARE and ZERO keys. See Section 12.5 on page 75 for a complete description of TARE and ZERO key functions for each of the regulatory modes.</p>
REGWORD	<b>GROSS</b> BRUTTO	Regulatory word for GROSS. Specifies GROSS or BRUTTO.
NEG NET	<b>ON</b> OFF	
SETPT	<b>DECIMAL</b> NODECML	Sets whether the setpoint values use a decimal point or not.
BUS	<b>LFT</b> IND	Sets the update rate of the Field Bus cards.
<b>Level 3 submenus</b>		
DATEFMT	<b>MMDDYY</b> DDMMYY YYMMDD	Specifies the format used to display or print the date.
DATESEP	<b>SLASH</b> DASH SEMI	Specifies the date separator character.
DATESET	<i>nnnnnn</i>	Enter date specified by the DATEFMT parameter.
TIMEFMT	<b>12HOUR</b> 24HOUR	Specifies the format used to display or print the time.
TIMESEP	<b>COLON</b> COMMA	Specifies the time separator character.
TIMESET	<i>nnnnnn</i>	Enter time specified by the TIMEFMT parameter.
ABS	<b>UNDER</b> OVER CKZBAND CKPRINT	Select checkpoints by giving absolute minimum and maximum weight values in primary units.
PERCENT	<b>TARGET</b> UNDER OVER CKZBAND CKPRINT	Select a target weight in primary units and enter the under/over values as a percent of the target. Specify values as a whole percent. Default is 10%.
ACCESS	<b>DISABLE</b> ENABLE	Operator access to piece count mode. Specify DISABLE if piece count mode will not be used. With access disabled, pressing the GROSS/NET (MODE) key toggles between gross and net modes only.

*Table 3-6. Program Menu Parameters (Continued)*

<i>PROGRM Menu</i>		
<b>Parameter</b>	<b>Choices</b>	<b>Description</b>
SPLSIZ	<b>10</b> 20 50 100 5	Sample size. Specify the default sample size used for counting scale operations. Sample size can be changed in counting mode during sample acquisition.
<b>Level 4 submenus</b>		
CKZBAND	<b>10D</b> 20D 50D OFF 1D 2D 5D	Check Zero Band. Specifies a band around gross zero in which the scale must pass in order to re-arm the TARGET autoprint and in which the digital outputs are set to OFF. Set in display divisions.
CKPRINT	<b>OFF</b> WAITSS TARGET	Check Print. Enables the autoprint feature. WAITSS and TARGET automatic print modes both perform automatic transmission of serial data whenever the scale settles out of motion within the ACCEPT band. WAITSS enables the autoprint feature when the scale goes into motion; TARGET enables autoprint whenever the scales enters then leaves the specified CKZBAND.

*Table 3-6. Program Menu Parameters (Continued)*

### 3.2.6 Print Format Menu

See Section 10.0 on page 61 for information about custom print formatting.

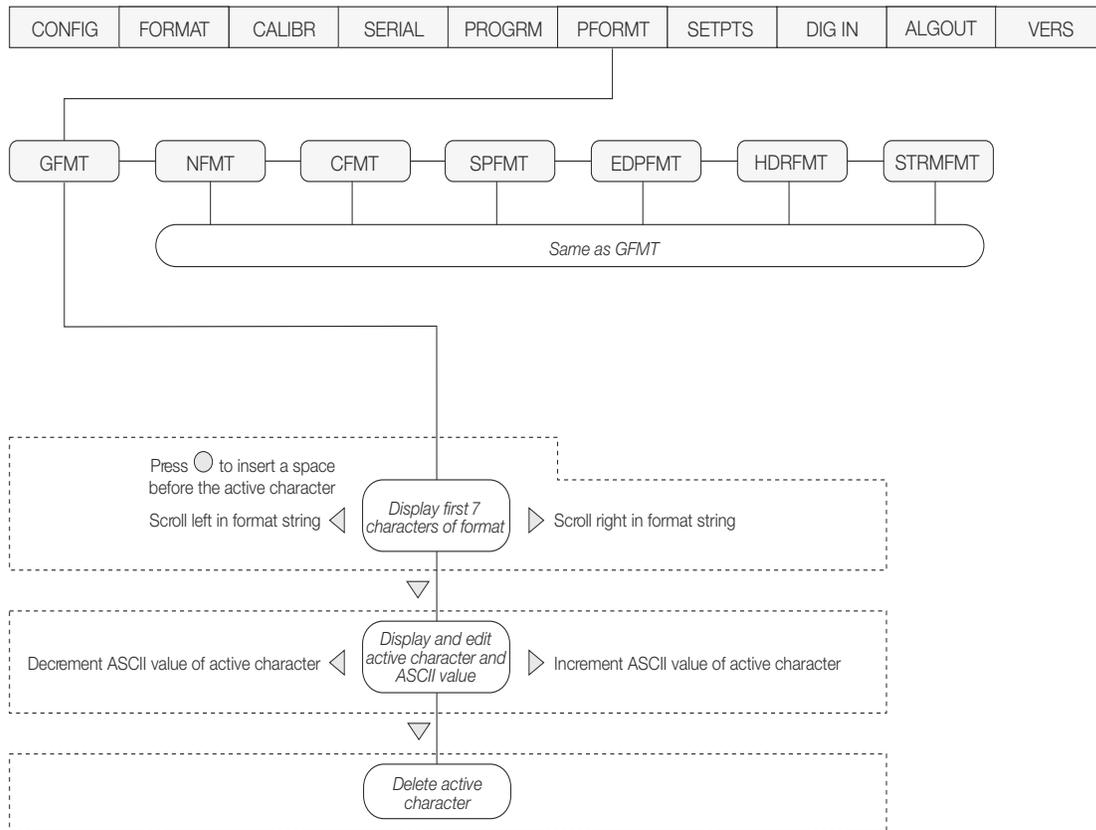


Figure 3-10. Print Format Menu

### 3.2.7 Setpoints Menu

See Section 11.0 on page 65 for more information about configuring and using setpoints.

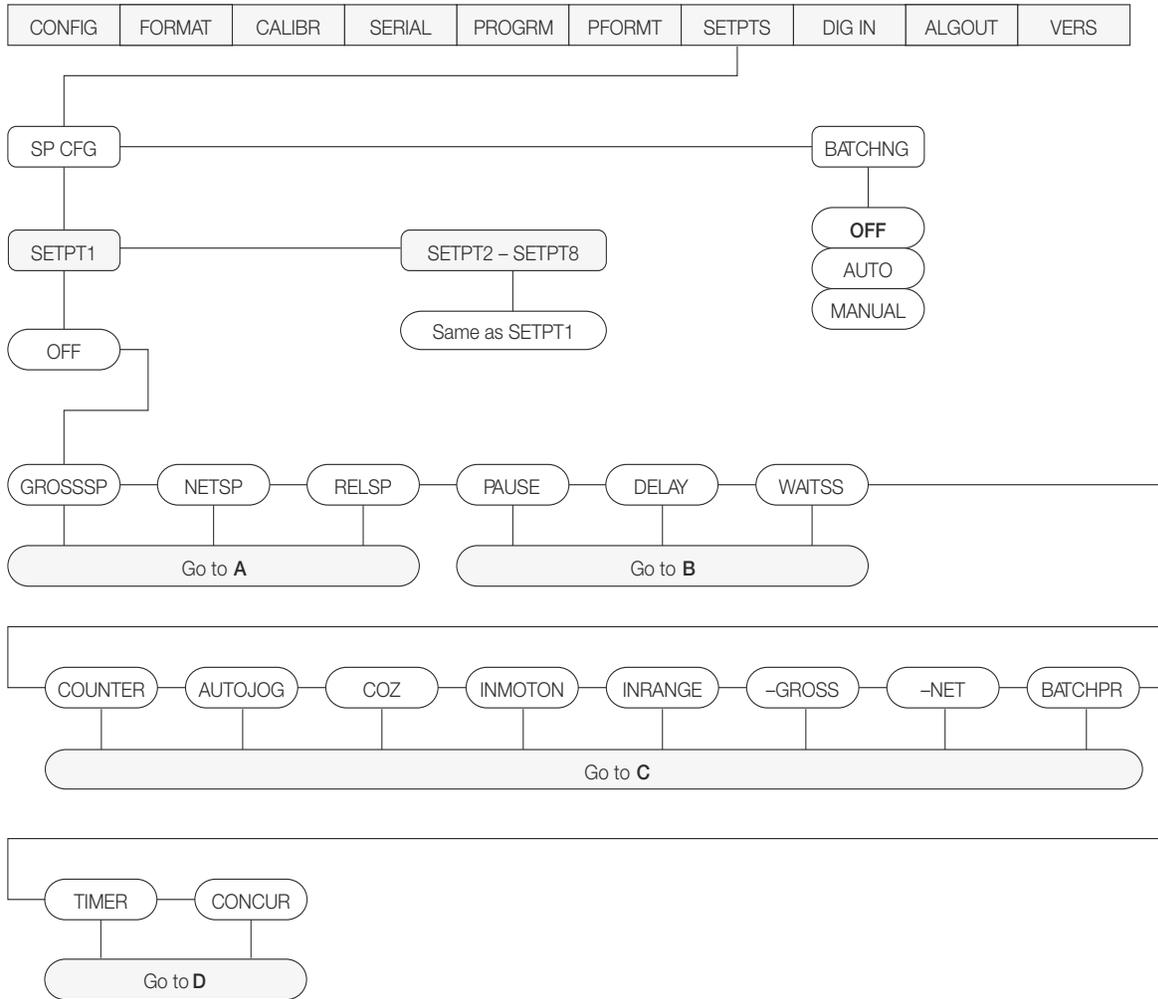


Figure 3-11. Setpoints Menu

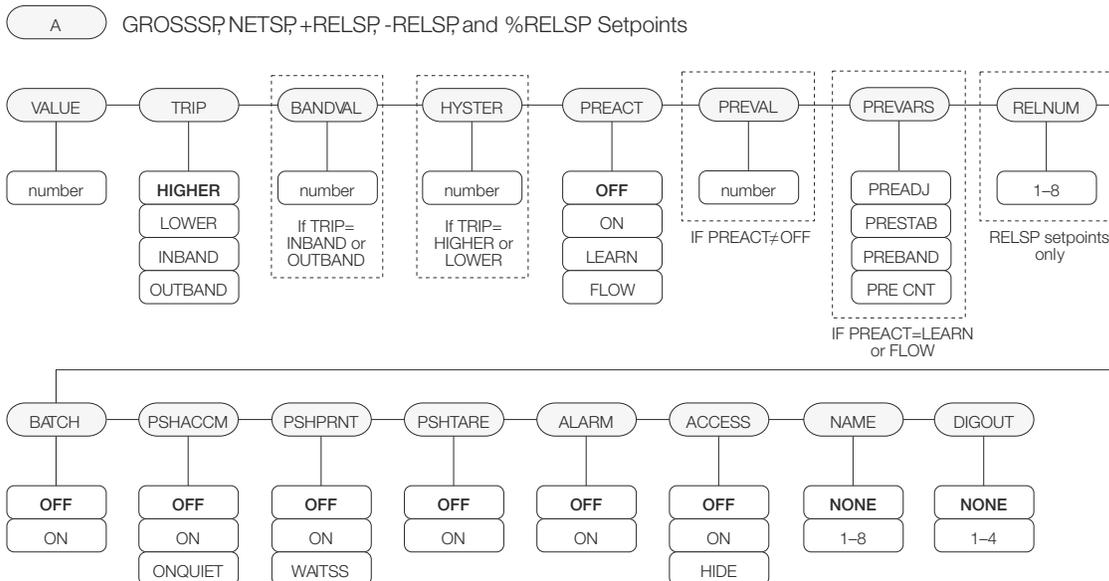


Figure 3-12. Submenu for GROSSSP, NETSP, and RELSP Setpoints

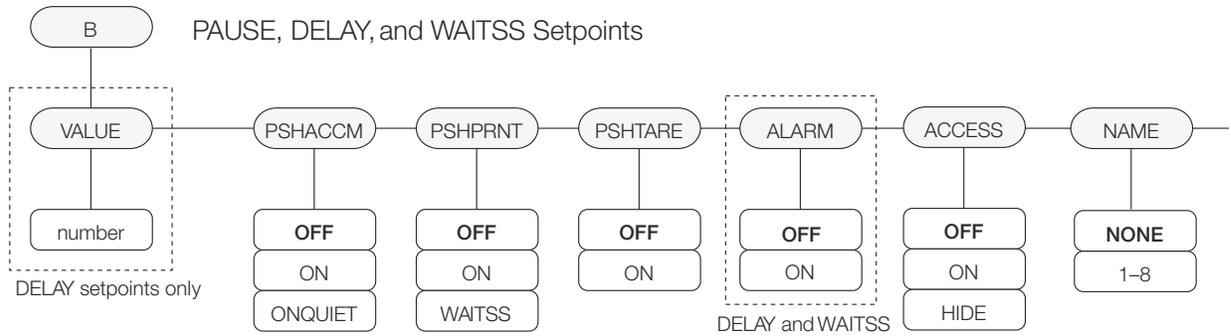


Figure 3-13. Submenu for PAUSE, DELAY, and WAITSS Setpoints

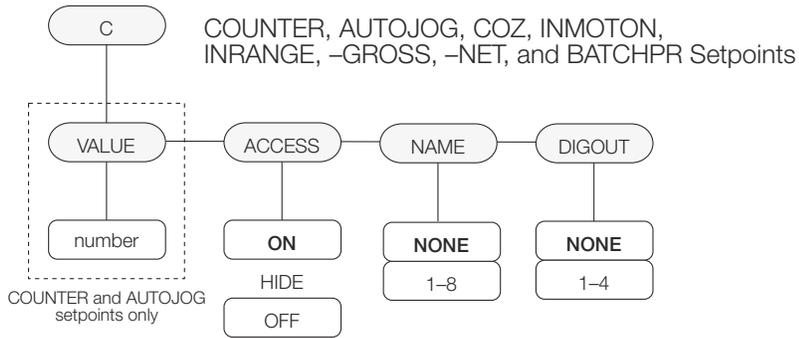


Figure 3-14. Submenu for COUNTER, AUTOJOG, COZ, INMOTON, INRANGE, -GROSS, -NET, and BATCHPR Setpoints

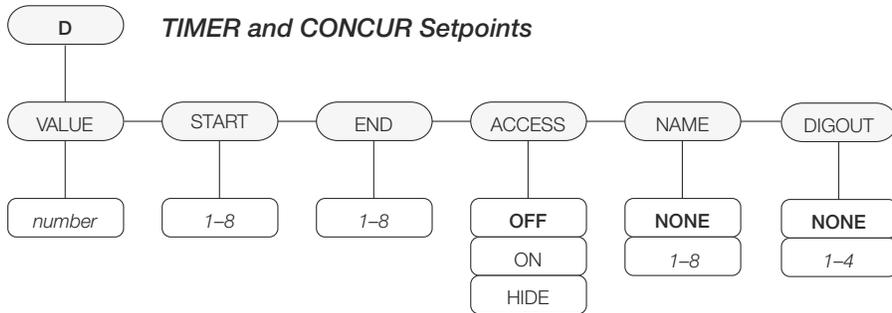


Figure 3-15. Submenu for TIMER and CONCUR Setpoints

SETPTS Menu		
Parameter	Choices	Description
<b>Level 2 submenus</b>		
SETPT1–SETPT8	<b>OFF</b> GROSSSP NETSP +RELS –RELS %RELS PAUSE DELAY WAITSS COUNTER AUTOJOG COZ INMOTON INRANGE –GROSS –NET BATCHPR TIMER CONCUR	Specifies the setpoint kind.  GROSSSP, NETSP, +RELS, –RELS, and %RELS setpoint kinds can be used as either batch or continuous setpoints.  PAUSE, DELAY, WAITSS, COUNTER, and AUTOJOG setpoint kinds can only be used in batch sequences.  COZ, INMOTON, INRANGE, –GROSS, –NET, BATCHPR, TIMER, and CONCUR setpoint kinds can only be used as continuous setpoints.  See Table 11-1 on page 65 for more information about setpoint kinds.
BATCHNG	<b>OFF</b> AUTO MANUAL	Batching enable. Set to AUTO or MANUAL to allow a batch sequence to run. MANUAL requires a BATSTRT digital input, BATSTART EDP command before the batch sequence can run. AUTO allows batch sequences to repeat continuously.

