

120 Plus

*Digital Weight Indicator
Software Version 5.00*

Technical Manual



- 1.0 Introduction..... 1**
 - 1.1 Overview 1
 - 1.2 Safety 1
 - 1.3 Operating Modes 2
 - 1.4 Front Panel Keypad 2
 - 1.5 LCD Annunciators 3
 - 1.6 Rear View 4
 - 1.7 Setup Switch 4
 - 1.8 Indicator Operations 5


- 2.0 Installation 7**
 - 2.1 Power Connector 7
 - 2.2 Serial/Print Connector 7
 - 2.2.1 Optional Digital I/O-Interface Cable (PN 106705) 9
 - 2.3 Load Cell Connections. 10
 - 2.4 Optional I/O Connections. 10
 - 2.4.1 Remote Switcher 10
 - 2.4.2 Setpoints Output 11
 - 2.5 Battery Installation 12
 - 2.5.1 Battery Tips 12

- 3.0 Configuration 13**
 - 3.1 Configuration Menu 14
 - 3.2 Format Menu 16
 - 3.3 Calibration 18
 - 3.3.1 Calibration Menu. 18
 - 3.3.2 Front Panel Calibration 18
 - 3.3.3 EDP Command Calibration 19
 - 3.4 Serial Menu 20
 - 3.5 Program Menu. 22
 - 3.6 Print Format Menu 24
 - 3.7 Set Points Menu 25
 - 3.8 Time Menu 27
 - 3.9 Date Menu. 28
 - 3.10 Version Menu 28

- 4.0 Test Mode Operations 29**
- 5.0 Panel Mode Operations 31**
- 6.0 Print Formatting 33**
 - 6.1 Print Format Commands 33
 - 6.2 Using Any Editor Through EDP 33
 - 6.3 Using Front Panel Editing. 34

- 7.0 Setpoint Operation 35**

- 8.0 Appendix 36**
 - 8.1 Electronic Data Processing Commands EDP 36
 - 8.1.1 General Commands 36
 - 8.1.2 Configuration Commands 37



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8.1.3	Format Commands	37
8.1.4	Calibration Commands	37
8.1.5	Serial Commands	38
8.1.6	Program Commands	38
8.1.7	Print Format Commands	39
8.1.8	Set Points Commands	39
8.1.9	Other Commands	40
8.1.10	Key Press on EDP Commands	40
8.1.11	Tare, Zero key and REGULAT Parameter	40
8.2	Conversion Factors and Continuous Output Format	41
8.2.1	Conversion Factors	41
8.3	ASCII Set and Specifications	42
8.3.1	Continuous Output (Stream) Format	44
8.3.2	Extended Format	44
8.4	Error Messages	45
8.5	Front Panel Display Characters	45
8.6	Gravity Compensation	46
8.8	120 Plus Specifications	47
120 Plus Limited Warranty		48



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1.0 Introduction

This manual is intended for use by service technicians responsible for installing and servicing 120 Plus digital weight indicators. This manual applies to indicators using Version 5.0 of the *120* software.



This manual can be viewed and downloaded from the Rice Lake Weighing Systems web site at www.ricelake.com.

1.1 Overview

The 120 Plus weight indicator is a precision digital weight indicator that takes portability to a new level. The feature of running on a rechargeable battery pack allows the 120 Plus to operate anywhere.

The indicator front panel consists of a backlit, six-digit, 7-segment LCD display and a set of keys. The prominent features of the 120 Plus include:

- Large 0.82", six-digit LCD display
- Powered either by an internal rechargeable battery or an external 5VDC wall adapter.
- Built in battery charging circuit
- Drives up to four 350 ohm or eight 700 ohm load cells
- Supports 4- to 6-wire load cell connections
- EDP Port; full duplex, RS-232 communications at up to 38400 bps
- Printer port for output only RS-232 and 20 mA current loop communications at up to 9600 bps
- One 500 character print ticket format
- Configurable shut-down and back light modes to prolong battery life
- Clock for print formats
- Battery level indication
- Three mode *HOLD* function
- *OPTION* setpoint and remote switch

1.2 Safety

Safety Symbol Definitions



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.



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



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.

General Safety



Failure to heed may result in serious injury or death.

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

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

DO NOT operate without the enclosure completely assembled.

DO NOT use for purposes other than weight taking.

DO NOT place fingers into slots or possible pinch points.

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

DO NOT exceed the rated specification of the unit.

DO NOT make alterations or modifications to the unit.

DO NOT remove or obscure warning labels.

DO NOT submerge.

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

1.3 Operating Modes

The 120 Plus supports the following modes of operation:

Mode	Description
Normal mode	Also known as the weighing mode. The display shows measured weights in the units required. See Section 1.5 for more information.
Setup (configuration) mode	Configuration mode allows user to modify parameter values and calibrate the indicator. See Section 3.0 for more information.
Test mode	Test mode performs diagnostic functions for the indicator. See Section 4.0 for more information.
Panel mode	Panel mode provides access to setting the serial port, non-metrological parameters, time, date, consecutive numbering, print formats, setpoints and test items. This is all done without the need to press the setup switch. See Section 5.0 for more information.

Table 1-1. 120 Operating Modes

1.4 Front Panel Keypad

Figure 1-1 shows the 120 Plus keypad.

See Section 3.0 on page 13 for information about using the front panel keys in configuration mode.



Figure 1-1. 120 Front Panel

The key functions are described in the following table:

Number	Name	Function
1	Power/Zero	Turns indicator on or off. Secondary use, it provides zero function.
2	Tare	Acquire the weight of the scale as tare.
3	Preset Tare	Methods of use: Short press = recall preset tare data Long press = enter preset tare value into memory
4	Hold	Activate the hold function.
5	Gross/Net	Toggle between gross and net weight.
6	Units	Toggle user defined units.
9	Numeric Key	Used to navigate through menus, select digits within numeric values, and increment/decrement values. Symbols shown on the 2, 4, 6, 8 keys (up, down, left, right) describe these key functions assigned in configuration and panel modes.
8	Clear	Clears the value except in normal weighing mode
7	Enter/Print	Press to print Symbol shown on the Print key (enter) describe this key function assigned in configuration and panel modes.

Table 1-2. 120 Plus Key Functions

1.5 LCD Annunciators

The 120 Plus display uses a set of LCD annunciators to provide additional information about the value being displayed.

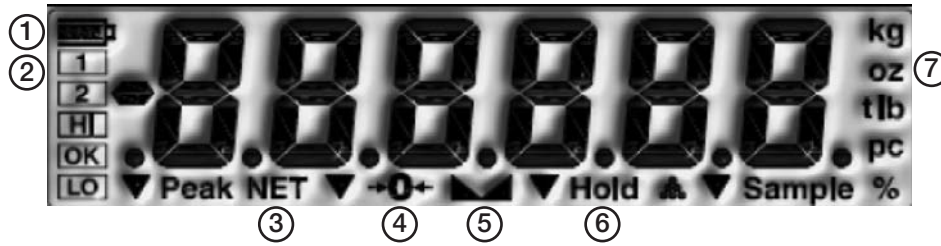


Figure 1-2. 120 Plus LCD Annunciators

The following table displays the functions of the LCD annunciators.



Number	Name	Function
1	Battery Level	The  icon indicates the level of the battery.
2	Setpoint 1 & 2	The 1 and 2 icons indicate the status of set point 1 and 2.
3	Gross/Net	The NET icon is shown if the displayed weight is the NET weight. Otherwise it's a gross weight.
4	Center of Zero	The →0← icon shown if the gross weight is within 0.25 graduation of zero.
5	Standstill	The ▲▲ icon shows that the scale is at a standstill or within the specified motion band. Some operations including tare function and printing can be done only when the standstill symbol is displayed.
6	Hold	The HOLD icon indicates that hold is active.
7	Units	<p>The Lb, Oz, Kg, t and g icons indicate the units of the displayed value. Lb - pound Oz - ounce Kg - kilogram g - gram t - tons</p> <p>In weighing mode, press  to toggle through the units.</p> <p>For example: If the primary unit is in pounds (Lb) and the secondary unit is in kilograms (Kg), the Lb LCD is lit for primary units, Kg for secondary units. If the primary unit is in kilograms (Kg) and the secondary unit is in pounds (Lb), the Kg LCD is lit for primary units, Lb for secondary units.</p> <p>NOTE: In OIML mode, only primary unit=kg and secondary=g are allowed.</p>

Table 1-3. LCD Annunicators

1.6 Rear View

Figure 1-3 shows the rear view of the 120 Plus.

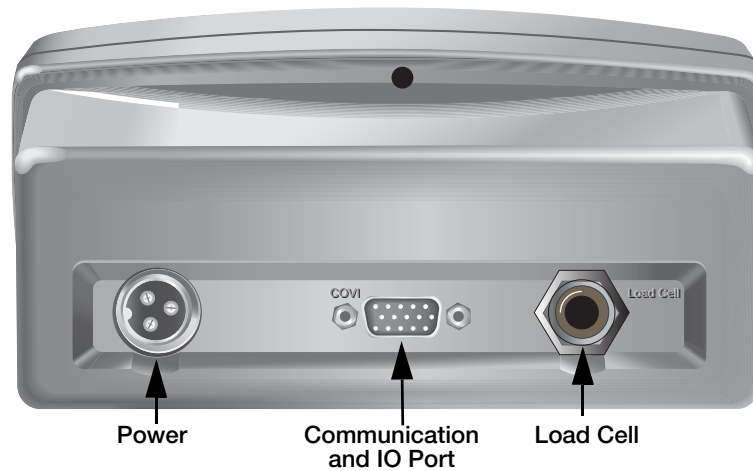


Figure 1-3. Rear View of the 120 Plus Indicator

1.7 Setup Switch

Figure 1-4 shows the location of the setup switch.

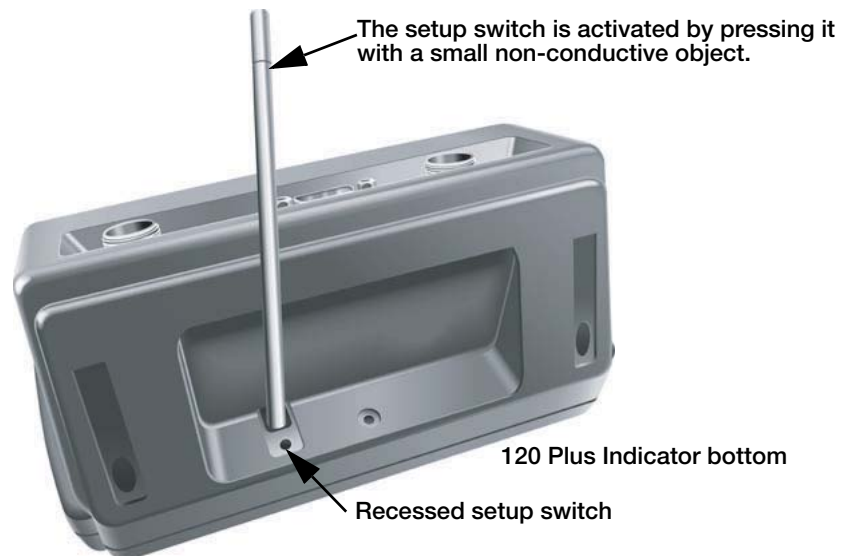


Figure 1-4. Setup Switch Location

The setup switch can only be activated by using a thin object to press it as shown in Figure 1-4.

The setup switch is used for entering configuration and calibration modes. In this mode, different parameters of the weight indicator can be configured and calibrated.




Note This operation should be performed only by a qualified technician; calibration of the indicator may be disqualified if performed by anyone else. The indicator should always be sealed after initial configuration. Sealing materials can be non-reversible lead seals or stickers.


1.8 Indicator Operations

The basic operations of the 120 Plus are summarized in the following sections.



1.8.1 Zero Scale

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



1.8.2 Acquire Tare

1. Place a container on the scale and wait for the standstill annunciator (▲▲).
2. Press  to acquire the tare weight of the container. The indicator switches to net mode.

1.8.3 Remove Stored Tare Value



1. Remove all weight from the scale and wait for the standstill annunciator (▲▲).
2. Press  (in NTEP mode) or  (in OIML mode). The indicator switches to gross mode, indicating that the tare value has been removed.

1.8.4 Keyed Tare

Using the numeric keypad, enter the desired tare weight in the currently displayed units and press  or . If entered correctly, the tare weight is stored and the display shows the net weight.

 **Note** *The keyed tare must be >0.*

1.8.5 Store Preset Tare

1. In order to program a tare value, hold  for two seconds. Then the 120 Plus will display *ProPt x*.
2. Press a numeric key. This is the memory to be programmed.
3. The 120 Plus will recall the preset tare and display it. Then enter the preset tare value and press .


 **Note** *The format depends on the PRI.DECPNT and SEC.DECPNT definition, the entered value depends on the display units. Press  to change it.*

The 120 Plus will store the new value in the memory designated.


1.8.6 Toggle Units

Press  to switch between primary and secondary units.

1.8.7 Print Ticket

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



1.8.8 Recall Preset Tare


1. Press , *Pt x* displays.
2. Enter a number. If a number is not entered within five seconds, the 120 Plus returns to normal weighing mode.
3. After entering the number, the 120 Plus will recall the preset tare, display it for two seconds, and switch to *NET* mode using the recalled *PT* value.

1.8.9 Hold Display



There are four modes for the hold function, see Section 3.5 on page 22.




Toggle Hold Mode

1. Wait for the standstill annunciator (▲ ▲). The wait time will depend on the setting of the motion band parameter.
2. Press  to freeze the display. The **HOLD** annunciator is lit on the display.
3. Press  again to return to the weighing mode.





 **Note** Only one print is allowed during Hold mode.

Average Hold Mode (Live Weight Averaging)

1. Place an item on the scale and wait until the display has stabilized.
2. Press  to start average weighing. During the sample period weighing, the current average weight appears on the display and then the final weighing result is displayed with the symbol **HOLD**. The weight indicator calculates the mean value from a hundred weighing operations within **AVGTM** seconds.
3. Press  again to go back to weighing mode, or wait until the **HOLDTM** minute.

