

# LaserLight LT

RD-1550 - 1.5" Remote Display  
Version 1.0

## Technical Manual





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# 1.0 Introduction

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This manual is intended for use by service technicians responsible for installing and servicing the *Laser LT*<sup>®</sup> LED remote display.

Installation procedures are presented in the order likely to be followed by the installer: pre-installation setup, configuration, and on-site installation.



This manual can be viewed and downloaded from the Rice Lake Weighing Systems web site at [www.ricelake.com](http://www.ricelake.com). Rice Lake Weighing Systems is an ISO 9001 registered company.

## 1.1 Overview

The *Laser LT* remote display features a bright LED display and non-glare filtered lens for use in a wide variety of applications. The *Laser LT* is available with a six-digit display. The *Laser LT* remote display is designed to work with most digital weight indicators, host computers, and peripherals using 20mA current loop or RS-232 communications.

This manual provides installation and configuration instructions for the display.

The *Laser LT* comes in three types of models:

- AC powered, 90-260 VAC
- DC powered, 9-36 VDC
- Board Only, requires 7.5 VDC power

### Hardware Features

- IP69K Stainless Steel enclosure
- Display/CPU board with 4 comm ports and an option board slot
- Power Supply
- Keypad/overlay

### Standard Features

The *Laser LT* remote display has six, 1.5 inch digits. The *Laser LT* uses an Auto-Learn function which automatically determines the serial settings and data format used by the attached indicator.

Additional standard features include:

- Hold displayed weight (demand input)
- Adjustable intensity
- Auto-sensing 115/230 VAC power supply or 9-36V DC power supply
- Annunciators for weighing mode, units and status
- Daisy chaining
- Controllable red and green annunciators
- Keypad for configurable serial control of host indicator functions
- Two digital inputs
- Addressable for displaying specific data
- Heavy-duty latch locking feature

### Configurable Features

- Front panel configuration by navigation through menus
- Revolution utility for uploading/downloading configuration
- Auto Learn function for setting baud rate and displaying weight data
- Port configuration for the host/keypress commands/daisy chain functions

### Optional Features

Optional features of the *Laser LT* remote display include the following:

- Field-installable metal visor (PN 115138)
- Fiber optic board (PN 96736)
- RS-232/422 board (PN 108579)
- Ethernet TCP/IP board (PN 77142)
- Ethernet wireless board (PN 108671)
- USB board (PN 93245 requires USB cable PN 95357)
- UL approved unit

## 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.



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 place fingers into slots or possible pinch points.

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

DO NOT make alterations or modifications to the unit.

DO NOT remove or obscure warning labels.

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



Figure 1-1. Safety Label PN 16861  
All Models

### UL48 Approved Safety

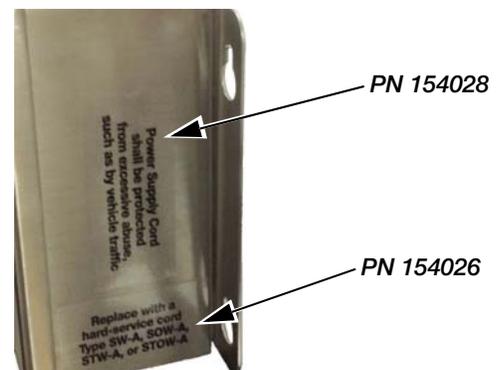
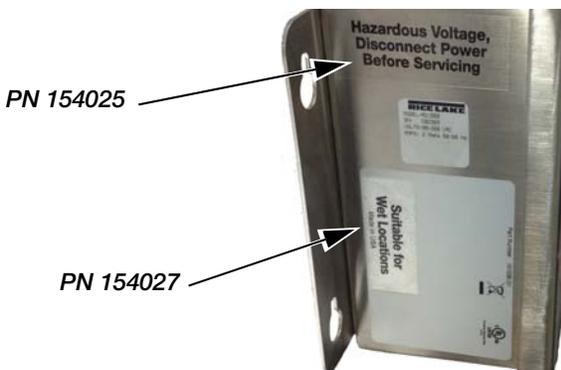


Figure 1-2. Safety Labels – UL Approved Models

UL48 Approval for:

- wet location
- cord connected
- stationary sign



Test operation of ground fault circuit interrupter each time the sign is plugged in.



All labels should be in legible condition, if not replace using the part numbers shown above.

### 1.3 Annunciators

The *Laser LT* remote display uses a set of six designated LED annunciators (shown in Figure 1-3) and a red and green (stop/go feature lights). The annunciators are dependent on the status character. They can also be associated with ASCII characters (*tokens*) and are shown in Table 4-1 on page 25 and the default status characters are shown in Table 3-2 on page 14.

- *GR* and *NT* annunciators are lit to show whether the displayed weight is a gross or net weight.
- *lb*, *kg* annunciators indicate the units associated with the displayed value and represent primary and secondary units.
- →0← indicates center of zero.
- ▴ ▾ indicates a standstill condition.

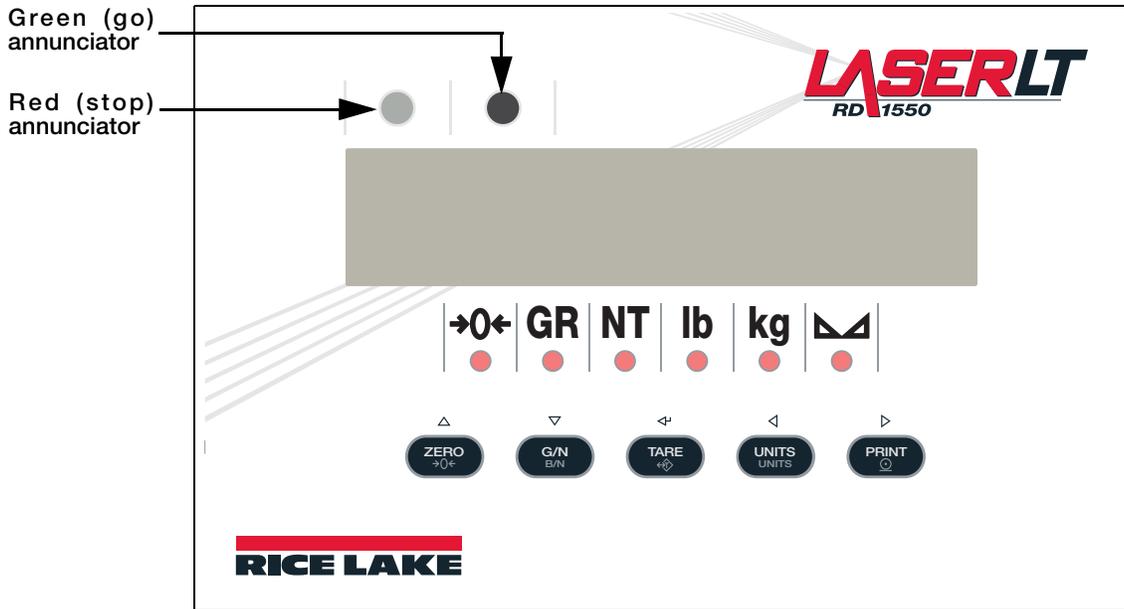


Figure 1-3. Front Panel Display

### 1.3.1 Tokens

The *Laser LT* has tokens that can be used in the general formatting of a serial string. The *Laser LT* will light the status annunciators (*tokens*) based on the ASCII characters sent in the serial string. Those tokens are:

- Gross Character
- Net Character
- Primary Character
- Secondary Character
- Negative Character
- Overload Character
- Center of Zero Character
- Motion Character

These tokens and their function are explained in further detail in Table 4-1 on page 25 and 25.

### 1.3.2 Remote Keypress Functions

The keypresses can be programmed to send up to 32 character commands. The default commands are shown in Table 1-1.

Command
KZERO
KGROSSNET
KTARE
KUNITS
KPRINT

*Table 1-1. Remote Keypress Function*

For more information on keypress functions, refer to Table 4-2 on page 27.

## 2.0 Installation and Setup

The *Laser LT* remote display can be easily set up and configured. This section describes basic installation, AC wiring, RS-232 and 20mA current loop connections. Once installation setup is complete, go to Section 3.0 for information on configuring the *Laser LT*.



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



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

### 2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the *Laser LT* remote display for damage. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately. The shipping carton contains the remote display, a parts kit, and this manual. Parts kits contents are listed in Table 6-5 on page 35.

### 2.2 Wall Mounting

The *Laser LT* remote display can be mounted to any vertical surface.

Select a site for installing the *Laser LT*. The unit has four keyhole slots on the outer flange of the unit and uses four installation screws or wall anchors to secure the remote display to a wall.



Figure 2-1. Keyhole Slots for Mounting

Once the enclosure is secured, the front cover can be unlatched to access inside of the enclosure.

Two latches secure the lid of the Laser LT

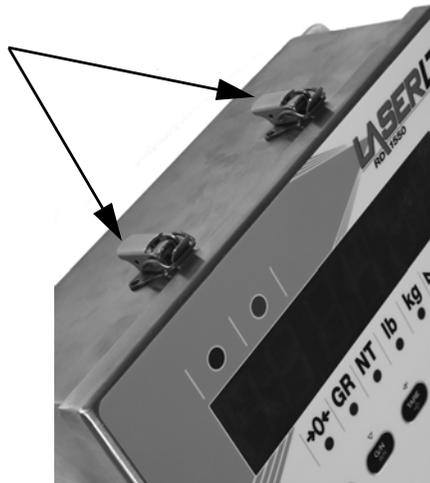


Figure 2-2. Enclosure Latches

## 2.3 Wiring

The *Laser LT* remote display provides two cord grips located on the underside of the enclosure for cabling; one for inputs, and one for outputs. An AC power cord is supplied with the unit. Only the serial communications cable must be connected. Use the following steps to wire the remote display.



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

Open the remote display by unlatching the lid (shown in Figure 2-2).

### 2.3.1 Cable Grounding

Except for the power cord, all cables routed through the cord grips should be grounded against the *Laser LT* enclosure. Do the following to ground shielded cables:

- Use the lockwashers, clamps, and keps nuts provided in the parts kit to install grounding clamps on the enclosure studs adjacent to cord grips. Install grounding clamps only for cord grips that will be used; do not tighten nuts.
- Route cables through cord grips and grounding clamps to determine cable lengths required to reach cable connectors. Mark cables to remove insulation and shield as described below:
- For cables with foil shielding, strip insulation and foil from the cable half an inch (15 mm) past the grounding clamp (see Figure 2-3). Fold the foil shield back on the cable where the cable passes through the clamp. Ensure silver (conductive) side of foil is turned outward for contact with the grounding clamp.
- For cables with braided shielding, strip cable insulation and braided shield from a point just past the grounding clamp. Strip another half inch (15 mm) of insulation *only* to expose the braid where the cable passes through the clamp (see Figure 2-3).

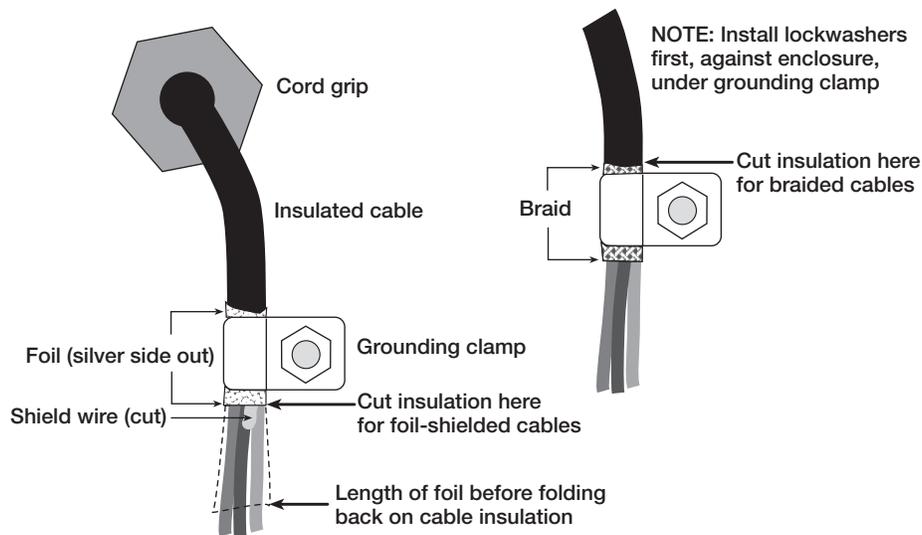


Figure 2-3. Grounding Clamp Attachment for Foil-Shielded and Braided Cabling

- Route stripped cables through cord grips and clamps. Ensure shields contact grounding clamps as shown in Figure 2-3. Tighten grounding clamp nuts.
- Finish installation using cable ties to secure cables inside of indicator enclosure.

### 2.3.2 AC Wiring

The *Laser LT* AC power cord comes in through a cord grip to the AC to DC power supply. The DC then goes to J5 on the main CPU board (see Table 2-3 on page 9).