*Table 3-7. Setpoint Menu Parameters*



**Note** See Section 11.0 on page 65 for detailed information on setpoints.

### 3.2.8 Digital Input Menu

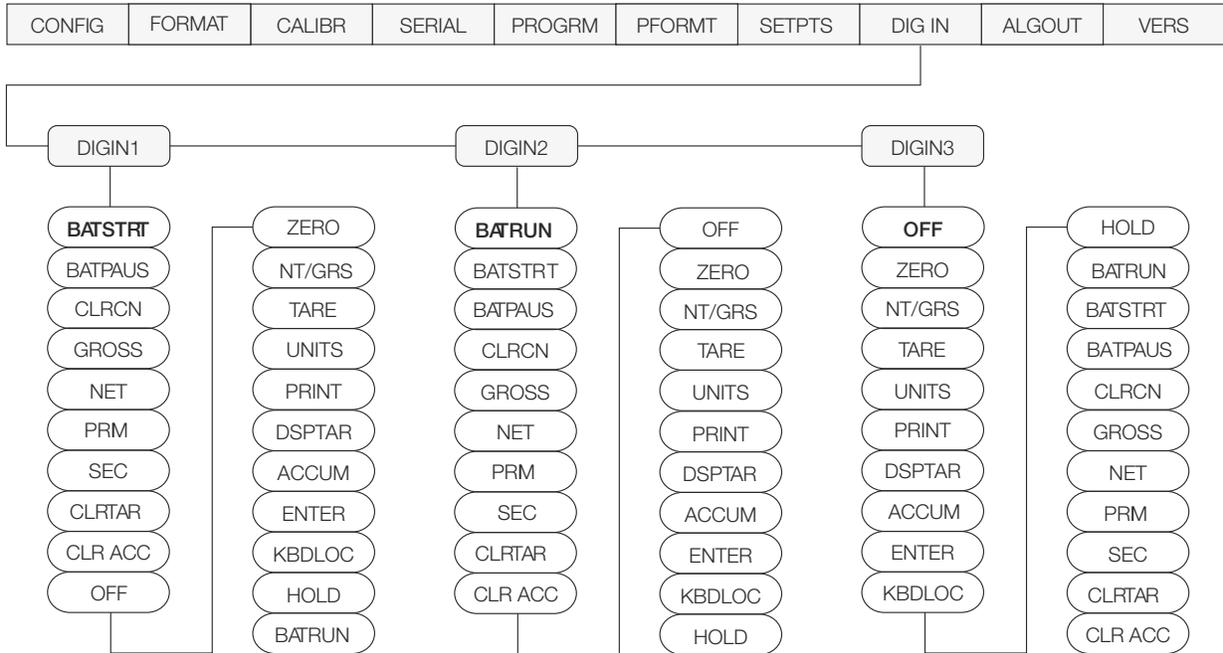


Figure 3-16. Digital Input Menu

DIG IN Menu		
Parameter	Choices	Description
<b>Level 2 submenus</b>		
DIGIN1 DIGIN2 DIGIN3	OFF ZERO NT/GRS TARE UNITS PRINT ACCUM DSPTAR ENTER KBDLOC HOLD BATRUN BATSTRT BATPAUS CLRCN GROSS NET PRM SEC CLRTAR CLRACC	<p>Specifies the function activated by digital inputs 1–3. Default values are: DIGIN1=BATSTRT; DIGIN2=BATRUN; DIGIN3=OFF.</p> <ul style="list-style-type: none"> <li>ZERO, NT/GRS (net/gross mode toggle), TARE, UNITS, and PRINT provide the same functions as the five front panel keys.</li> <li>ACCUM displays the current accumulator value.</li> <li>DSPTAR displays the tare.</li> <li>ENTER simulates pressing the ENTER key in weigh mode (for setpoint and checkweigh value changes from the front panel).</li> <li>BATRUN allows a batch routine to be started and run. With BATRUN active (low), the BATSTRT input starts the batch; if BATRUN is inactive (high), BATSTRT cancels the batch.</li> <li>BATSTRT starts or ends a batch routine, depending on the state of the BATRUN input.</li> <li>BATPAUS pauses a batch routine when held low.</li> <li>KBDLOC locks the keyboard (indicator front panel) when held low.</li> <li>HOLD holds the current display. Releasing this input clears the running average filter.</li> <li>CLRCN resets the consecutive number to the value specified on the CONSTUP parameter (PROGRAM menu).</li> <li>GROSS, NET, PRIM, and SEC select gross, net, primary units, or secondary units display modes.</li> <li>CLRTAR clears the current tare.</li> <li>CLRACC clears the accumulator.</li> </ul>

Table 3-8. Digital Input Menu Parameters

### 3.2.9 Analog Output Menu

The ALGOUT menu is used only if the analog output option is installed. If the analog output option is installed, configure all other indicator functions and calibrate the indicator before configuring the analog output. See Section 12.12 on page 86 for analog output calibration procedures.

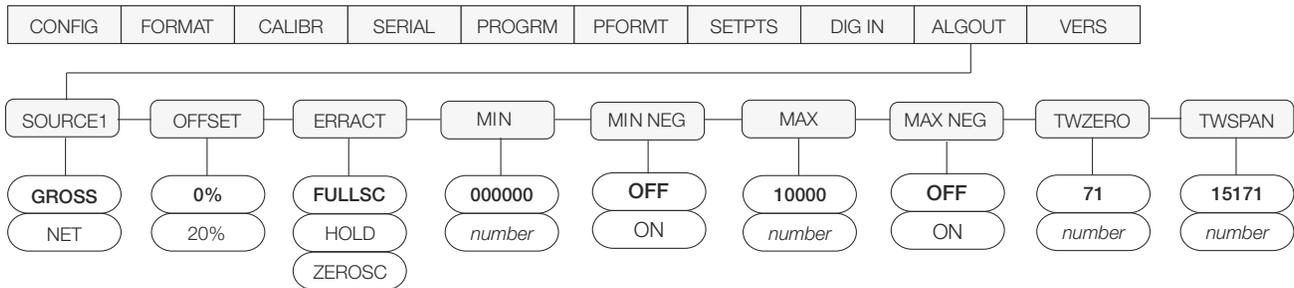


Figure 3-17. Analog Output Menu

ALG OUT Menu		
Parameter	Choices	Description
<b>Level 2 submenus</b>		
SOURCE1	<b>GROSS</b> NET	Specifies the source tracked by the analog output.
OFFSET	<b>0%</b> 20%	Zero offset. Selects whether the analog output supplies voltage (0–10 V) or current (4–20 mA) output. Select 0% for 0–10 V output; select 20% for 4–20 mA output.
ERRACT	<b>FULLSC</b> HOLD ZEROSC	Error action. Specifies how the analog output responds to system error conditions. Possible values are:  FULLSC: Set to full value (10 V or 20 mA) HOLD: Hold current value ZEROSC: Set to zero value (0 V or 4 mA)
MIN	<b>0.000000</b> number	Specifies the minimum weight value tracked by the analog output. Specify a value in the range 0–9999999.
MIN NEG	<b>OFF</b> ON	The analog output can be set to track negative scale weight values.
MAX	<b>10000.00</b> number	Specifies the maximum weight value tracked by the analog output. Specify a value in the range 0–9999999
MAX NEG	<b>OFF</b> ON	The analog output can be set to track negative scale weight values.
TWZERO	<b>000020</b> number	Tweak zero. Adjust the analog output zero calibration. Use a multimeter to monitor the analog output value. Press and hold $\Delta$ or $\nabla$ to adjust the output.
TWSPAN	<b>0062040</b> number	Tweak span. Adjust the analog output span calibration. Use a multimeter to monitor the analog output value. Press and hold $\Delta$ or $\nabla$ to adjust the output.

Table 3-9. Analog Output Menu Parameters

### 3.2.10 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.

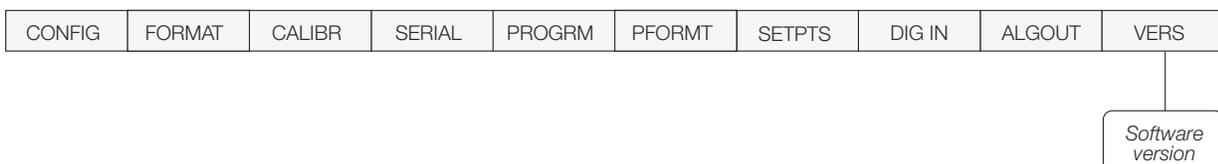


Figure 3-18. Version Menu

# 4.0 Calibration

The 520 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 five-point linearization
- Optional rezero calibration for test weights using hooks or chains.

The following sections describe the calibration procedure for each of the calibration methods (see Section 4.1 on page 41 for further explanation on calibration).

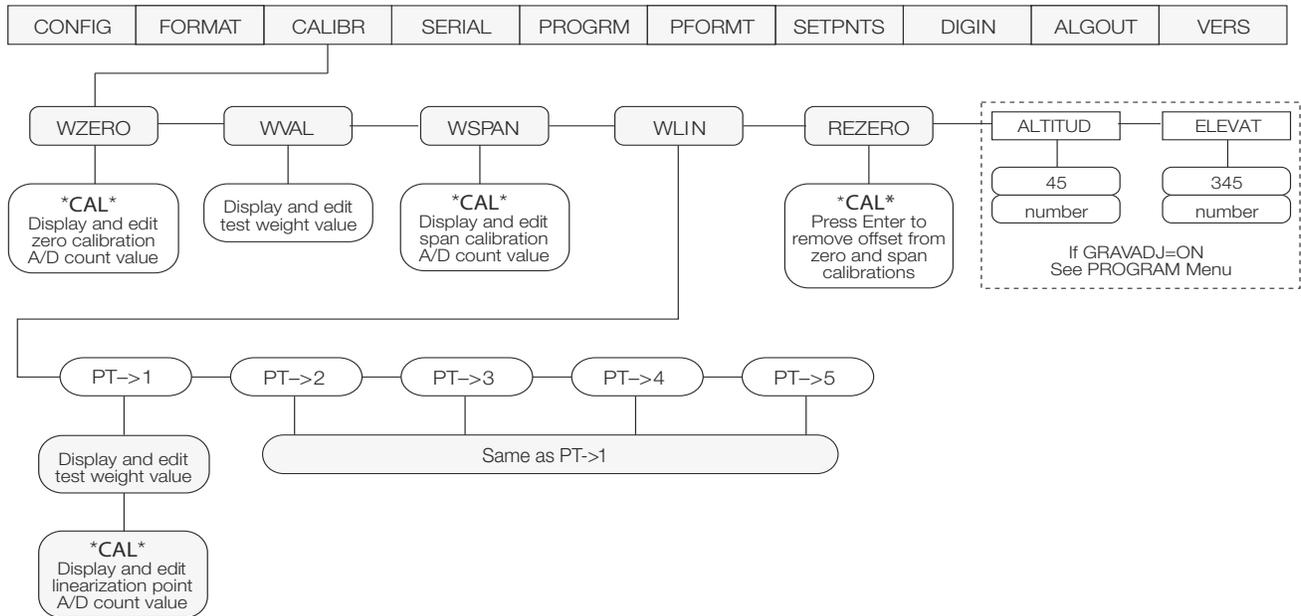


Figure 4-1. Calibration (CALIBR) Menu

## 4.1 Front Panel Calibration

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

1. Place the indicator in setup 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  $\blacktriangleright$  until the display reads *CALIBR* (see Figure 4-1). Press  $\blacktriangledown$  to go to zero calibration (*WZERO*).
3. Standard Calibration: With *WZERO* displayed, press  $\bigcirc$  to calibrate zero. The indicator displays \*CAL\* while calibration is in progress. When complete, the A/D count for the zero calibration is displayed. Press  $\bigcirc$  again to save the zero calibration value and go to the next prompt (*WVAL*).

Millivolt Calibration: To enable millivolt calibration, set *MVCALIB=ON* on the *PROGRM* menu (see Section 3.2.5 on page 30). Once enabled, press  $\bigcirc$  to display and edit millivolt value at zero weight (see Figure 4-2 on page 41), press  $\bigcirc$  again to calibrate and display raw A/D count, press  $\bigcirc$  the third time to move to the next selection.

4. With *WVAL* displayed, press  $\bigcirc$  to display the stored calibration weight value. Use the procedure shown in Figure 4-2 to enter the actual value of the test weights to be used for the span calibration. Press  $\bigcirc$  to store the entered *WVAL* value and advance to the next prompt (*WSPAN*).

0 0 0 0 0 0

When editing numeric values, press  $\blacktriangleleft$  or  $\blacktriangleright$  to change the digit selected. Press  $\blacktriangle$  or  $\blacktriangledown$  to increment or decrement the value of the selected digit. If a decimal point is required in value, press  $\bigcirc$  to view and move decimal point. Press  $\blacktriangleleft$  or  $\blacktriangleright$  to move decimal position. Press  $\bigcirc$  to save the value entered and return to the level above.

Figure 4-2. Editing Procedure for Numeric Values

5. With *WSPAN* displayed, place test weights on the scale and press  $\bigcirc$  to calibrate span. The indicator displays \*CAL\* while calibration is in progress. When complete, the A/D count for the span calibration is displayed. Press  $\bigcirc$  to store the span calibration value and advance to the next prompt (*WLIN*).

Millivolt Calibration: If millivolt calibration is enabled, press  $\bigcirc$  to display and edit millivolt value at span weight, press  $\bigcirc$  again to calibrate and display raw A/D count, press  $\bigcirc$  the third time to move to the next selection.

6. Five-point linearization (using the *WLIN* parameter) provides increased scale accuracy by calibrating the indicator at up to five

additional points between the zero and span calibrations.

**Linearization is optional:** if you choose not to perform linearization, press the right arrow and you will keep scrolling through the menu choices. When complete, use the up arrow to exit. If linearization values have previously been entered, these values are reset to zero during calibration. To perform linearization, follow the procedure below:

Standard Calibration: With *WLIN* displayed, Press  $\blacktriangledown$  to go to the first linearization point (*PT-> 1*). Place test weights on the scale and press  $\bigcirc$  or **ENTER**.

Use the procedure shown in Figure 4-2 to enter the actual test weight value, then press  $\bigcirc$  to calibrate. The indicator displays \*CAL\* while calibration is in progress. When complete, the A/D count for the linear calibration is displayed. Press  $\bigcirc$  again to save the calibration value and go to the next prompt (*PT-> 2*).

Repeat for up to five linearization points. To exit the linearization parameters, press  $\blacktriangle$  to return to *WLIN*.

Millivolt Calibration: If millivolt calibration is enabled press  $\bigcirc$  to display and edit the test weight value, press  $\bigcirc$  again to display and edit the millivolt value for that weight, press  $\bigcirc$  again to calibrate and display the raw A/D count, press  $\bigcirc$  again to move to the next calibration point.

7. The rezero function is used to remove a calibration offset when hooks or chains are used to hang the test weights.

- If no other apparatus was used to hang the test weights during calibration, remove the test weights and press  $\blacktriangle$  to return to the *CALIBR* menu.

- If hooks or chains were used during calibration, remove these and the test weights from the scale. With all weight removed, press  $\bigcirc$  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. When complete, the adjusted A/D count for the zero calibration is displayed. Press  $\bigcirc$  to save the value, then press  $\blacktriangle$  to return to the *CALIBR* menu.

8. Press  $\blacktriangleleft$  until the display reads *CONFIG*, then press  $\blacktriangle$  so that the display reads *WAIT*, and returns back to weigh mode.

## 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 2.4.3 on page 9 for EDP port pin assignments; see Section 9.0 on page 50 for more information about using EDP commands.

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

1. Place the indicator in setup 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.
3. Place test weights on the scale and use the WVAL command to enter the test weight value in the following format:  
WVAL=nnnnn<CR>
4. Send the WSPAN EDP command to calibrate span. The indicator displays \*CAL\* while calibration is in progress.

5. Up to five linearization points can be calibrated between the zero and span calibration values. Use the following commands to set and calibrate a single linearization point:

```
WLIN.V1=nnnnn<CR>  
WLIN.C1<CR>
```

The WLIN.V1 command sets the test weight value (nnnnn) for linearization point 1. The WLIN.C1 command calibrates the point. Repeat using the WLIN.Vx and WLIN.Cx commands as required for additional linearization points.

6. 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.
7. Send the KUPARROW or KEXIT EDP command to exit setup mode.

## 4.3 Revolution® Calibration

To calibrate the indicator using Revolution, the indicator EDP port must be connected to a PC running the Revolution configuration utility.

Use the following procedure to calibrate the indicator:

1. Place the indicator in setup mode (display reads *CONFIG*) and remove all weight from the scale platform.
2. Select *Calibrate Indicator* from the Revolution main menu.
3. On the Indicator Calibration display, select the indicator model (520) and communications port then click *OK* (see Figure 4-3).

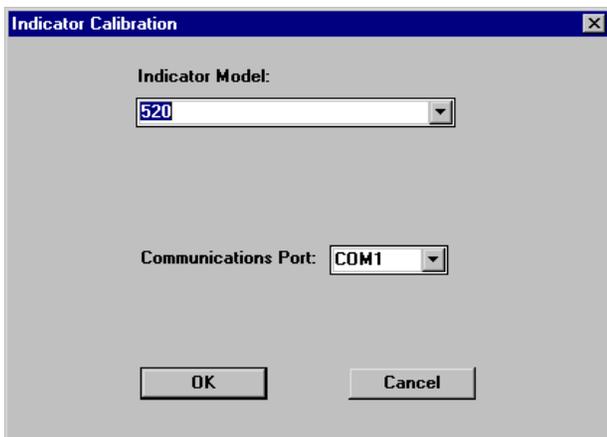


Figure 4-3. Revolution Calibration Display

4. Revolution uploads calibration data from the indicator then presents the information in a display.
5. Enter the *Value of Test Weight* to be used for span calibration then click *START*.
6. A dialog box asks whether hooks or chains are used to hang calibration test weights. Click *Yes* or *No* to continue.
7. The Zero Calibration dialog box prompts you to remove all weight from the scale. Clear the scale and click *OK* to begin zero calibration. If your test weights require hooks or chains, place the hooks or chains on the scale for zero calibration.
8. When zero calibration is complete, the Span Calibration dialog box prompts you to place test weights on the scale for span calibration. Place test weights on the scale then click *OK*.
9. When span calibration is complete, a dialog box asks whether you wish to perform linear calibration. Click *Yes* to perform linear calibration for up to five linearization points, or click *No* to continue calibration with step 11.
10. On the Linear Calibration display, select the point (1–5) to calibrate, then click *Calibrate*. Place test weights on scale then click *OK*. When prompted, enter the test weight value then press *Enter*. Repeat for additional linearization points, then click *Exit* to return to the Indicator Calibration display.

11. If hooks or chains were used to hang test weights, the Rezero dialog box prompts you to remove weights from the scale. Remove the weights then click *OK*.

If hooks or chains were not used in the calibration procedure, Revolution goes directly to step 12. Calibration is complete.

12. When calibration is complete, the *New Settings* fields of the Indicator Calibration display are filled in. Click *Exit* to save the new values and return to the Revolution main menu; to restore the previous calibration values (including linear calibration values), click *Restore Settings*.

## 4.4 More About Calibration

The following topics provide additional information about compensating for environmental factors (Section 4.4.1) and diagnostic information for determining expected zero and span coefficients.

### 4.4.1 Adjusting Final Calibration

Calibration may be affected by environmental factors including wind, vibration, and angular loading. For example, if the scale is calibrated with 1000 lb, a strain test may determine that at 2000 lb the calibration is 3 lb high. In this case, final calibration can be adjusted by tweaking *WVAL* to 998.5 lb. This adjustment provides a linear correction of 1.5 lb per 1000 lb.

To adjust the final calibration, return to the *WVAL* prompt and press  $\odot$  to show the test weight value. Press  $\triangle$  or  $\nabla$  to adjust calibration up or down. Press  $\odot$  to save the value, then press  $\triangle$  to return to the *CALIBR* menu.

### 4.4.2 Gravity Compensation

This feature is used to compensate for the variance in gravitational pull from one location to another and is available for the *520*. To calibrate with gravity compensation, the *GRAVADJ* parameter under the *PROGRM* menu must be set to *ON* (see Section 3.2.5 on page 30), and the *LATITUD* (latitude) and *ELEVATN* (elevation in meters, relative to sea level) parameters set before calibrating the indicator (see Figure 4-1 on page 40).

If the indicator is later installed at a different location, gravity compensation can be applied to a pre-calibrated indicator by adjusting the *LATITUD* and *ELEVATN* parameters.

## 5.0 Using Revolution®

The Revolution utility provides functions used to support configuration of the 520 indicator. Software configuration, stream and ticket formatting, and setpoint configuration are all supported by Revolution.