 **Note** When  is pressed for the first time, the weight indicator does not wait for a stable signal. It is possible to press  before placing an item on the scale. Averaging will begin when the load has stabilized (via setting **MOTBAND**).

Auto Hold Mode

1. While the net weight is within the zero band, the indicator shows the current weight. Press  in NTEP mode or  to clear any residual weight and return the scale to the zero state.
2. Press  to enter the Auto Hold Mode. The current weight displays and alternately flashes **READY** message and the **HOLD** symbol, if the weight stays inside than the zero band.
3. Place the item to be weighed on the scale. Once the weight exceeds the zero band and the signal is stable, the indicator begins to calculate a long term average (selectable time, **AVGTM**) that re-calibrates for any movement in the mass. During the selectable time the signal must be stable, if not, time starts again. The display flashes the **HOLD** symbol and shows the current average value. The **HOLD** symbol is displayed continuously when the final sample weight is shown on the display.
4. Press  to force the sample to be re-calculated.
5. Press any other key to go back to the weighing mode. Once the weight has returned to zero **dead** band, the cycle can be repeated without any pressing any key.

 **Note** The definition of zero band is 5DD or 5 scale divisions of center of zero.

2.0 Installation

This section provides information for connecting the indicator to a loadcell, digital inputs and outputs, and serial communications cables. Battery installation is also described in this chapter in Section 2.5.

To power up the 120 Plus indicator, press the **ZERO** key on the front panel. The indicator must be installed near an easily accessible power source or can be operated on an internal battery.

The various sockets on the 120 Plus are shown in Figure 2-1.

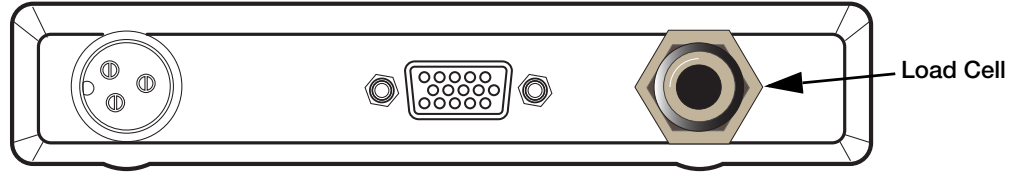
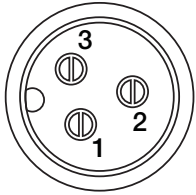


Figure 2-1. 120 Plus Cable Connections

2.1 Power Connector

The following table details the power connector pin functions.



Pin	Designation	Function
1	DC+	Power Source
2	DC-	Power Source
3	Earth	Power Return

Table 2-1. Power Connection Pin Outs

2.2 Serial/Print Connector

Table 2-2 details the serial pin connector functions:

Port	Pin	Designation	Function
EDP Port	2	EDP TxD	RS-232 Transmit Data
	6	EDP RxD	RS-232 Receive Data
	12	EDP GND	RS-232 Ground or -20 mA Out
Print Port	1	PR: TxD	RS-232 Transmit Data
	11	PR: TxD 20 mA	+ 20 mA Out
	12	PR: -20 mA OUT	RS-232 Ground or -20 mA Out

Table 2-2. Serial Connector

The RS-232 EDP port and the Printer port connections are shown in Figure 2-2. RS-232 or 20mA may be connected to a PC, printer or remote display.

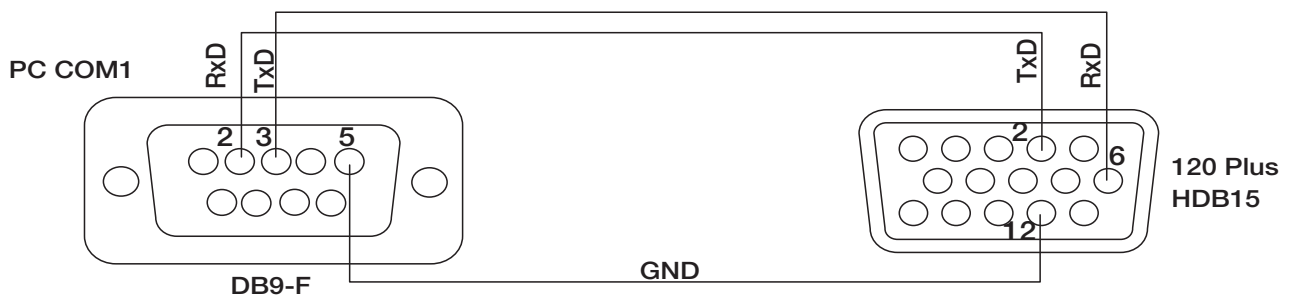


Figure 2-2. Connect RS-232 EDP Port to PC

2.2.1 Optional Digital I/O-Interface Cable (PN 106705)

An optional 15 pin digital I/O-interface cable plugs into the back of the 120 Plus indicator via the DB-15 connector.

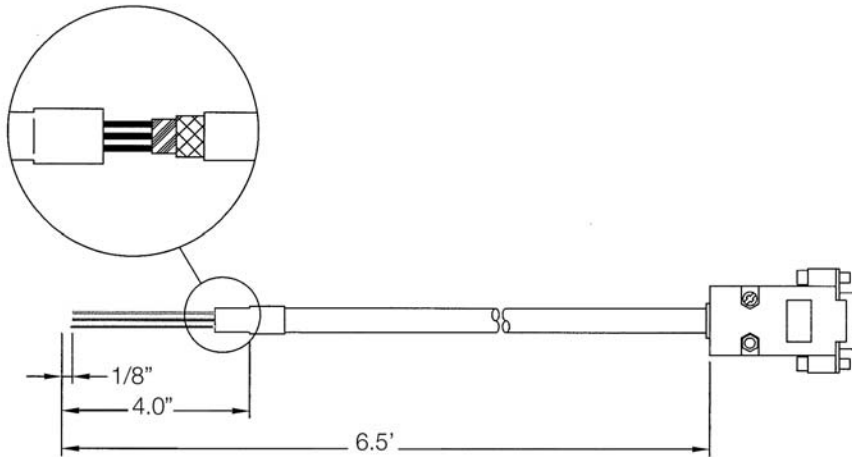


Figure 2-3. Optional Digital I/O-Interface Connector

The blunt end of wires are delivered with approximately four inches of exposed wire that can typically be wired into terminal strips or connectors. The following table illustrates the wiring colors.

DB-15 Pin Outs	Wire Color	DB-15 Pin Outs	Wire Color
1	Black	9	Grey
2	Brown	10	White
3	Red	11	Pink
4	Orange	12	Light Blue
5	Yellow	13	Light Green
6	Green	14	Red/Black
7	Blue	15	White/Black
8	Purple		

Table 2-3. Digital I/O-Interface Cable Colors

2.3 Load Cell Connections

The following table shows the load cell connection pins to the CPU.

J1 Pin	Load Cell Connections on the CPU Board
1	- Excitation
2	- Sense
3	- Signal
4	+ Signal
5	+ Sense
6	+ Excitation

Table 2-4. J1 Load Cell Connector

6-Wire Load Cell Connection with Optional Quick Disconnect

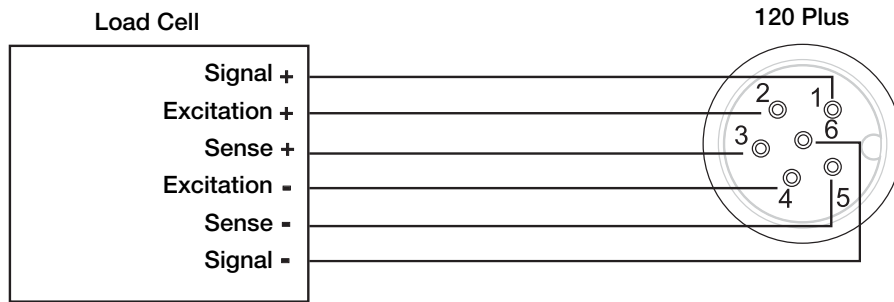


Figure 2-4. 6-Wire Load Cell Application

2.4 Optional I/O Connections

The optional I/O board provides three digital inputs and two isolation digital relay outputs.

2.4.1 Remote Switcher

The 120 Plus indicator has provisions to connect an external input device such as a push button switch (purchased separately) to provide a keypad function. The keypad function can be set in the SETPNT menu; the external device must provide a normally open (N.O.) momentary switch contact. The remote switch input requires a voltage free contact between RSW input and GND.

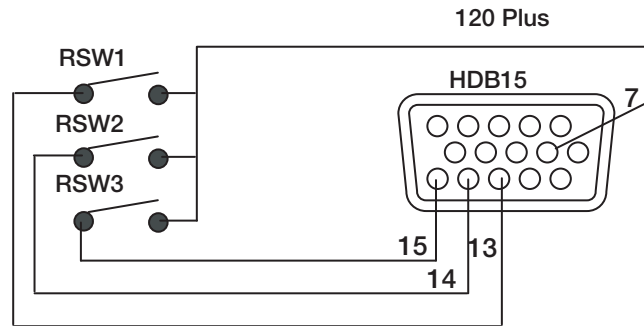


Figure 2-5. Connect Remote Switcher Inputs to an External Input Device

The following table displays the pins and port functions of the female HDB15.

Pin	Port	Function
4	Out 1/2 Com	Setpoint 1 and 2 common
5	Out 2	Setpoint 2
7	Ground	Remote switch 1, 2, and 3 ground
10	Out 1	Setpoint 1
13	RSW 1	Remote switch 1
14	RSW 2	Remote switch 2
15	RSW 3	Remote switch 3

Table 2-5. Remote Switch Pin Outs

2.4.2 Setpoints Output

Output drivers for the 120 Plus are isolated open emitter transistor drives that are capable of driving up to a total of 800mA. This configuration allows for the direct connection of the 120 Plus outputs to most types of PLC.

To drive external loads (e.g. relays), connect the relay coil positive supply to the output common and the output line directly to one side of the relay coil. Connect the other end of the relay coil to the negative supply. It is recommended that fly-back diodes or transient suppressors be fitted across relay coils to limit switching noise. See Figure 2-6.

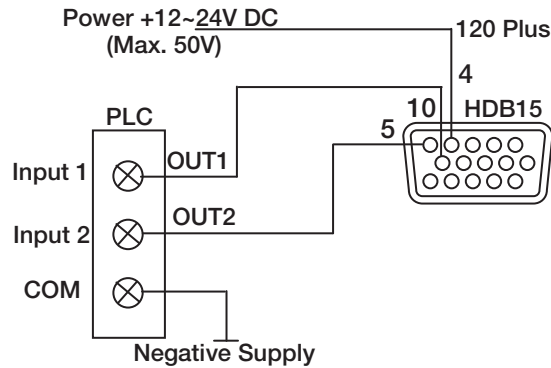


Figure 2-6. Connect Setpoints Outputs to Drive PLC

The voltage applied to the COM terminal appears on the output lines (i.e. OUT1 and OUT2) when the outputs are active (e.g. To connect to a PLC connect +24V to the common terminal). The outputs can then be connected directly to PLC inputs so when the outputs are active the PLC will see a 24V signal. See Figure 2-7.

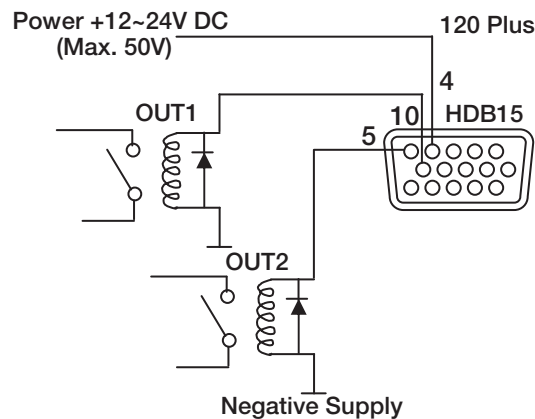


Figure 2-7. Connect Setpoints Outputs to Drive Relay

2.5 Battery Installation

To install the battery, do the following.

1. Slide the battery cover to the left to open it as shown in Figure 2-8.

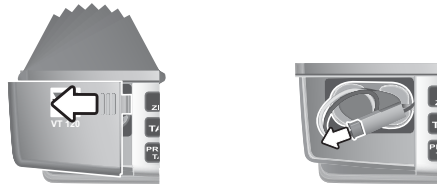


Figure 2-8. Open Battery Cover

2. Slightly pull out the battery wires from the housing.
3. Connect the wires with red-to-red, black-to-black.
4. Insert a rechargeable battery into the housing.
5. Close the battery cover.

2.5.1 Battery Tips

Battery life depends on the load, use frequency, temperature, setting, and accessories you use. Always use Rice Lake Weighing Systems original batteries (PN 103637). The warranty does not cover damage caused by using non-Rice Lake batteries and/or chargers.

- New batteries or batteries stored for a long time may take more time to charge. When charging your battery, keep it near room temperature.
- Never expose batteries to temperatures below -10°C (14°F) or above 45°C (113°F).
- It is normal for batteries to gradually wear down and require longer charging times. If you notice a change in your battery life, it is probably time to purchase a new battery.
- New batteries are shipped partially charged. Some batteries perform best after several full charge/discharge cycles. The battery may self-discharge while in storage on the shelf and require a full battery charge upon first usage. The average charge time for the battery is eight hours.
- Do not dispose of used batteries in normal trash. Follow the proper disposal or recycling requirements in accordance with local laws and regulations.
- When storing your battery, keep it uncharged in a cool, dark, dry place, such as a refrigerator.



WARNING

Never dispose of batteries in a fire because they may explode. Regulations vary for different areas. Dispose of batteries in accordance to local regulations.