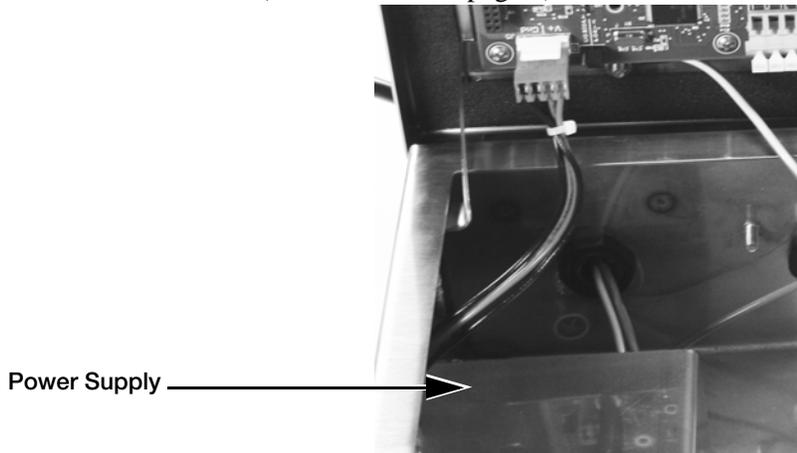


Figure 2-4. AC Wiring

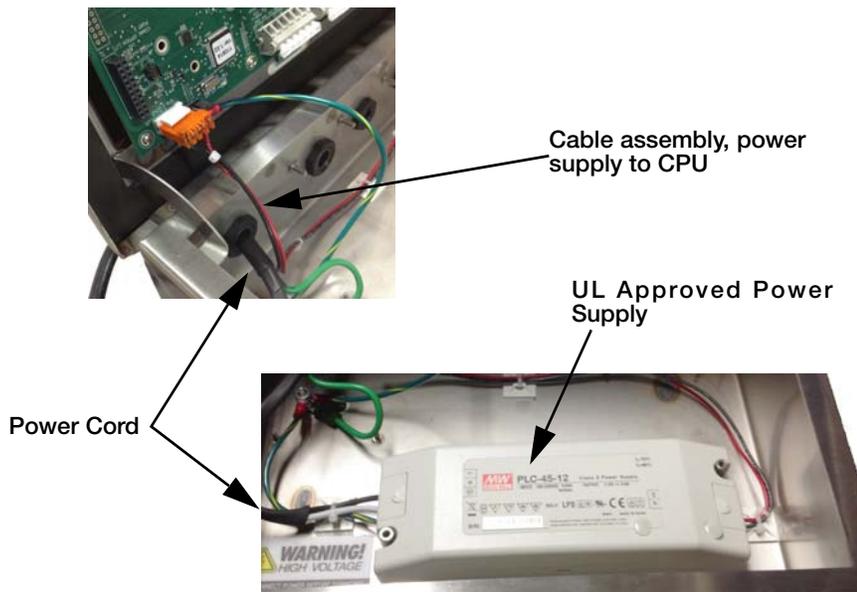


Figure 2-5. UL Approved Unit Wiring

Refer to the following table for AC wiring connections.

3-pin Terminal Block			To Power Supply	To Power Supply
Pin	Wire	Color	Pin	UL Approved Unit
1	Neutral	Blue or White	1	N
2	Hot	Brown or Black	2	L
3	Ground	Green or Green/Yellow	Ground Tab	

Table 2-1. AC Wiring Connections

**!** **Important** Ensure that a ground wire is attached to the grounding stud located on the enclosure backplate.

### 2.3.3 DC Wiring

Alternatively a 9-36V DC power converter may be supplied. To connect DC power to the DC to DC converter, wire the positive voltage to pin 1 (red wire - right hand side of connector), ground to pin 3 (black wire-left side) on CN1 DC power supply .

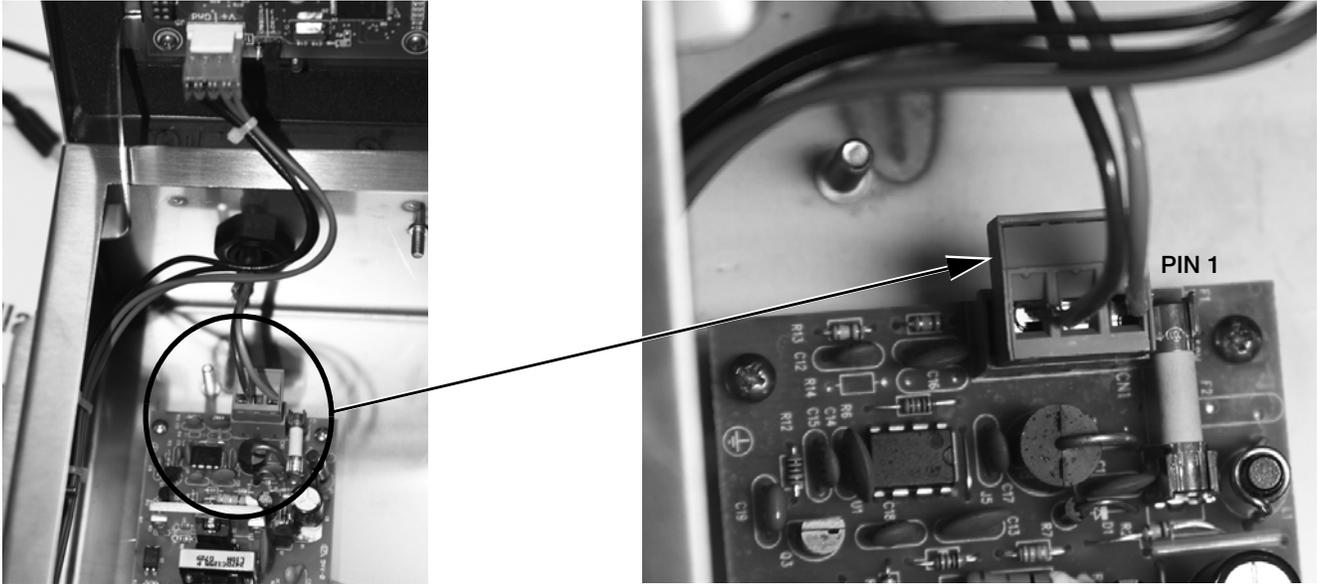


Figure 2-6. DC Power Supply

Connector	Pin	Function
CN1	1	V+
	2	NC
	3	V- (GND)

Table 2-2. CN1 DC Power Supply Connections

### 2.3.4 Serial Wiring

Serial communications are connected to the CPU board using clamp spring connectors on J2, J3 and J4 (see Table 2-3 for wiring positions ).

To connect the communications cable to the remote display, do the following:

1. If the enclosure is not open, make sure power is disconnected from the unit and open the latches on the enclosure.
2. Loosen the serial cable cord grip and push enough communications cable into the enclosure to allow attachment to the CPU board.
3. Strip 1/4" (.65 cm) of insulation from the serial cable ends.
4. Make cable connections for RS-232, or 20 mA current loop communications. Communications can be made to any port. Com options are set up on ports 3 and 4. See Configuration of ports (host, keypad, daisy chain) in Table 3-3 on page 17.
5. Remove any excess cable from inside the enclosure. Tighten the serial cable cord grip.

Use the following table for wiring positions.

Connector	Pin Assignment	Function	Port Position
J1	1	I/O 2	Digital I/O
	2	I/O 1	
	3	GND	
	4	+5	
J2	1	RX+ (20mA)	Port 1 (20 mA)
	2	RX- (20mA)	
	3	TX+ (20mA)	
	4	TX- (20mA)	
	5	V+ (20mA)	
	6	GND (20mA)	
J3	1	RTS	Port 2 (RS-232)
	2	DTR	
	3	RX	
	4	TX	
	5	GND	
	6	GND	
J4	1	TX	Port 3 RS-232 or Com Option Port
	2	RX	
	3	GND	
	4	TX	Port 4 RS-232 or Com Option Port
	5	RX	
	6	GND	
J5	1	+V Input	Power Input
	2	+V Input	
	3	- V Input (GND)	
	4	- V Input (GND)	
J7	Header	Com Port Option Slot	Port 3 and 4

Table 2-3. Serial Communications Wiring

### Communications Cable Distance Limitations

The maximum cable lengths that can be used for various communications types depend on a number of factors. These include: output impedance of the transmitter, electrical noise in the environment; cable capacitance, gauge, termination, and shielding.

Given that these and other factors will affect the maximum usable cable length, the following distances can be used as a general guide for the *Laser LT* communications cabling.

RS-232	50 ft (15 m) @ 19,200 baud rate
RS-422	1000 ft (300 m) Twisted pair cable
Fiber Optic	375 ft (114 m)
USB	16.5 ft (5 m)
802.11	330 ft (100 m)

Table 2-4. Communications Cable Distance Limitation Chart

### 20 mA Current Loop

The 20 mA current loop communication is provided on connector J2 (Port 1) of the CPU board (Figure 2-7, Table 2-3). Select active or passive switch settings with S1 (receive) and S2 (transmit).

The 20 mA switches enable active or passive selection of the 20 mA current loop communication. Refer to Figure 2-7 for the switch location on the CPU board.

### RS-232

RS-232 connections are provided on connectors J3 and J4 of the CPU board (Figure 2-7).

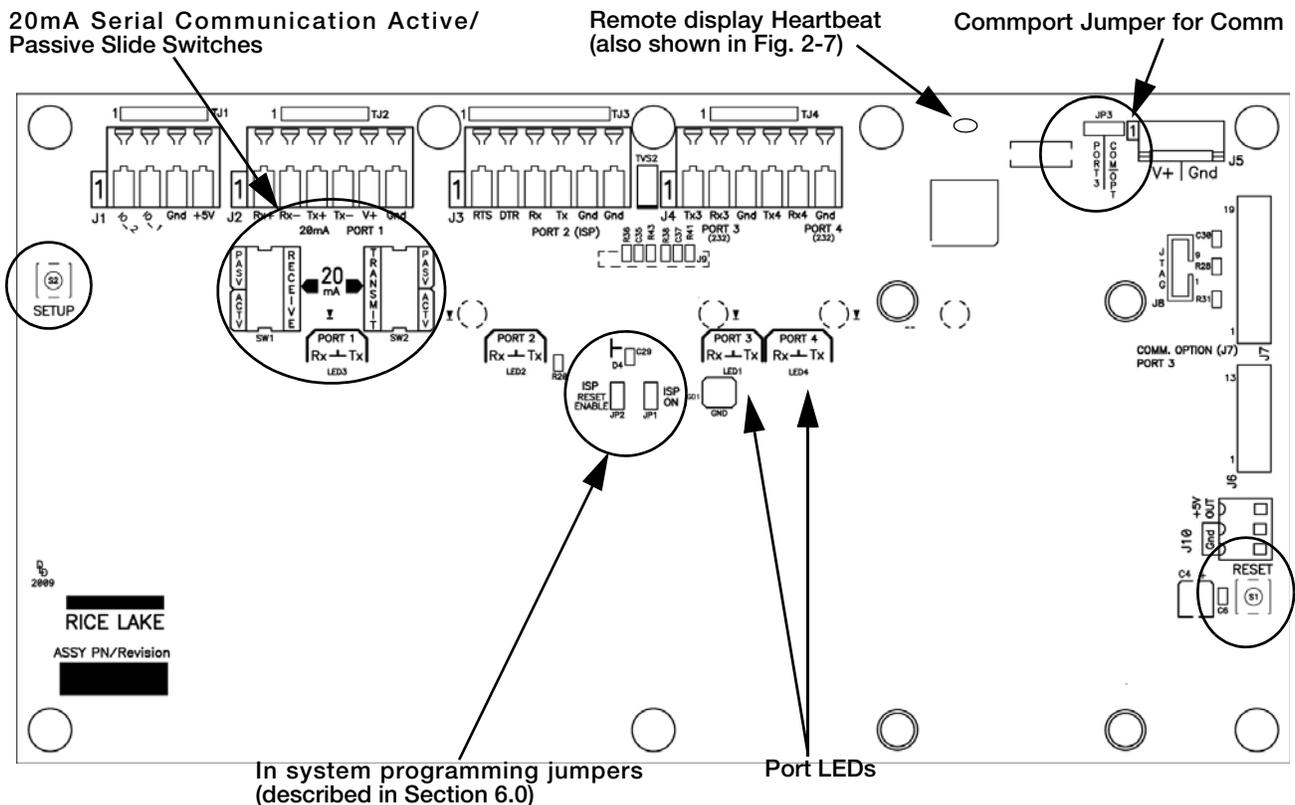


Figure 2-7. Jumper Pin Locations

### 2.3.5 Reset Switch

The reset switch enables a simulated power up reset. It then goes back to normal operation mode. The reset switch eliminates having to unplug the unit to do a reset. Refer to Figure 2-7 for the reset switch location on the CPU board.