### Hardware and Software Requirements

Revolution runs on most Windows operating systems, including Windows 95 (original release), Windows 95 OSR2, Windows 98, Windows 98 SE, Windows ME, Windows NT 4.0 (SP4 or greater), Windows 2000, and Windows XP (in compatibility mode).

Minimum system requirements: 486-75 MHz, or higher CPU, with 8MB RAM (16MB recommended), 5MB disk space, and Windows 3.1 or later running in enhanced mode.



**Note** You must install Revolution version 3.0 or later to configure the 520 indicator.

### 5.1 Installing and Starting the Program

The following methods outline the process for installing and starting the Revolution software program.

#### 5.1.1 To Install Revolution From Diskette

1. Insert the Revolution installation disk into the appropriate PC floppy disk drive. For the following example, the A drive was used.
2. Pull down **File** and select **Run**.
3. Type *A:setup* in the Run dialog box. Click **OK**.



Figure 5-1. Windows Run Dialog Box

4. A Setup progress screen appears as the installation wizard program loads.
5. A Welcome screen appears advising you to exit all Windows programs. If none are running, click **Next** and skip to step 7. If you have not previously closed all Windows programs, click **Cancel** then **Exit Setup**. After closing all Windows programs, return to step 4.
6. Follow on-screen directions on the User Information screen. When done, click **Next**.

7. At the Choose Destination Location screen, choose the directory and folder where you want Revolution installed. Click **OK**, then **Next**.
8. At the Select Program Folder screen, choose where you want the start-up icon and uninstall program placed for convenience. Click **Next**.
9. A summary of choices appears in the Start Copying Files screen. If correct, click **Next** to extract and load the program.
10. A prompt screen offers the choice to either read the “ReadMe” file, launch the Revolution program or close the prompt window. Installation is complete.

#### 5.1.2 To Install Revolution by Downloading from the Web



**Note** To install Revolution via the RLWS web site, your PC must be equipped with an Internet connection.

1. Connect to the Internet.
2. Open your preferred web browser and go to [www.rlws.com](http://www.rlws.com). Click **Distributor Site**. Enter your username and password to enter the Distributor Site. Click **Software Downloads** and then the **Revolution** hot link. Click the **Download Revolution** hot link to begin the download process.
3. The download process prompts you to *Save Program to Disk* or *Run Program from Current Location*. Click **Run Program from Current Location** to begin the installation process.
4. The download begins (speed of the download depends on the internet connection and modem speed). Once download is complete, click **Start Installation** to begin installation.
5. Prompting begins for various steps in the installation process. The “recommended” or “typical” choices are selected by default. Scroll through the prompts by clicking the **Next** button.
6. Once finished stepping through the prompts, click the **Finish** button to begin installation. The Installation Wizard begins installing the .exe file and accessory files necessary for the Revolution program.
7. A prompt screen offers the choice to either read the “ReadMe” file, launch the Revolution program or close the prompt window. Installation is complete.

## 5.2 Configuration

Figure 5-2 shows the initial screen when Revolution is started.

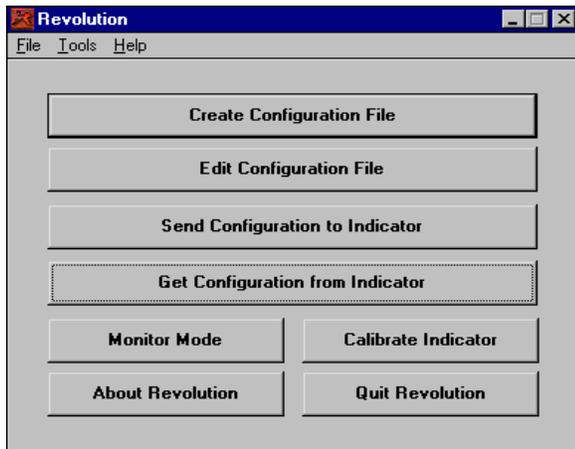


Figure 5-2. Initial Revolution Screen

### 5.2.1 New Configuration File

1. To build a new configuration file, start the Revolution program.
2. Click the **Create Configuration File** button.
3. Choose the 520 file type to give the new file the appropriate .520 file extension.
4. Give the new file a name by highlighting and replacing the default asterisk in the file name field.

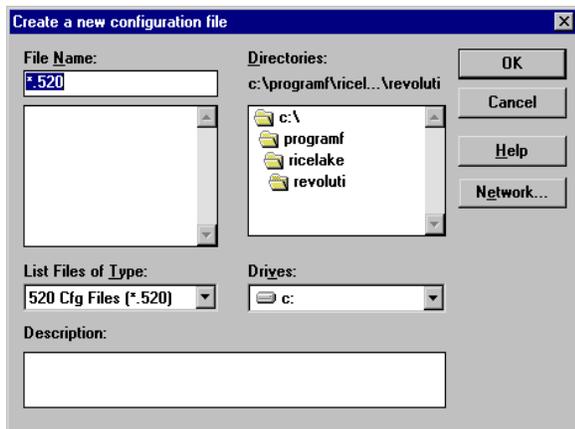


Figure 5-3. New Configuration File Screen

### 5.2.2 Opening an Existing Configuration File

1. To open an existing configuration file, start the Revolution program.
2. Click the **Edit Configuration File** button.
3. Choose the 520 file type to view all existing 520 configuration files.
4. Choose an existing 520 configuration and click the **Open** button.

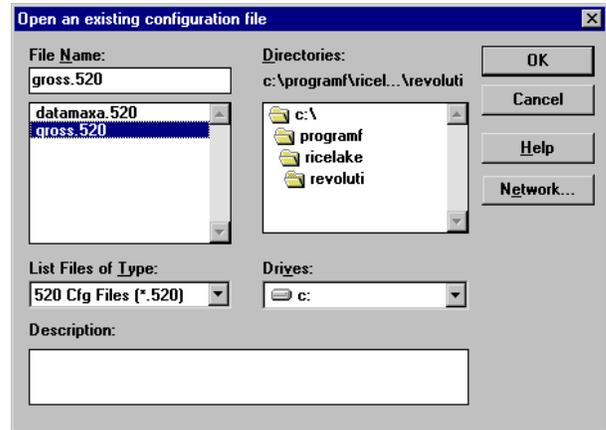


Figure 5-4. Opening an Existing Configuration File

### 5.2.3 Saving a Configuration File

1. Once you have set all parameters needed in your configuration file, you need to save the file for download to the indicator.
2. If the file is an already existing configuration file, click the **File** menu and choose **Save** from the menu options. This saves over the previous file with that name, but with all the parameter settings you altered in the file.
3. If the file is a new configuration file, click the **File** menu and choose **Save As** from the menu options. Revolution prompts for any changes to the file name and where to store the file on the PC's hard drive.

## 5.3 Downloading to the Indicator

Click the **Send File to Indicator** button on the opening Revolution screen to download a configuration file to the 520 indicator (see Figure 5-2 on page 45).

## 5.4 Getting Data from Indicator

Click the **Get Configuration from Indicator** button on the opening Revolution screen to get configuration data from the 520 indicator (see Figure 5-2 on page 45).

## 5.5 Revolution Help

The menu bar in Revolution contains a Help system for further assistance in using Revolution software.

The Help system contains an index of Help topics and a search function. The search function allows the user to search with a keyword. When a keyword is typed into the search text box, Help searches its Index and finds the closest related topic in the Help system.

# 6.0 Counting Operations

The 520 provides a piece count mode that allows the indicator to serve as a counting scale. In piece count mode, the indicator display shows the number of parts on the scale rather than the weight of those parts.

**Note** *Legal-for-Trade applications require product to be sold by weight rather than an equivalent parts count. Operator access to piece count mode is disabled when the indicator is shipped from the factory.*

To enable operator access to piece count mode, set the ACCESS parameter to ENABLE (COUNT submenu on the PROGRM menu) or send the CNTMOD=ENABLE EDP command.

Piece count mode has two submodes:

- Count display mode displays the current parts count and allows ticket printing using the CFMT print format.
- Sample acquisition mode is used to calculate the average piece weight of the sample for parts counting.

### Count Display Mode

Piece count mode is entered by pressing the MODE (GROSS/NET) key from normal weighing mode. In count display mode, the display shows the number of parts rather than weight, the two-digit annunciator displays PC, and pressing the PRINT key sends the CFMT print format data string to the serial port.

If a sample weight has not yet been acquired, the indicator switches automatically to sample acquisition mode.

### Sample Acquisition Mode

Sample acquisition mode is used to select the sample quantity and calculate the average piece weight for the parts being counted.

To set a new sample weight, do the following:

1. Place empty parts container on scale. Wait for standstill, then press TARE to acquire the tare weight of the container.
2. Press MODE to enter piece count mode.
3. From count display mode, press the SAMPLE (UNITS) key to enter sample acquisition mode.
4. The indicator display shows the message Addnnn, where nnn is the sample quantity to be placed on the scale. Add the number of parts shown or choose a different sample size by pressing the SAMPLE key to scroll through the selectable sample quantities (5, 10, 20, 50, 100).
5. Once the sample quantity is on the scale, press ENTER to calibrate the indicator for counting the new parts. The indicator display shows the message -CNT- as it acquires the sample weight, then switches to count display mode and shows the part quantity.

If the weight of the sample quantity is insufficient for piece counting, the indicator automatically requests the next higher sample quantity by showing the Addnnn message again. If the sample quantity is at maximum (100) and the sample weight is still not sufficient, the indicator shows the message CNT ERR.

To view gross and net weight of parts, press MODE to switch from count display mode to normal weighing mode.

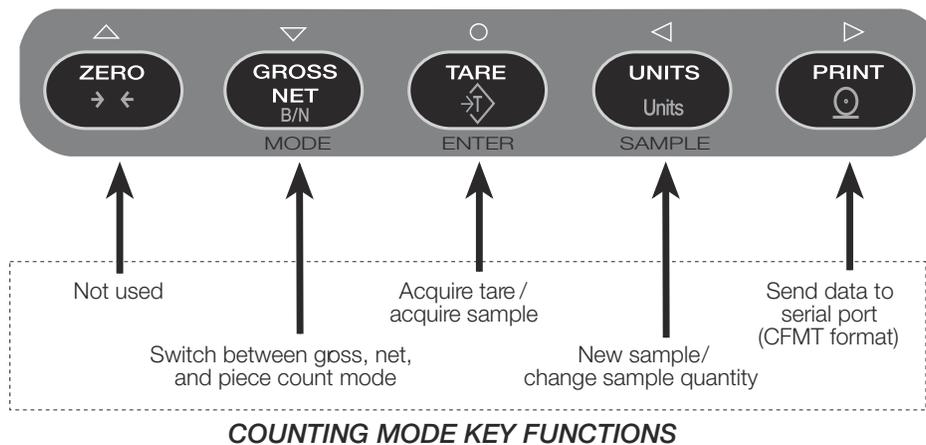


Figure 6-1. Front Panel Key Functions in Piece Count Mode

# 7.0 Checkweigh Mode

The 520 provides a checkweigh mode that can be enabled for either absolute values (*ABS*) or percent values (*PERCENT*).

### Checkweighing Modes

- **ABSOLUTE** allows you to enter actual weight values for over and under (values can be either positive or negative).
- **PERCENT** allows you to enter a target weight value and percentages of this value (in whole percent values) for over and under.

### Autoprint Modes

- **WAITSS** print mode performs an automatic print any time the weight settles out of motion within the **ACCEPT** range. The autoprint is reset each time the scale goes into motion and then achieves standstill within the acceptable weight range.
- **TARGET** print mode performs automatic print any time the weight settles out of motion within the **ACCEPT** range. To reset, the scale weight must return to within the zero band, as specified in the **CKZBAND** parameter, and then achieve standstill again within the acceptable weight range.

Range	Active Digital Output
UNDER	D/O 1
ACCEPT	D/O 2
OVER	D/O 3

Table 7-1. Checkweigh Ranges/Active Digital Output

In checkweigh mode there is an accompanying bargraph displayed on the secondary display. The underrange presentation is from the right side to the center. During the **ACCEPT** bandwidth, the prompt **ACCEPT** is displayed. The overrange presentation is from the center to the left side (see Figure 7-1).

The value for the underrange determines the bargraph bandwidth for both the under- and overrange. Therefore, if the underrange is 0 to 10 pounds, the overrange also represents a 10 pound range.

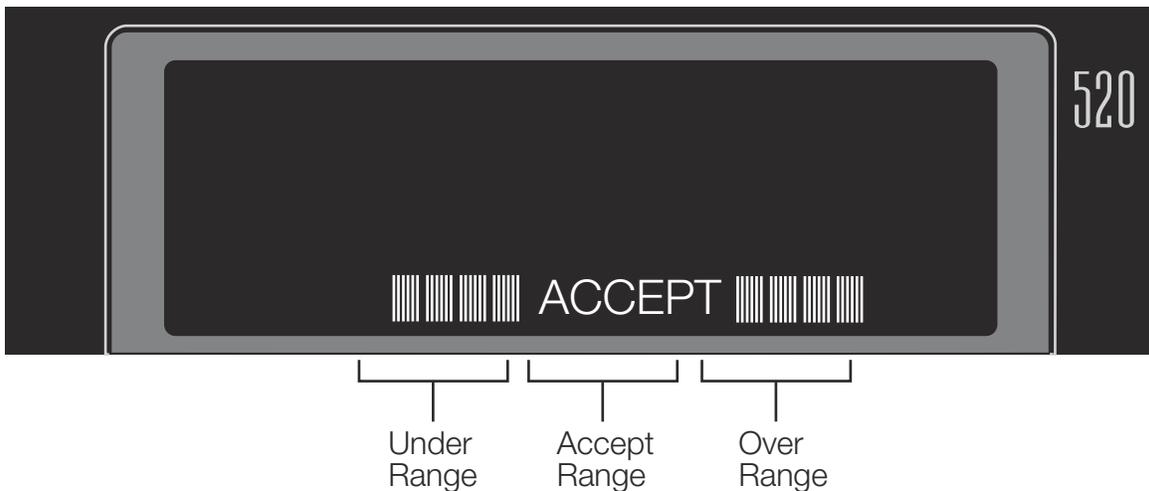


Figure 7-1. Bar Graph Ranges

A tare can be entered to allow net mode check weighing. When a tare weight is entered, the **ACCEPT** range uses net values, but the under- and overrange bargraph continue to track gross weight.

The **ABSOLUTE** mode can be used to check weight in either the gross or net mode. However, for check weighing around zero (negative under value), the entered values should be net values. In the absolute mode, when a negative gross value is entered, the bargraph only displays the **ACCEPT** range.

## Checkweighing Operations

To display a checkweigh value, enter front panel setup mode. Hold the **UNITS** key for five seconds. To exit the bargraph mode, press the  $\Delta$  key at any prompt. If no keys are pressed for 10 seconds, the program times out and exits.

Use the procedure shown in Figure 7-2 to enter the actual checkweigh value



**Note** *If the checkweigh function is enabled, setpoints remain configured but do not function until checkweigh is disabled.*



When editing numeric values, press  $\triangleleft$  or  $\triangleright$  to change the digit selected. Press  $\triangle$  or  $\nabla$  to increment or decrement the value of the selected digit. If a decimal point is required in value, press  $\circ$  to view and move decimal point. Press  $\triangleleft$  or  $\triangleright$  to move decimal position. Press  $\circ$  to save the value entered and return to the level above.

*Figure 7-2. Editing Procedure for Numeric Values*

## 8.0 Peak Hold Mode

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The peak hold function is used to determine, display, and print the greatest net weight read during a weighing cycle.

A weighing cycle ends when the print command is given, or when the peak net weight is manually cleared by the **ZERO** and **PRINT** key. Peak hold tracks only net weight and operates independently of the display. For example, if the indicator is displaying gross weight, but **AUTO** peak hold is active, the display remains in gross, but the net peak weight is automatically printed when standstill is achieved at net zero.

Peak hold function is selected using the **PK HOLD** parameter on the **PROGRM** menu (see Section 3.2.5 on page 30).

### Normal Setting

- Positive Peak
- Manual Reset

This is the basic peak hold function in which a weight is applied to a scale and the greatest net weight value is held in memory until the weight is removed from the scale, and either the **ZERO** or **PRINT** key is pressed. If the display is in gross mode, the peak net weight can be displayed by scrolling to the net mode with the **GROSS/NET** key.



**Note** *A tare weight can be used with peak hold. At the tare value, the highest peak hold is 0 net. Tare is cleared by returning to gross zero and pressing the **TARE** key.*

### Bi-Dir Setting

- Bi-Directional Peak
- Manual Reset

This is the same as **NORMAL** parameter setting, except that the peak can either be a positive or negative number, determined by the absolute weight value. This means that if a positive peak is displayed, a negative weight value of greater absolute value can update the peak information in the same cycle. As above, the peak cycle is reset by pressing the **ZERO** or **PRINT** key after the weight has been removed.

### Auto Setting

- Positive Peak
- Auto Print
- Auto Reset

This is the same as **NORMAL** parameter setting, except that automatic print occurs when the scale load is reduced to  $0 \pm 10$  display divisions and the scale achieves standstill. Following the print command, the peak value is cleared and reset automatically. Press the **ZERO** or **PRINT** key to clear the peak hold value.

Use the **GROSS/NET** mode key to display gross weight data during peak hold function cycles.

## 9.0 EDP Commands

The 520 indicator can be controlled by a personal computer or terminal 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.

### 9.1 The EDP Command Set

The EDP command set can be divided into five groups: key press commands, reporting commands, the RESETCONFIGURATION special function command, parameter setting commands, and transmit weight data commands.

When the indicator processes an EDP command, it responds with the message *OK*. The *OK* response verifies that the command was received and has been executed. 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.

#### 9.1.1 Key Press Commands

Key press EDP commands (see Table 9-1) simulate pressing the keys on the front panel of the indicator. These commands can be used in both setup and weighing mode. Several of the commands serve as “pseudo” keys, providing functions that are not represented by a key on the front panel.