3.0 Configuration

The following sections provide graphic representations of the indicator menu structures. The top level menu structure of the weight indicator is as follows:

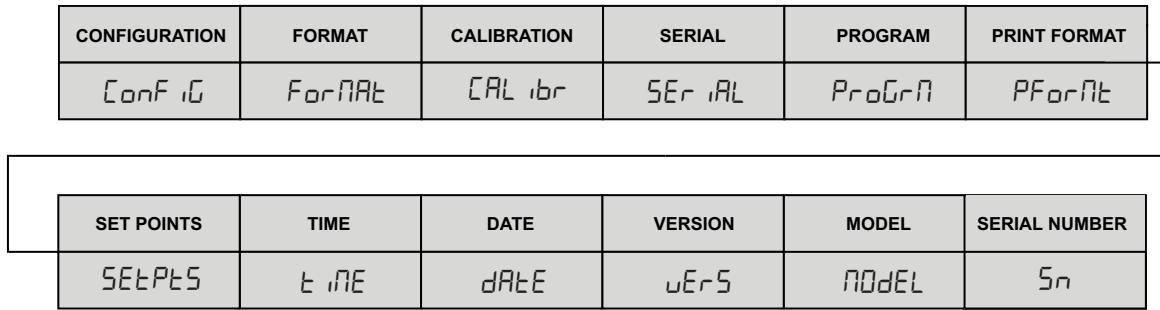


Figure 3-1. Configuration Menu

The following table gives a brief introduction to what each menu item does.

Main Menu	Function
Configuration Menu	Sets parameters affecting weighing function such as: <ul style="list-style-type: none"> • Number of full scale graduations • Range within which the scale can be zeroed • Change in load at which the scale will exit the stable condition • Regulatory mode
Format Menu	Sets the format for calculation and display of various units like: <ul style="list-style-type: none"> • Primary and secondary units • Multiplier and decimal point location • Rate at which the display is refreshed
Calibration Menu	Used for calibrating the indicator
Serial Menu	Configures the parameters of the serial ports
Program Menu	Sets the power up mode, shut down method, back light, keyboard lock, and consecutive number values
Print Format Menu	Sets the print format used for print tickets
Set Points Menu	Sets the parameters for the two setpoints, and the digital inputs
Time Menu	Display or set the current time
Date Menu	Display or set the current date
Version Menu	Displays the installed software version number
Model	Displays the model number of the indicator
Serial Number	Displays the serial number of the indicator

Table 3-1. 120 Plus Menu Structure

The front panel keys can be used as directional keys to navigate through the menus in configuration mode. An example of navigation process is shown below in Figure 3-2.

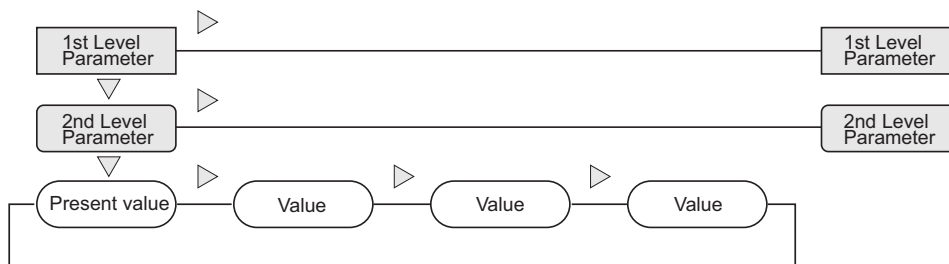


Figure 3-2. Navigating the Setup Menu

3.1 Configuration Menu

Use this mode to configure the parameters of the weighing scale. To configure items from this menu, press the setup switch. the configuration menu is shown below.

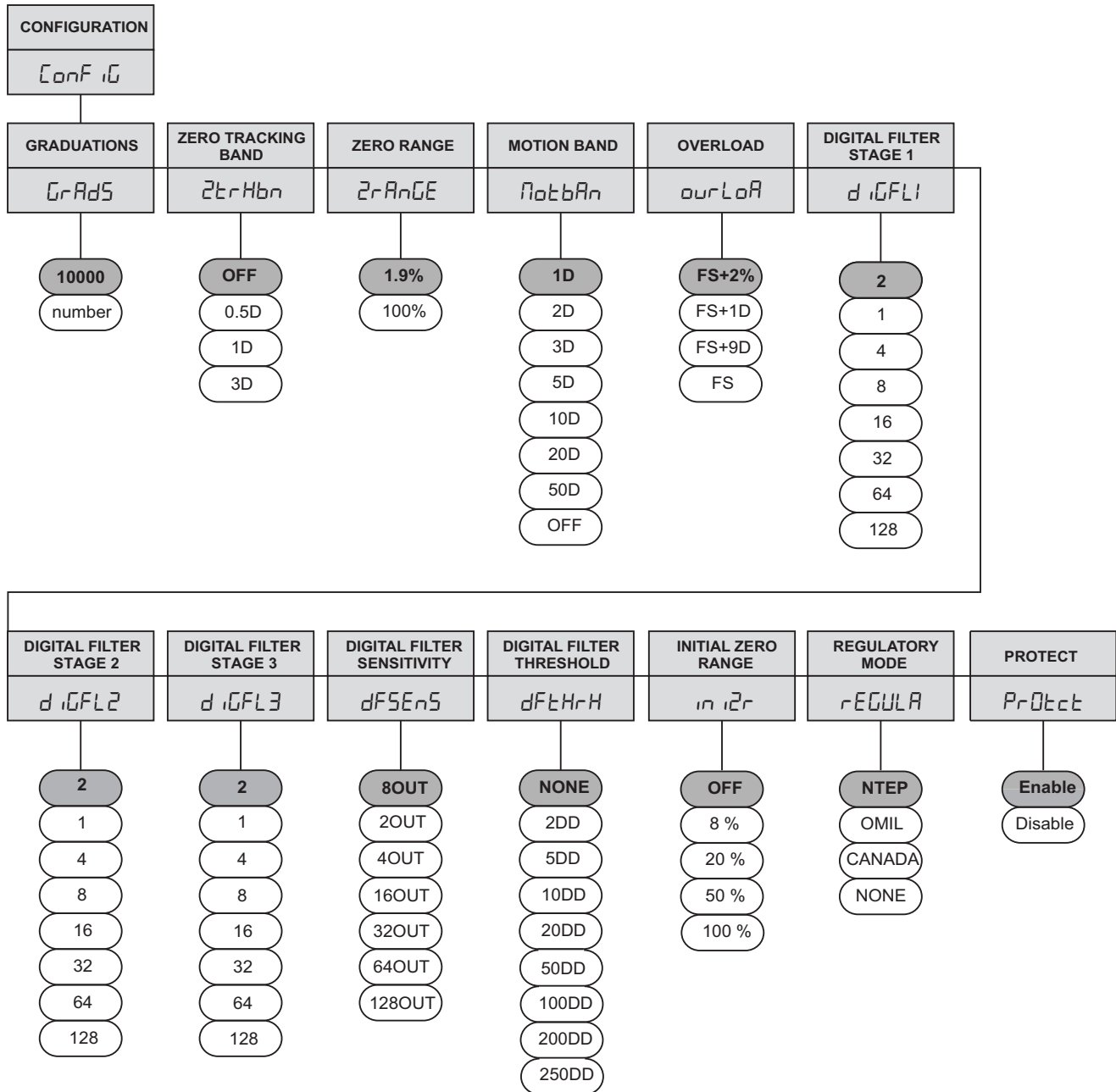


Figure 3-3. Configuration Menu

The following table describes the various configuration options (values in bold are the default values).

Parameter	Options	Description
Graduations	10000 Number	The value entered must be in the range 1 ~ 100000 and should be consistent with legal requirements and environmental limits on system resolution. To calculate GRADS, use the formula: Grads = Capacity / Minimum Weight (or division size) Minimum Weight for primary and secondary units are specified in the FORMAT menu.
Zero tracking band	OFF 0.5D 1D 3D	This automatically zeros the scale when the input drifts slowly within the specified range The maximum legal value is dependent on local regulations.
Zero range	1.9% 100%	This is the range within which the scale can be zeroed. For example, if this value is set to 1.9%, it means that the zero range is ±1.9% of capacity around the calibrated zero point, for a total range of 3.8%. The indicator must be in a stable condition to zero the scale. Use 1.9% for legal-for-trade applications. 100% indicates the scale can be zeroed at any load.
Motion band	1D 2D 3D 5D 10D 20D 50D OFF	Defines the change in load at which the scale will exit a stable condition (motion condition). If motion is not detected for more than 1 second, the stability annunciator lights. The motion band value must satisfy local regulations.
Overload	FS+2% FS+1D FS+9D FS (FS=full scale)	Defines the point of overload or underload. The display indicates "-----" when the point of overload is reached. The maximum or minimum legal value varies depending on legal regulations.
Digital filter Stage 1/2/3	2 1 4 8 16 32 64 128	Defines the digital filtering rate used to reduce the effects of mechanical vibration. Choices indicate the number of A/D conversions that are averaged to obtain the displayed reading. A higher number gives a more stable display by minimizing the effect of a few noisy readings, but slows down the setting rate of the indicator.
Digital filter cutout sensitivity	8out 2out 4out 16out 32out 64out 128out	Defines the number of consecutive readings that must fall outside the filter threshold (defined by DFTHR) before digital filtering is suspended.
Digital filter cutout threshold	None 2DD 5DD 10DD 20DD 50DD 100DD 200DD 250DD	Specifies the filter threshold in display divisions. When a specified number of consecutive scale readings (DFSENS parameter) fall outside this threshold, digital filtering is suspended. If NONE is selected, the filter is always enabled.

Table 3-2. Configuration Menu

Parameter	Options	Description
Initial zero range	OFF 8% 20% 50% 100%	Defines the range within which the scale will be zeroed upon application of power. Each range is a plus or minus value. For example, 8% means $\pm 8\%$ around the calibrated zero point, for a total range of 16%.
Regulatory mode	NTEP OIML Canada None	Specifies the regulatory agency having jurisdiction over the scale site.
Protect	Enable Disable	Sets whether or not the indicator has to be in Config mode to allow configuration changes using serial commands through the EDP Port. Set to Enable to 'Protect', or prevent changes to configuration settings in weight mode. When set to Disable, configuration values may be changed by serial commands at any time.

Table 3-2. Configuration Menu

3.2 Format Menu

The items in this menu are used to configure the format for calculation and display of various units. To configure items from this menu, enter configuration mode and then press the right arrow key once.

The Format menu is shown below:

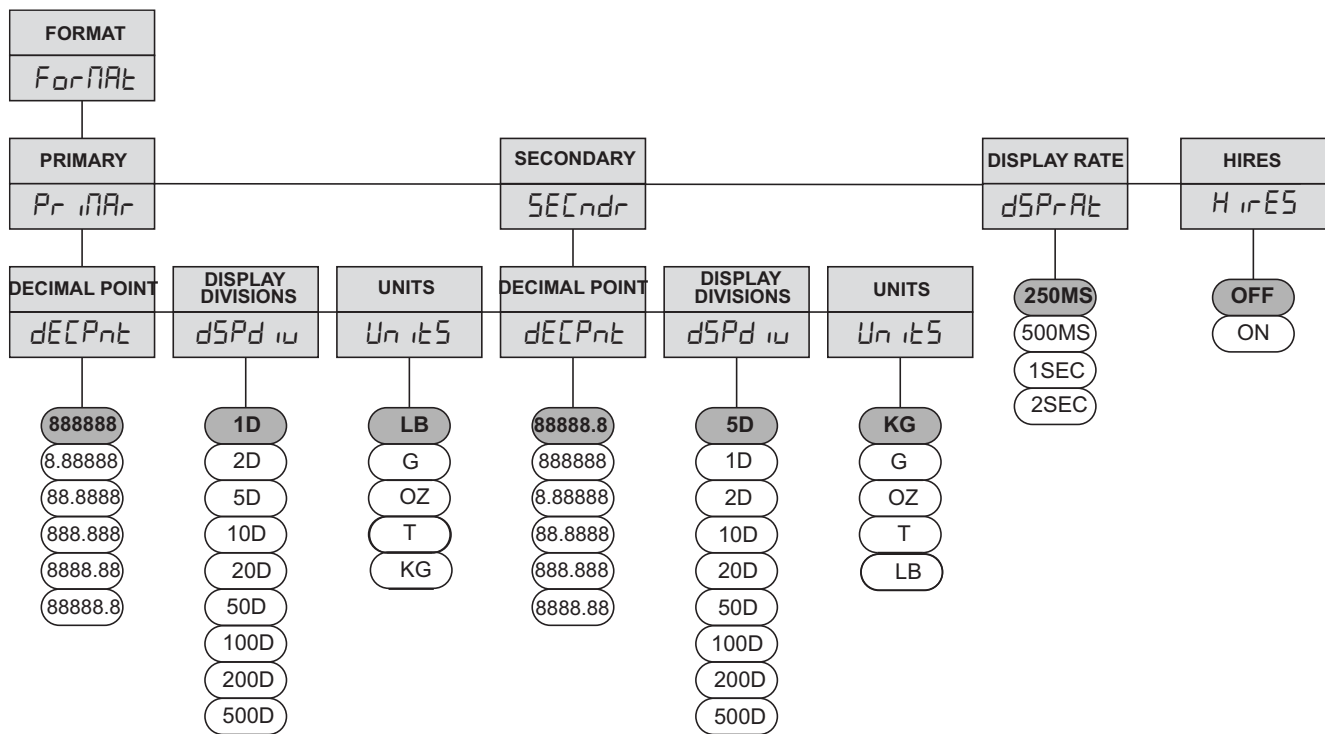


Figure 3-4. Format Menu

Parameter		Options	Description
Primary		DECPNT DSPDIV UNIT	Specifies the Primary decimal position, display divisions, and units used for the primary units.
	Decimal point	888888 8.88888 88.8888 888.888 8888.88 88888.8	Decimal Point defines the location of the decimal point. The value set should be consistent with local legal requirements.
	Display divisions	1D 2D 5D 10D 20D 50D 100D 200D 500D	Display Division defines the minimum division size for the weight displayed by the primary units.
	Units	LB (pound) KG (kilogram) OZ (ounce) G (gram) T (ton)	This defines the primary Units for display and printing.
Secondary		DECPNT DSPDIV UNIT	Specifies the Secondary decimal position, display divisions, and units used for the secondary units.
	Decimal point	88888.8 888888 8.88888 88.8888 888.888 8888.88	Decimal Point Location defines the location of the decimal point. The value set should be consistent with local legal requirements.
	Display divisions	5D 1D 2D 10D 20D 50D 100D 200D 500D	Display Divisions defines the minimum division size for the weight displayed by the secondary units.
	Units	KG (kilogram) G (gram) OZ (ounce) T (ton) LB (pound)	This defines the secondary Units for display and printing.
Display rates		250 MS 500 MS 1 Sec 2 Sec	Display Rate - sets the update rate for displayed values.
Hires		OFF ON	High Resolution - When set to ON, the indicator displays weight at 10 times the normal resolution. This is intended for test purposes but may be used for non-trade weighing. Note: Do not set this parameter to ON if PRI. DECPNT = 8.88888 or SEC. DECPNT = 8.88888. On high resolution mode the display blinks.