### 2.3.6 Commport Jumper

The com port jumper (shown in Figure 2-7, upper right hand corner) is used when an option card is plugged into J7 on the CPU board (see Figure 2-9 for the J7 location). Available option boards include:

- Fiber optic board - accessed Port 3
- RS-232/422 board - accessed Port 3
- Ethernet TCP/IP board - accessed Port 3
- USB board - accessed Port 3
- Ethernet wireless - accessed Port 4

If using one of the listed option boards, the commport jumper setting must be moved to the right.

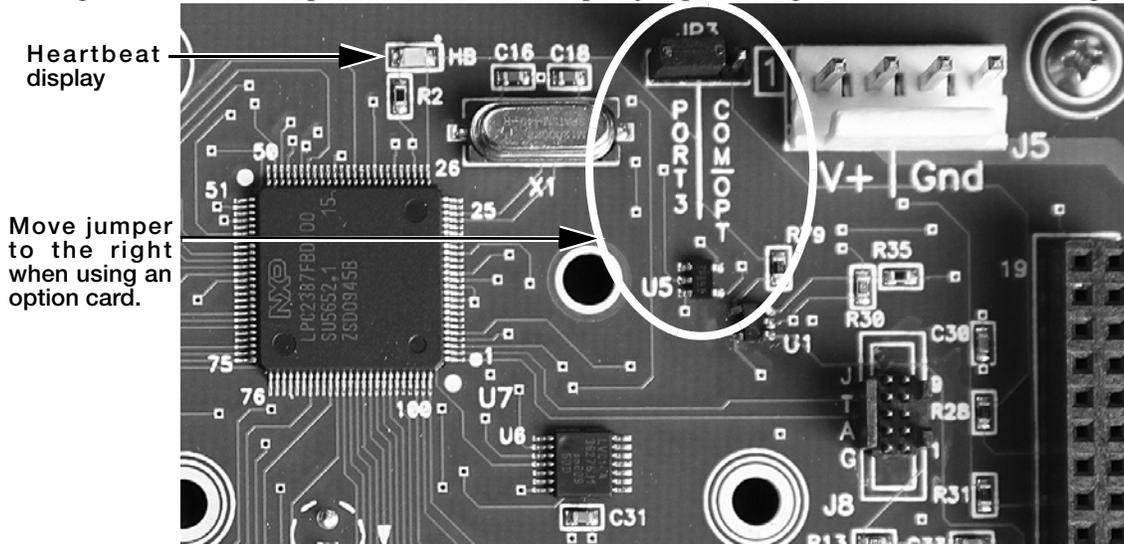


Figure 2-8. Commport Jumper Location

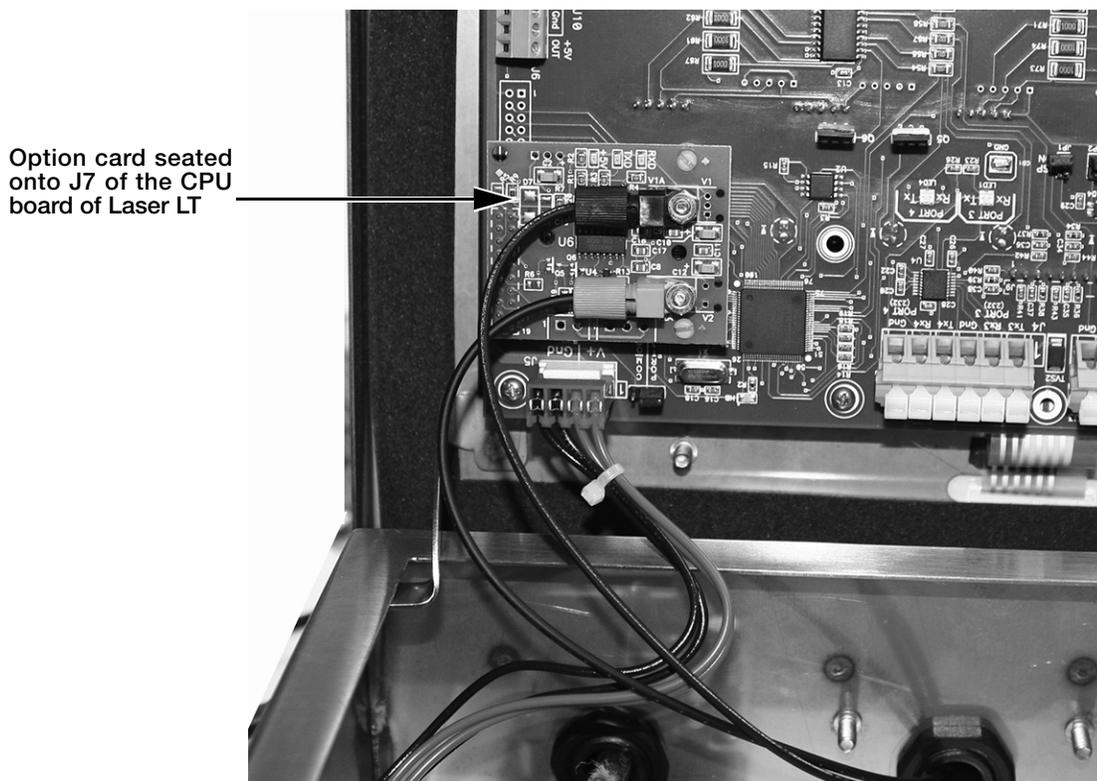


Figure 2-9. Option Board Location on the CPU Board

## 3.0 Configuration

Once the *Laser LT* remote display is installed, it may need to be configured. This can be done manually through the front panel and is explained in Sections 3.2 through 3.6.

Using Auto-Learn (Section 3.1) simplifies installation by automatically detecting the communications format and data rate used by the indicator and may eliminate the need for configuration.

Use the Revolution Utility to help configure the *Laser LT* using your PC. Revolution can be used to program and configure the *Laser LT* and is further explained in See Section 3.10 on page 22 of this manual.

### 3.1 Auto-Learn

The *Laser LT* remote display incorporates a software feature called Auto-Learn. Auto-Learn examines the serial data stream sent from the attached indicator and attempts to determine the data settings and format used by the indicator.

Use the following quick steps for Auto-Learn.

1. Ensure that **Lock** in Configuration mode is set to the **Off** position.

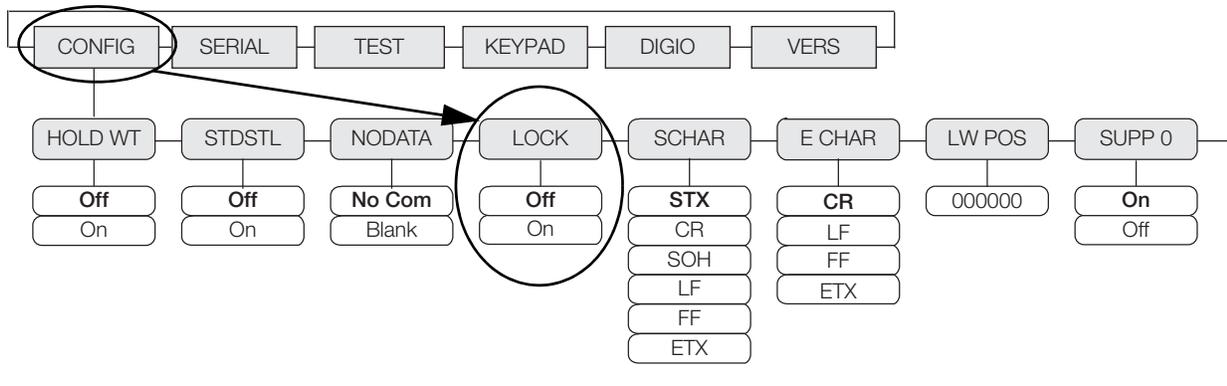


Figure 3-1. Lock Parameter Location

2. Set up the Host Port.
3. Enter the Auto-Learn feature from Run Mode by pressing and holding the **Gross/Net** key for three seconds.
4. If this does not work, and Learn fails, use Revolution Utility software (Section 3.10 on page 22).

#### Note

- It is recommended to set the parameter **LOCK** to the **ON** position (see Table 3-4), to eliminate any un-intentional changes from occurring.
- If the displayed weight is not correctly positioned, press and hold the right (unit) and left (print) buttons for three seconds then release, to shift the displayed data string. The data will move one position. Repeat this as many times as necessary to move the data over another position.

## 3.2 Manual Configuration

To begin configuration, open the enclosure to access the CPU board (Figure 3-2).

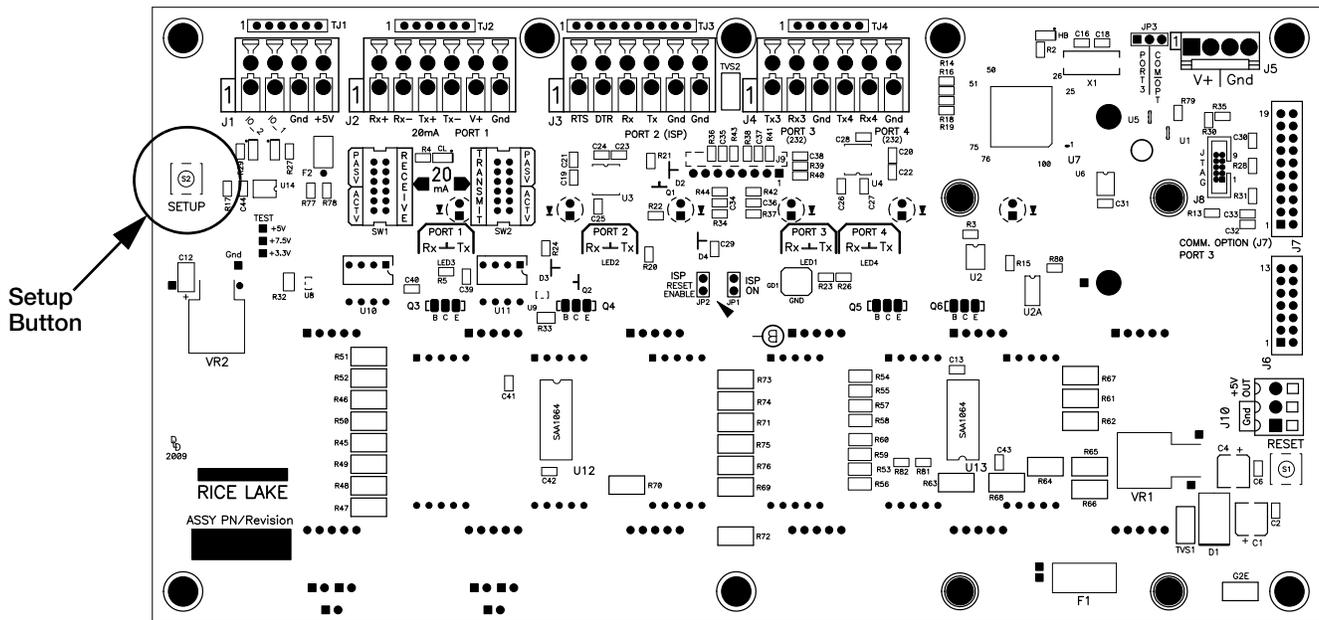


Figure 3-2. Laser LT CPU Board

The setup button is located on the CPU board (Figure 3-2). This allows access into Configuration Mode.

Press the **SETUP** button to access main menu configuration parameters.

The *Laser LT* remote display can be configured using a series of menus accessed from the front panel of the unit as shown in Figure 3-3.



Figure 3-3. Configuration Setup Buttons

Use the **UP/DOWN**, **LEFT/RIGHT** buttons to navigate through menu items and the **ENTER** button for setting a selection.

Table 3-1 summarizes the functions of each of the main menus and Figure 3-4 illustrates the main menu selections.

Menu	Menu Function	Table/Section Number
CONFIG	Configuration. Displays brightness and other parameters associated with configuring the remote display	Table 3-2
SERIAL	Serial. Configures serial ports	Table 3-3 and 3-4
TEST	Test. System hardware tests	Table 3-5
KEYPAD	Keypad. Configures keypad operation and allows the strings sent with each keypad press to be modified to comply with other manufacturers	Section 3.5
DIGIO	Digital I/O. Assigns digital input functions	Section 3.6
VERS	Version. Displays installed software version number	Section 3.7

Table 3-1. Laser LT Remote Display Menu Summary

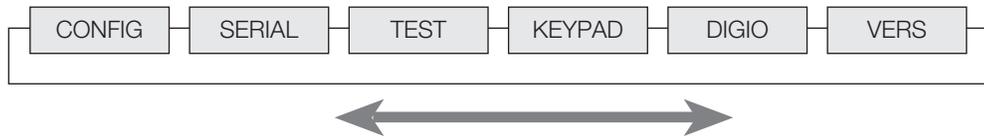


Figure 3-4. Laser LT Main Menu Flow

Figure 3-5 shows the Configuration menu.