For example, to enter a 15-pound tare weight using EDP commands:

1. Type K1 and press **ENTER** (or **RETURN**).
2. Type K5 and press **ENTER**.
3. Type KTARE and press **ENTER**.

Command	Function
KZERO	In weighing mode, press the ZERO key.
KGROSSNET	In weighing mode, press the GROSS/NET key.
KGROSS	Go to gross mode (pseudo key).
KNET	Go to net mode (pseudo key).
KTARE	Press the TARE key.
KUNITS	In weighing mode, press the UNITS key.
KPRIM	Go to primary units (pseudo key).
KSEC	Go to secondary units (pseudo key).
KPRINT	In weighing mode, press the PRINT key.
KCLRTAR	Clear tare from system (pseudo key).
KLEFTARROW	In setup mode, move left in the menu.
KRIGHTARROW	In setup mode, move right in the menu.
KUPARROW	In setup mode, move up in the menu.
KDOWNARROW	In setup mode, move down in the menu.
KEXIT	In setup mode, exits to normal mode.
KCLRNV	Clear non-volatile RAM.
KCOUNT	Go to count mode.
KDOT	Enters a decimal point in the entry buffer.
KCLRACCUM	Clears accumulator.
KCLRCON	Clears consecutive number.
K0-K9	Enters the number in the entry buffer, used for keyed tare entry.
KYBDLK=ON/OFF	Locks/unlocks keys except SETUP key.
KLOCK/KUNLOC K= KPRINT, KUNITS, KTARE, KGROSSNET, KZERO	Locks/unlocks the specified key.
KDISPACCUM	Displays accumulator.
KDISPTARE	Displays tare.
KCLR	Used in conjunction with KDISPACCUM and KDISPTARE commands to clear the current accumulator/tare values. Asks for zero to confirm.

Table 9-1. EDP Key Press Commands

### 9.1.2 Reporting Commands

Reporting commands (see Table 9-2) send specific information to the EDP port. These commands can be used in both setup mode and normal mode.

Command	Function
DUMPALL	List all parameter values
SPDUMP	Print setpoint configuration
VERSION	Write 520 software version
P	Write current displayed weight with units identifier. See Section 12.4 on page 74 for more information.
S	Write one frame of stream format

Table 9-2. EDP Reporting Commands

### 9.1.3 The RESETCONFIGURATION Command

The RESETCONFIGURATION command can be used in setup mode to restore all configuration parameters to their default values.

This command is equivalent to using the DEFAULT function in TEST mode. See Section 12.3 on page 74 for more information about test mode.



**Note** All load cell calibration settings are lost when the RESETCONFIGURATION command is run.

### 9.1.4 Parameter Setting Commands

Parameter setting commands allow you to display or change the current value for a particular configuration parameter (Tables 9-3 through 9-12).

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

*command*<ENTER>

Most parameter values can be changed in setup mode only; setpoint parameters listed in Table 11-2 on page 69 can be changed when in normal weighing mode.

Use the following command syntax when changing parameter values:

*command=value*<ENTER>

where *value* is either a number or a parameter value. Use no spaces before or after the equal (=) sign. If you type an incorrect command, the display reads ??.

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

*MOTBAND=5D*<ENTER>

For parameters with selectable values, enter the command and equal sign followed by a question mark:

*command=?*<ENTER>

to see a list of those values. The indicator must be in setup mode to use this function.

Command	Description	Values
GRADS	Graduations	1-9999999
ZTRKBND	Zero track band	OFF, 0.5D, 1D, 3D
ZRANGE	Zero range	1.9%, 100%
MOTBAND	Motion band	1D, 2D, 3D, 5D, 10D, 20D, OFF
OVRLOAD	Overload	FS+2%, FS+1D, FS+9D, FS
SMPRAT	Sample rate	60HZ, 120HZ, 30HZ, 7.5HZ, 15HZ
DIGFLTR1 DIGFLTR2	Digital filtering	1, 2, 4, 8, 16, 32, 64, 128, 256
RATLTRAP	Rattletrap filtering	OFF, ON
DFSSENS	Digital filter cutout sensitivity	2OUT, 4OUT, 8OUT, 16OUT, 32OUT, 64OUT, 128OUT
DFTHRH	Digital filter cutout threshold	NONE, 2DD, 5DD, 10DD, 20DD, 50DD, 100DD, 200DD, 250DD
PWRUPMD	Power up mode	GO, DELAY
TAREFN	Tare function	BOTH, NOTARE, PBTARE, KEYED

Table 9-3. CONFIG EDP Commands

Command	Description	Values
PRI.DECPNT	Primary units decimal position	8.888888, 88.88888, 888.8888, 8888.888, 88888.88, 888888.8, 8888888, 88888880, 8888800
PRI.DSPDIV	Primary units display divisions	1D, 2D, 5D
PRI.UNITS	Primary units	LB, KG, G, OZ, TN, T, GN, LT, NONE
SEC.DECPNT	Secondary units decimal position	8.888888, 88.88888, 888.8888, 8888.888, 88888.88, 888888.8, 8888888, 88888880, 8888800
SEC.DSPDIV	Secondary units display divisions	1D, 2D, 5D
SEC.UNITS	Secondary units	LB, KG, G, OZ, TN, T, GN, LT, NONE
SEC.MULT	Secondary units multiplier	0.00000–99999.99
DECFMT	Decimal format	DOT, COMMA
DSPRATE	Display rate	250MS, 500MS, 750MS, 1SEC, 1500MS, 2SEC, 2500MS, 3SEC, 4SEC, 6SEC, 8SEC

Table 9-4. FORMAT EDP Commands

Command	Description	Values
WVAL	Test weight value	<i>test_weight_value</i>
WLIN.F1–WLIN.F5	Actual raw count value for linearization points 1–5	—
WLIN.V1–WLIN.V5	Test weight value for linearization points 1–5	<i>test_weight_value</i>
WLIN.C1–WLIN.C5	Calibrate linearization points 1–5	—
WLIN.M1–WLIN.M5	Millivolt value for linearization points 1–5	<i>test_weight_value</i>
WLIN.W1–WLIN.W5	Working calibration values	—
LC.CD	Set deadload coefficient	<i>value</i>
LC.CW	Set span coefficient	<i>value</i>
WK.CD	Working deadload coefficient	—
WK.CW	Working span coefficient	—
MV.CD	Millivolt calibration value	—
MV.CW	Millivolt span calibration value	—

Table 9-5. CALIBR EDP Commands

Command	Description	Values
EDP.BAUD	EDP port baud rate	300, 600, 1200, 2400, 4800, 9600, 19200
EDP.BITS	EDP port data bits/parity	8NONE, 7EVEN, 7ODD
EDP.TERMIN	EDP port termination character	CR/LF, CR
EDP.EOLDLY	EDP port end-of-line delay	0–255 (0.1-second intervals)
EDP.HANDSHK	EDP port handshaking	OFF, ON
EDP.ADDRESS	EDP port RS-485 address	0, 01–255
EDP.STREAM	EDP port streaming	OFF, LFT, IND
EDP.FORMAT	EDP port stream format	DEFAULT8, CUSTOM, BUS FMT, DEFAULT7
PRN.BAUD	Printer port baud rate	300, 600, 1200, 2400, 4800, 9600, 19200
PRN.BITS	Printer port data bits/parity	8NONE, 7EVEN, 7ODD
PRN.TERMIN	Printer port termination character	CR/LF, CR
PRN.EOLDLY	Printer port end-of-line delay	0–255 (0.1-second intervals)

Table 9-6. SERIAL EDP Commands

Command	Description	Values
PRN.HANDSHK	Printer port handshaking	OFF, ON
PRN.STREAM	Printer port streaming	OFF, LFT, IND
PRN.FORMAT	Printer port stream format	DEFAULT8, CUSTOM, BUS FMT, DEFAULT7
PRNDEST	Print destination	EDP, PRN, BOTH
STR.POS	Custom stream identifiers	SPACE, NONE, +
STR.NEG	Custom stream identifiers	SPACE, NONE, -
STR.PRI	Custom stream identifiers	<i>Specify replacement text for token</i>
STR.SEC		Example: STR.PRI=L
STR.GROSS		
STR.NET		
STR.TARE		
STR.MOTION		
STR.RANGE		
STR.OK		
STR.INVALID		See Section 12.7 on page 77 for information more about custom stream formatting.

Table 9-6. SERIAL EDP Commands (Continued)

Command	Description	Values
SD	Set date	<i>nnnnnn</i> (enter using DATEFMT specified)
ST	Set time	<i>hhmm</i> (enter using 24-hour format)
DATEFMT	Date format	MMDDYY, DDMMYY, YYMMDD
DATESEP	Date separator	SLASH, DASH, SEMI
TIMEFMT	Time format	12HOUR, 24HOUR
TIMESEP	Time separator	COLON, COMMA
CONSNUM	Consecutive numbering	0-9 999 999
CONSTUP	Consecutive number start-up value	0-9 999 999
PEAKHOLD	Greatest net weight achieved	OFF, NORMAL, BI-DIR, AUTO
THEORETIC	Theoretical calibration	OFF, ON
SAMPSIZ	Count mode sample size	5, 10, 20, 50, 100
UID	Unit identifier	<i>nnnnnnn</i> (up to seven alphanumeric characters)
CNTMOD	Count mode	DSABLE, ENABLE
ACCUM	Accumulator	OFF, ON
ACCUM.RTZGRADS	Grads above to allow accumulation	0-9999
KYBDLK	Keyboard lock (disable keypad)	OFF, ON
ZERONLY	Disable all keys except ZERO	OFF, ON
REGULAT	Regulatory compliance	NONE, OIML, NTEP, CANADA
REGWORD	Regulatory word for GROSS	GROSS, BRUTTO
GRAVADJ	Gravity adjustment	OFF, ON
PROMPT#n-8		
CKWEIGH	Checkweigh Mode	OFF, ABS, PERCENT
CK_OVER	Absolute Over Value	<i>number</i>
CK_OVER_PCT	Percent Over Value	<i>number</i>
CK_PRINT		OFF, TARGET, WAITSS

Table 9-7. PROGRAM EDP Commands

Command	Description	Values
CK_TARGET		<i>number</i>
CK_UNDER		<i>number</i>
CK_UNDER_PCT		<i>number</i>
CK_ZBAND		OFF, 1D, 2D, 5D, 10D, 20D, 50D
ELEV.CAL	Displays the calibrated value for elevation (view only).	
ELEV.LOC	Enter the elevation value at your current location (must be changed to match the elevation at the operating location if different than the elevation at the initial calibration site)	
LAT.CAL	Displays the calibrated value for latitude (view only).	
LAT.LOC	Enter the latitude value at your current location (will be changed to match the latitude at the operating site if different than the latitude at the initial calibration site)	
FBTRACK	Sets the update rate of the Field bus cards (DeviceNet, Profibus, Remote I/O)	LFT, IND
SPDECPTFMT	Allows the setpoint values to use a decimal point or not	DECIMAL, NODECML

Table 9-7. PROGRM EDP Commands (Continued)

Command	Description	Values
SETPOINT	Setpoint number	1-8
KIND	Setpoint kind	OFF, GROSSSP, NETSP, +RELS, -RELS, %RELS, PAUSE, DELAY, WAITSS, COUNTER, AUTOJOG, COZ, INMOTON, INRANGE, -GROSS, -NET, BATCHPR, TIMER, CONCUR
VALUE	Setpoint value	number
PSHTARE	Push tare	OFF, ON
PSHPRINT	Push print	OFF, ON, WAITSS
PSHACCM	Push accumulate	OFF, ON, ONQUIET
TRIP	Trip	HIGHER, LOWER, INBAND, OUTBAND
BANDVAL	Band value	number
HYSTER	Hysteresis	number
ALARM	Alarm	OFF, ON
PREACT	Preact	OFF, ON, LEARN, FLOW
PREVAL	Preact value	number
PREADJ		1-100%
PRESTAB		0-65535
PREBAND		number
PRECOUNT		1-65535
BATCH	Batch enable	OFF, ON
BATSTART	Batch step enable	See Section 11.0 on page 65 for detailed information
BATPAUSE	Batch step pause	
BATRESET	Batch step reset	
BATSTATUS	Batch status	
NAME	Setpoint name number	
ACCESS	Setpoint access	OFF, ON, HIDE
DIGOUT	Digital output	NONE, 1-4
RELNUM	Relative setpoint number	1-8
START	Starting setpoint	1-8
END	Ending setpoint	1-8
BATCHNG	Batching mode	OFF, AUTO, MANUAL

Table 9-8. SETPNTS EDP Commands

Command	Description	Values
GFMT	Gross demand print format string	See Section 10.2 on page 62 for detailed information
NFMT	Net demand print format string	
CFMT	Count format string	
SPFMT	Setpoint print format string	
EDPFMT	EDP demand print format string	
HDRFMT	Ticket header format string	
STRMFMT	Custom stream format string	

Table 9-9. PFORMT EDP Commands

Command	Description
DON#nn	Set digital output nn on (active)
DON#0	Set all digital outputs on (active)
DOFF#nn	Set digital output nn off (inactive)
DOFF#0	Set all digital outputs off (inactive)
For commands ending with "#nn", nn is the digital output (1-4) being set on or off.	

Table 9-10. DIG OUT EDP Commands

Command	Description	Values
DIGIN1 DIGIN2 DIGIN3	Digital input function	OFF, ZERO, NT/GRS, TARE, UNITS, PRINT, ACCUM, DSPTAR, ENTER, BATRUN, BATSTRT, BATPAUS, KBDLOC, HOLD, CLRCN, GROSS, NET, PRIM, SEC, TIME, DATE, CLRTAR, CLRACC

Table 9-11. DIG IN EDP Commands

Command	Description	Values
SOURCE1	Analog output source	GROSS, NET
OFFSET	Zero offset	0%, 20%
ERRACT	Error action	FULLSC, HOLD, ZEROSC
MIN	Minimum value tracked	0-9 999 999
MAX	Maximum value tracked	0-9 999 999
ZERO1	Zero calibration	0-99999
SPAN1	Span calibration	0-99999

Table 9-12. ALGOUT EDP Commands

### 9.1.5 Normal Mode Commands

The normal mode commands (see Table 9-13) transmit data to the EDP port on demand. The SX command is valid only in normal operating mode; all other commands are valid in either setup or normal mode.

Command	Description	Response Format
CONSNUM	Set consecutive number	0-9 999 999
UID	Set unit ID	<i>nnnnnn</i> (up to seven characters)
SD	Set date	<i>MMDDYY, DDMMYY, YYMMDD</i> (enter using DATEFMT specified)
ST	Set time	<i>hhmm</i> (enter using 24-hour format)
SX	Start EDP or PRN streaming	OK or ?? The respective port for EDP.STREAM or PRN.STREAM must be set to LFT or IND to use these.
EX	Stop EDP or PRN streaming	
DX	Start streaming raw A/D counts	
RS	Reset system	—
XA	Transmit accumulator value	<i>nnnnnn UU</i> where <i>nnnnnn</i> is the weight value, <i>UU</i> is the units.
XC	Transmit count	
XG	Transmit gross weight in displayed units	
XN	Transmit net weight in displayed units	
XT	Transmit tare weight in displayed units	
XG2	Transmit gross weight in non-displayed units	
XN2	Transmit net weight in non-displayed units	
XT2	Transmit tare weight in non-displayed units	
XE	Query system error conditions	<i>nnnnn</i> See Section 12.3 on page 74 for detailed information about the XE command response format.

Table 9-13. Normal Mode EDP Commands

## 9.1.6 IQ310A Compatible Commands

Command	Description of Function
AZ	Sets scale to zero. Valid only in Operate Mode.
AT	Tare in. Entered as "AT nnnnnnn <EOL>" where nnnnnnn is a 7-digit tare weight, no decimal point or leading zeros. Entering "AT <EOL>" acquires the current displayed value as a tare. "pT" indicates a tare entered through the EDP port.
FT	Performs a front panel tare operation. Entering "FT <EOL>" acquires a tare like pressing the TARE key.
CT	Tare out (removes the tare value)
LB	Selects "lb" for weight units (if set up for "lb" or "kg" units mode)
KG	Selects "kg" for weight units (if set up for "lb" or "kg" units mode)
GN	Simulates a GROSS/NET key press. Entering "GN <EOL>" toggles between the gross and net display mode.
PR	Sends formatted weight data to either or both serial ports (port mode must be "TICKET"). During printer operation, EDP commands are ignored. Wait for "OK" display before sending more commands. If printing is inhibited by scale being out of range or in SETUP mode, "??" is displayed. If the scale is in motion, the command is executed when standstill returns. Valid only in Operate Mode.
RE	Clears the EEPROM.
RS	Resets system
SX	Starts continuous serial transmission on the EDP port using the selected serial output data format. Serial transmission stops in SETUP mode.
PX	Starts continuous serial transmission on the printer port using the selected serial output data format. Serial transmission stops in SETUP mode.
EX	Ends continuous serial transmission on the EDP port
PQ	Ends continuous serial transmission of the printer port
XG	Transmits GROSS [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit]. Valid only in Operate Mode.
XN	Transmits NET [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit]. Valid only in Operate Mode.
XT	Transmits TARE [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit]. Valid only in Operate Mode.
XS	Transmits a single serial string from the EDP port in the selected output format.

*Table 9-14. IQ310A Compatible Commands*

## 9.1.7 Batching Control Commands

The commands listed below provide batching control through the EDP port.

### BATSTART

If the BATRUN digital input is active (low) or not assigned, the BATSTART command can be used to start the batch program.

### BATRESET

Stops the program and resets the batch program to the first batch step. Run the BATRESET command after making changes to the batch configuration.

### BATPAUSE

Stops the batch program at the current step. All digital outputs set on by the current step are set off. The BATSTRT DIGIN or BATSTART EDP commands can be used to restart the batch program at the current step.

### BATSTATUS

The BATSTATUS command is used to check the current status of various setpoint and batching conditions. BATSTATUS returns 14 bytes of status data as described in Table 9-15. BATSTATUS is principally used to provide status information to a controlling batch program when using the Remote I/O Interface option.

Status information returned in bytes 3–12 is coded as ASCII characters @ (hex 40) through O (hex 4F); only the low order bits of these characters are significant. Table 9-15 shows the low order bit assignments for bytes 3–12. Use Table 9-16 on page 60 to interpret the status of the low order bits for a given ASCII character.