Table 3-3. Format Menu

3.3 Calibration

3.3.1 Calibration Menu

This menu is used to calibrate the indicator. To configure items from this menu, enter configuration mode and then press the right arrow key twice.

CAL indicates that the machine is calibrating the selected value. The Calibration menu is shown below:

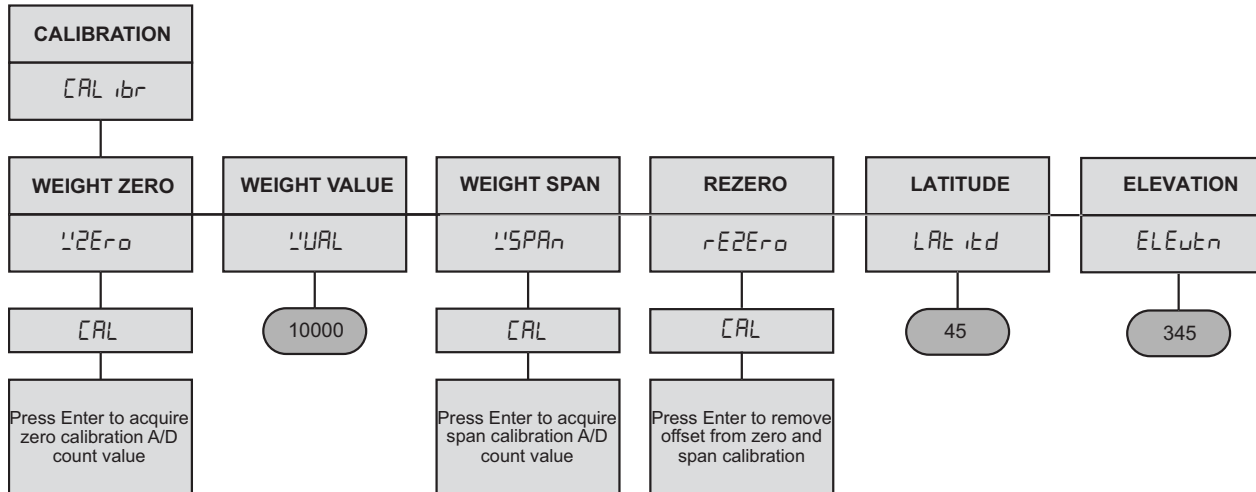


Figure 3-5. Calibration Menu

The following table describes the various calibration options (values in bold are default values).

Parameter	Options	Description
Weight Zero	None	Pressing Enter while displaying WZERO will perform the zero calibration. Ensure the scale is empty before pressing Enter. Do not adjust this value after WSPAN has been set.
Weight Value	10000 0-999999	Displays and edits the test weight value.
Weight Span	None	Pressing Enter while displaying WSPAN will perform the span calibration. Ensure test weight is equal to the value entered in as the Weight Value are in place on the scale before pressing Enter.
Rezero	None	Removes an offset value from the zero and span calibrations. Use this setting only after WZERO and WSPAN have been set.
Latitude	0-90	The latitude in degrees at the place of calibration
Elevation	-9999 to 9999	The elevation in meters at the place of calibration

Table 3-4. Calibration Menu


3.3.2 Front Panel Calibration

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

1. Place the indicator in configuration mode by pressing the setup switch in the back (See figure 1-3). The display reads **CONFIG**. Remove all weight from the scale platform. If the test weights require hooks or chains, place the hooks or chains on the scale for zero calibration.
2. Press the **6** key until the display reads **CALIBR**. Press the **8** key to navigate to zero calibration (**WZERO**).
3. With **WZERO** displayed, press the **enter** key to calibrate zero. The indicator displays **CAL** while calibration is in progress. When complete, **WVAL** is displayed.
4. With **WVAL** displayed, place test weights on the scale and press the **8** key to show the test weight value. To edit the value, press the Enter key; the last digit of the displayed value blinks. Press the **clear** key to clear

the value, then use the numeric keys (0-9) to enter the test weight value. Press the **enter** key to save the test weight value and navigate to span calibration (**WSPAN**).

5. With **WSPAN** displayed, press the **enter** key to calibrate span. The indicator displays **CAL** while calibration is in progress. When complete, **REZERO** is displayed.
6. Optional: The rezero function is used to remove a calibration offset when hooks or chains are used to hang the test weights.
 - If hooks or chains were used during calibration, remove these and all test weights from the scale. Press the **enter** key to rezero the scale. This function adjusts the zero and span calibration values. When complete, **LATITD** is displayed.
7. Press the **two** key until the display reads **EXIT Y**, then press **enter** key to exit configuration mode.

 **Note** When editing numeric values, press the **enter** key to allow the numeric entry, and then press the **clear** key to clear the values. Press numeric keys (0-9) to enter the value. Press the **enter** key to save the value entered and return to the level above.

The calibration process is depicted in the following figure:

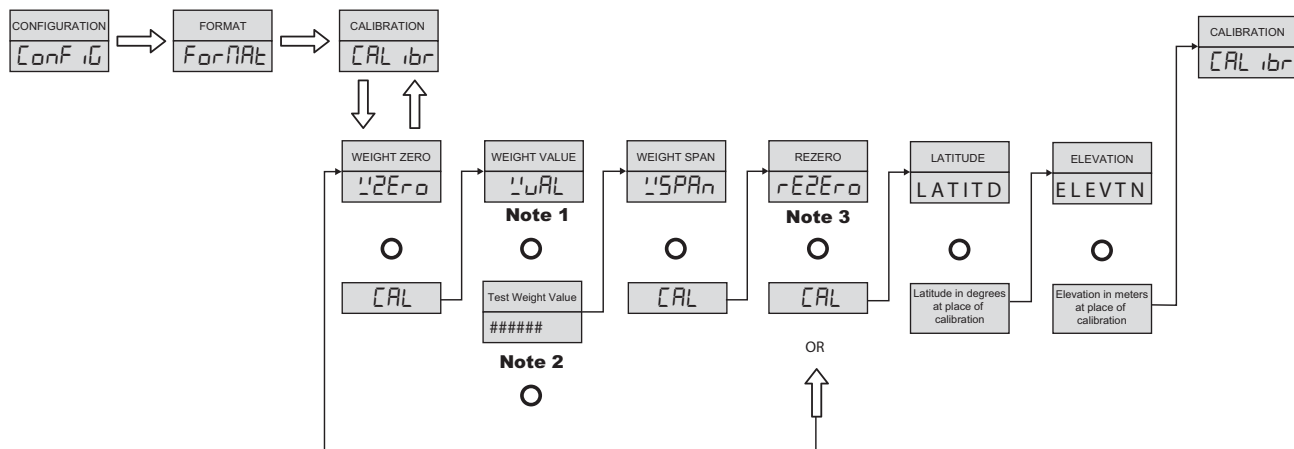


Figure 3-6. Calibration Process

NOTE 1: Place test weights.


NOTE 2: Use arrow keys, see Figure 3-2 on page 13 to set the maximum weight value.

NOTE 3: Optional - use only when hooks or chains were used during calibration. To recalibrate zero, remove these and the test weights from the scale.

3.3.3 EDP Command Calibration

To calibrate the indicator using EDP commands, the indicator EDP port must be connected to a terminal or personal computer. See Section 2.2 on page 7 for EDP port pin assignments; see Section 8.1 on page 36 for more information about using EDP commands. Once the indicator is connected to the sending device, do the following:

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

 **Note** During EDP command calibration, the ***CAL*** message remains on the display. Once the calibration is complete, an **OKAY** message is sent to the terminal or personal computer.

3. Place test weights on the scale and use the **WVAL** command to enter the test weight value in the following format: **WVAL=nnnnnn<CR>**.
4. Send the **WSPAN** command to calibrate span. The indicator displays ***CAL*** while calibration is in progress.
5. To remove an offset value, clear all weight from the scale, including hooks or chains used to hang test weights, and then send the **REZERO** command. The indicator displays ***CAL*** while the zero and span calibrations are adjusted.

3.4 Serial Menu

The items in this menu are used to configure the serial port used for transferring data between the indicator and a PC or printer. To configure items in this menu, press the setup switch and then the right arrow key three times.

The Serial menu is shown below:

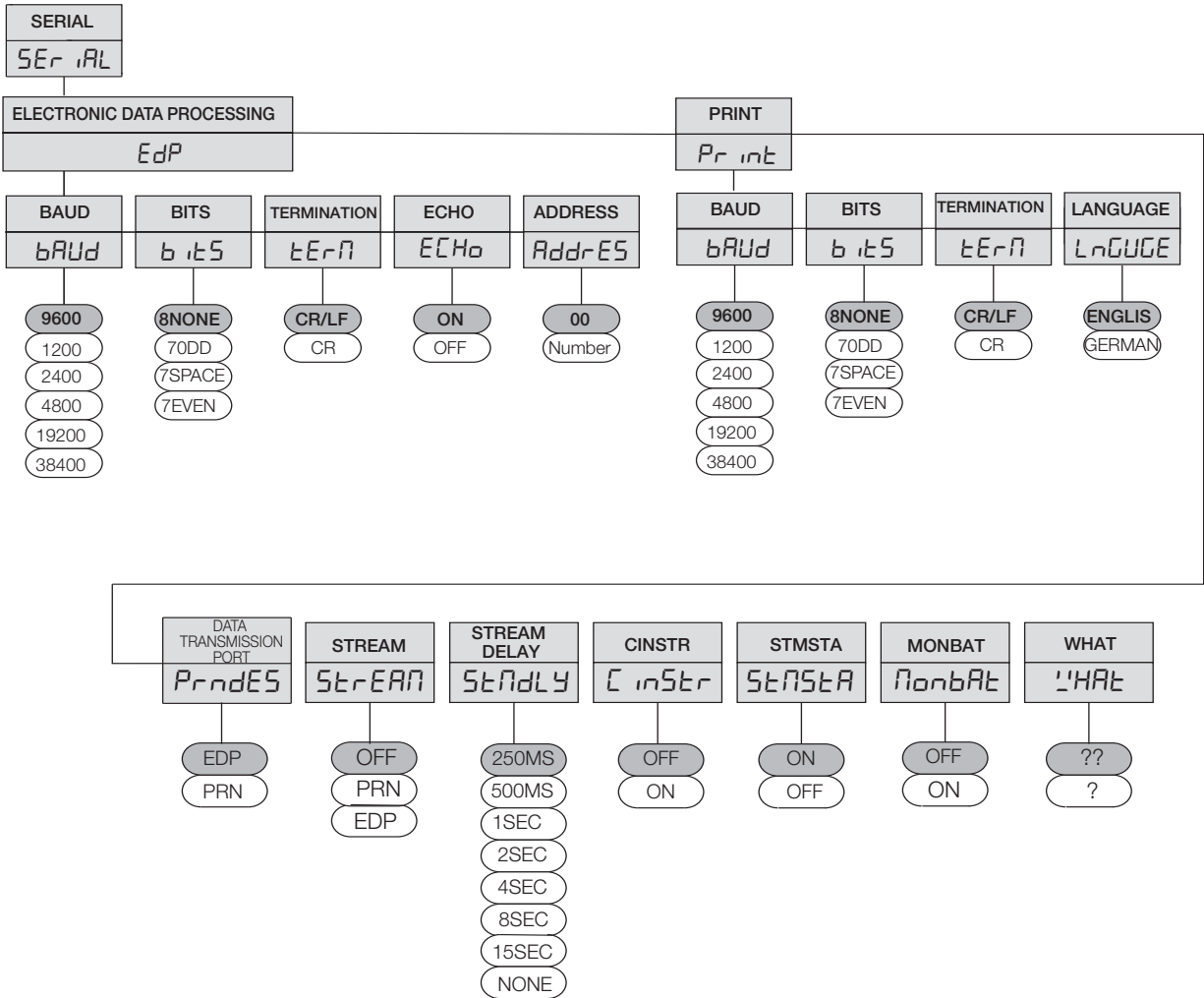


Figure 3-7. Serial Menu

Parameter	Options	Description
Electronic Data Processing (EDP)	Baud Bits Term Echo Address	Specifies port settings for baud rate, data bits, termination characters, and end-of-line delay used by the EDP port.
Baud	9600 1200 2400 4800 19200 38400	Baud Rate. Selects the transmission speed for the EDP port.
Bits	8NONE 7ODD 7EVEN 7SPACE	Selects number of data bits and parity of data transmitted from the EDP port.

Table 3-5. Serial Menu

Parameter	Options	Description
Termination	CR/LF CR	Selects the termination character for data sent from the EDP port.
Echo	ON OFF	Specifies whether commands sent to the indicator are echoed.
Address	00 number	Specifies the node address of RS485. The value is in hex format. 00 represents that this function is disabled. If ADDRESS is enabled, EDP commands became <ADDRESS> + command, where address is one byte, and auto off echo even if echo is on. Note: User can connect via an external RS232 to RS485 converter.
Print	BAUD BITS TERM LANGUAGE	Specifies port settings for baud rate, data bits, termination characters, and end- of-line delay used by the printer port.
Baud	9600 1200 2400 4800	Baud Rate. Selects the transmission speed for the printer port.
Bits	8NONE 7ODD 7EVEN 7SPACE	Selects number of data bits and parity of data transmitted from the printer port.
Termination	CR/ LF CR	Selects the termination character for data sent from the printer port.
Language	ENGLIS GERMAN	Ticket language. Selects the language for the printer tickets. English/ German Gross/ Brutto Net/ Netto Tare/ Tara Height/ Groesse
Print Destination	EDP PRN	Print destination. Selects the port for data transmission when the PRINT key is pressed or the KPRINT EDP command is sent.
Stream	OFF EDP PRN	Selects the serial port used for continuous transmission. See " Continuous Output (Stream) Format" on page 46 for more information about the 120 Plus continuous data format.
Stream Delay	250MS 500MS 1SEC 2SEC 4SEC 8SEC 15SEC OFF	Specifies the delay in seconds (SEC) or milliseconds (MS) inserted between stream frames.
Cinstr	OFF ON	Selects to enable or disable the stream display for additional raw data and time.
STMSTA	ON OFF	Stream addition information with status.
Monbat	OFF ON	Selects to enable or disable the stream display for additional battery data.
WHAT	?? ?	Reply ? or ??, if invalid parameter, or a valid parameter command that cannot be executed.