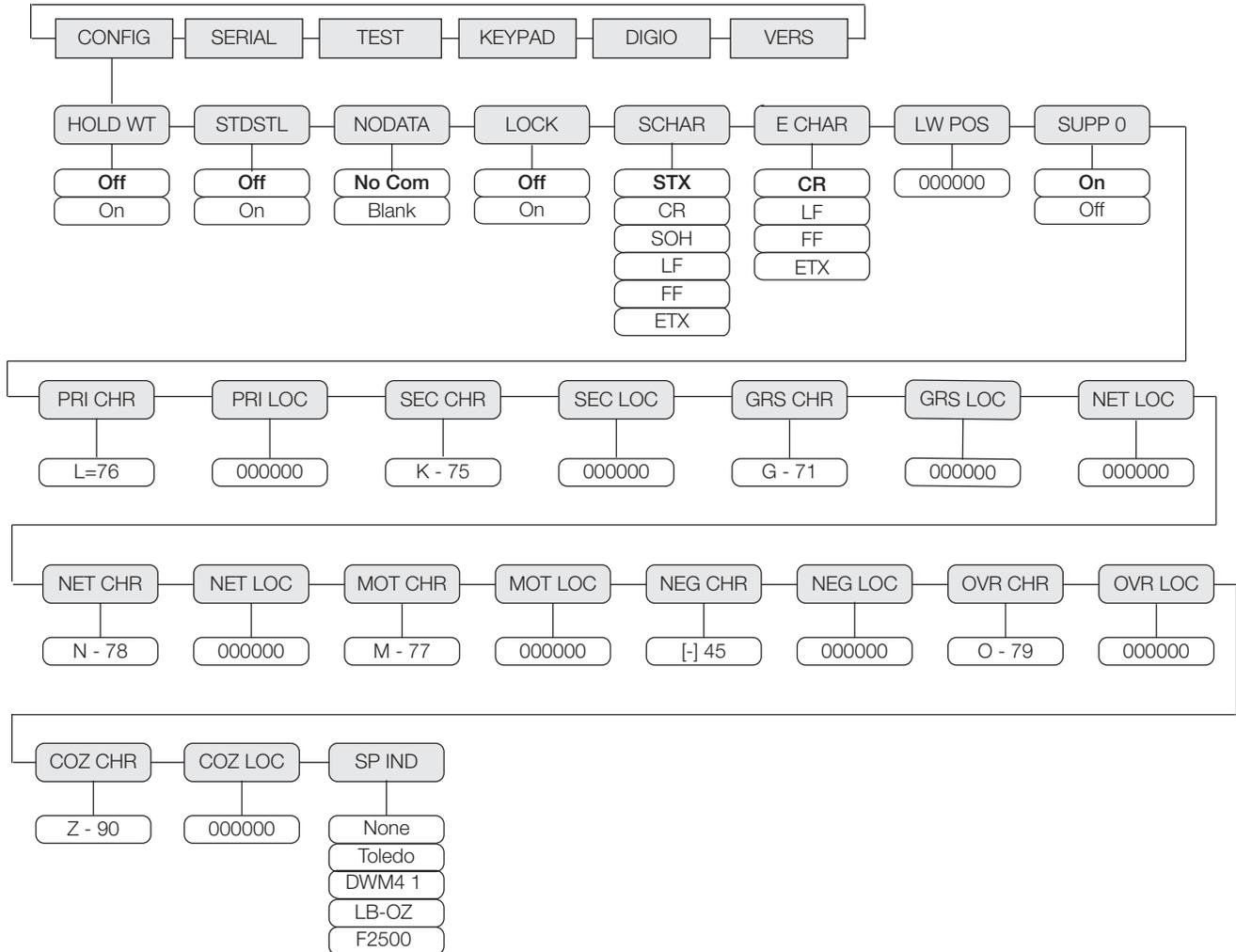


Figure 3-5. Configuration Main Menu Choices

CONFIG Menu		
Parameter	Choices	Description
Level 2 Submenus		
HOLD WT	Off On	Select On to enable this feature to keep the last weight displayed if communication is lost or when using demand updated weight to prevent the remote display from going into a NO DATA error condition.
STDSTL	Off On	Select On to blank the display when the scale is in motion.

Table 3-2. Configuration Menu Summary - Level 2

CONFIG Menu		
NO DATA	No Com Blank	Selects what to display when the <i>Laser LT</i> is not receiving recognizable data - "NO COM" or blank screen.
LOCK	Off On	Select On to make sure the current settings don't get changed and to disable Auto-Learn. When off, the system enables Auto-Learn.
S CHAR	STX CR SOH LF FF ETX	The <i>Laser LT</i> scans for this character to determine the start of a packet.
E CHAR	CR LF FF ETX	The <i>Laser LT</i> scans for this character to determine the end of a packet.
LW POS	000000	Defines the position of the last character in a weight. Range 0-63 with 0 as the default. <ul style="list-style-type: none"> <li>• With a 0 setting, the <i>Laser LT</i> will search from the end of the data stream for the first group of digits.</li> <li>• With a non-zero setting, the <i>Laser LT</i> will begin searching for digits at the specified location.</li> <li>• If LWPOS is past the weight in the data stream, it will work its way back to the first group of digits it finds.</li> <li>• A custom setting of this parameter is how a particular value is displayed from a multi-weight data stream.</li> </ul>
SUPP O	On Off	Enable (on) or disable (off) leading zero suppression.
PRI CHR	<b>L = 76</b>	Allows the user to select the primary unit character
PRI LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63
SEC CHR	<b>K - 75</b>	Allows the user to select the secondary unit character
SEC LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63
GRS CHR	<b>G - 71</b>	Allows the user to select the gross character
GRS LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63
NET CHR	<b>N - 78</b>	Allows the user to select the net character
NET LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63
MOT CHR	<b>M - 77</b>	Allows the user to select the motion status character
MOT LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63
NEG CHR	<b>[-] 45</b>	Allows the user to select the negative polarity status character.
NEG LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63
OVR CHR	<b>O - 79</b>	Allows the user to select the overload status character.
OVR LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63
COZ CHR	<b>Z - 90</b>	Allows the user to select the center of zero status character
COZ LOC	<b>000000</b>	This is the character location in the string format. A 0 (zero) indicates that the <i>Laser LT</i> will look for the character anywhere in the incoming data. The range is 0-63

Table 3-2. Configuration Menu Summary - Level 2

CONFIG Menu		
SP IND	<p><b>None</b> Toledo</p> <p>DWM4 1 LB-OZ F2500 Fairbanks</p>	<p>Select, decode status, and settings for special indicator types.</p> <p>None Toledo or Fairbanks format</p> <p>SPECIAL NOTES:</p> <ul style="list-style-type: none"> <li>• If using a Metler Toledo indicator named something other than a numeric model, you may need to set to None</li> <li>• If using a Metler Toledo numbered model indicator, set to Toledo</li> </ul> <p>Flexweigh DWM4 1 mode 1 format Condec pound ounce format Fairbanks 2500 and 9401 compatible format</p>

Table 3-2. Configuration Menu Summary - Level 2

### 3.3 Serial Communications

The *Laser LT* remote display has four serial ports available:

- Port 1, 2, 3, and 4 - Provides communication with the indicator and other remote or serial devices.

There are four sub-parameters associated with Ports 1, 2, 3 and 4 which are shown in Figure 3-6. Each port can be independently configured for baud rate, 7 or 8 bits, 1 or 2 stop bits and whether an EDP command will echo to the host (see Table 3-4).

The role of the port is also assigned which is host, key destination, or a daisy chain.

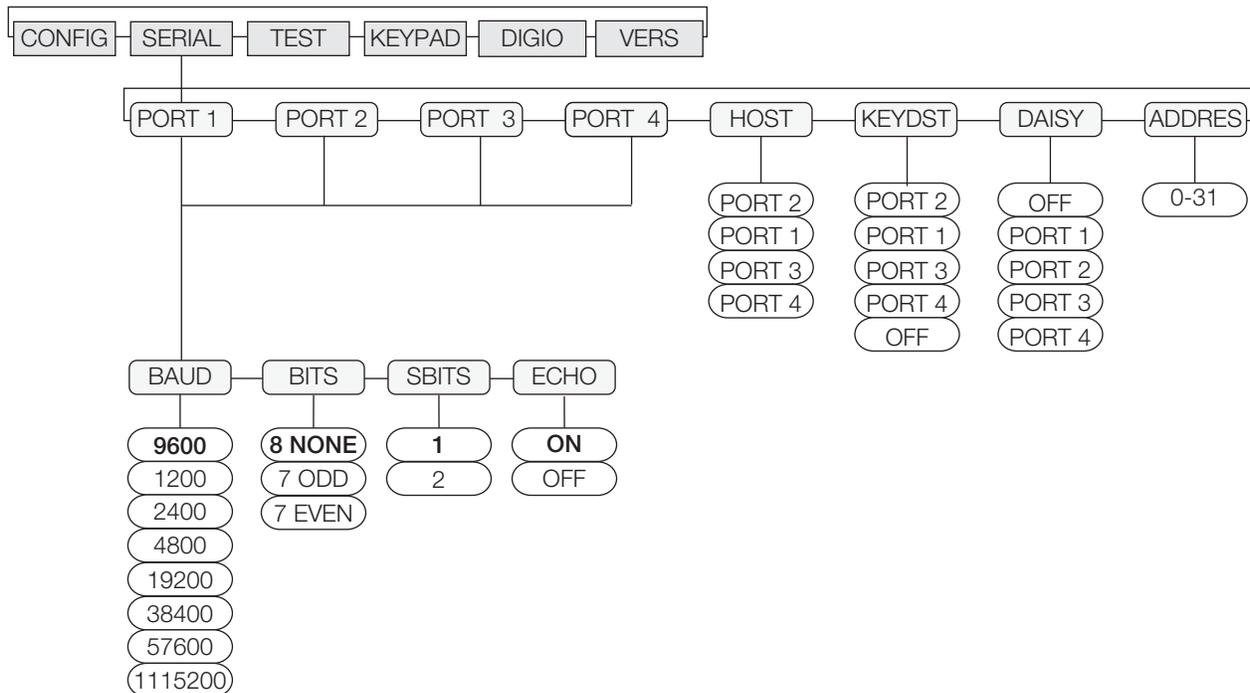


Figure 3-6. Serial Menu

Serial Menu		
Parameter	Choices	Description
Port 1, 2, 3, and 4	BAUD DATA BITS STOP BITS ECHO	Configure Ports 1, 2, 3, and 4. See Level 3 submenu parameter descriptions.
HOST	PORT 2 PORT 1 PORT 3 PORT 4	Allows the user to select which port is connected to the weight indicator or host device.
KEYDST	PORT 2 OFF PORT 1 PORT 3 PORT 4	Allows the user to select which port the key press data will be sent to.
DAISY	OFF PORT 1 PORT 2 PORT 3 PORT 4	This allows the user to select which port will echo data received from the host device.
ADDRES	0 through 31	Assign a command address by selecting a number between 0-31. See Section 3.9.1 for Run Mode Commands

Table 3-3. Serial Communication Menu Summary

Port 1, 2, 3, and 4 Parameter		
Parameters	Choices	Description
BAUD	9600 1200 2400 4800 19200 38400 57600 19200 57600 115200	Baud rate. Selects the transmission speeds for Ports 1, 2, 3, and 4
BITS	8 NONE 7 ODD 7 EVEN	Selects the bits of data of Ports 1, 2, 3, and 4
SBITS	1 2	Selects the number of stop bits of Ports 1, 2, 3, and 4
ECHO	On Off	This enables or disables echoing of received EDP command characters.

Table 3-4. Port 1, 2, 3 and 4 Serial Menu

### 3.4 Testing the Remote Display

The *Laser LT* remote display provides a test menu to check the hardware of the remote display. These tests can be accessed through the main menu (Figure 3-7).

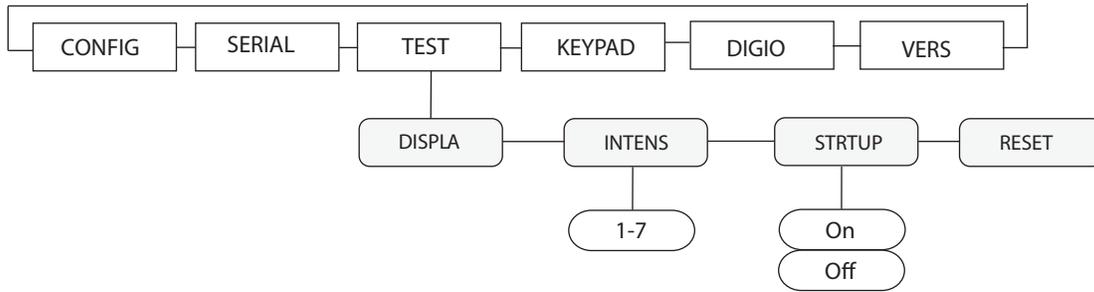


Figure 3-7. Test Menu Choices

TEST Menu		
Parameter	Choices	Description
DISPLA		When this feature is enabled, all LEDs remain lit until a key is pressed with the exception of the <b>ENTER</b> or <b>DOWN</b> key.
INTENS	7 1 2 3 4 5 6	This allows the user to select the degree of brightness between the values of 1-7 with 1 being the dimmest and 7 being the brightest.
STRTUP	On Off	When this feature is enabled, a display check is performed and the software version number is shown at powerup.
RESET		The reset parameter resets the <i>Laser LT</i> remote display to default parameters

Table 3-5. Test Menu Descriptions

### 3.5 Keypad

By using the keypad parameter, the user is able to configure keypad operation and allows strings to be sent with each keypad press which can be modified to comply with other manufacturers.