Batch Status Data	Byte	Values				ASCII Values
Batch Status	0	"S" = stopped "R" = running "P" = paused				
Current Batch Step	1 – 2	00 – 08				
		Low Order Bit Assignments for Bytes 3 – 12				ASCII Values
Continuous Setpoint Status	3 – 7	Bit 3	Bit 2	Bit 1	Bit 0	@@@@ – 00000
Low order bits of bytes 3–4 are set on to indicate continuous setpoints for which conditions are being met. Bits are assigned to setpoint numbers as shown at right.	3	SP 1	SP 2	SP 3	SP 4	
	4	SP 5	SP 6	SP 7	SP 8	
	5	N/A				
	6	N/A				
	7	N/A				
Digital Output Status	8 – 11	Bit 3	Bit 2	Bit 1	Bit 0	@@@@ – 0000
Low order bits of bytes 8–9 are set on to indicate active digital outputs. Bits are assigned to digital outputs as shown at right.	8	DIGOUT 1	DIGOUT 2	DIGOUT 3	DIGOUT 4	
	9	N/A				
	10	N/A				
	11	N/A				
Digital Input / Alarm Status	12	DIGIN 1	DIGIN 2	DIGIN 3	Alarm	@ – O
Carriage Return	13	N/A				(CR)

Table 9-15. BATSTATUS Command Structure

Translating ASCII Status Data	ASCII Value	Bit 3	Bit 2	Bit 1	Bit 0
<p>Use the table at right to evaluate the ASCII character output for bytes 3 – 12 and determine which of the low order bits are set on.</p> <p>For example, if the Digital Output Status returned in bytes 8 – 11 is AC@@, the table at right can be used with the bit assignments described above to determine that digital outputs 4, 7, and 8 are active:</p> <ul style="list-style-type: none"> <li>• A (byte 8) indicates that DIGOUT 4 (bit 0) is on</li> <li>• C (byte 9) indicates that DIGOUTs 7 and 8 (bits 1 and 0) are on</li> <li>• @@ indicates that bytes 10 and 11 are not used</li> </ul>	@	0	0	0	0
	A	0	0	0	1
	B	0	0	1	0
	C	0	0	1	1
	D	0	1	0	0
	E	0	1	0	1
	F	0	1	1	0
	G	0	1	1	1
	H	1	0	0	0
	I	1	0	0	1
	J	1	0	1	0
	K	1	0	1	1
	L	1	1	0	0
	M	1	1	0	1
	N	1	1	1	0
O	1	1	1	1	

Table 9-16. ASCII Translation Table for BATSTATUS Data

## 10.0 Print Formatting

The 520 provides seven print formats. Formats GFMT, NFMT, EDPFMT, and CFMT will be printed in a ticket format based on the current mode of operation when the **PRINT** key is pressed (see Table 10-2 on page 62). HDRFMT can be inserted into any other ticket format using the <AE> formatting command. SPFMT is printed if PSHPRINT is set to ON or WAITSS in the setpoint configuration. STRMFMT defines what the streamed output will be if the FORMAT parameter is set to CUSTOM.

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

### 10.1 Print Formatting Commands

Table 10-1 lists commands you can use to format the 520 print formats. Commands included in the format strings must be enclosed between < and > delimiters. Any characters outside of the delimiters are printed as text on the ticket. Text characters can include any ASCII character that can be printed by the output device.

Command	Description	Ticket Format	
		GFMT/NFMT/EDPFMT /CFMT	SPFMT
<G>	Gross weight in displayed units	√	√
<G2>	Gross weight in non-displayed units	√	√
<N>	Net weight in displayed units	√	√
<N2>	Net weight in non-displayed units	√	√
<T>	Tare weight in displayed units	√	√
<T2>	Tare weight in non-displayed units	√	√
<A>	Accumulated weight in displayed units	√	√
<AC>	Number of accumulator event (5-digit counter)	√	√
<AT>	Time of last accumulator event	√	√
<AD>	Date of last accumulator event	√	√
<SCV>	Setpoint captured value		√
<STV>	Setpoint target value		√
<SPM>	Setpoint mode (gross or net label)		√
<SNA>	Setpoint name		√
<SN>	Setpoint number		√
<SPV>	Setpoint preact value		√
<TI>	Time	√	√
<DA>	Date	√	√
<TD>	Time and date	√	√
<ID>	ID number	√	√
<CN>	Consecutive number	√	√
<AE>	Ticket header (HDRFMT)	√	√
<C>	Piece count	√	
<W>	Average piece weight in count mode.	√	
<NLnn>	New line (nn = number of termination (<CR/LF> or <CR>) characters)*	√	√

Table 10-1. Print Format Commands

Command	Description	Ticket Format	
		GFMT/NFMT/EDPFMT /CFMT	SPFMT
<SPnn>	Space (nn = number of spaces)*	√	√
<SU>	Toggle weight data format (formatted/unformatted)**	√	√

NOTES:  
Gross, net, tare and setpoint values 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 1–7 characters in length, as required.  
ID numbers included in the print format string (<ID> command) must be set using the UID EDP command or via keypad in setup mode.  
Ticket header (AE) inserts information specified for the HDRFMT header format.  
\* If nn is not specified, 1 is assumed. Value must be in the range 1–99.  
\*\* After receiving an SU command, the indicator sends unformatted data until the next SU command is received. Unformatted data omits decimal points, leading and trailing characters.

Table 10-1. Print Format Commands (Continued)



**Note** The <G2>, <N2>, and <T2> commands listed in Table 10-1 print the gross, net, and tare weights in non-displayed units—that is, in the units not currently displayed on the indicator.

## 10.2 Default Ticket Formats

Table 10-2 shows the default print formats for the 520 and lists the conditions under which each print format is used. The HDRFMT format is used to specify header information that can be used by the other ticket formats. The contents of the HDRFMT format can be inserted into any other ticket format using the <AE> formatting command.

Format	Default Format String	Used When
GFMT	GROSS<G><NL2><TD><NL>	Normal mode, no tare in system
NFMT	GROSS<G><NL>TARE<SP><T><NL>NET<SP2><N><NL2><TD><NL>	Normal mode, tare in system
CFMT	GROSS<G><NL>TARE<SP><T><NL>NET<SP2><N><NL>COUNT<C><NL>APW<SP2><W><NL>	Count mode
SPFMT	<SCV><SP><SPM><NL>	Setpoint push print operation (PSHPRINT=ON)
EDPFMT	GROSS<G><NL2><TD><NL>	Normal mode, PRNDEST=BOTH (SERIAL menu). GFMT (or NFMT) print format is sent to printer port simultaneously.
HDRFMT	COMPANY NAME<NL>STREET ADDRESS<NL>CITY, ST ZIP<NL2>	Inserted into another print format to specify header information.
STRMFMT	<2><P><W7.><U><M><S><CR><LF>	Port print format set to CUSTOM (see Section 12.7 on page 77).

**Note** In OIML and CANADA modes, the letters PT (preset tare) are automatically inserted after the printed tare weight.  
For most applications, when using a printer attached to the EDP port, set PRNDEST (on the SERIAL menu) to EDP. If PRNDEST=BOTH, only the EDP format is sent to the printer.

Table 10-2. Default Print Formats

## 10.3 Customizing Print Formats

The following sections describe procedures for customizing print formats using the EDP port, the front panel (PFORMAT menu), and the Revolution® configuration utility. See Section 12.7 on page 77 for information about custom stream formatting.

### 10.3.1 Using the EDP Port

With a personal computer, terminal, or remote keyboard attached to the 520 EDP port, you can use the EDP command set to customize the print format strings.

To view the current setting of a format string type the name of the print format and press **ENTER**. For example, to check the current configuration of the GFMT format, type GFMT and press **ENTER**. The indicator responds by sending the current configuration for the gross format:

```
GFMT=<G> GROSS<NL>
```

To change the format, use the GFMT or NFMT EDP command followed by an equals sign (=) and the modified print format string. For example, to add the name and address of a company to the gross format, you could send the following EDP command:

```
GFMT=JOE'S SALVAGE<NL>1167 EAST HIGHWAY ROAD<NL>ANYTOWN<NL2><G> GROSS<NL>
```

A ticket printed using this format might look like the following:

```
JOE'S SALVAGE
1167 EAST HIGHWAY ROAD
ANYTOWN
```

```
1345 LB GROSS
```

The ticket above could also be formatted by specifying the company address information in the HDRFMT ticket format, then substituting the <AE> command for the address in the GFMT ticket format:

```
HDRFMT=JOE'S SALVAGE<NL>1167 EAST HIGHWAY ROAD<NL>ANYTOWN<NL2>GFMT=<AE><G> GROSS<NL>
```

### 10.3.2 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 PFORMAT menu (see Figure 10-1) to customize the print formats. Using the PFORMAT menu, you can edit the print format strings by changing the decimal values of the ASCII characters in the format string.

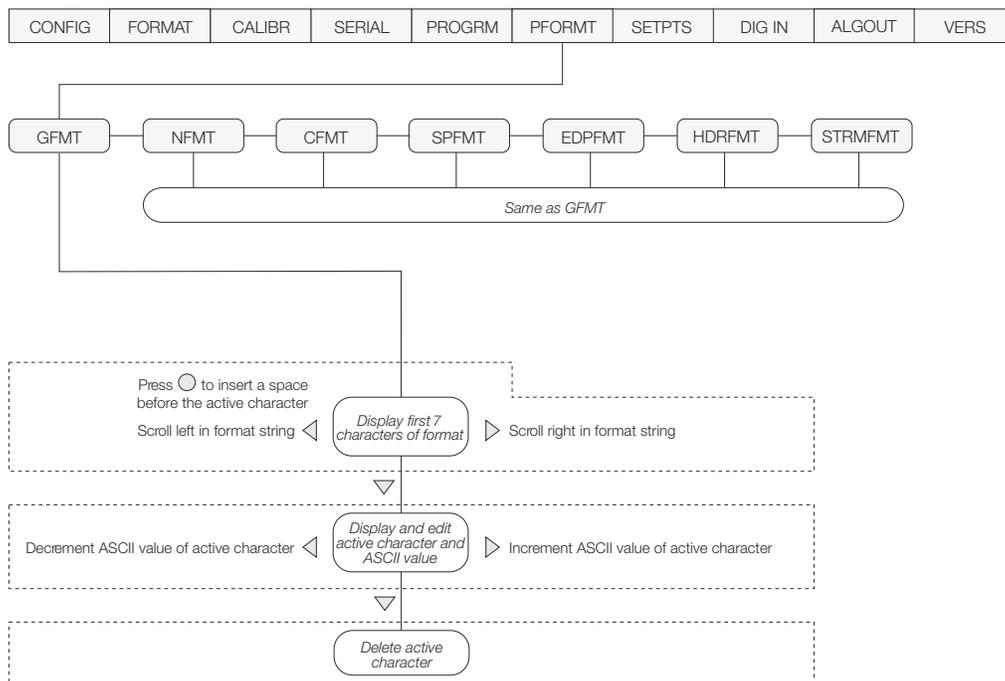


Figure 10-1. Print Format Menu



**Note** Lower-case letters and some special characters cannot be displayed on the 520 front panel (see the ASCII character chart on page 82) and are shown as blanks. The 520 can send or receive any ASCII character; the character printed depends on the particular ASCII character set implemented for the receiving device.

### 10.3.3 Using Revolution®

The Revolution configuration utility provides a print formatting grid with a tool bar. The grid allows you to construct the print format without the formatting commands (<NL> and <SP>) required by the front panel or EDP command methods. Using Revolution, you can type text directly into the grid, then select weight value fields from the tool bar and place them where you want them to appear on the printed ticket.

Figure 10-2 shows an example of the Revolution print formatting grid.

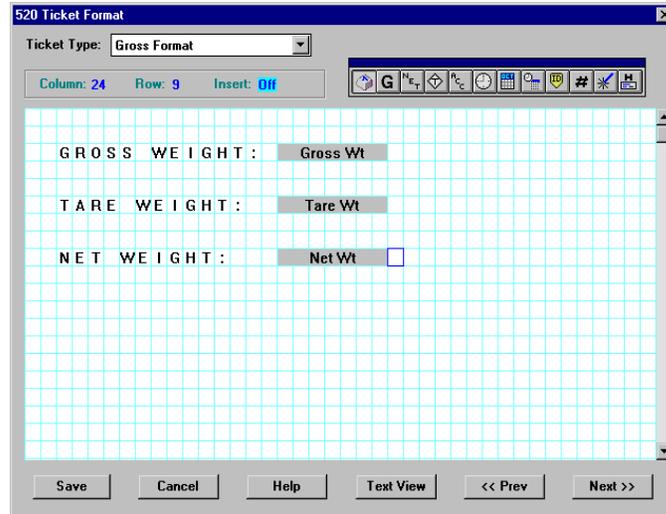


Figure 10-2. Revolution Print Format Grid

# 11.0 Setpoints

The 520 indicator provides eight configurable setpoints for control of both indicator and external equipment functions. Setpoints are configured to trip based on specified conditions; tripping the setpoint can be used to request indicator functions (print, tare, accumulate) or to change the state of a digital output controlling external equipment.

## 11.1 Batch and Continuous Setpoints

520 setpoints can be either continuous or batch setpoints.

**Continuous setpoints** are free-running: the indicator constantly checks the input channel for the setpoint value at each A/D update. If the input channel weight reading matches the setpoint value, the indicator sets the corresponding digital output on.

**Batch setpoints** are active one at a time, in an ordered sequence. The 520 can use batch setpoints to control up to eight separate batch processing steps. A digital output associated with a batch setpoint is on until the setpoint condition is met, then latched for the remainder of the batch sequence.

To use batch setpoints, you must activate the BATCHNG parameter on the SETPTS menu. This parameter defines whether a batch sequence is automatic or manual. AUTO sequences repeat continuously, while MANUAL sequences require a BATSTRT digital input or BATSTART EDP command before restarting. As shown in Table 11-1 on page 65, GROSSSP, NETSP, and RELSP setpoint kinds can be configured as either batch or continuous setpoints.



**Note** *If the checkweigh function is enabled, setpoints remain configured but do not function until checkweigh is disabled.*

The BATCH parameter must also be set on for each batch setpoint. If the setpoint is defined but the BATCH parameter is off, the setpoint operates as a continuous setpoint, even during batch sequences.

Kind	Description	Batch	Continuous
OFF	Setpoint turned off/ignored.		
GROSSSP	Gross setpoint. Trips when the current gross weight matches this value.	√	√
NETSP	Net setpoint. Trips when the current net weight matches this value.	√	√
+RELSP	Positive relative setpoint. Trips at a specific value above the referenced setpoint.	√	√
-RELSP	Negative relative setpoint. Trips at a specific value below the referenced setpoint.	√	√
%RELSP	Percent relative setpoint. Trips at a specific percentage value of the referenced setpoint.	√	√
PAUSE	Pauses the batch sequence indefinitely. Operator must activate the BATSTRT digital input to continue processing.	√	
DELAY	Delays the batch sequence for a specified time. The length of the delay (in tenths of a second) is specified on the Value parameter.	√	
WAITSS	Wait for standstill. Holds the batch sequence until the scale is at standstill.	√	
COUNTER	Specifies the number of consecutive batch sequences to perform. A BATRESET needs to be sent (through either a serial command or digital input) or a new counter value entered for COUNTER setpoint to function properly.	√	
AUTOJOG	Automatically jogs the previous filling operation.	√	
COZ	Center of zero. The digital output associated with this setpoint is activated when the scale is at center of zero. No value is required for this setpoint.		√
INMOTON	In motion. The digital output associated with this setpoint is activated when the scale is not at standstill. No value is required for this setpoint.		√
INRANGE	In range. The digital output associated with this setpoint is activated when the scale is within capacity range. No value is required for this setpoint.		√

Table 11-1. Setpoint Kinds

Kind	Description	Batch	Continuous
-GROSS	Negative gross weight. The digital output associated with this setpoint is activated when the gross weight reading is less than zero. No value is required for this setpoint.		√
-NET	Negative net weight. The digital output associated with this setpoint is activated when the net weight reading is less than zero. No value is required for this setpoint.		√
BATCHPR	Batch processing signal. The digital output associated with this setpoint is activated whenever a batch sequence is in progress. No value is required for this setpoint.		√
TIMER	Tracks the progress of a batch sequence based on a timer.  The timer value, specified in tenths of a second on the VALUE parameter, determines the length of time allowed between start and end setpoints. The indicator START and END parameters are used to specify the start and end setpoints. If the END setpoint is not reached before the timer expires, the digital output associated with this setpoint is activated.		√
CONCUR	Allows a digital output to remain active over a specified portion of the batch sequence. Two types of concur setpoints can be configured:  Type 1 (VALUE=0): The digital output associated with this setpoint becomes active when the START setpoint becomes the current batch step and remains active until the END setpoint becomes the current batch step.  Type 2 (VALUE > 0): If a non-zero value is specified for the VALUE parameter, that value represents the timer, in tenths of a second, for this setpoint. The digital output associated with this setpoint becomes active when the START setpoint becomes the current batch step and remains active until the timer expires.  NOTE: If more than one concurrent setpoint is configured, each must be assigned to a different digital output.		√

*Table 11-1. Setpoint Kinds (Continued)*

## 11.2 Setpoint Menu Parameters

Figure 11-1 shows the general structure of the SETPTS menu. See Section 3.2.7 on page 35 for a detailed description of the SETPTS menu. The eighteen setpoint kinds are described in Table 11-1 on page 65.