Table 3-5. Serial Menu

3.5 Program Menu

Use this menu to configure various settings of this indicator. The Program menu is shown below:

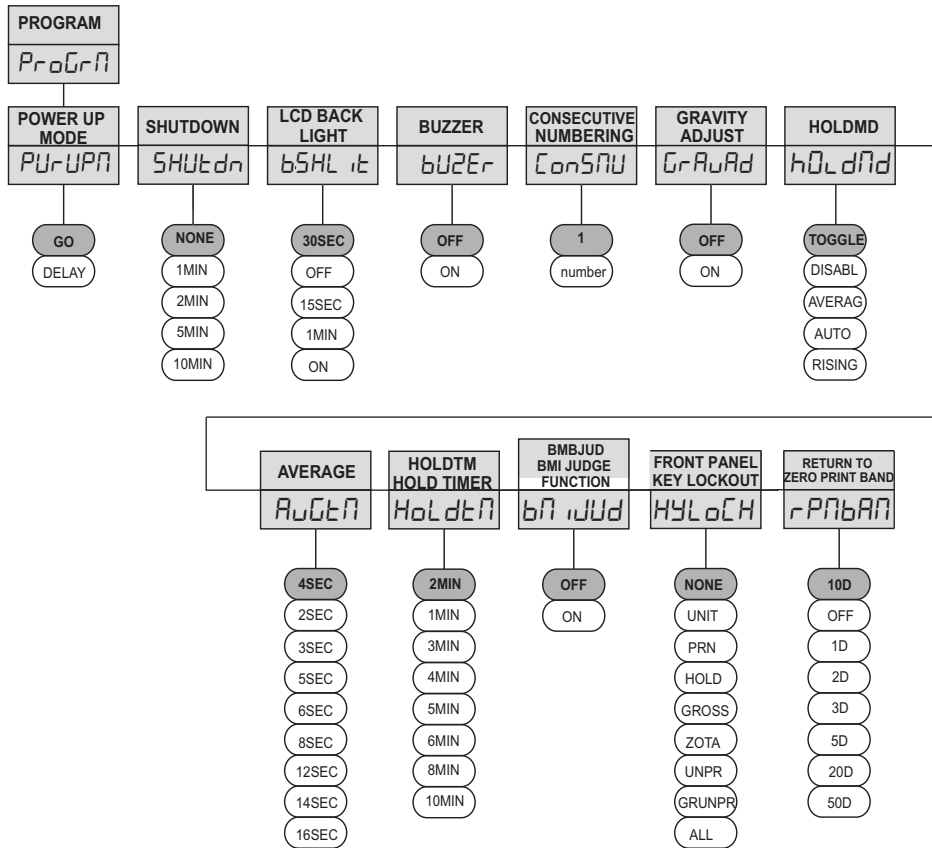


Figure 3-8. Program Menu

The following table describes the various program options (values in bold are default values).

Parameter	Options	Description
Power Up Mode	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 the power up display test and enters a 60-second warm up period. Delay mode is terminated either at the end of the warm up period or when the predefined temperature is reached. If motion is not detected during the warm up period, it goes into Normal Mode.
Shutdown	NONE 1MIN 2MIN 5MIN 10MIN	Function is to automatically turn off the indicator if it is not used for the set amount of time.
LCD Backlight	30SEC OFF 15SEC 1MIN ON	Function to automatically switch off the LCD back light if the indicator is not in use for the set amount of time. Setting the parameter to ON keeps the backlight always on. Setting it to OFF disables the backlight.
Buzzer	OFF ON	Enables or disables the audible tones when the keys are pressed.
Consecutive Numbering	1 number	Consecutive Numbering allows sequential numbering for print operations. This value is increased following each print operation.

Table 3-6. Program Menu

Parameter	Options	Description
Gravity Adjust	Off On	Turns the gravity correction on or off. This can be used along with the Latitude and Elevation parameters of the Calibration menu to compensate for the variance in gravitational pull from one location to another. See Section 8.6 for more information.
Hold MD	Toggle Disabl Averag Auto Rising	Hold function Toggle: After pressing the HOLD key, the weight will be frozen if there is no motion and weight is greater than zero. Press HOLD again and the display goes back to weighing mode. Disabl: Disables the HOLD function. Average: If after pressing the HOLD key, the weight is greater than zero and does not increase, will start taking an average value in three seconds. During this time the weight will remain frozen. Press the HOLD key again to go back to weighing mode or it will default back after a period as set by the Hold Timer parameter. Auto: When there is no motion and weight is greater than zero, the weight will remain frozen. Press the HOLD key to return back to weighing mode or will default back after a period as set by the Hold Timer parameter. Rising: Only allowed for medical applications and is not legal for trade.
Average Timer	4SEC 2SEC 3SEC 5SEC 6SEC 8SEC 12SEC 14SEC 16SEC	Timer for hold function to average raw data or time limited according to the HOLDMD setting. See Section 1.8.9 on page 7 for details.
Hold Timer	2MIN 1MIN 3MIN 4MIN 5MIN 6MIN 8MIN 10MIN	Defines how long to hold the weight on the display. See Hold function section for details.
BMIJUD	OFF ON	BMI automatic judge function (works only with the BMI key)
Key Lockout	NONE UNIT PRN HOLD GROSS ZOTA UNPR GRUNPR ALL	Front Panel Key Lockout option. In some applications, it is desirable that the front panel keys cannot be accessed while operating in normal mode. NONE: none of the keys are locked. UNIT: UNITS key disabled. PRN: Print/Enter key disabled. HOLD: HOLD key disabled. GROSS: GROSS/NET key disabled. ZOTA: ZERO, TARE, and PRESET TARE keys disabled. UNPR: UNITS and Print/Enter keys disabled. GRUNPR: GROSS/NET, UNITS and Print/Enter keys disabled. ALL: disable all keys. Note that this option only disables the front panel keys and does not lock out the functions that these keys perform. The zero, gross/net, tare, and print command are still accessible from the remote inputs on HDB15.
Return to Zero Print Band	10 DIV 1D 2D 3D 5D 20D 50D Off	This sets the number of divisions that the weight must return to around zero before the indicator will allow a print to occur. Set to off to always allow printing.

Table 3-6. Program Menu

3.6 Print Format Menu

Use these menu options to configure the print format settings. The Print Format menu is shown below:

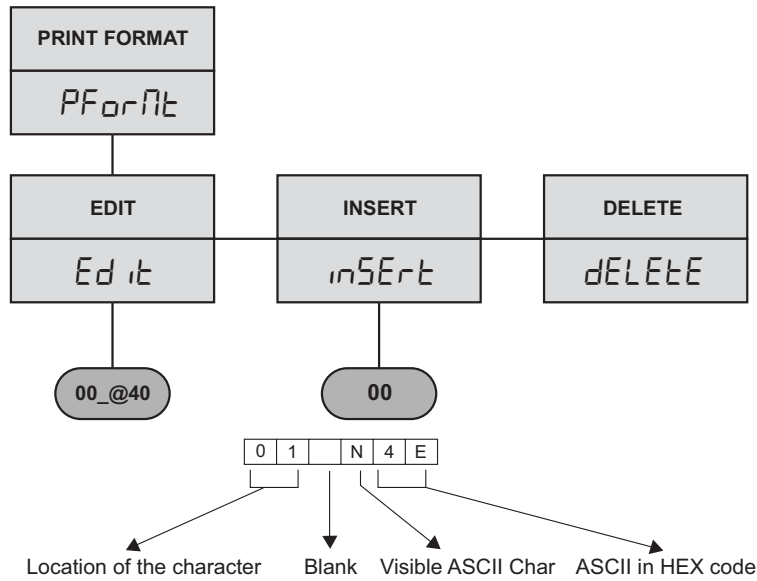


Figure 3-9. Print Format Menu

The following table describes the various print format options.

Parameter	Options	Description
EDIT	NONE	Edits the print format.
INSERT	NONE	Inserts a new character initialized to 00, at the end of the value edited using the previous EDIT option. This shifts all data after it to the right by one position. After insertion, the user can edit the value.
DELETE	NONE	Deletes the last character of the value edited by the previous EDIT option. This shifts all data after it to the left by one position.

Table 3-7. Print Format Options

3.7 Set Points Menu

Use this menu to configure set points settings. The Set Points menu is shown below:

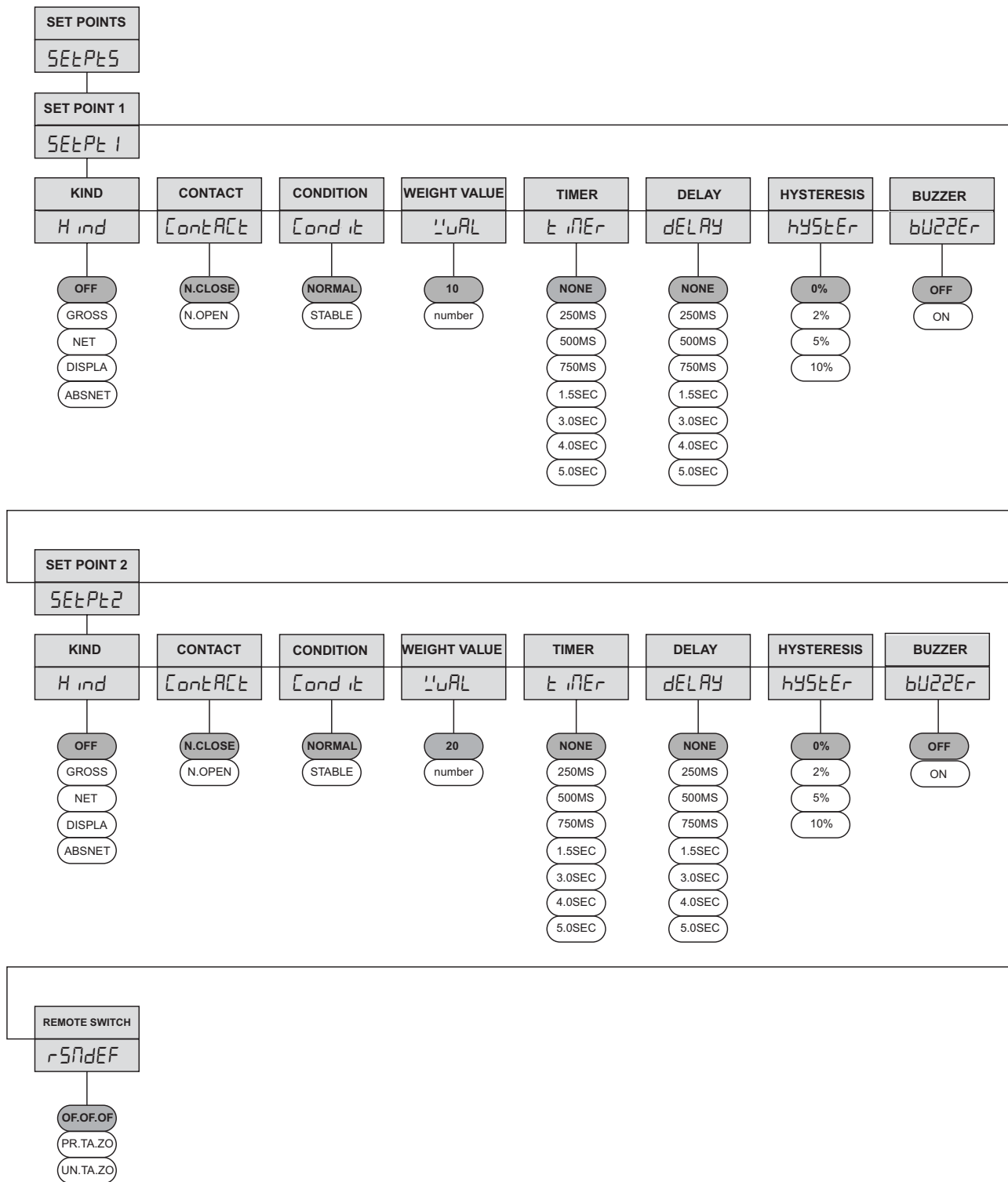


Figure 3-10. Set Points Menu

The following table describes the various set points options (values in bold are default values).

Parameter	Options	Description
Set Point 1	OFF KIND CONTACT CONDIT WVAL TIMER DELAY HYSTER BUZZER	Specifies settings for mode, contact type, condition, weight valve, timer, delay, and hysteresis used by the set point 1.
Kind	OFF GROSS NET DISPLA ABSNET	Specifies the mode of operation, or the source of the weight value. Gross Weight Data Net Weight Data Display Weight Data Absolute Value of Net Weight Data
Contact Type	N.CLOSE N.OPEN	Contact type. Contact status below the set point value, Comparator output to be normal open or normal close.
Condition	NORMAL STABLE	The output is enabled either as soon as the weight exceeds the setpoint value (NORMAL) or only after the weight exceeds the setpoint value AND has become stable (STABLE).
Weight Value	10 or 20 0-999999	Sets weight thresholds for set point. Output active if load over this weight. (load >= wval)
Timer	NONE 250MS 500MS 750MS 1.5SEC 3.0SEC 4.0SEC 5.0SEC	Disables output after a specified time.
Delay	NONE 250MS 500MS 750MS 1.5SEC 3.0SEC 4.0SEC 5.0SEC	Time delay before the output is enabled.
Hysteresis	0% 2% 5% 10%	Specifies the Hysteresis value for the setpoint. Hysteresis means that once the output is enabled, the weight must drop below a value defined as the setpoint value minus the hysteresis setting before it is disabled. (output disabled if weight < setpoint value - (setpoint value x hysteresis)). Set to 0% for no Hysteresis.
Buzzer	OFF ON	Enable or disable beep from indicator when set point tripped
Set Point 2	OFF KIND CONTACT CONDIT WVAL TIMER DELAY HYSTER BUZZER	Specifies settings for mode, contact type, condition, weight valve, timer, delay, and hysteresis used by the set point 2.