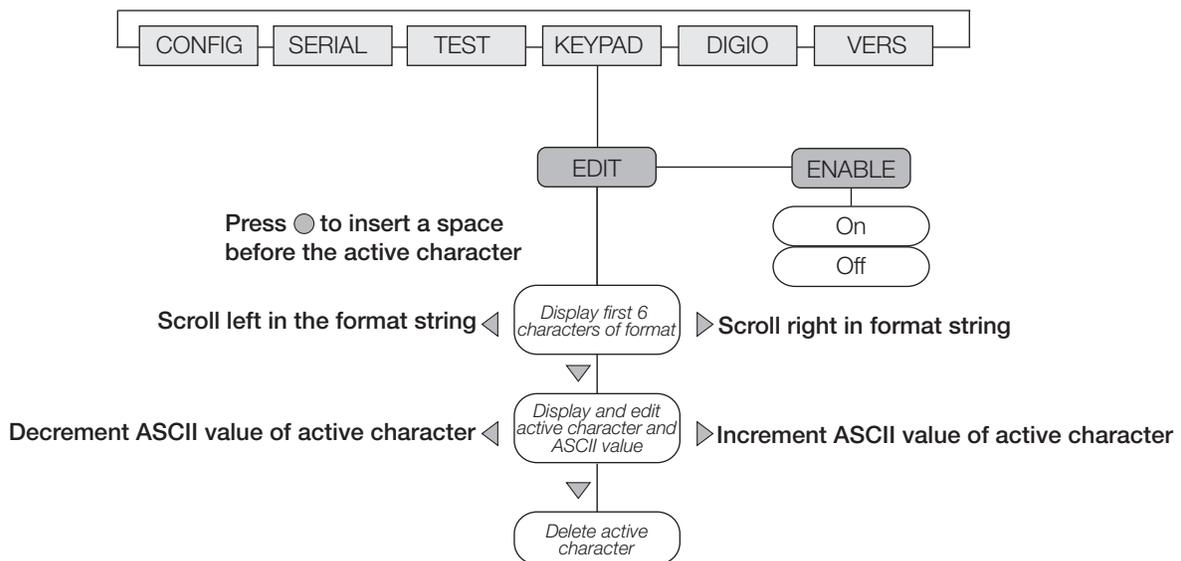


Figure 3-8. Keypad Menu

See Section 6.4 for how characters are displayed.

	Label	Default	Description
KEYPAD 1	Zero	ENABLE = ON STRING = KZERO<13>	Keypad strings are captured using the following format for all 5 keys:  KEYPAD1.STRING = <KZERO<13>  KZERO is a string which can be up to 32 characters <13> is the ASCII for carriage return.
KEYPAD 2	G/N	ENABLE = ON STRING = KGROSSNET<13>	
KEYPAD 3	Tare	ENABLE = ON STRING = KTARE<13>	
KEYPAD 4	Units	ENABLE = ON STRING = KUNITS<13>	
KEYPAD 5	Print	ENABLE = ON STRING = KPRINT<13>	

Table 3-6. Keypress Parameter Settings

### 3.6 Digital I/O

When enabled, the digital inputs control the Red/Green light status LEDs or the front panel keypress as shown in Figure 3-9. See J1 in Table 2-1 for wiring.

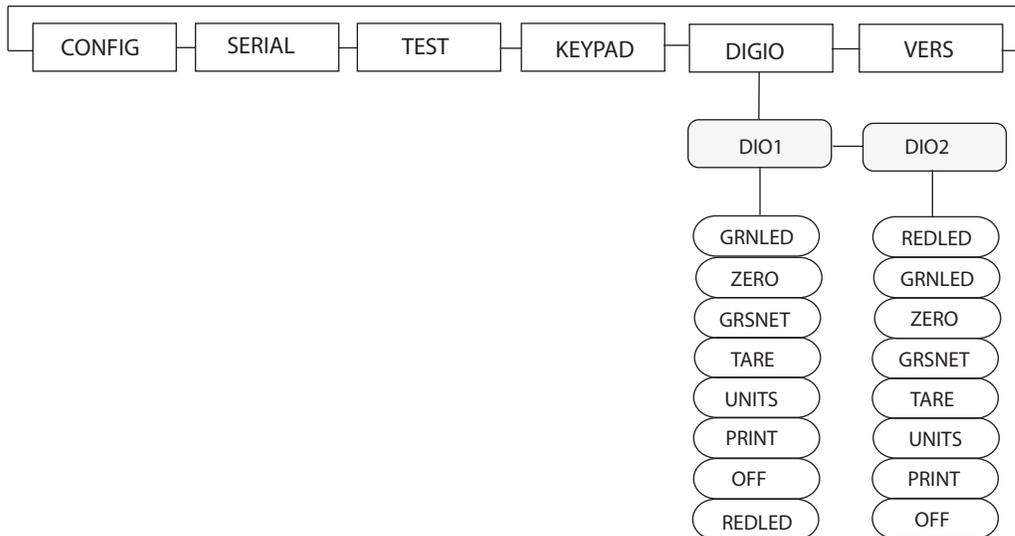


Figure 3-9. Digital I/O Menu

Digital I/O	Logic	Status
DIO1	0 - GND	Active
	1 (+ 5V)	Inactive
DIO2	0 - GND	Active
	1 (+5V)	Inactive

Table 3-7. Digital I/O Descriptions

### 3.7 Version

When *Version* is selected from the main menu choices (Figure 3-10), the current software version is shown on the remote display.

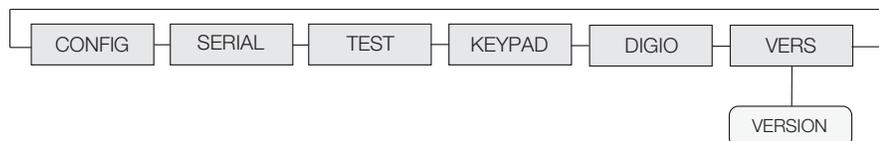


Figure 3-10. Version Menu

## 3.8 Demand Print Displaying

The indicator and the *Laser LT* remote display can be set up to do a demand print display for such applications as cattle weighing. This is useful if you want to show and keep the last weight of an animal.

Using Auto-Learn, ensure *HOLD WT* is on and continuously push the print button on the indicator to learn a demand print display.

## 3.9 Run Mode Serial Commands

The *Laser LT* remote display has the ability to receive commands that display messages, or read a digital I/O (2 inputs). If the *Laser LT* remote display is interfaced with a programmable smart indicator like the 920i, a user program can be written to allow the user to send messages utilizing softkeys or events. When sending messages from a user program, the user can send one message to temporarily override the streamed weight display or send multiple messages to be displayed one at a time for several seconds each, replacing the weight display all together if desired.



**Note** The following commands are valid only while in run mode and on the host port.

### 3.9.1 Laser LT Display Message Command

The display message command will place an alpha-numeric message on the display. The weigh annunciators (gross, net, etc) will be cleared but the Red and Green LEDs will retain their current state.

|<AA>DM<timeout>|<message>!

or

|<AA><DM><message>!

Response: None

Where:

| = Pipe character (0x 7C)

AA = Two byte address, ASCII digits (00-31)

DM = Literal DM

Timeout = The number of milliseconds to hold the message on the display. If a timeout value is not included then the message will remain on the display until replaced with another message or a weight string.

message = The message to be displayed

! = Exclamation point character (0 x21)

### 3.9.2 Laser LT Set Red/Green LED Command:

This command will set the state of the red and green LEDs at the upper left of the *Laser LT*.

The red and green LEDs can also be configured to operate via the digital inputs. An LED controlled from a digital input will ignore serial commands.

|<AA>SL<data>!

Response: None

Where:

| = Pipe character (0x7C)

AA = Two byte address, ASCII digits (00-31)

SL = Literal SL

Data = The LED state data

0 = both red and green off

1 = red on

2 = red off

3 = green on

4 = green off

5 = both red and green on

! = Exclamation point character (0 x21)

### 3.9.3 Laser LT Get Digital Input Command

The Get Digital Input command will return the state of the requested digital input.

|<AA>GR<data>!

Response: <State><CR>

Where:

| = Pipe character (0x7C)

AA = Two byte address, ASCII digits (00-31)

GR = Literal GR

Data = 1 or 2

CR = Carriage return, (0x 0D)

State = The state of the requested relay, possible responses:

1 = On

1 = Off

2 = On

2 = Off

! = Exclamation point character (0 x21)

### 3.9.4 Laser LT Query Display Command

The query display command will return what is currently being displayed and is mainly intended for testing.

An example of a possible operation would be to transmit a weight string or a display message command to the *Laser LT*, let it set the display, transmit the query display command and capture the response. The response could then be compared against what was expected.

|<AA>QD!

Response: <displayed>,<annunciator state><CR>

Where:

| = Pipe character (0x7C)

AA = Two byte address, ASCII digits (00-31)

QD = Literal QD

displayed = 6 characters minimum, up to 12 with decimal points.

A space (hex 20) represents a blank.

<CR> = Carriage return, (0x 0D)

<annunciator state> = The sum of the lit annunciators. For example: a value of 17 indicates that the lb and gross annunciators are lit.

lb = 1

kg = 2

red = 4

green = 8

gross = 16

net = 32

center zero = 64

standstill = 128

! = Exclamation point character (0 x21)

### 3.10 Configuration with Revolution®

Revolution is a user-friendly tool for configuring the *Laser LT* using your PC. Revolution can be used to program and configure the *Laser LT*.

Revolution can be downloaded from the Rice Lake Weighing Systems web site at: [www.ricelake.com/support/software/firmware/Revolution Scale Software](http://www.ricelake.com/support/software/firmware/Revolution Scale Software).

Use the following steps to configure the *Laser LT* using Revolution.

1. Select Revolution from the start up menu. The following start up screen appears.

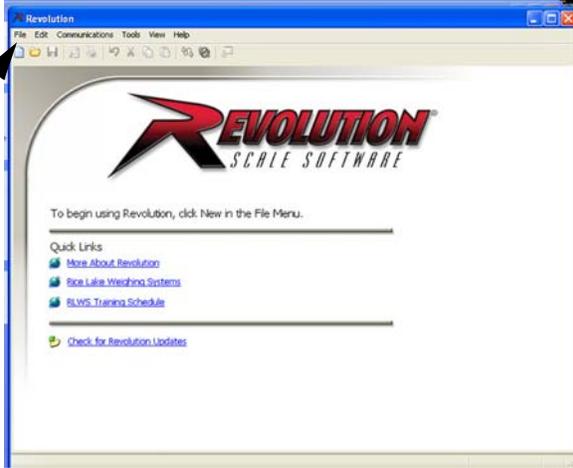


Figure 3-11. Start up Screen

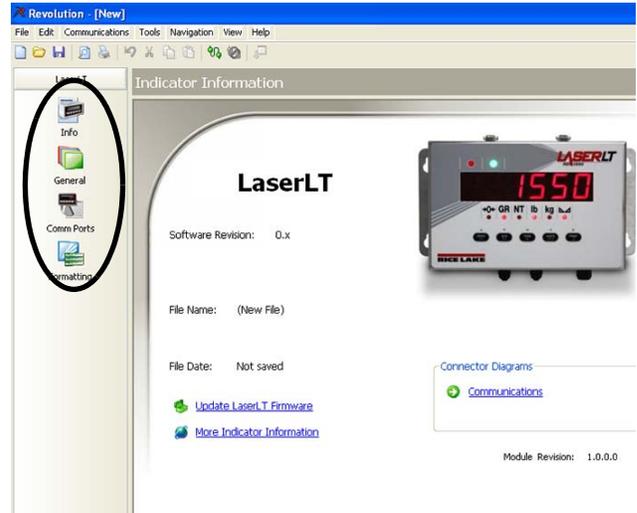


Figure 3-13. New File Screen

2. To begin using Revolution, click **New** in the File menu (see Figure 3-10 arrow). A select indicator screen appears. Select the *Laser LT* to access and press OK.