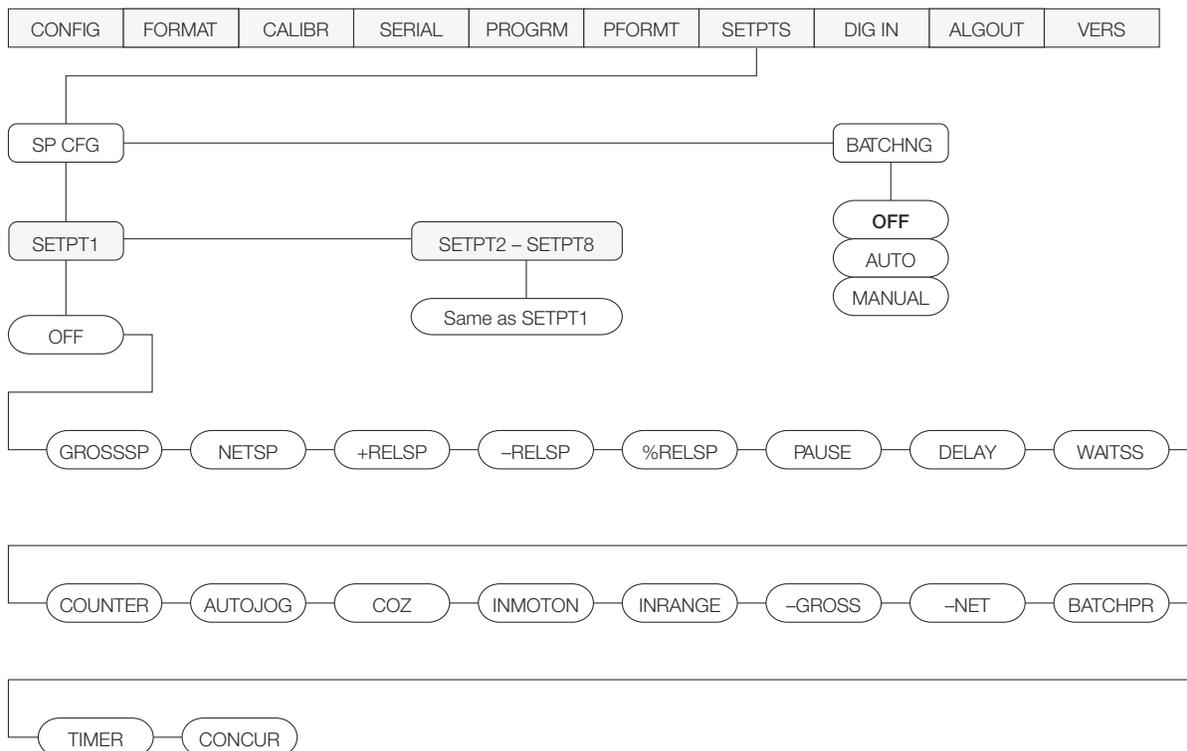


Figure 11-1. SETPTS Menu

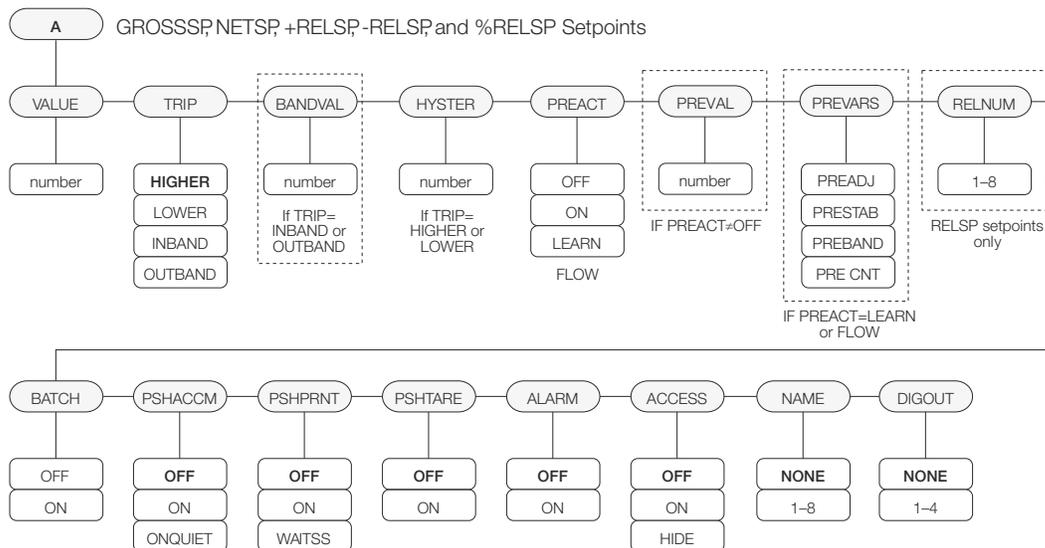


Figure 11-2. Submenu for GROSSSP, NETSP, and RELSP Setpoints

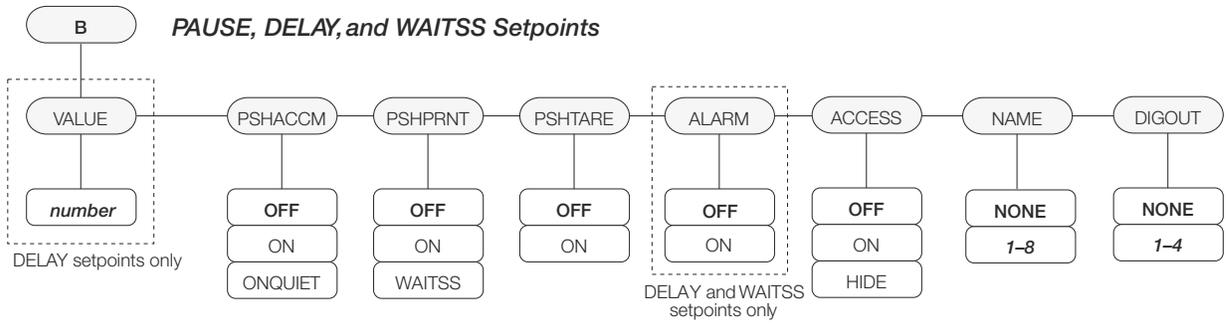


Figure 11-3. Submenu for PAUSE, DELAY, and WAITSS Setpoints

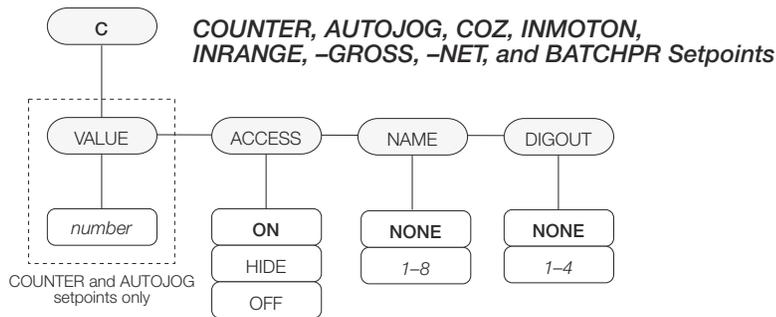


Figure 11-4. Submenu for COUNTER, AUTOJOG, COZ, INMOTON, INRRANGE, -GROSS, -NET, and BATCHPR Setpoints

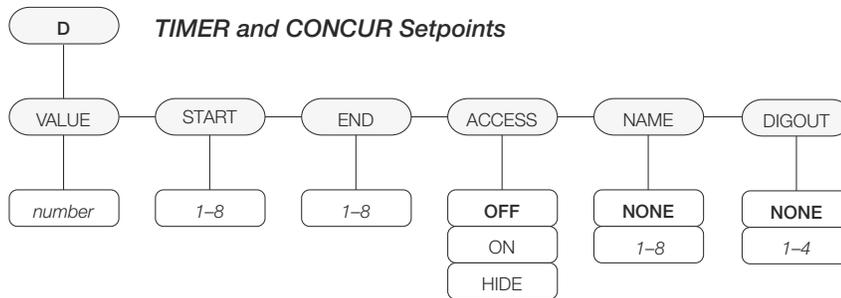


Figure 11-5. Submenu for TIMER and CONCUR Setpoints

SETPTS Menu		
Parameter	Choices	Description
<b>Level 3 submenus</b>		
GROSSSP NETSP +RELSP -RELSP %RELSP	VALUE TRIP BANDVAL HYSTER PREACT PREVAL RELNUM BATCH PSHACCM PSHTARE PSHPRNT ALARM ACCESS NAME DIGOUT	Configure GROSSSP, NETSP, and RELSP setpoints. See Figure 3-12 on page 35 and Level 4 parameter descriptions.
PAUSE DELAY WAITSS	PSHTARE PSHPRNT PSHACCM ACCESS DIGOUT NAME VALUE	Configure PAUSE, DELAY, and WAITSS setpoints. See Figure 3-13 on page 36 and Level 4 parameter descriptions.
COUNTER AUTOJOG COZ INMOTON INRANGE -GROSS -NET BATCHPR	VALUE ACCESS NAME DIGOUT	Configure COUNTER, AUTOJOG, COZ, INMOTON, INRANGE, -GROSS, -NET, AND BATCHPR setpoints. See Figure 3-14 on page 36 and Level 4 parameter descriptions.
TIMER CONCUR	VALUE START END ACCESS NAME DIGOUT	Configure TIMER and CONCUR setpoints. See Figure 3-15 on page 36 and Level 4 parameter descriptions.
<b>Level 4 submenus</b>		
VALUE	<i>number</i>	GROSSSP, NETSP, RELSP setpoint types: Specifies the target weight value. DELAY, AUTOJOG, TIMER, and CONCUR setpoint types: Specifies, in 0.1-second intervals, a time value in the range 0–65535. COUNTER setpoint types: Specifies the number of consecutive batches to be run.
TRIP	<b>HIGHER</b> LOWER INBAND OUTBAND	GROSSSP, NETSP, and RELSP setpoint types: Specifies whether the setpoint is tripped when the weight is higher or lower than the setpoint value, within a band established around the value, or outside of that band. In a batch sequence with TRIP=HIGHER, the associated digital output is active until the setpoint value is reached or exceeded; with TRIP=LOWER, the output is active until the weight goes below the setpoint value.
BANDVAL	<i>number</i>	GROSSSP, NETSP, and RELSP setpoint types with TRIP=INBAND or OUTBAND: Specifies a weight equal to half the bandwidth. The band established around the setpoint value is VALUE ±BANDVAL.

Table 11-2. Setpoint Menu Parameters

<i>SETPTS Menu</i>		
<b>Parameter</b>	<b>Choices</b>	<b>Description</b>
HYSTER	<i>number</i>	GROSSSP, NETSP, and RELSP setpoint types: Specifies a band around the setpoint value that must be exceeded before the setpoint, once off, can trip on again.
PREACT	<b>OFF</b> ON LEARN FLOW	GROSSSP, NETSP, and RELSP setpoint types: Allows the digital output associated with a setpoint to shut off before the setpoint is satisfied to allow for material in suspension.  The ON value adjusts the setpoint trip value up or down (depending on the TRIP parameter setting) from the setpoint value.  The LEARN value can be used to automatically adjust the preact value after each batch. LEARN compares the actual weight at standstill to the target setpoint value, then adjusts the preact by half of the difference after each batch.  The FLOW value provides compensation for material flow rate in determining when to shut off the digital output. Rather than waiting for the specified weight to be reached, FLOW preact uses the change in weight over time to anticipate when the preact weight value will be reached.
PREVAL	<i>number</i>	GROSSSP, NETSP, and RELSP setpoint types: Specifies the preact value for setpoints with PREACT set to ON or LEARN. Depending on the TRIP setting specified for the setpoint, the setpoint trip value is adjusted up or down by the preact value.
PREVAR	<b>PREADJ</b> PRESTAB PREBAND PRE CNT	GROSSSP, NETSP, and RELSP setpoint types: Specifies the preact variable for setpoints with PREACT set to LEARN or FLOW.  PREADJ variable sets what percentage of error correction applied each time a preact adjustment is made (default is 50%)  PRESTAB variable is timeout for PREACT LEARN value. For setpoints set to LEARN or FLOW, PRESTAB specifies the time (in 0.1 second intervals) to wait for standstill before adjusting the preact value. PREACT is not recalculated if standstill is not achieved (default is 0).  PREBAND defines a band value that will prevent the PREACT from becoming skewed if a large amount of product falls into the scale at the end of a filling cycle (default is 0.0).  PRE CNT is PREACT LEARN interval. For setpoints set to LEARN or FLOW, PRE CNT specifies the number of batches after which PREACT is recalculated. Default value of 1 specifies that PREACT will be recalculated after every batch cycle.
RELNUM	1–8	RELSP setpoints: Specifies the number of the relative setpoint. The target weight for this setpoint is: <ul style="list-style-type: none"><li>• For +RELSP, the value of the relative setpoint plus the value (VALUE parameter) of this setpoint</li><li>• For –RELSP, the value of the relative setpoint minus the value of this setpoint</li><li>• For %RELSP, the percentage (specified on the VALUE parameter for this setpoint) of the relative setpoint</li></ul>
BATCH	<b>OFF</b> ON	GROSSSP, NETSP, and RELSP setpoint types: Specifies whether the setpoint is used as a batch (ON) or continuous (OFF) setpoint.
PSHACCM	<b>OFF</b> ON ONQUIET	GROSSSP, NETSP, RELSP, PAUSE, DELAY, and WAITSS setpoint types: Specify ON to update the accumulator and perform a print operation when the setpoint is satisfied. Specify ONQUIET to update the accumulator without printing.
PSHPRNT	<b>OFF</b> ON WAITSS	GROSSSP, NETSP, RELSP, PAUSE, DELAY, and WAITSS setpoint types: Specify ON to perform a print operation when the setpoint is satisfied; specify WAITSS to wait for standstill after setpoint is satisfied before printing.
PSHTARE	<b>OFF</b> ON	GROSSSP, NETSP, RELSP, PAUSE, DELAY, and WAITSS setpoint types: Specify ON to perform an acquire tare operation when the setpoint is satisfied. NOTE: PSHTARE acquires the tare regardless of the value specified for the REGULAT parameter on the PROGRAM menu.

*Table 11-2. Setpoint Menu Parameters (Continued)*

<i>SETPTS Menu</i>		
Parameter	Choices	Description
ALARM	OFF ON	GROSSSP, NETSP, RELSP, DELAY, and WAITSS setpoint types: Specify ON to display the word <i>ALARM</i> on the primary display while the setpoint is active (batch setpoints) or while the setpoint is not tripped (continuous setpoints).
START	1–8	TIMER and CONCUR setpoint types: Specifies the starting setpoint number. <i>Do not</i> specify the number of the TIMER or CONCUR setpoint itself. The TIMER or CONCUR setpoint begins when the starting setpoint begins.
END	1–8	TIMER and CONCUR setpoint types: Specifies the ending setpoint number. <i>Do not</i> specify the number of the TIMER or CONCUR setpoint itself. The TIMER or CONCUR setpoint stops when the ending setpoint begins.
ACCESS	ON HIDE OFF	All setpoint types: Specifies whether or not the setpoint can be accessed in weigh mode via the front panel entry mode. ON: Value can be displayed and changed HIDE: Value cannot be displayed or changed OFF: Value can be displayed but not changed  Setpoints with ACCESS=ON can be turned on or off when a batch is not running: <ul style="list-style-type: none"> <li>To turn the setpoint on/off, enter front panel setup mode (push and hold UNITS key). Select setpoint by pressing UNITS or PRINT (◀ or ▶). Turn setpoint on/off by pressing GROSS/NET (▽).</li> </ul>
NAME	NONE, 1–8	All setpoint types: Specify the number of an assigned prompt. Up to 8 prompt names can be specified on the PROMPTS submenu of the PROGRM menu.
DIGOUT	NONE, 1–4	All setpoint types: Specifies a digital output associated with the setpoint. For continuous setpoints, the digital output becomes active (low) when the condition is met; for batch setpoints, the digital output is active <i>until</i> the setpoint condition is met.

*Table 11-2. Setpoint Menu Parameters (Continued)*

## 11.3 Batching Switch

The batching switch option, PN 19369, comes as a complete unit in an FRP enclosure, with legend plate, locking stop switch (mushroom button), and a run/start/abort 3-way switch.

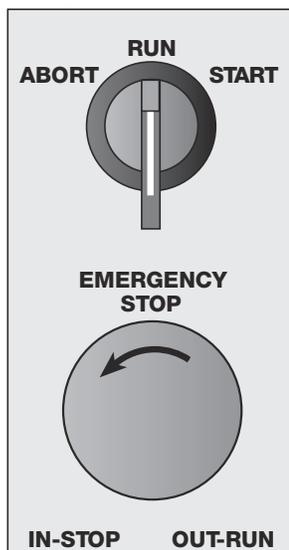


Figure 11-6. Batching Switch

Both switches are wired into the indicator's digital I/O terminal strip as shown in Figure 11-7. Each switch uses a separate digital input.

Once cables and switches have been connected to the indicator, use the setup switch to place the indicator in setup mode. Use the DIGIN menu (see Section 3.2.8 on page 38) to configure digital input functions. The default values for DIGIN1 and DIGIN2 are BATSTRT and BATRUN, respectively.

When configuration is complete, exit setup mode. Initialize the batch by turning the 3-way switch to *ABORT*, then unlock the STOP button (the STOP button must be in the *OUT* position to allow the batch process to run). The batching switch is now ready to use.



**WARNING** If no digital input is assigned to *BATRUN*, batching proceeds as if *BATRUN* were always on: If *DIGIN2* is not assigned to *BATRUN*, the batch will start when the 3-way switch is turned to *START*, but the STOP mushroom button will not function.



**Note** Use this procedure (or the *BATRESET* EDP command) to initialize the new batch routine following any change to the setpoint configuration.

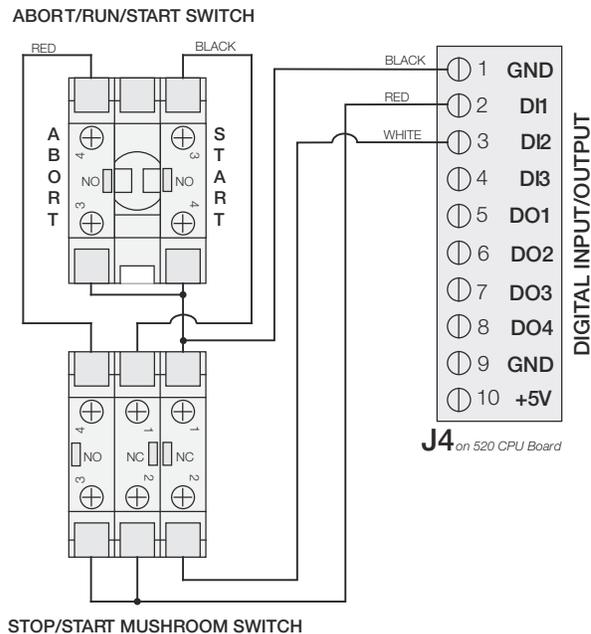


Figure 11-7. Batching Switch Wiring Diagram

To begin a batch process, turn the 3-way switch to *START* momentarily. If the STOP button is pushed during the batch process, the process halts and the button locks in the *IN* position.

The *START* switch is ignored while the STOP button is locked in the *IN* position. The STOP button must be turned counterclockwise to unlock it, then released into the *OUT* position to enable the 3-way switch.

To restart an interrupted batch from the step where it left off, do the following:

1. Unlock STOP button (*OUT* position)
2. Turn 3-way switch to *START*

To restart an interrupted batch from the first batch step, do the following:

1. Turn 3-way switch to *ABORT*
2. Unlock STOP button (*OUT* position)
3. Turn 3-way switch to *START*

# 12.0 Appendix

## 12.1 Error Messages

The 520 indicator provides a number of error messages. When an error occurs, the message is shown on the indicator display. Error conditions can also be checked remotely by using the XE EDP command as described in Section 12.3 on page 74.

### 12.1.1 Displayed Error Messages

The 520 provides a number of front panel error messages to assist in problem diagnosis. Table 12-1 lists these messages and their meanings.