Table 3-8. Setpoints Menu

Parameter	Options	Description
Remote Switch	OF.OF.OF PR.TA.ZO UN.TA.ZO { { { 3 2 1	Specifies the function activated by remote switch inputs 1, 2 and 3. OF.OF.OF disable all remote switches PR.TA.ZO provides the same functions as the front panel keys. Remote switch 1 be ZERO key Remote switch 2 be TARE key Remote switch 3 be Print/Enter key UN.TA.ZO provides the same functions as the front panel keys. Remote switch 1 be ZERO key Remote switch 2 be TARE key Remote switch 3 be UNITS key

Table 3-8. Setpoints Menu

3.8 Time Menu

Use these menu options to configure time settings. The Time menu is shown below:

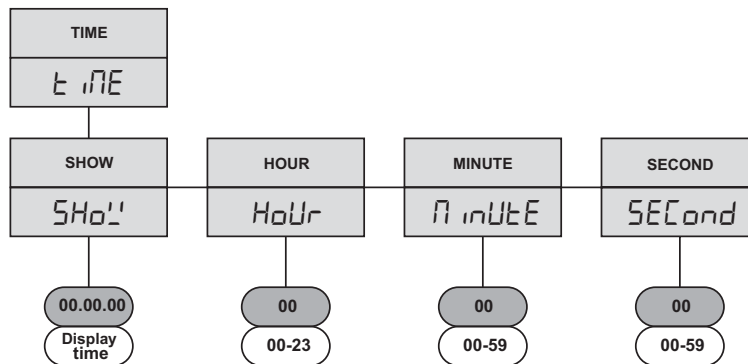


Figure 3-11. Time Menu

The following table describes the various time options.

Parameter	Options	Description
Show	HH.MM.SS	Displays current time in HH.MM.SS format
Hour	hour (HH)	Sets hour using 24-hour format
Minute	minute (MM)	Sets minute
Second	second (SS)	Sets second

Table 3-9. Time Menu

3.9 Date Menu

Use these menu options to configure date settings. The Date menu is shown below:

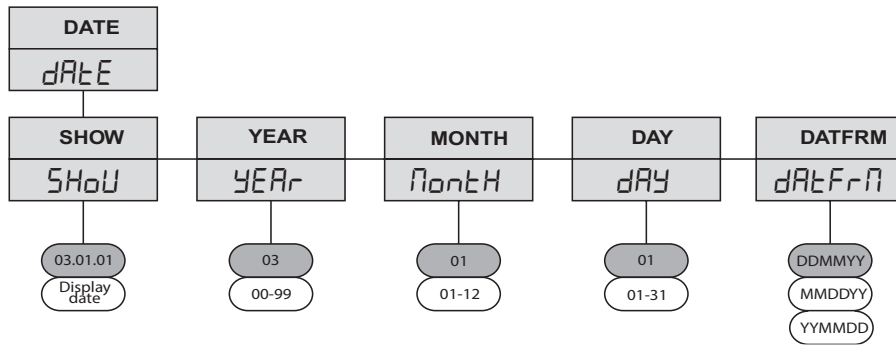


Figure 3-12. Date Menu

The following table describes the various date options.

Parameter	Options	Description
SHOW		Displays current date in YY.MM.DD, DD.MM.YY or MM.DD.YY format
YEAR	year (YY)	Set year (two digits 00-99)
MONTH	month (MM)	Set month (MM)
DAY	day (DD)	day (DD)
DATFRM	DDMMYY MMDDYY YYMMDD	Specifies the date format. DDMMYY: day, month, year MMDDYY: month, day, year YYMMDD: year, month, day

Table 3-10. Date Menu

3.10 Version Menu

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

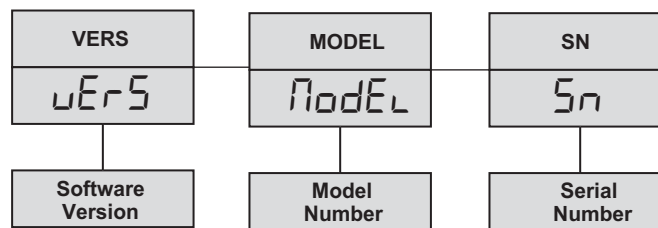



Figure 3-13. Version Menu

4.0 Test Mode Operations

Use this mode to test the parameters of the weight indicator.

 **Note** This procedure should only be performed by a certified technician.

To enter test mode, press the *setup switch* for three seconds. The display will change from *CONFIG* to *A/DTST*.

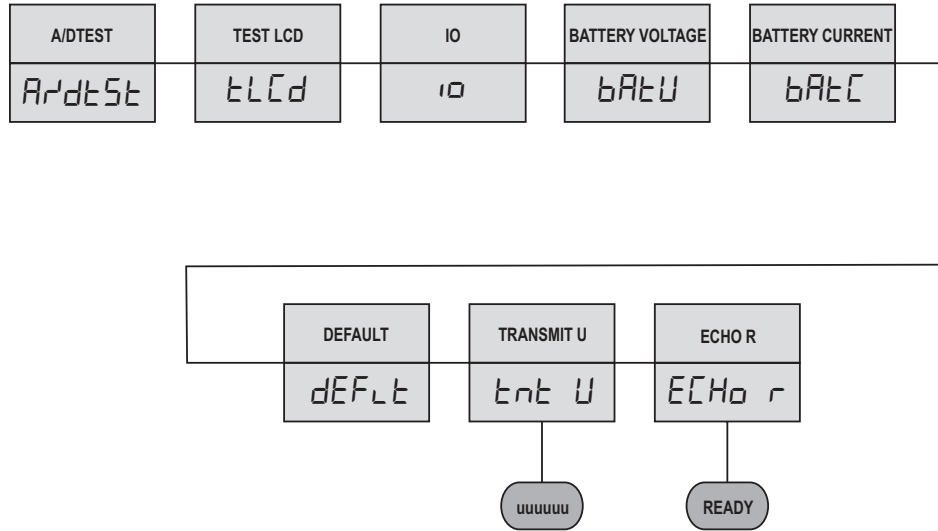


Figure 4-1. Test Mode Operation Menu

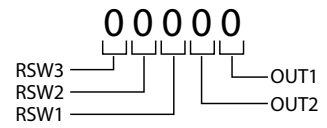
Parameter	Description
A/D TEST	Displays A/D Test. Press the ENTER key to display the raw count value from A/D converter.
TEST LCD	Press ENTER to light all the segments on the LCD display.
I/O	Display digital input (Remote Switch) and output (Set Point) status. <div style="text-align: center;">  </div>
BATTERY VOLTAGE	Display battery voltage in V.
BATTERY CURRENT	Display battery charging current in A.
DEFAULT	Default parameters. Press the ENTER key to reset configuration and calibration parameters to factory default values. NOTE: Not available in panel mode operation
TRANSMIT U	Transmits "U". Press the ENTER key to send the U character [ASCII: 85 decimal, 55 hex] to test the serial line quality and integrity.

Table 4-1. Test Mode Option Parameters

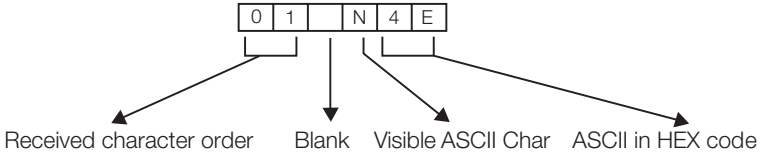
Parameter	Description
ECHO R	<p>This displays the character received from the serial port to test the serial line quality. Press the down arrow once until the indicator displays "READY". Then, press the ENTER key on the front panel. This displays the value received from serial port on the front panel. The format of the data displayed by the ECHO R command is shown as shown:</p> <div style="text-align: center;">  <pre> graph TD subgraph Box [] direction LR 0[0] --- 1[1] --- N[N] --- 4[4] --- E[E] end 0_1[0 1] --> RCO[Received character order] N --> B[Blank] 4 --> VAC[Visible ASCII Char] E --> AHC[ASCII in HEX code] </pre> </div>

Table 4-1. Test Mode Option Parameters

5.0 Panel Mode Operations

Panel Mode provides access to setting the serial port, non-meteorological parameters, time, date, consecutive number, print format, set points, and test items without the need to press the *Setup Switch*.

To enter Panel Mode, press and hold the **CLEAR** key under normal mode until the **FILTER** menu is displayed. Use the navigation keys to move around the menu; to change a value, use the navigation keys to select the digit and increase or decrease its value. Press the **ENTER** key to set the value and return to the menu level above. The pictorial representation of the panel menu is as follows:

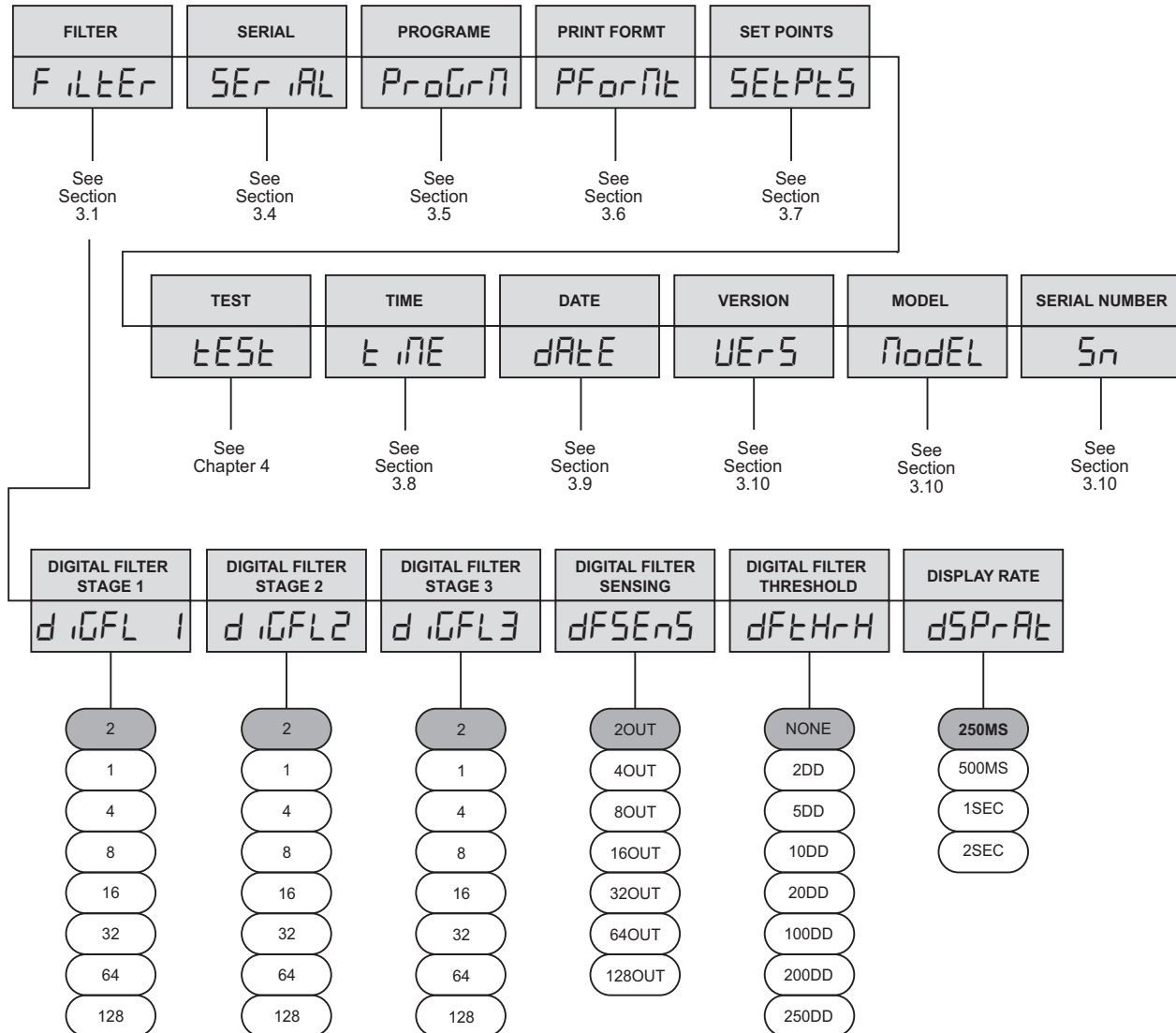


Figure 5-1. Panel Mode Operation Menu

Parameter	Options	Description
FILTER	DIGFL1 DIGFL2 DIGFL3 DFSENS DFTHR DSPRAT	Sets the filter rate, filter cutout sensitivity, and filter cutout threshold. See Section 3.1 on page 14 for more information.
SERIAL	EDP PRINT PRNDES STREAM STMDLY CINSTR MONBAT WHAT	Enters the Serial menu. See Section 3.4 on page 20 for more information.
PROGRAM	RPNBAN SHUTDN BAKLIT BUZZER HOLDMD KYLOCK CONSNU	Enters the Program menu. See Section 3.5 on page 22 for more information.
PRINT FORMAT	EDIT INSERT DELETE	Enters the Print Format menu. See Section 3.6 on page 24 for more information.
SET POINTS	SETPT1 SETPT2 RSWDEF	Enters the Set Point menu. See Section 3.7 on page 25 for more information.
TEST		Enters the Test mode. See Section 4.0 on page 29 for more information.
TIME	SHOW HOUR MINUTE SECOND	Sets the time. See Section 3.8 on page 27 for more information.
DATE	SHOW YEAR MONTH DAY DATFRM	Sets the date. See Section 3.9 on page 28 for more information.
VERSION		Displays the installed software version.
MODEL		Displays the model number.
SERIAL NUMBER		Displays the serial number of the unit.

Table 5-1. Panel Mode Description

6.0 Print Formatting

6.1 Print Format Commands

The following table gives the possible indicator parameters and command values that may be printed.