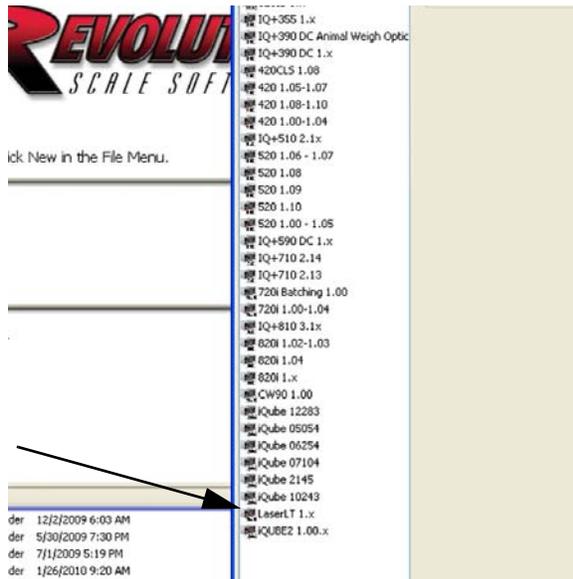


Figure 3-12. Select Indicator

There are three categories which can be configured. They are:

- General Configuration
- Comm Ports
- Formatting

#### 3.10.1 General

General Configuration can be set up through this tab such as selecting the Digital I/O, locking the Learn Mode and so on.

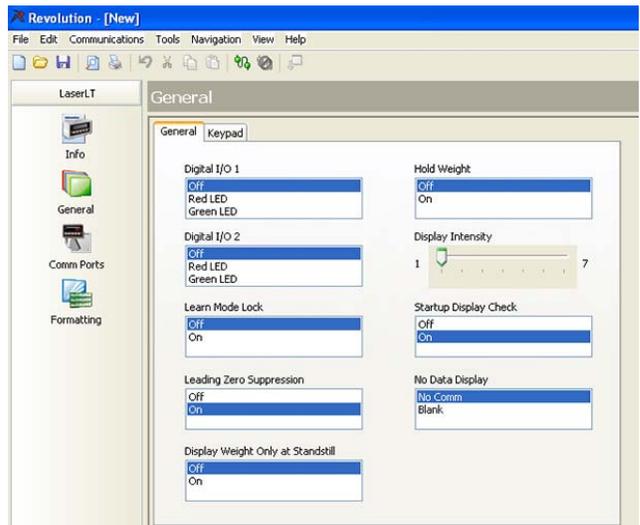


Figure 3-14. General Tab

3. The chosen screen will appear as shown in Figure 3-13.

Parameter settings are further explained in the following flow charts:

Configuration menu found in Figure 3-14  
 Keypad menu found in Figure 3-15  
 Digital I/O menu found in Figure 3-14

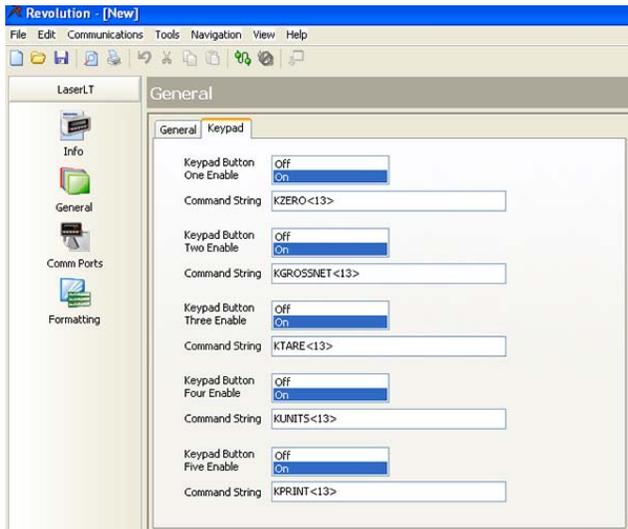


Figure 3-15. Keypad Setup

### 3.10.2 Comm Ports

Select the Comm Ports icon to access and set up Ports 1 through 4 information such as baud rate, data bits, stopbits and echoing.

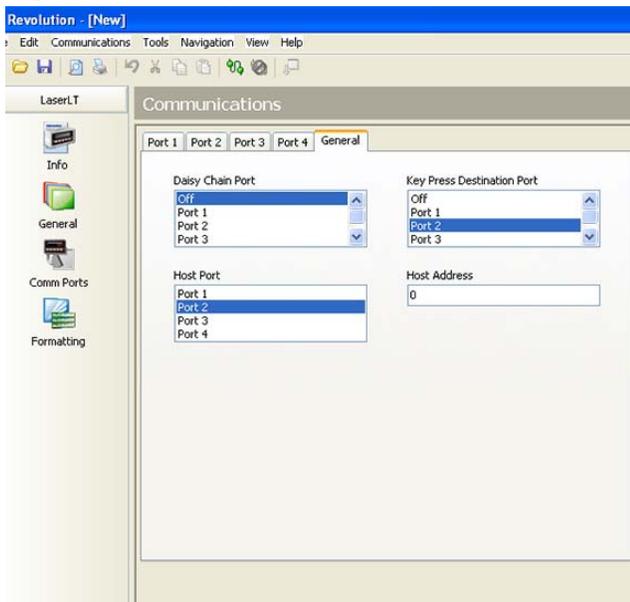


Figure 3-16. Comm Port Screen

See Figure 3-5 for more information on setting these parameters.

If the cursor is placed before the first character after the start character, it will be LOC1. Each character after that is LOC2 through the end of the frame. If the character is L for the primary and it is at LOC10, then

### 3.10.3 Formatting



**Note** Information must be uploaded prior to using the Formatting screen in Revolution.

With Revolution running and the new file screen shown (from Figure 3-14), select **Communications** from the upper toolbar. Select **Connect** and then select upload configuration.

Select the Formatting icon to access the general formatting screen shown in Figure 3-17. This would generally be used when the *Laser LT* Auto Learn failed to display weight or annunciators. By viewing information on the screen, you are able to see what information the *Laser LT* has captured. Changes can be made and downloaded to the *Laser LT* to customize the display weight and annunciators.

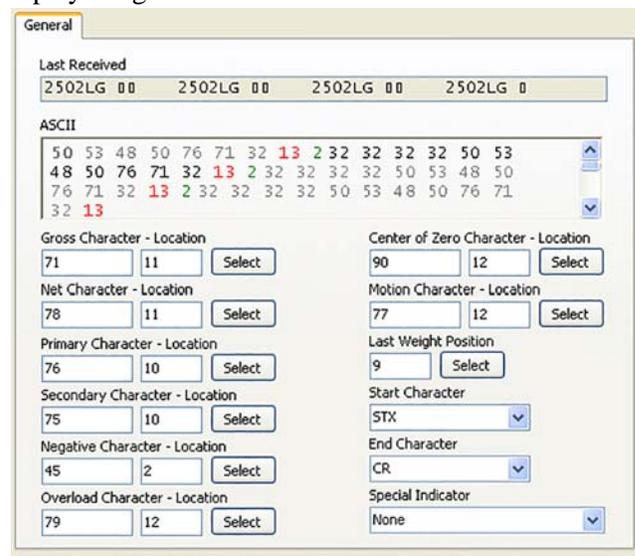


Figure 3-17. Formatting Screen

From this screen you can set up annunciator and weight parsing.

The first text box on the screen shows the last received data that the LaserLT sends when data is uploaded. This is a “snapshot” of 50 characters that the LaserLT received from the host. It will display the ASCII value of each character in the frame. Use the start character and end character’s ASCII values to determine the frame. Characters between the start and end characters make up the frame. You should only refer to the first full frame. There may be half of a frame at the beginning due to the timing of when the LaserLT sent the “last received” data.

Look at each location to see what it is and what token needs to be updated.

you need to put the cursor before the L and click SELECT for the primary token. Revolution will plug in the character and location.

Continue with all known characters and download this new data and the LaserLT should now display a proper weight with the available tokens.

The below is a sample of Section Print. The parameters tell the LaserLT how to decode the stream.

- Center of Zero Character: 90
- Center of Zero Location: 0
- Overload Character: 79
- Overload Location: 0
- Gross Character: 71
- Gross Location: 11
- Net Character: 78
- Net Location: 0
- Motion Character: 77
- Motion Location: 0
- Primary Character: 76
- Primary Location: 10
- Secondary Location: 10
- Negative Character: 45
- Negative Location: 0
- Last Weight Position: 0
- End Character: CR
- Start Character: STX
- Special Indicator: None

## 4.0 EDP Commands

The *Laser LT* remote display can be controlled by a personal computer or a remote keyboard connected to the remote display. Control is provided by a set of EDP (Electronic Data Processing) commands that can simulate front panel key press functions, display and change setup parameters and perform reporting functions.

EDP commands are able to view or change the parameters either in Run or Configuration mode. If used in the Run mode, the user must send the command *SAVE.CFG* when finished.



**Note** Any port that is selected for the host port will not accept EDP commands. A host device cannot change any parameters using the port the data is being sent out on.

### 4.1 Annunciator and Weight Position EDP Commands

The *Laser LT* uses an Auto-Learn function which automatically determines the serial settings and data format used by the attached indicator. EDP commands are used for manually configuring the weight stream parsing.

#### 4.1.1 Data Formats

##### Continuous Output Serial Data Format

If continuous transmission is configured for a serial port in the Host (STREAM parameter set to LFT or INDUST on the SERIAL menu), the *Laser LT* receives data using the Consolidated Controls serial data format shown in Figure 4-1:

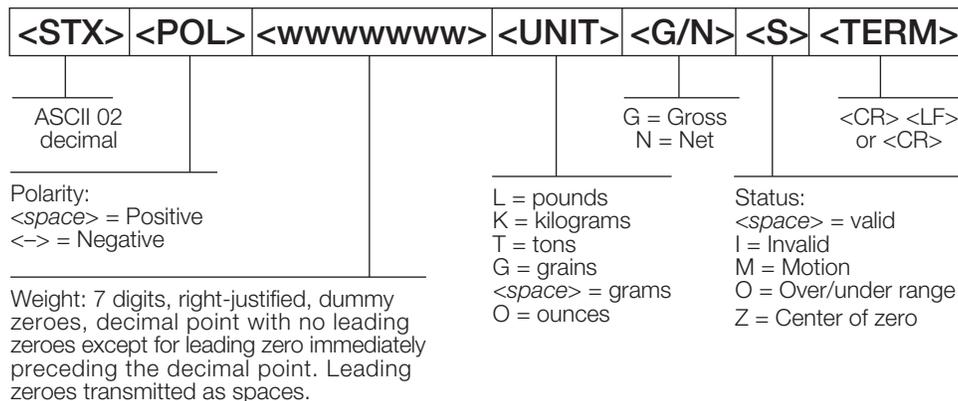


Figure 4-1. Continuous Output Serial Data Format

#### 4.1.2 Annunciators

The following table lists the EDP commands for configuring the annunciators.

Command	Default Value	Description
COZ.CHAR	90 (Z)	Allows the user to select the center of zero status character
COZ.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
GROSS.CHAR	71 (G)	Allows the user to select the gross character
GROSS.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
NEG.CHAR	45 (-)	Allows the user to select the negative character
NEG.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
NET.CHAR	78 (N)	Allows the user to select the net character

Table 4-1. Annunciator and Weight Position EDP Commands

Command	Default Value	Description
NET.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
PRI.CHAR	76 (L)	Allows the user the select primary unit character
PRI.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
SEC.CHAR	75 (K)	Allows the user to select the secondary unit character
SEC.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
MOTION.CHAR	77 (M)	Allows the user to select the motion status character. When a motion character is received, the standstill annunciator is turned off. When no motion character is being received, the standstill annunciator is turned on.
MOTION.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
OVR.CHAR	79 (O)	Allows the user to select the overload status character
OVR.LOC	0	This is the character location in the string format. A 0 (zero) indicates that the Laser LT will look for the character anywhere in the incoming data. The range is 0-63
LWPOS	0	Defines the position of the last charactor in a weight. Range 0-63 with 0 as the default. <ul style="list-style-type: none"> <li>• With a 0 setting, the LaserLT will search from the end of the data stream for the first group of digits.</li> <li>• With a non-zero setting, the LaserLT will begin searching for digits at the specified location.</li> <li>• If LWPOS is past the weight in the data stream, it will work its way back to the first group of digits it finds.</li> <li>• A custom setting of this parameter is how a particular value is displayed from a multi-weight data stream.</li> </ul>
ENDCHAR	CR	Choices: CR LF FF ETX The terminating character of the received weight stream
SPECIALINDICATOR	<b>NONE</b> TOLEDO DWM4 1 (Flexweigh) LB - OZ F2500 (Fairbanks)	This configures the Laser LT to use a serial stream that requires special handling.
STARTCHAR	<b>STX</b> CR SOH LF FF ETX	Defines which character indicates the start of a weight stream.

Table 4-1. Annunciator and Weight Position EDP Commands

## 4.2 Parameter Setting Commands

The following table describes EDP parameter setting commands with descriptions and ranges.