Error Message	Description	Solution
E EEROM	EEPROM physical error	Call RLWS Service.
E VIREE	Virgin EEPROM	Use TEST menu to perform DEFLT (restore defaults) procedure (see Section 12.13 on page 86), then recalibrate load cells.
E PCKSM	Parameter checksum error	
E LCKSM	Load cell calibration checksum error	Recalibrate load cells.
E ACKSM	A/D calibration checksum error	A/D converter requires recalibration. Call RLWS Service.
E FCKSM	Print format checksum error	Use TEST menu to perform DEFLT (restore defaults) procedure (see Section 12.13 on page 86).
E IDATA	Internal RAM data error	Call RLWS Service.
E XDATA	External RAM data error	
E A/D	A/D physical error	
E REF	A/D reference error	A/D converter requires recalibration. Call RLWS Service.
REG ERR	Non-volatile RAM (NVRAM) register error	Battery weak or not installed. Replace battery, then use TEST menu to perform CLR NV (clear non-volatile storage) procedure (see Section 12.13 on page 86).
TAR ERR	Tare register checksum error	Acquire tare, acquire zero, or reset configuration.
ACC ERR	Accumulator overflow error	Press ACCUM to display accumulator value, then press CLEAR twice to clear the accumulator.
PWRFAIL	Power failure	Input voltage too low.
OVERFL	Overflow error	Weight value too large to be displayed.
-----	Gross > overload limit	Gross value exceeds overload limit. Check configuration.
_____	A/D underrange	A/D reading < -4 mV. Check scale for binding or damage.
LOW BAT	Low battery	Replace battery.
E GRAV	Gravity error	Do gravity adjustment calibration or check gravity adjustment settings.
CNT ERR	Count error	Indicator unable to calculate piece weight. Check quantity size on scale.
OPT ERR	Option board error	Option unable to initialize. Check option board connection or replace option board.

Table 12-1. 520 Error Messages

## 12.2 Using the HARDWARE Command

The HARDWARE serial command can be used to verify that installed option cards are recognized by the system. The HARDWARE command returns a single-digit card code, representing the card installed:

Code	Card Type
0	No card installed
4	Analog Output Card
8	Bus Card

Table 12-2. HARDWARE Command Option Card Type Codes

If an installed card is not recognized (HARDWARE command returns code of 0), ensure that the card is seated properly. Reinstall the card, if necessary, then cycle the power to read the configuration again. If the card is still not recognized, you may need to try a different option card.

## 12.3 Using the XE EDP Command

The XE EDP command can be used to remotely query the 520 for the error conditions shown on the front panel. The XE command returns a decimal number representing any existing error conditions.

If more than one error condition exists, the number returned is the sum of the values representing the error conditions (see Table 12-3). For example, if the XE command returns the number 1040, this value represents the sum of an A/D reference error (1024) and an A/D calibration checksum error (16).

Error Code	Description	Binary Value
0	No error	0000 0000 0000 0000 0000
1	EEPROM physical error	0000 0000 0000 0000 0001
2	Virgin EEPROM	0000 0000 0000 0000 0010
4	Parameter checksum error	0000 0000 0000 0000 0100
8	Load cell calibration checksum error	0000 0000 0000 0000 1000
16	A/D calibration checksum error	0000 0000 0000 0001 0000
32	Print format checksum error	0000 0000 0000 0010 0000
64	Internal RAM data error	0000 0000 0000 0100 0000
128	External RAM data error	0000 0000 0000 1000 0000
256	NV register checksum error	0000 0000 0001 0000 0000

Table 12-3. Error Codes Returned on XE Command

Error Code	Description	Binary Value
512	A/D physical error	0000 0000 0010 0000 0000
1024	A/D reference error	0000 0000 0100 0000 0000
2048	Tare register error	0000 0000 1000 0000 0000
4096	Accumulator overflow error	0000 0001 0000 0000 0000
8192	A/D underrange	0000 0010 0000 0000 0000
16384	Power failure	0000 0100 0000 0000 0000
32768	Gross > overload limit	0000 1000 0000 0000 0000
65536	Gravity error	0001 0000 0000 0000 0000
131072	Count error	0010 0000 0000 0000 0000
262144	Low battery error	0100 0000 0000 0000 0000
524288	Option board error	1000 0000 0000 0000 0000

Table 12-3. Error Codes Returned on XE Command

## 12.4 Status Messages

Two EDP commands, P and ZZ, can be used to provide status about the indicator.

- The P EDP command returns whatever is currently shown in the indicator's primary display area.
- The ZZ EDP command returns whatever is currently shown in both the primary and secondary displays. Depending on the type of device used to receive data from the indicator, the standstill and center of zero symbols may be shown as spaces or as special characters. The ZZ command returns information in the following format:

PPPPPPP uu ssssssssssssssss

where:

- PPPPPPP is the information shown on the primary display
- uu is the 2-digit units annunciator
- ssssssssssssssss is the contents of the secondary display

If the indicator is in an underrange or overload condition, the weight value is replaced with &&&&& (overload) or::: (underrange).

## 12.5 TARE and ZERO Key Functions

The function of the front panel TARE and ZERO keys depends on the value specified for the REGULAT parameter on the PROGRM menu. Table 12-4 describes the function of these keys for each of the regulatory modes.

REGULAT Parameter Value	Weight on Scale	Tare in System	Front Panel Key Function	
			TARE	ZERO
NTEP	zero or negative	no	<i>no action</i>	ZERO
		yes	CLEAR TARE	
	positive	no	TARE	
		yes	TARE	
CANADA	zero or negative	no	<i>no action</i>	ZERO
		yes	CLEAR TARE	
	positive	no	TARE	
		yes	<i>no action</i>	
OIML	zero or negative	no	<i>no action</i>	ZERO
		yes	CLEAR TARE	ZERO <i>and</i> CLEAR TARE
	positive	no	TARE	ZERO
		yes	TARE	ZERO <i>and</i> CLEAR TARE if weight is within ZRANGE. <i>No action</i> if weight is outside of ZRANGE
NONE	zero or negative	no	TARE	ZERO
		yes	CLEAR TARE	
	positive	no	TARE	
		yes	CLEAR TARE	

Table 12-4. TARE and ZERO Key Functions for REGULAT Parameter Settings

## 12.6 Data Formats

### 12.6.1 Continuous Output Serial Data Format

If continuous transmission is configured for the EDP or printer port (STREAM parameter on the SERIAL menu), the 520 sends data using the Consolidated Controls serial data format shown in Figure 12-1:

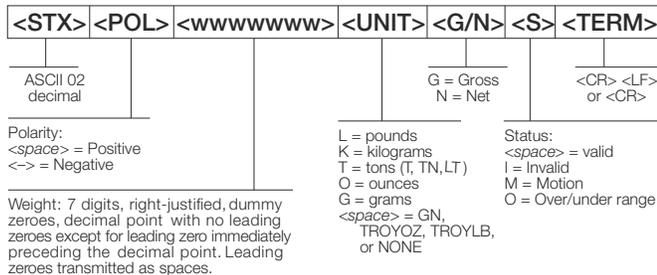


Figure 12-1. Continuous Output Serial Data Format

### 12.6.2 Demand Output Serial Data Format

When demand mode is configured for the EDP or printer port in the setup menus (PRNDEST on the SERIAL menu), the 520 uses a data string formatted for a basic ticket printout. The particular ticket format printed depends on the indicator configuration.

You can use the EDP port or keypad to fully customize the ticket to work with a wide variety of printers, scoreboard displays, and other remote equipment. See Section 12.0 on page 73 for more information on custom print formats.

### 12.6.3 RS-485 Data Formats

The 520 has a built-in RS-485 software protocol which is enabled when you assign a non-zero address to the indicator. Valid RS-485 addresses must be in the range 1–255; the address is specified on the ADDRESS parameter on the SERIAL menu.

All remote commands are initiated using the data format shown in Figure 12-2:

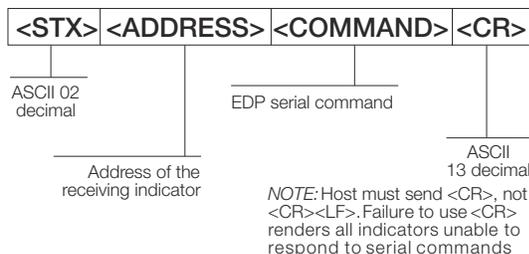


Figure 12-2. RS-485 Send Data Format

If the initiating device address matches the port address of a 520 on the RS-485 network, that indicator responds. For example, with demand outputs, or in response to a XG command, the responding indicator uses the format shown in Figure 12-3:

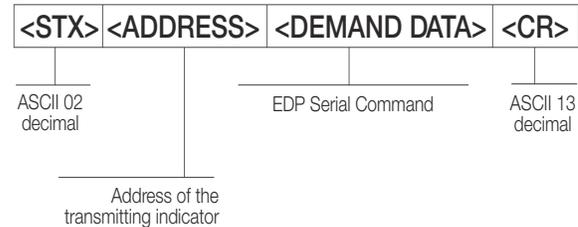


Figure 12-3. RS-485 Respond Data Format

**Example:** To send the XG command from an ASCII terminal to an indicator at address 65 (decimal) on the RS-485 network, use the format shown in Figure 12-2.

- The keyboard equivalent for the start-of-text (STX) character is CONTROL-B (see Table 12-9 on page 82).
- The indicator address (65) is represented by an upper case “A”.
- The carriage return (CR) character is generated by pressing the ENTER key.

Therefore, to send the XG command to the indicator at address 65, enter the following at the terminal:

CTRL-B A XG ENTER.

The indicator will respond to the XG command with the gross weight and units. See Section 9.0 on page 50, for other commands that can be used.

## 12.7 Custom Stream Formatting

Each port can be independently configured to stream a default frame format or can be customized to stream a user-defined format. Custom formatting is very similar to the standard print formatting described in Section 12.0. Table 12-5 lists the format identifiers used to configure a custom print format.

Format Identifier	Defined By	Description
<P[G I N I T]>	STR.POS STR.NEG	Polarity. Specifies positive or negative polarity for the current or specified (Gross/Net/Tare) weight on the source scale.
<U[P I S I T]>	STR.PRI STR.SEC	Units. Specifies primary or secondary units for the current or specified weight on the source scale.
<M[G I N I T]>	STR.GROSS STR.NET STR.TARE	Mode. Specifies gross, net, or tare weight for the current or specified weight on the source scale.
<S>	STR.MOTION STR.RANGE STR.OK STR.INVALID	Status for the source scale. Default values and meanings for each status: STR.MOTION    M        In motion STR.RANGE    O        Out of range STR.OK        <space>    OK STR.INVALID   I        Invalid
<B [-]n,...]	<i>See descriptions below</i>	Bit fields. Comma-separated sequence of bit field specifiers. Must not exceed 8 bits. Entering minus sign before number will negate the bit setting.
B0	—	Always 0
B1	—	Always 1
B2	Configuration	=1 if even parity
B3	Dynamic	=1 if MODE=NET
B4	Dynamic	=1 if COZ
B5	Dynamic	=1 if standstill
B6	Dynamic	=1 if gross negative
B7	Dynamic	=1 if out of range
B8	Dynamic	=1 if secondary
B9	Dynamic	=1 if tare in system
B10	Dynamic	=1 if tare is keyed
B11	Dynamic	=00 if MODE=GROSS =01 if MODE=NET =10 if MODE=TARE =11 ( <i>not used</i> )
B12	Dynamic	=00 if UNITS=PRIMARY =01 if UNITS=SECONDARY =10 if UNITS=TERTIARY =11 ( <i>not used</i> )
B13	Configuration	=00 ( <i>not used</i> ) =01 if current DSPDIV=1 =10 if current DSPDIV=2 =11 if current DSPDIV=5
B14	Configuration	=00 ( <i>not used</i> ) =01 if primary DSPDIV=1 =10 if primary DSPDIV=2 =11 if primary DSPDIV=5
B15	Configuration	=00 ( <i>not used</i> ) =01 if secondary DSPDIV=1 =10 if secondary DSPDIV=2 =11 if secondary DSPDIV=5

Table 12-5. Custom Stream Format Identifiers

B16	Configuration	N/A
B17	Configuration	=000 if current DECPNT=8888800 =001 if current DECPNT=8888880 =010 if current DECPNT=8888888 =011 if current DECPNT=888888.8 =100 if current DECPNT=88888.88 =101 if current DECPNT=8888.888 =110 if current DECPNT=888.8888 =111 if current DECPNT=88.88888
B18	Configuration	=000 if primary DECPNT=8888800 =001 if primary DECPNT=8888880 =010 if primary DECPNT=8888888 =011 if primary DECPNT=888888.8 =100 if primary DECPNT=88888.88 =101 if primary DECPNT=8888.888 =110 if primary DECPNT=888.8888 =111 if primary DECPNT=88.88888
B19	Configuration	=000 if secondary DECPNT=8888800 =001 if secondary DECPNT=8888880 =010 if secondary DECPNT=8888888 =011 if secondary DECPNT=888888.8 =100 if secondary DECPNT=88888.88 =101 if secondary DECPNT=8888.888 =110 if secondary DECPNT=888.8888 =111 if secondary DECPNT=88.88888
B20	Configuration	N/A
<wspec [-] [0] digit[.digit]>	Scale weight	Weight for the source scale. <i>wspec</i> is defined as follows: <i>wspec</i> indicates whether the weight is the current displayed weight (W,w), gross (G,g), net (N,n), or tare (T,t) weight. Upper-case letters specify right-justified weights; lower-case are left-justified. Optional /P, /S, or /T suffixes can be added before the ending delimiter (>) to specify weight display in primary (/P) or secondary (/S) units. [-] Enter a minus sign (-) to include sign for negative values. [0] Enter a zero (0) to display leading zeroes. <i>digit[.digit]</i> The first digit indicates the field width in characters. Decimal point only indicates floating decimal; decimal point with following digit indicates fixed decimal with <i>n</i> digits to the right of the decimal.
<CR>	—	Carriage return
<LF>	—	Line feed

Table 12-5. Custom Stream Format Identifiers (Continued)

## 12.8 Stream Formatting Examples

### 12.8.1 Toledo 8142 Indicator

Sample string for Toledo 8142 indicator (with no checksum):

<STX><Status Word A><Status Word B><Status Word C><wwwwww><ttttt><EOL>

String recognized by the 520:

<02><B2, B0, B1, B13, B17><B2, B0, B1, B8, B5, B7, B6, B3><B2, B0, B1, B0, B0, B0, B0, B0><W06><T06><CR>

Identifier	Description
<STX>	The STX character is entered into the string using the <02> hex value.
<Status Word A>	<p>Toledo status words are made up of various bit fields (see Table 12-5 on page 77). NOTE: Identifiers must be entered beginning with the high-order bit (bit 7–bit 0) of the Toledo status word.</p> <p>Status Word A contains the following fields. Equivalent 520 format identifiers are shown in parentheses. Bit 7: parity (B2) Bit 6: always 0 (B0) Bit 5: always 1 (B1) Bits 3–4: display divisions (B13) Bits 0–2: decimal format (B17)</p>
<Status Word B>	<p>Status Word B contains the following fields. Equivalent 920i format identifiers are shown in parentheses. Bit 7: parity (B2) Bit 6: always 0 (B0) Bit 5: always 1 (B1) Bit 4: lb/kg units (B8) Bit 3: stable/motion (B5) Bit 2: in/out-of-range (B7) Bit 1: pos/neg (B6) Bit 0: gross/net (B3)</p>
<Status Word C>	<p>Status Word C contains the following fields. Equivalent 520 format identifiers are shown in parentheses. Bit 7: parity (B2) Bit 6: always 0 (B0) Bit 5: always 1 (B1) Bits 0–4: always 0 (B0)</p>
<wwwwww>	<p>The &lt;W06&gt; and &lt;T06&gt; indicate six digits of indicated weight and tare weight with leading zeroes. Valid characters are W, w, G, g, T, t, N, or n (lower case indicates left justified). W indicates current weight, G gross weight, N net weight, and T tare weight. /P and /S can be used to specify primary or secondary.</p> <p>Minus indicates sign inclusion, and (0) indicates leading zeros. First digit indicates field width in characters. Decimal indicates floating decimal point. Decimal with subsequent digit indicates fixed decimal with <i>n</i> digits to the right of the decimal. Two consecutive decimals (for example, &lt;W06..&gt;) send the decimal point even if it falls at the end of the transmitted weight field.</p>
<ttttt>	Tare weight. See description above.
<EOL>	<CR> is entered at the end of the string as the end of line character in this example.

Table 12-6. Toledo Sample String Identifiers

## 12.8.2 Cardinal 738 Indicator

Sample string for the Cardinal 738 indicator:

```
<CR><POL><wwwwww><S><SP><units><SP><G/N><SP><SP><EOL>
```

String recognized by the 520:

```
<CR><P><W07...><S><SP><U><SP><M><SP2><03>
```

Identifier	Description
<CR>	Carriage Return
<POL>	Cardinal uses + for positive and – for negative, so the stream polarity tokens need to reflect this. The EDP commands for the 520 are STR.POS=+ and STR.NEG= -.
<wwwwwww>	<p>The &lt;W07...&gt; identifier that the 520 recognizes indicates seven digits of weight with a decimal and leading zeroes, with the decimal being sent at the end of the weight. Valid characters are W, w, G, g, T, t, N, or n (lower case indicates left justified). W indicates current weight, G gross weight, N net weight, T tare weight. /P and /S can be used to specify primary or secondary.</p> <p>Minus indicates sign inclusion, while (0) indicates leading zeros. First digit indicates field width in characters. Decimal indicates floating decimal point. Decimal with subsequent digit indicates fixed decimal with <i>n</i> digits to the right of the decimal. Two consecutive decimals (for example, &lt;W06...&gt;) send the decimal point even if it falls at the end of the transmitted weight field.</p>
<S>	<p>There are four possible tokens for status bits that can be used: motion, out-of-range, valid, and invalid. In the Cardinal, m indicates motion, o indicates out-of-range, and a space is used for valid or invalid weights. The commands to set these tokens in the 520 are STR.MOTION=m, STR.RANGE=o, STR.OK= , STR.INVALID= .</p> <p>NOTE: Although it appears that there are no commands for OK and INVALID, there is a space entered with the keyboard before pressing the ENTER key.</p>
<SP>	Space
<units>	The Cardinal uses two-character, lower-case units identifiers. The commands to set these tokens in the 520 include: STR.PRI=lb (options: kg, g, tn, t , gr, oz, or sp), STR.SEC=kg (options: lb, g, tn, t , gr, oz, or sp).
<SP>	Space
<G/N>	The mode used for Cardinal is <i>g</i> for gross and <i>n</i> for net. These tokens are set using the STR.GROSS= <i>g</i> and STR.NET= <i>n</i> tokens.
<SP>	Space
<SP>	Space
<EOL>	The end of line character is an ETX in this case so the hex value of <03> is entered in the string.