Command	Description
@G	Gross weight in displayed units. This also displays the weight units used.
@T	Tare weight in displayed units.
@N	Net weight in displayed units.
@C	Print consecutive number.
@Ln	New line, n specifies termination number.
@t	Time
@d	Date
@Sn	Space, n specifies the number of spaces.
@M	Use in pairs to quote Tare and Net data. If Tare is present, then the Tare and Net data will be printed on the ticket.

ID and consecutive number (CN) fields are 1-6 characters in length, as required.
 Gross, Net and Tare weights are 9 digits in length, including sign (10 digits with decimal point), followed by a space and a two-digit units identifier. The total field length with units identifier is 12 (or 13) characters.

Table 6-1. Print Format Commands

This section describes setting the print formats for the indicator, using the serial port or the front panel. There are two methods to edit the print format.

6.2 Using Any Editor Through EDP

Write the print format data in pure text format. The following samples are for an Eltron LP 2742 printer.

```
Wwpf = 0
N
A0,0,0,3,1,2,N,"Rice Lake Weighing Systems. @d @t @C" A8,50,0,5,1,1,N,"@G" @MA8,120,0,5,1,1,N,"@T"
A8,190,0,5,1,1,N,"@N"@M B8,260,0,3,3,7,100,B,"@G"
P1
```

First, place a "WWPF=0" in the first line to indicate that the following is a print format file. Place printer parameters in the beginning of each line as required, and then use double quotes to contain the text that you want to print on the ticket (see table above).

Note in the above example, N, AxxxxN, B, and P1 are printer specific parameters for the Eltron LP 2742.

You can also send the characters using ASCII HEX values. To start, use WPF=0, then send the remaining values as HEX characters.

ASCII characters in HEX mode:

```
wpf=0
4E 0D 41 30 2C 30 2C 30 2C 33 2C 31 2C 32 2C 4E 2C 22 52 69 63 65 20 4C 61 6B 65 69 67 68 69 6E 67 20 53 79 73 74 65 6D
73 20 40 64 20 40 74 20 40 43 22 20 41 38 2C 35 30 2C 30 2C 35 2C 31 2C 31 2C 4E 2C 22 40 47 22 20 40 4D 41 38 2C 31 32
30 2C 30 2C 35 2C 31 2C 31 2C 4E 2C 22 40 54 22 0D 41 38 2C 31 39 30 2C 30 2C 35 2C 31 2C 31 2C 4E 2C 22 40 4E 22 40
4D 20 42 38 2C 32 36 30 2C 30 2C 33 2C 33 2C 37 2C 31 30 30 2C 42 2C 22 40 47 22 0D 50 31 0D
```





First, place "WPF=0" in the first line to indicate that the following is a print format file. Then place each character in ASCII HEX format and include a 0D for carriage return.

6.3 Using Front Panel Editing





Using the PFORMAT menu (see Figure 3-8), you can edit the print format string by changing the hex values of the ASCII characters in the format string.

To edit a print format, do the following:



1. In configuration mode, use the navigation keys to go to the PFORMAT menu.

2. Press the  key to show the *EDIT* submenu.
3. Press the  key again to show the print format string.
4. Use the  key and the  key to scroll through the format. The number position of each character is shown in the two digits at the left of the display.



To Edit a Character:

1. Press the **ENTER** key while the character is displayed. The right most digit blinks, indicating that it can be changed.
2. Use the  key and  keys to increase or decrease the value, or use the  key to move to the next digit.
3. Press the **ENTER** key to save any changes and advance to the next character in the string.
4. If done, press the  key to return to the *EDIT* submenu.

To Insert One of More Characters:

1. Move the cursor to the character after which new characters are to be inserted.
2. Press the  key to return to the *EDIT* submenu, and then press the  key to show the *INSERT* parameter.
3. Press the **ENTER** key to insert one character; press repeatedly to add more characters. Each press of the **ENTER** key adds a character at the location last shown under *EDIT* submenu and shifts all subsequent characters to the right. Inserted characters are assigned hex value 00 (null). To edit inserted characters, return to the *EDIT* submenu and make changes as described in this section “To edit a character.”

To Delete One of More Characters

1. Move the cursor to the character to be deleted.
2. Press the  key to return to the *EDIT* submenu, and then press the  key twice to show the *DELETE* parameter.
3. Press **ENTER** key to delete one character; press repeatedly to delete more characters. Each press of the **ENTER** key deletes a character, starting at the location last shown under *EDIT* submenu, and then moving left to preceding characters. Each deletion shifts all subsequent characters to the left.

The format of the characters to be entered is shown.

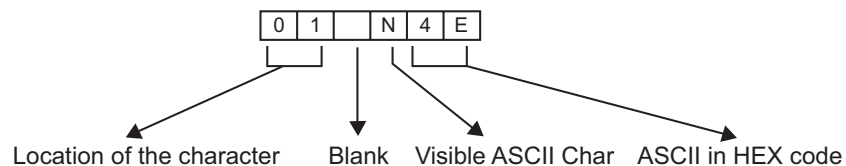


Figure 6-1. Print Format



Note

- *EDP or Electronic Data Processing refers to a PC or a terminal that can enter ASCII characters using a keyboard and a screen via the EDP interface of the 120 Plus.*
- *Some characters cannot be displayed on the 120 Plus front panel (See the ASCII character chart in Appendix C - ASCII Set and Specifications and Appendix E - Front Panel Display Characters on pages 44 and 48.) and are shown as blanks. The 120 Plus can send or receive any ASCII character; the character printed depends on the particular ASCII character set implemented for the receiving device.*

7.0 Continuous Output

7.1 Continuous Output (Stream) Format

All values are ASCII code characters.

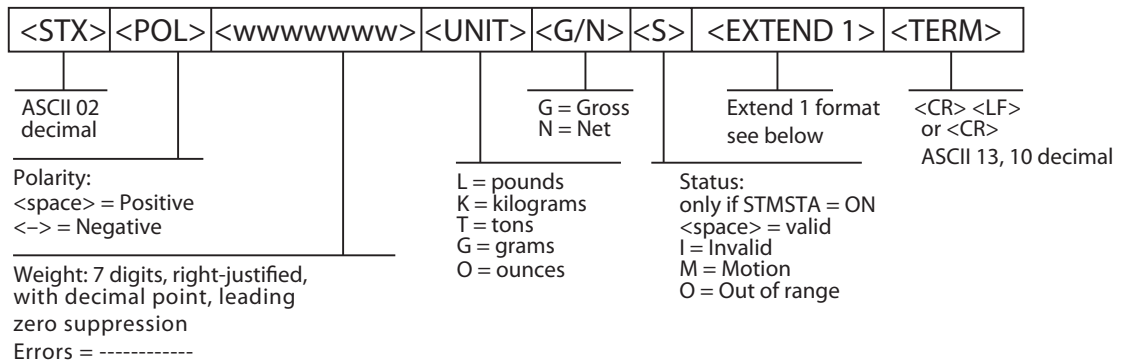


Figure 7-1. Continuous Output Format

7.2 Extended Format

- Extend 1: (If CINSTR = ON)

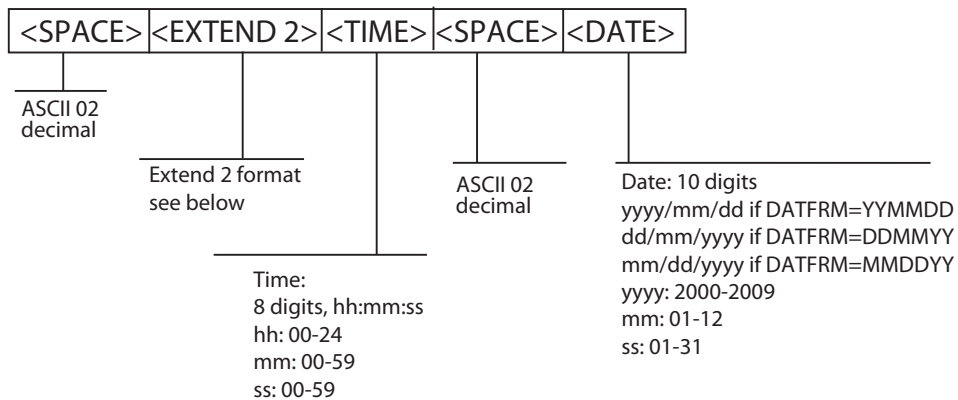


Figure 7-2. Continuous Output Format

- Extend 2: (If MONBAT = ON)

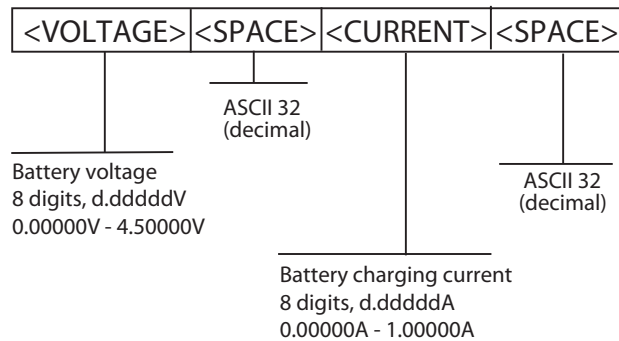


Figure 7-3. Continuous Output Format

8.0 Appendix

8.1 Electronic Data Processing Commands EDP

The EDP port and commands may be used to set indicator parameters, retrieve indicator parameters, and perform keypad functions.

To set parameter values, enter the corresponding EDP commands from the terminal. In order to set the parameter values, use the following format:

"Command=Parameter Value"

For example: To set GRADS (graduations) to 5000, do the following:

grads=5000 (Press "Enter" on the keyboard)

OK

The indicator responds with OK. OK means the setting was valid, and the indicator was in a mode that allowed the setting to be made.

To retrieve parameter values, send the parameter name. For example: To retrieve the GRADS (graduations) value, do the following:

grads (Press "Enter" on the keyboard)

5000

The indicator responds with 5000. This means the current value for the parameter GRADS is 5000.

If an unknown command is sent, or a known command is sent, but an attempt is made to set it to an incorrect value, the indicator will respond with the value as set by the WHAT parameter, either ?? (default) or ?.

8.1.1 General Commands

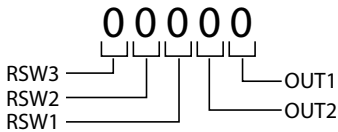
Command	Function
DUMPALL	List all parameter values
VERSION	Return the firmware version, checksum, and serial number in the following format: 120PLS v.vv_ccccc SN: sssss where v.vv is the version, ccccc is the checksum and sssss is the serial number.
P	Show currently displayed weight with single letter unit (L for pounds, K for kilograms)
ZZ	Return current displayed weight with unit Format: swwwwwww uu zzz s: positive " ", negative "-" wwwwwww: currently displayed weight value - - - - - (overload), ::::: (underrange) uu: currently displayed unit zzz: annunciator status value 0 = kg 1 = lb 2 = t 4 = oz 8 = g 16 = hold 32 = net 64 = center of zero 128 = standstill For example, if the annunciator status value returned with the ZZ command is 161, the net, standstill, and lb annunciators are lit: 161 represents the sum of the values for the standstill annunciator (128), net mode annunciator (32), and the lb units annunciator (1).
BAT	Battery voltage and charging current
ADS	A/D converter memory map
IO	List status of digital input (Remote Switch) and output (Set Point) 
DEFAULT	Reset default parameter values
RS	Software reset

Table 8-1. General Commands

8.1.2 Configuration Commands

Command	Description	Values
GRADS	Graduations	1 - 999999
ZTRKBND	Zero Track Band	OFF, 0.5D, 1D, and 3D
ZRANGE	Zero Range	1.9%, 100%
MOTBAND	Motion Band	OFF, 1D, 3D, 5D, 10D, 20D, and 50D
OVRLOAD	Overload	FS+2%, FS+1D, FS+9D, and FS
DIGFLTR 1 DIGFLTR 2 DIGFLTR 3	Digital Filtering 1-3	1, 2, 4, 8, 16, 32, 64, and 128
DFSENS	Digital Filtering Cutout Sensitivity	2OUT, 4OUT, 8OUT, 16OUT, 32OUT, 64OUT, and 128OUT
DFTHR	Digital Filtering Cutout Threshold	NONE, 1DD, 2DD, 5DD, 10DD, 20DD, 50DD, 100DD, 200DD, and 250DD
INIZR	Initial Zero Range	8%, 20%, 50%, 100%, OFF
REGULAT	Regulatory Compliance	NTEP, OIML, CANADA, NONE
PROTECT	Protection	DISABLE, ENABLE

Table 8-2. Configuration Commands

8.1.3 Format Commands

Command	Description	Values
PRI.DECPNT	primary units decimal point position	8.88888, 88.8888, 888.888, 8888.88, 88888.8, and 888888
PRI.DSPDIV	Primary units display division	1D, 2D, 5D, 10D, 20D, 50D, 100D, 200D, and 500D
PRI.UNITS	Primary units	LB, KG, OZ, G
SEC.DECPNT	Secondary units decimal points position	8.88888, 88.8888, 888.888, 8888.88, 88888.8, and 888888
SEC.DSPDIV	Secondary units display division	1D, 2D, 5D, 10D, 20D, 50D, 100D, 200D, and 500D
SEC.UNITS	Secondary units	LB, KG, OZ, G
DSPRAT	Display rate	250 MS, 500 MS, 1 SEC, 2 SEC
HIRES	Hires	ON, OFF

Table 8-3. Format Commands

8.1.4 Calibration Commands

Command	Description	Values
WZERO	Perform zero calibration	-
WWAL	Test weight value	0-999999
WSPAN	Perform span calibration	-
REZERO	Perform rezero calibration	-
LC.CD	Set deadload coefficient	value
LC.CW	Set span coefficient	value
LAT.CAL	Latitude (degrees) at point of calibration	0 - 90
ELEV.CAL	Elevation (meters) at point of calibration	-9999 - 9999

Table 8-4. Calibration Commands

8.1.5 Serial Commands

Command	Description	Values
EDP.BAUD	EDP port baud rate	1200, 2400, 4800, 9600, 19200, 38400
EDP.BITS	EDP port data bits/parity	8NONE, 7EVEN, 7ODD, and 7SPACE
EDP.TERMIN	EDP port termination character	CR/LF, CR
EDP.ECHO	EDP port echo input	ON, OFF
EDP.ADDRESS	EDP port RS-485 address	Value in hex (00~ffh)
PRN.BAUD	Printer port baud rate	1200, 2400, 4800, and 9600
PRN.BITS	Printer port data bits/parity	8NONE, 7EVEN, 7ODD, 7SPACE
PRN.TERMIN	Printer port termination character	CR/LF, CR
PRN.LNGUGE	Ticket language	ENGLIS, GERMAN
PRN.DEST	Print destination	EDP, PRN
STREAM	Continuous weight transmission	OFF, EDP, PRN
STMDLY	Stream output delay period	250MS, 500MS, 1SEC, 2SEC, 4SEC, 8SEC, 15SEC
CINSTR	Stream additional information with raw data and time	ON, OFF
STMSTA	Stream additional information with weight status	ON, OFF
MONBAT	Stream additional information with battery data	ON, OFF
WHAT	Defines response to invalid command	??, ?