Command	Choices	Description
DAISY	<b>OFF</b> PORT 1 PORT 2 PORT 3 PORT 4	This is the port that will echo the weight data to another remote display
DIO1	<b>OFF</b> REDLED GRNLED ZERO TARE UNITS PRINT GRSNET	Select which LED or front panel key function is controlled by this digital I/O point. Note: DIO1 and DIO2 could both be set to the same front panel key function.
DIO2	<b>OFF</b> REDLED GRNLED ZERO TARE UNITS PRINT GRSNET	Select which LED or front panel key function is controlled by this digital I/O point. Note: DIO1 and DIO2 could both be set to the same front panel key function.
HOLDWEIGHT	<b>OFF</b> ON	Holds the last received weight on the display instead of showing an error if communications are lost or the host is sending demand data.
HOST	<b>PORT 2</b> PORT 1 PORT 3 PORT 4	The port to receive weight data from the indicator on.
INTENSITY	<b>7</b> 1 2 3 4 5 6	The intensity of the LED elements with 1 = dimmest and 7 = brightest
KEYDST	<b>PORT 2</b> OFF PORT 1 PORT 3 PORT 4	This is the port that will transmit keypress commands.
LOCK	<b>OFF</b> ON	Locks (on) or unlocks (off) access to the Learn Mode.
NODATA	<b>NO COM</b> BLANK	This parameter allows the display to either display NO COM or go blank when data transmission is lost, unless over-ridden by the hold weight parameter.
STANDSTILL	<b>OFF</b> ON	Select On to blank the display when the scale is in motion.
STARTUP	<b>ON</b> OFF	This defines whether or not to do a display check and version display on power up. On = this performs the test and shows the version Off = this goes straight into the operation
SUPPRESSZERO	<b>ON</b> OFF	Enable (on) or disable (off) leading zero suppression.

Table 4-2. Laser LT Parameter Setting Descriptions

Command	Choices	Description
PORTS 1 THRU 4	BAUD = 9600 BITS = 8 NONE ECHO = ON SBITS = 1 STOP BIT	
KEYPAD 1	ENABLE = ON STRING = KZERO<13>	Keypad strings are captured using the following format for all 5 keys:  KEYPAD1.STRING = <KZERO<13>  KZERO is a string which can be up to 32 characters <13> is the ASCII for carriage return.
KEYPAD 2	ENABLE = ON STRING = KGROSSNET<13>	
KEYPAD 3	ENABLE = ON STRING = KTARE<13>	
KEYPAD 4	ENABLE = ON STRING = KUNITS<13>	
KEYPAD 5	ENABLE = ON STRING = KPRINT<13>	

Table 4-2. Laser LT Parameter Setting Descriptions

### 4.3 Reporting Commands

Reporting commands send specific information to the serial port.



**Note** All Reporting commands are read only and will not function for baud rates lower than 4800.

Parameter	Function
DUMPALL	Lists all configuration parameters.
DUMP.KEYPAD	Lists only the 10 keypad parameters.
DUMP.PORT	Lists only the 4 ports with 4 parameters per port.
DUMP.SY	List the parameters not dumped with the other commands.
BUILD	Lists the date and time that this software version was compiled.
SYSMODE	Returns the current mode in Run or Setup.
VERSION	Returns the software version.
WHOAMI	Returns the version of the Laser LT and the port that you are connected to and its parameters.
COMMOPTS	<b>7 = Empty</b> 1 = RS-232/422 2 = USB/Serial 3 = Reserved 4 = Ethernet WiFi/Serial 5 = Ethernet 6 = Fiber Optic Read only. Returns a numeric identifier for an installed option card

Table 4-3. Laser LT Reporting Commands

## 5.0 Options

---

### 5.1 Visor Installation

An optional visor can be installed on the *Laser LT* display. Figure 5-1 shows the remote display with the optional visor installed.



*Figure 5-1. Laser LT Remote Display w/ Optional Visor Installed*

Mount the visor (PN 115138) on top of the remote display by opening the front cover, sliding the visor over the latch assembly and re-close the latches on the enclosure.

# 6.0 Appendix

## 6.1 Error Messages

The *Laser LT* remote display provides error messages. When an error occurs, the message is shown on the display.

Message	Cause/Remedy
NO COM	No communication with the ports and the device that it's communicating with
ABORT	The <i>Laser LT</i> failed to Auto Learn. See Troubleshooting Section 6.2.

Table 6-1. Error Messages

## 6.2 Troubleshooting

Prior to troubleshooting, it is important to default the *Laser LT* to the default settings. See Section 2.3.5 on page 10 for instructions on defaulting the unit.



**Note** Set the host port to match wiring.

Table 6-2 lists general troubleshooting tips for various error conditions.

Symptom		Cause/Remedy
Power	No Display on Power up	Not plugged in - Ensure that power is getting to the Laser LT. On power up, the display should show a display check or weight data.
		Blown fuse - Check fuse on power supply board and replace if necessary.
		No power to CPU board - Using a voltmeter, check power on J5 of the CPU board (see Figure 10). Power output should be approximately +7.5V
		No heartbeat - Verify that the heartbeat LED is blinking. See Figure 2-8 11 for heartbeat location. <ul style="list-style-type: none"> <li>• Blinking annunciator - normal</li> <li>• Solid light on annunciator - hardware error</li> <li>• No light on annunciator - check power source</li> </ul>
		Check that the NO DATA parameter is set to NO COM (see Table 3-2) for default settings as no communication can cause a blank display
Communications	No Communication	Check for port LED blinking. Red is receive, and Green is transmit.
		Verify wiring - see Section 2.3.4 on page 9 for wiring information
		Verify ports - Verify that the port is set for the Host and the device that it is communicating with and is connected to the Host port.
		Verify streaming - the indicator or other host device should be set to on or off.
Daisy Chain	No Echoing	Check parameters - verify that parameter Daisy is set to the correct port (see Section 3.3 on page 16)
		Verify wiring - Section 2.3.4 on page 9.

Table 6-2. Basic Troubleshooting

## 6.3 Updating the Laser LT

If software needs to be updated for the *Laser LT*, the updater utility is available through Revolution.

A flash update cable (PN 115968) must be used to connect the CPU board of the *Laser LT* to a port on your PC. Plug the flash update cable connector into the header TJ3 on the *Laser LT* CPU board and the other end into the PC.

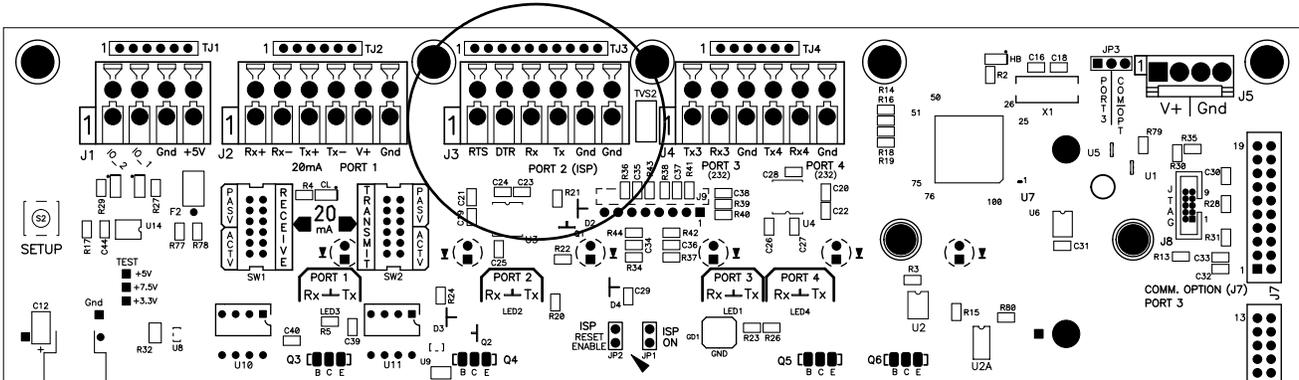


Figure 6-1. Flash Update Cable Plugin Location on Laser LT

Follow on screen instructions to update the *Laser LT*.

To access the updater, select the Update icon from the main Revolution menu and follow screen prompts.

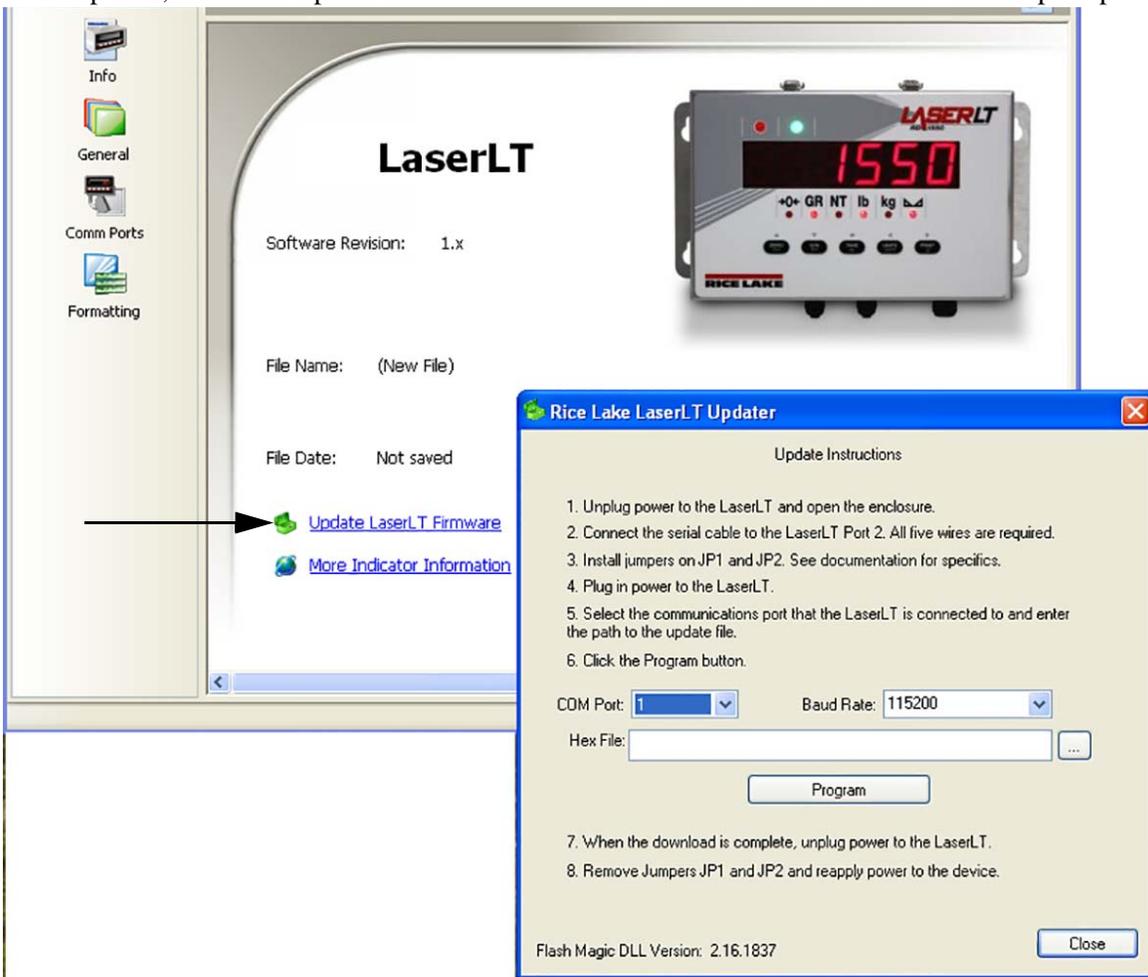


Figure 6-2. Updater Screen for the Laser LT

## 6.4 Front Panel Display Characters

Figure 6-3 shows the 7-segment LED character set used to display alphanumeric characters on the *Laser LT* front panel.