Table 12-7. Cardinal Sample String Identifiers

### 12.8.3 Weightronix WI 120 Indicator

Sample string for the Weightronix WI120 indicator:

<SP><G/N><POL><wwwwww><SP><units><EOL>

String recognized by the 520:

<SP><M><P><W06.><SP><U><CR><LF>

Identifier	Description
<SP>	Space
<G/N>	The mode used for Weightronix is <i>G</i> for gross and <i>N</i> for net. These tokens are set using the STR.GROSS= <i>G</i> and STR.NET= <i>N</i> tokens.
<POL>	Since the Weightronix uses + for positive and – for negative, the polarity tokens need to reflect this. The EDP commands for the 520 are STR.POS=+ and STR.NEG= –.
<wwwwww>	The <W06.> that the 520 recognizes indicates six digits of weight with a decimal and leading zeroes. Valid characters are <i>W</i> , <i>w</i> , <i>G</i> , <i>g</i> , <i>T</i> , <i>t</i> , <i>N</i> , or <i>n</i> (lower case indicates left justified). <i>W</i> indicates current weight, <i>G</i> gross weight, <i>N</i> net weight, and <i>T</i> tare weight. <i>/P</i> and <i>/S</i> can be used to specify primary or secondary.  Minus indicates sign inclusion, while (0) indicates leading zeros. First digit indicates field width in characters. Decimal indicates floating decimal point. Decimal with subsequent digit indicates fixed decimal with <i>n</i> digits to the right of the decimal. Two consecutive decimals (for example, <W06..>) send the decimal point even if it falls at the end of the transmitted weight field.
<SP>	Space
<units>	The Weightronix uses two-character, lower-case units identifiers. The commands to set these tokens in the 520 include: STR.PRI= <i>lb</i> (options: <i>kg</i> , <i>g</i> , <i>tn</i> , <i>t</i> , <i>gr</i> , <i>oz</i> , or <i>sp</i> ), STR.SEC= <i>kg</i> (options: <i>lb</i> , <i>g</i> , <i>tn</i> , <i>t</i> , <i>gr</i> , <i>oz</i> , or <i>sp</i> ).
<EOL>	<CR> or <CR> and <LF>

Table 12-8. Weightronix Sample String Identifiers

## 12.9 ASCII Character Chart

Use the decimal values for ASCII characters listed in Tables 12-9 and 12-10 when specifying print format strings on the 520 PFORMAT menu. The actual character printed depends on the character mapping used by the output device.

The 520 can send or receive any ASCII character value (decimal 0–255). Due to limitations of the indicator display, some characters cannot be shown.

Control	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- <sub>~</sub>	US	31	1F	?	63	3F	_	95	5F	DEL	127	7F

Table 12-9. ASCII Character Chart (Part 1)

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	½	171	AB		203	CB	δ	235	EB
î	140	8C	¼	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
ç	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
f	159	9F		191	BF		223	DF		255	FF

Table 12-10. ASCII Character Chart (Part 2)

## 12.10 Digital Filtering

Standard digital filtering uses mathematical averaging to eliminate the variant digital readings that the A/D converter sends periodically because of external vibration. Digital filtering does not affect the indicator measurement rate, but does affect the settling time. The selections from 1 to 256 reflect the number of readings averaged per update period. When a reading is encountered that is outside a predetermined band, the averaging is overridden, and the display jumps directly to the new value.

### 12.10.1 DIGFLT<sub>x</sub> Parameters

The first two digital filtering parameters, DIGFLT1, and DIGFLT2, 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.

A rolling average from filter one is placed in filter two. The overall filtering is effectively a weighted average of the product of the values (DIGFLT1 X DIGFLT2) within a time frame equivalent to the sum of the values (DIGFLT1 + DIGFLT2).

Setting the filters to 1 effectively disables digital filtering.

### 12.10.2 RATTLETRAP® Filtering

RATTLETRAP digital filtering (RATTRAP parameter set ON) uses a vibration-dampening algorithm to provide a combination of the best features of analog and digital filtering. The RATTLETRAP algorithm evaluates the frequency of a repeating vibration then derives a composite displayed weight equal to the actual weight on the scale less the vibration-induced flaws. It is particularly effective for eliminating vibration effects or mechanical interference from nearby machinery. Using RATTLETRAP filtering can eliminate much more mechanical vibration than standard digital filtering, but will usually increase settling time over standard digital filtering.

### 12.10.3 DSENS and DFTHR Parameters

The digital filter can be used by itself to eliminate vibration effects, but heavy filtering also increases settling time. The DSENS (digital filter sensitivity) and DFTHR (digital filter threshold) parameters can be used to temporarily override filter averaging and improve settling time:

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

### 12.10.4 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 the digital filter parameters (DIGFLT1 and DIGFLT2) to 1. Set DFTHR 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 DFTHR 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 DIGFLT<sub>x</sub> parameters to eliminate the vibration effects on the scale. (Leave DFTHR set to NONE.) Find the lowest effective value for the DIGFLT<sub>x</sub> parameters.
4. Calculate the DFTHR parameter value by converting the weight value recorded in Step 2 to display divisions:

$$\text{threshold\_weight\_value} / \text{DSPDIV}$$

In the example in Step 2, with a threshold weight value of 50 lb and a display division value of 5D:  $50 / 5D = 10$ . DFTHR should be set to 10DD for this example.

5. Finally, set the DSENS parameter high enough to ignore transient peaks. Longer transients (typically caused by lower vibration frequencies) will cause more consecutive out-of-band readings, so DSENS should be set higher to counter low frequency transients.

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

## 12.11 Conversion Factors for Secondary Units

The 520 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 12-11 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 0.000500.
- To configure secondary units using **EDP** commands, use the Table 12-11 to find the conversion multiplier for the **SEC.MULT** command. For example, if the primary unit is pounds and the secondary unit is short tons, send the **EDP** command **SEC.MULT=0.0005<CR>** to set the multiplier for the secondary units.



**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 will display an overflow message (**OVERFL**).

For example, if the primary units are short tons, secondary units are pounds, and the secondary decimal point is set to 8888.888, the indicator will overflow if 5 tons or more are applied to the scale. With 5 tons applied, and a conversion factor of 2,000, the secondary units display needs five digits to the left of the decimal point to display the 10,000 lb secondary units value.

Primary Unit	x Multiplier	Secondary Unit
grains	0.064799	grams
	0.002286	ounces
	0.000143	pounds
	0.000065	kilograms
	0.002083	troy ounces
	0.000174	troy pounds
ounces	437.500	grains
	28.3495	grams
	0.06250	pounds
	0.02835	kilograms
	0.911458	troy ounces
	0.075955	troy pounds

Table 12-11. Conversion Factors

Primary Unit	x Multiplier	Secondary Unit
pounds	7000.00	grains
	453.592	grams
	16.0000	ounces
	0.453592	kilograms
	14.58333	troy ounces
	1.215278	troy pounds
	0.000500	short tons
	0.000446	long tons
0.000453	metric tons	
grams	15.4324	grains
	0.035274	ounces
	0.002205	pounds
	0.001000	kilograms
	0.032151	troy ounces
	0.002679	troy pounds
kilograms	15432.4	grains
	35.2740	ounces
	1000.00	grams
	2.20462	pounds
	32.15075	troy ounces
	2.679229	troy pounds
	0.001102	short tons
	0.000984	long tons
	0.001000	metric tons
short tons	2000.00	pounds
	907.185	kilograms
	0.892857	long tons
	0.907185	metric tons
metric tons	2204.62	pounds
	1000.00	kilograms
	1.10231	short tons
	0.984207	long tons
long tons	2240.00	pounds
	1016.05	kilograms
	1.12000	short tons
	1.01605	metric tons

Table 12-11. Conversion Factors (Continued)

## 12.12 Analog Output Calibration

The following calibration procedure requires a multi meter to measure voltage or current output from the analog output module. If the option is not already installed, see Section 2.4 on page 8.



**Note** The analog output must be calibrated after the indicator itself has been configured (Section 3.0) and calibrated (Section 4.0).

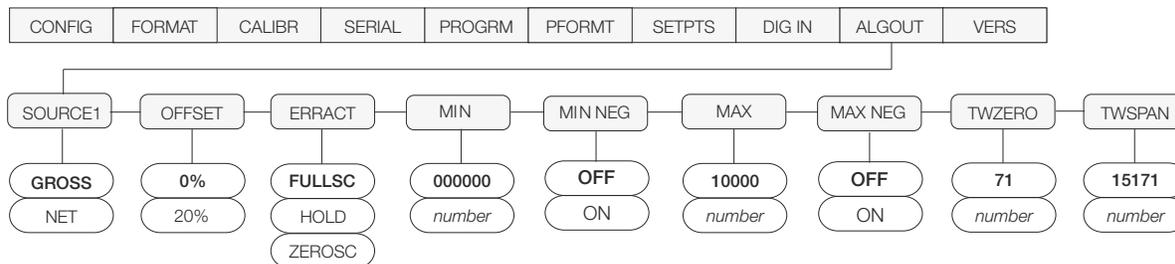


Figure 12-4. Analog Output Menu

- Enter setup mode and go to the ALGOUT menu (see Figure 12-4):
  - Set OFFSET to 0% for 0–10 V output, 20% for 4–20 mA output
  - Set mode select jumper on analog output board to “V” for 0-10 V output, or “I” for 4-20 mA output
  - Set MIN to lowest weight value to be tracked by the analog output
  - Set MAX to highest weight value to be tracked by the analog output
- Connect multimeter to connector J1 on the analog output board:
  - For voltage output, connect voltmeter leads to pins 3 and 4
  - For current output, connect ammeter leads to pins 1 and 2
- Adjust zero calibration: Scroll to the TWZERO parameter. Press  $\nabla$  to view zero value, then check voltage or current reading on multimedia. Press and hold  $\Delta$  or  $\nabla$  to adjust the zero value up or down.
- Adjust span calibration: Scroll to the TWSPAN parameter. Press  $\nabla$  to view span value, then check voltage or current reading on multimeter. Press and hold  $\Delta$  or  $\nabla$  to adjust the span value up or down.
- Final zero calibration: Return to the TWZERO parameter and verify that the zero calibration has not drifted. Press and hold  $\Delta$  or  $\nabla$  to re-adjust the zero value as required.
- Return to normal mode. Analog output function can be verified using test weights.

## 12.13 Test Mode

In addition to normal and setup modes, test mode provides a number of diagnostic functions for the 520, including:

- Display raw A/D count
- Display digital input states
- Reset configuration parameters to default values
- Clear non-volatile (battery backed) storage
- Set analog output state to zero or full scale
- Set A/D offset and gain calibration
- Print configuration

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

Figure 12-5 on page 87 shows the Test Menu structure; Figure 12-6 shows the front panel key functions in test mode. Note that, because the Test Menu functions are all on a single menu level, the **GROSS/NET** ( $\nabla$ ) key has no function. Press the **ZERO** ( $\Delta$ ) key to exit test mode. Table 12-12 on page 87 summarizes the test menu functions.



**Important**

*A/D calibration functions, ADOFFS and ADGAIN, must be used only by qualified service personnel, and only after replacing A/D converter components. Improper A/D calibration may render the indicator unusable.*

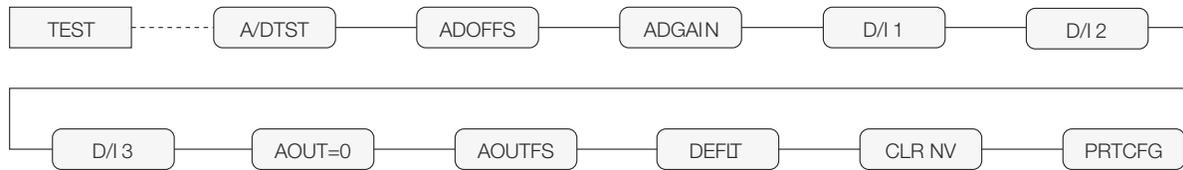


Figure 12-5. Test Menu

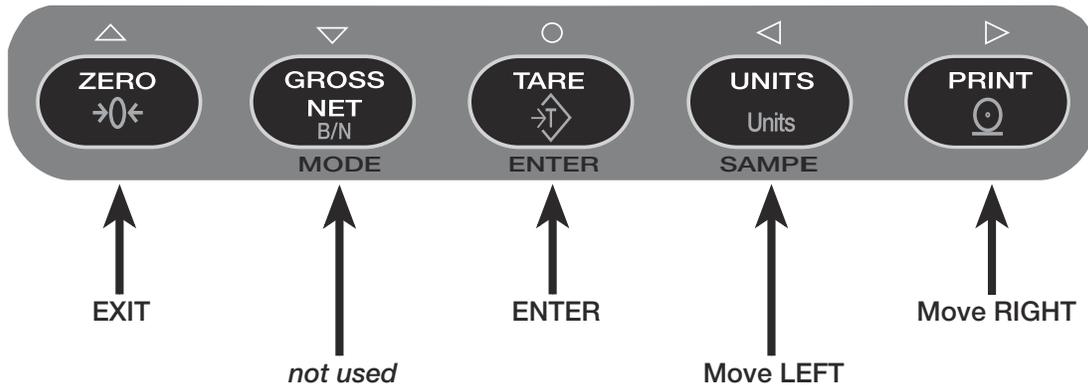


Figure 12-6. Front Panel Key Functions in Test Mode

TEST Menu	
Function	Description
A/DTST	Display A/D test Press and hold <b>ENTER</b> key to display raw count from A/D converter.
ADOFFS	A/D offset calibration (-0.5 mv/V).  Press and hold the setup switch, then press the <b>ENTER</b> key to perform offset calibration.
ADGAIN	A/D gain calibration (4.5 mv/V).  Press and hold the <b>ENTER</b> key to perform gain calibration.
D/I 1 – D/I 3	Display digital inputs 1-3  Press and hold <b>ENTER</b> key to show status of DIGINx (Dlx=HI or Dlx=LO).
AOUT=0	Set analog output to zero  Press and hold <b>ENTER</b> key to set analog output to its zero value.
AOUTFS	Set analog output to full scale  Press and hold <b>ENTER</b> key to set analog output to its full scale value.
DEFLT	Default parameters  Press and hold the setup switch, then press the <b>ENTER</b> key 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 40);
CLR NV	Clear non-volatile storage  Press and hold the setup switch, then press the <b>ENTER</b> key to clear values stored in battery-backed SRAM.
PRTCFCG	Print configuration  Press and hold <b>ENTER</b> key to send configuration data to the serial port. This function is equivalent to using the DUMPALL EDP command.

Table 12-12. Test Menu Functions

## 12.14 Specifications

### Power

Line Voltages	115 or 230 VAC
Power Consumption	160 mA @ 115 VAC 80 mA @ 230 VAC
Fusing F1 & F2	
115 VAC	2 x 160 mA TR5 subminiature fuses Wickmann Time-Lag 19374 Series UL Listed, CSA Certified and Approved
230 VAC	2 x 80 mA TR5 subminiature fuses Wickmann Time-Lag 19372 Series UL Recognized, Semko and VDE Approved

### Analog Specifications

Full Scale Input Signal	-10 to +40mV
Excitation Voltage	10 ± 0.5 VDC, 8 x 350Ω or 16 x 700Ω load cells
Sense Amplifier	Differential amplifier with 4- and 6-wire sensing
Analog Signal Input Range	0.3 mV/V – 7mV/V
Analog Signal Sensitivity	0.3 μV/graduation minimum, 1.5 μV/grad recommended
A/D Sample Rate:	7.5 – 120Hz, software selectable
Input Impedance	200 MΩ, typical
Noise (Usable Minimum LSB)	0.3 μV p-p
Internal Resolution	8 000 000 counts @ 23 usable bits, approximate
Display Resolution	100 000 dd
Input Sensitivity	10 nV per internal count
System Linearity	0.01% of full scale signal
Temperature	
Zero	±150 nV/°C, maximum
Span	±3.5 ppm/°C, maximum
Calibration Method	Software, constants stored in EEPROM
Common Mode	Voltage ±0.8V in unbalanced condition
Common Mode Rejection	120 dB minimum @ 50 or 60 Hz
Input Overload	± 12 V continuous, static discharge protected
EMI/RFI Protection	Signal, excitation, and sense lines protected by capacitor bypass and filtering elements
Optional Analog Output	Fully isolated, voltage or current output Voltage output: 0 –10 VDC Load resistance: 1kΩ minimum Current output: 4–20 mA External loop resistance: 500Ω maximum

### Digital Specifications

Microcomputer	Hitachi H8/3002 main processor @ 14.74756 MHz
Digital Inputs	3 inputs, TTL or switch closure, active-low
Digital Outputs	4 Outputs, current limited darlington pair with TTL pull-up, 40V withstand
Digital Filter	Two stage software selectable: 1–256, enhanced Rattletrap® hybrid digital filtering

### Serial Communications

2 RS-232 ports	Full Duplex, EDP and PRN ports
1 RS-485 port	Half Duplex, 2 wire
1 Current Loop port	Active 20mA current loop, 2 wire
All Ports:	300,600,1200,2400,4800,9600,19200 bps; 7 data bits with even or odd parity; 8 data bits with no parity; two stop bits on transmit, one stop bit on receive

### Operator Interface

Display	Vacuum fluorescent display: 7-digit, 14-segment primary weight display; Two 5x7 dot matrix digits for units, alphanumeric entry mode designators; 16-character dot matrix display for additional symbols, user prompts.
Keyboard	5-key membrane panel

### Environmental

Operating Temperature	-10 to +40°C (legal-for-trade applications); -10 to +50°C (industrial applications)
Storage Temperature	-25 to +70°C
Humidity	0–95% relative humidity

### Enclosure

Enclosure Dimensions	9.5 in x 8.38 in x 5.25 in 241 mm x 213 mm x 133 mm
Panel Mount:	7.375 in x 3.875 in x 8.250 in 187.325 mm x 98.425 mm x 299.550 mm
Desktop:	7.55 in x 3.80 in x 7.27 in 191.8 mm x 96.5 mm x 184.7 mm
Rating/Material	
Panel Mount:	NEMA 4x/IP65 bezel
Desktop:	NEMA 1 painted steel

### Certifications and Approvals

NTEP  
CoC Number: 01-087



Measurement Canada  
Approval: AM-5425

UL  
File Number: E151461



OIML  
File Number: GB1160



## 520 Limited Warranty

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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 two years.

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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# For More Information

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## Web Site

Frequently Asked Questions (FAQs) at

- <http://www.ricelake.com/faqs.aspx>

## Contact Information

### Hours of Operation

Knowledgeable customer service representatives are available 6:30 a.m. - 6:30 p.m. Monday through Friday and 8 a.m. to 12 noon on Saturday. (CST)

### Telephone

- Sales/Technical Support 800-472-6703
- Canadian and Mexican Customers 800-321-6703
- International 715-234-9171

### Immediate/Emergency Service

For immediate assistance call toll-free 1-800-472-6703 (Canadian and Mexican customers please call 1-800-321-6703). If you are calling after standard business hours and have an urgent scale outage or emergency, press 1 to reach on-call personnel.

### Fax

Fax Number 715-234-6967

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May 22, 2013      PN 68973 Rev A