Table 8-5. Serial Commands

8.1.6 Program Commands

Command	Description	Values
PWRUPMD	Power up mode	GO, DELAY
RPNBAND	Return to zero point band	10D, OFF, 1D, 2D, 3D, 5D, 20D, 50D
SHUTDN	Power shut down mode	None, 1 min, 2 min, 5 min, 10 min
BAKLIT	Back light of LCD	OFF, 15 sec, 30 sec, 1 min, ON
BUZZER	Sound of key press	OFF, ON
HOLDMD	Hold mode	DISABL, TOGGLE, AVERAG, AUTO
AVGTM	Average timer for hold function	2SEC, 3SEC, 4SEC, 5SEC, 6SEC, 8SEC, 12SEC, 14SEC, 16SEC
HOLDTM	Hold timer for hold function	1MIN, 2MIN, 3MIN, 4MIN, 5MIN, 6MIN, 8MIN, 10MIN,
KYLOCK	Lock the keypad	NONE, UNIT, PRN, HOLD, ZOTA, UMPR, BMUNPR, ALL
CONSNM	Consecutive number	1 - 999999
DATE	Date	20yy/mm/dd
TIME	Time	hh:mm:ss
DATFRM	Date format	YYMMDD, MMDDYY, DDMMYY
GRAVADJ	On/Off	Turns the gravity correction feature on or off
LATITUD	Latitude (degrees) at point of use	0 - 90
ELEVATN	Elevation (meters) at point of use	-9999 to 9999

Table 8-6. Program Commands

8.1.7 Print Format Commands

Command	Description	Values
WWPF	Print format strings in ASCII characters	See "Print Formats"
WPF	Print format strings in ASCII hex code	See "Print Formats"

Table 8-7. PFROMT Commands

8.1.8 Set Points Commands

Command	Description	Values
S1.KIND	Kinds of Operation mode for set point 1	OFF, GROSS, NET, DISPLA, ABSNET
S1.CONTACT	Contact status below the set point 1 value	N.CLOSE, N.OPEN
S1.CONDITI	Output enabled only after the weight reading has stabilized	NORMAL, STABLE
S1.WAVL	Set weight thresholds for set point 1. Output 1 active if load over this weight (load >= wval)	0 - 999999
S1.HYSTER	Set weight thresholds for set point 1. Output 1 deactive if load under this weight (load < wval x hysteresis)	0%, 2%, 5%, and 10%
S1.TIMER	Output is disabled after the time period has expired	NONE, 250MS, 500MS, 750MS, 1.5SEC, 3.0SEC, 4.0SEC, 5.0SEC
S1.DELAY	Time delay before the output is enabled	NONE, 250MS, 500MS, 750MS, 1.5SEC, 3.0SEC, 4.0SEC, 5.0SEC
S1.BUZZER	Enable/Disable set point	OFF, ON
S2.KIND	Kinds of Operation mode for set point 2	OFF, GROSS, NET, DISPLA, ABSNET

Table 8-8. Set Points Commands

Command	Description	Values
S2.CONTACT	Contact status below the set point 2 value	N.CLOSE, N.OPEN
S2.CONDITI	Output enabled only after the weight reading has stabilized	NORMAL, STABLE
S2.WAVL	Set weight thresholds for set point 2. Output 2 active if load over this weight (load >= wval)	0 - 999999
S2.HYSTER	Set weight thresholds for set point 2. Output 2 deactive if load under this weight. (load < wval x hysteresis)	0%, 2%, 5%, and 10%
S2.TIMER	The output is disabled after the time period has expired	NONE, 250MS, 500 MS, 750 MS, 1.5 SEC, 3.0 SEC, 4.0 SEC, 5.0 SEC
S2.DELAY	Time delay before the output is enabled	NONE, 250 MS, 500 MS, 750 MS, 1.5 SEC, 3.0 SEC, 4.0 SEC, 5.0 SEC
S2.BUZZER	Enable/Disable set point	OFF, ON
RSWDEF	Specifies the function activated by remote switch inputs 1, 2, and 3.	OF.OF.OF, PR.TA.ZO, UN.TA.ZO

Table 8-8. Set Points Commands

8.1.9 Key Press EDP Commands

Command	Description	Values
KZERO	Same function as ZERO key press	-
KGROSSNET	Same function as GROSS/NET key press	-
KTARE	Same function as TARE key press	-
KUNITS	Same function as UNITS key press	-
KPRIUNIT	Force to primary unit	-
KSECUNIT	Force to secondary unit	-
KPRINT	Same function as PRINT key press	-
KHOLD	Same function as HOLD key press	
KENTER	Same function as ENTER key press	
KPTARE	Same function as PRESET TARE key press	
KCLEAR	Same function as CLEAR key press	
KNR0-9	Same function as 0-9 key press	

Table 8-9. Key Press Commands

8.1.10 Tare, Zero key and REGULAT Parameter

The function of the TARE and ZERO keys depends on the value specified for the REGULAT parameter. Table 8-11 below describes the function of these keys for each of the regulatory modes.

REGULAT parameter value	Weight on scale	Tare in system	Key press function	
			KTARE	KZERO
USA	zero or negative	no	no active	zero
		yes	clear tare	
	positive	no	tare	
		yes	tare	
CANADA	zero or negative	no	no active	zero
		yes	clear tare	
	positive	no	tare	
		yes	no active	
EUROPE	zero or negative	no	no active	zero
		yes	clear tare	zero and clear tare
	positive	no	tare	zero
		yes	tare	zero and clear tare
NONE	zero or negative	no	tare	zero
		yes	clear tare	
	positive	no	tare	
		yes	clear tare	

Table 8-10. Regulate Parameter Values



- ZERO if in Standstill.
- ZERO if Weight is within ZRANGE. No action if weight is outside of ZRANGE.
- CLEAR TARE or ZERO force indicators into gross mode.
- TARE force indicator into net mode

8.2 Conversion Factors and Continuous Output Format

8.2.1 Conversion Factors - Secondary Unit = Primary Unit x Multiplier

Primary Unit	X Multiplier or Divisor	Secondary Unit
KG	x 2.20462262184878	lb
KG	x 1000	g
KG	x 35.2739619495804	oz
lb	x 2.20462262184878	kg
lb	x 453.59237	g
lb	x 16	oz
g	/ 1000	kg
g	x 453.59237	lb
g	x 0.00228571428571429	oz
oz	/ 35.2739619495804	kg
oz	/ 16	lb
oz	/ 0.00228571428571429	g

Table 8-11. Conversion Factors

8.3 ASCII Set and Specifications

Use the decimal values for ASCII characters listed in the table, when specifying print format strings on the 120 Plus PFORMT menu. The actual character printed depends on the character mapping used by the output device. The 120 Plus can send and receive any ASCII character value (decimal 0-255) but the indicator display is limited to numbers, upper- case, unaccented letters, and a few special characters.

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

Table 8-12. ASCII Chart Part 1

ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex
Ç	128	80	á	160	A0		192	C0	α	224	E0
Û	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
â	134	86	ª	166	A6		198	C6	μ	230	E6
ç	135	87	º	167	A7		199	C7	τ	231	E7
è	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 8-13. ASCII Chart Part 2

8.4 Error Messages

The 120 Plus indicator displays a number of error messages. When an error occurs, the message is shown on the indicator LED display.

Error Message	Description	Solution
CENTER DASHES	Gross > Overload limit	Gross value exceeds overload limit. Check configuration or signal input level.
UNDER DASHES	Underflow error	Weight value too small to be displayed
OVER DASHES	Overflow error	Weight value too large to be displayed
AD LOW	A/D over negative range	Check scale for binding or damage
AD HI	A/D over positive range	Check scale for binding or damage
EE SUM	Parameter or calibration check- sum error	Recalibration is needed; contact Rice Lake Weighing Systems service
WW WR	EEPROM write error	Contact Rice Lake Weighing Systems service
PM SUM	Internal program checksum error	Contact Rice Lake Weighing systems service
HOFSET	Load > calibrated zero + capacity × INIZR	Check weight and INIZR
LOFSET	Load < calibrated zero + capacity × INIZR	Check weight and INIZR
UOFSET	Unstable within 2 sec of powering on	Check weight and INIZR

Table 8-14. Error Messages

8.5 Front Panel Display Characters

	/ 2	; 8	G 0	S 5
	0 0	< 9	H 8	T 6
% 4	1 1	= 2	I 1	U 0
& 8	2 2	> 7	J 0	V 0
' 9	3 3	? 2	K 6	W 0
(8	4 4	@ 8	L 0	X 4
) 8	5 5	A 8	M 6	Y 4
* 0	6 6	B 6	N 6	Z 2

Figure 8-1. 120 Plus Display Characters

8.6 Gravity Compensation

This feature is used to compensate for the variance in gravitational pull from one location to another and is available for the 120 Plus. To calibrate with gravity compensation, the GRAVADJ parameter must be set to ON, and the LATITD (latitude in degree) and ELEVTN (elevation in meters, relative to sea level) parameters set before calibrating the 120 Plus.

If the indicator is later installed at a different location, gravity compensation can be applied to a pre-calibrated 120 Plus by adjusting the LATITD and ELEVTN parameters.

Gravity is greater at the poles than at the equator and decreases with increase in altitude. The effect of gravity at any given location can be calculated using the following formula:-

$$g_{CAL} = 9.80632 - 0.0258 \cos(0.0349065850\phi_{CAL}) + 0.00003 \cos(0.00698131701\phi) - 0.00000293h_{CAL} \quad (\text{EQ 1})$$

$$g_{Opa} = 9.80632 - 0.0258 \cos(0.0349065850\phi_{OPA}) + 0.00003 \cos(0.00698131701\phi) - 0.00000293h_{OPA} \quad (\text{EQ 2})$$

Where ϕ = degrees latitude and h = height in meters

$$W_{Opa} = \frac{W_{CAL}}{\frac{g_{Opa}}{g_{CAL}}} \quad \text{if GRAVADJ} = \text{ON}$$

$$W_{Opa} = W_{CAL} \quad \text{if GRAVADJ} = \text{OFF}$$

For example:

Calibration location at Canada Magog, and Operation location at Taiwan Taipei.

The geographic data and calculation:

Magog: $\phi = 45^\circ$ and h = 222m, Taipei $\phi = 23^\circ$ and h = 10m

$$g_{CAL} = 9.80564, \quad g_{Opa} = 9.78836$$

$$W_{Opa} = \frac{W_{CAL}}{\frac{9.78836}{9.80564}} = 1.00174W_{CAL}$$

8.7 120 Plus Specifications

Performance

Resolution: up to 999,999 dd (setup selectable)
Conversion Speed: 3, 7, 15, 30 (setup selectable)
Sensitivity: 1.0 μ V/Vsi for approved scales; 0.5 μ V/Vsi for non-approved scales.
Full Scale Range: 17.5 mV/V
Linearity: 0.01% of full scale
Excitation: 5 \pm 0.3 VDC, 4 x 350 Ω or 8 x 700 Ω load cells (4- and 6- wires)
Offset Drift: 3.5 ppm / $^{\circ}$ C
Span Drift: 3.5 ppm / $^{\circ}$ C
A/D Converter Type: Sigma-Delta, ratiometric. Filter: Digital filter, software selectable
Count By: x1, x2, x5, x10, x20, x50, x100, x200, x500
Decimal point setting: between any digits of the weight display
Calibration Methods: Software, constants stored in EEPROM
Weighing Functions:

- Automatic zero tracking
- No motion detection
- Auto-zero on power-up
- Zero
- Tare
- GROSS/Net
- Print
- Units conversion

Serial Communications

EDP Port: Full duplex RS-232
Transmission Rate: 38400, 19200, 9600, 4800, 2400, 1200 bps
Printer Port: Output-only RS-232 or active 20mA current loop
Transmission Rate: 9600, 4800, 2400, 1200 bps

Environmental

Operating Temperature: -10 $^{\circ}$ C to +40 $^{\circ}$ C (14 $^{\circ}$ F to 104 $^{\circ}$ F)
Storage Temperature: -25 $^{\circ}$ C to +70 $^{\circ}$ C (-13 $^{\circ}$ F to 158 $^{\circ}$ F)
Relative Humidity: 0-95%

Display and Keyboard

Display: 6 digit, 7-segment, LCD, 21.2 mm
Status annunciators: No motion, Center of Zero, Net, units used (lb, kg, g, oz, t), Battery, Set Points, Hold, HI/ OK/ LO Weight Digits: 4, 5 or 6 (setup selectable)
Keyboard: 18 key flat membrane panel

Power and Battery

Voltage: 5VDC, using power adapter 115 or 230VAC Power Consumption: 11W in-charger, 2W off-charger
Battery Operation: Charge Time: 7 ~ 10 hours
Estimated Battery Life:

- Full active: 46 ~ 63 hours
- Saving: 300 hours

Enclosure

Black ABS
Dimensions: 18.6 x 10 x 9.5 cm (7.32" x 4.05" x 3.74") L x H x D
Weight: 0.4 kg (without battery)
Mounting: Desktop, Wall and Tilt mount

Approvals



OIML - TC7626
Accuracy Class III n_{max} : 10 000

Measurement Canada - Approval: AM 5517 - rev.1
Accuracy Class III / III HD n_{max} : 10 000



NTEP
CoC Number 03-059A1
Accuracy Class III / III L n_{max} : 10 000



120 Plus Limited Warranty

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

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

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

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

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