	-	9	E	Q
	.	:	F	R
	/	;	G	S
	0	<	H	T
%	1	=	I	U
&	2	>	J	V
'	3	?	K	W
(	4	@	L	X
)	5	A	M	Y
*	6	B	N	Z
+	7	C	O	[
,	8	D	P	\

Figure 6-3. Laser LT Display Characters

## 6.5 Replacement Parts

### 6.5.1 UL Approved Replacement Parts

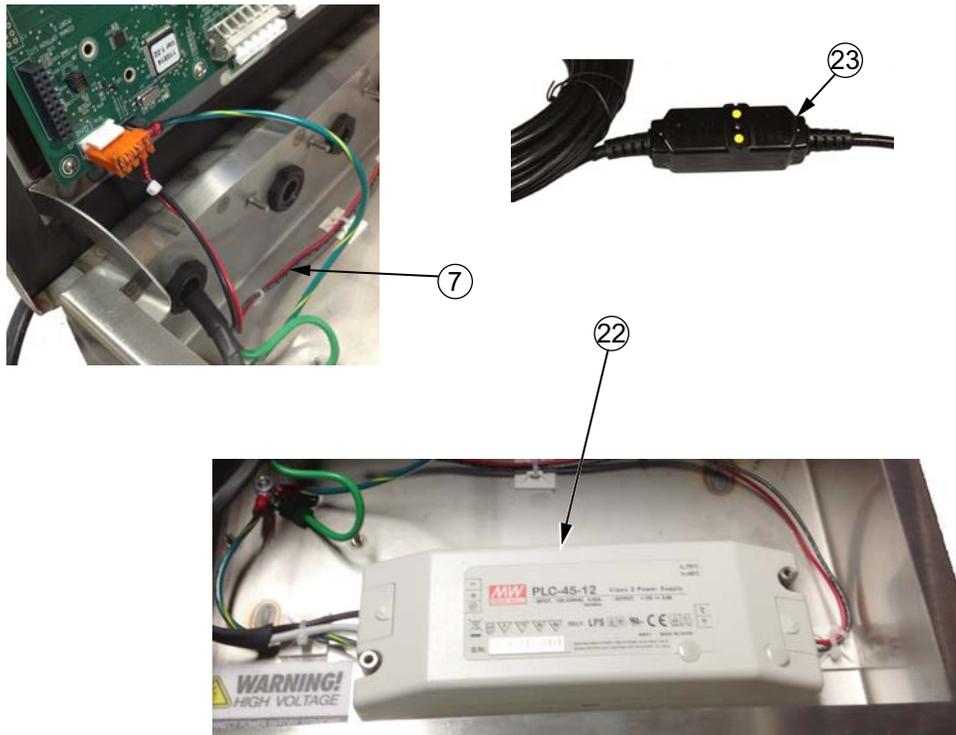
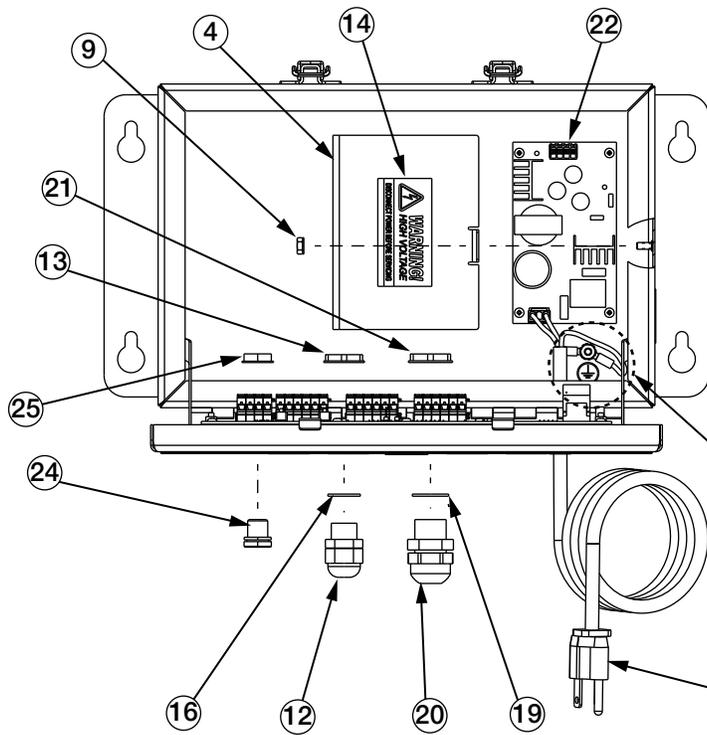


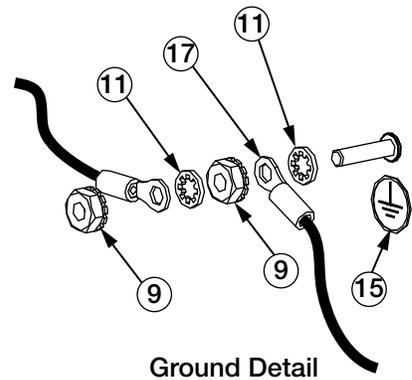
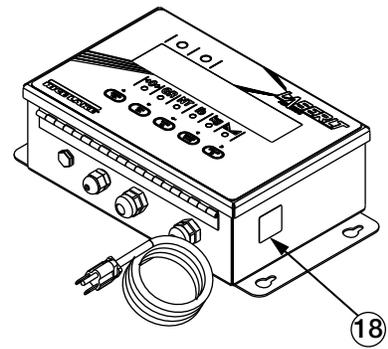
Figure 6-4. UL Approved Power Supply Parts Illustration

Item No.	Part No.	Description
7	153811	Cable Assembly Power Supply to CPU
22	153600	Power Supply 12V 45Watt PLC-45-12
23	153808	AC Input Power Cord Assembly, GFCI

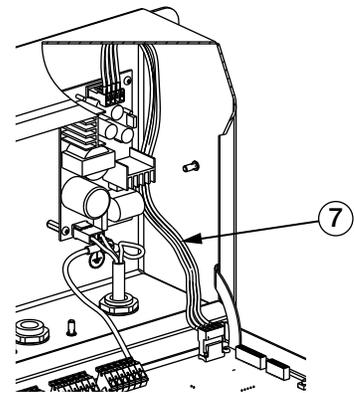
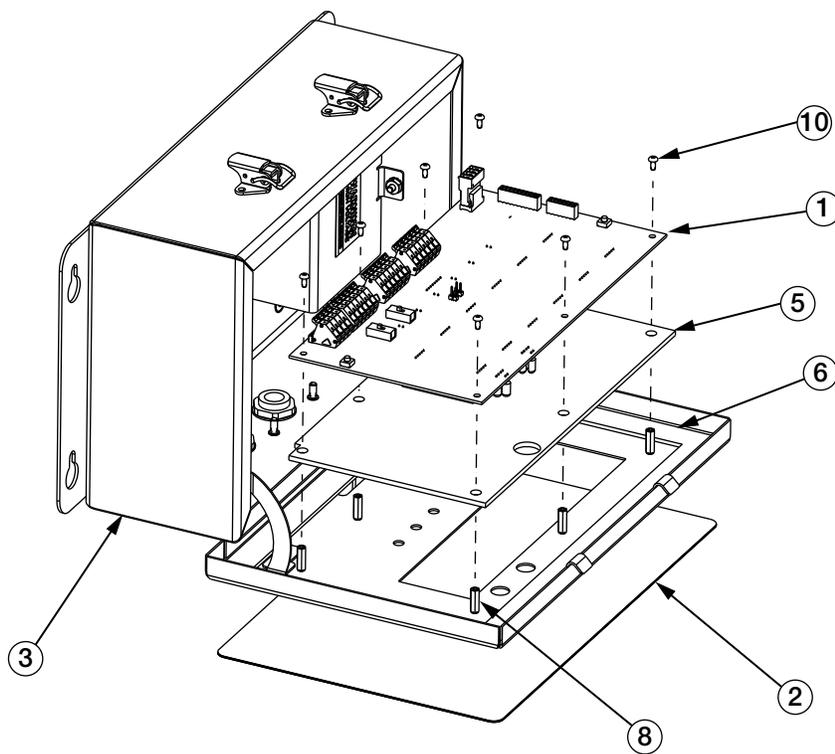
Table 6-3. UL Approved Power Supply Parts List



See Ground Detail



Ground Detail



## 6.6 Replacement Parts

Table 6-1 lists selected replacement parts for the *Laser LT* remote display.

Item No.	Part No.	Description	Qty
1	110384	Board Assembly, LED remote CPU	1
2	111848	Overlay, Laser LT	1
3	113535	Enclosure, Laser LT RD1550	1
4	113542	Power Supply Cover, Laser LT 1550	1
5	113769	Lens	1
6	114019	Enclosure Gasket	1
7	114433	Cable Assembly	1
	153811	UL Approved Item, see Figure 6-4	1
8	114549	Standoff 4-40NC x 9/16L x 3/16 Hex	11
9	14626	Kep Nut #8	4
10	14825	Machine Screw, 4-40NC x 1/4 pan head phillips	11
11	15134	Lock Washer, #8 internal tooth	3
12	15626	Gable Grip	1
13	15627	Locknut, PG9	1
14	16861	Label, Warning High Voltage	1
15	16892	Label, Earth Ground	1
16	30375	Nylon Sealing Ring	1
17	40672	Wire Assembly, Ground 9" w/ Eye Connector	1
18	53308	Label	1
19	68599	Sealing Ring	1
20	68600	Cord Grip	1
21	68601	Locknut	1
22	76556	AC Power Supply, 25 watt	1
	97475	DC Power Supply, 25 watt	1
	153600	UL Approved Item, see Figure 6-4	1
23	85202	Power Cord Assembly	1
	153808	UL Approved Item, see Figure 6-4	1
24	88733	Breather Vent	1
25	88734	Breather Vent Nut	1
	85791	Fuse, 2.5 amp, 5x20 mm, 250V	1
	115968	Flash update cable, 10 position DB9	1

Table 6-4. Selected Replacement Parts

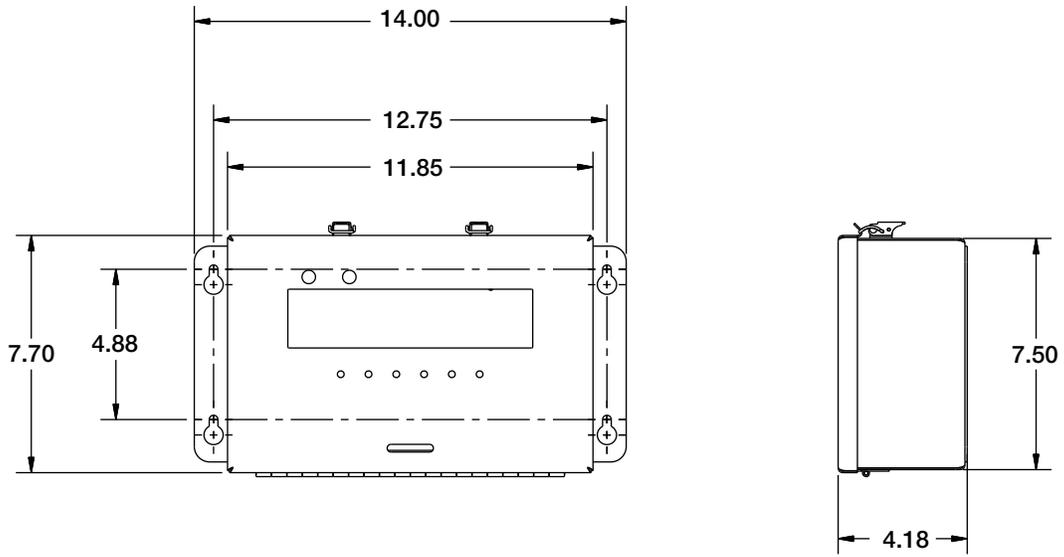
## 6.7 Parts Kit Contents (PN 115525)

Table 6-5 lists the parts kit contents for the *Laser LT* remote display.

Part No.	Description
14626	Kep nuts, 3-32NC (3)
15133	Lock washers, No. 8, Type A (3)
15631	Cable ties, 3 inch nylon (2)
19538	Post only, slotted black 1/4 x 1 (1)
53075	Clamp, ground cable shield (3)

Table 6-5. Parts Kit Contents

## 6.8 Laser LT Enclosure Dimensions



## 6.9 Specifications

### Display

Six digit LED, 7-segment character, 1.5 in height  
Six annunciators for GR, NT, LB, KG, Motion and COZ  
One Red, one Green light (serial or I/O controlled)  
Overlay with contrast filtered lens  
Optional visor for direct sunlight

### Input Interface

Port 1                    20mA bidirectional  
Port 2                    RS-232 bidirectional  
Port 3                    RS-232 or pluggable option for fiber optic, USB, Ethernet TCP/IP, RS-422  
Port 4                    RS-232 or pluggable option for wireless LAN

### Output Interface

Echo                    Daisy chain output mode - port selectable  
Keypad output mode   Configurable strings and port selectable

### Input Data Format

Learn mode or software selectable for data types  
Baud Rate:    1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200  
Characters:    7 Even, 7 Odd, 8 None  
Stop bits:      1 or 2 selectable

### Digital I/O

Two inputs for control of Red and Green annunciators and front panel keys

### Power Supply

AC Power:    Line voltages 115 or 230 VAC  
                  Frequency 50 or 60 Hz  
                  Power Consumption 1.5A @ 115 VAC (8W)  
                  0.75A @ 230 VAC (8W)  
                  Fusing 2.5A 5x20mm fuse

DC Power:    Line voltages 9-36 VDC DC Input  
                  Power Consumption 1.5A max  
                  Fusing internal short circuit protection

### Rating/Material

NEMA 4X, IP69K, 304 Stainless Steel

### Weight

10 lbs

### Operating Temperature Range

-20°F to 120°F (-30°C to 50°C)

### Warranty

Two-year limited warranty

### UL Approval for UL Models Only

 File Number: E355385  
LISTED

# Laser LT Remote Display 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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