320IS

Intrinsically Safe Digital Weight Indicator
Version 2.1

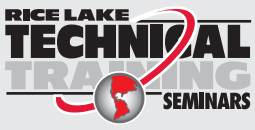
Installation Manual

REVOLUTION® SCALE SOFTWARE

RICE LAKE® WEIGHING SYSTEMS
To be the best by every measure®

74612 Rev A

Contents



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

Version 2.1, Rev. A April 2014

About This Manual

This manual is intended for use by service technicians responsible for installing and servicing *320IS* digital weight indicators. This manual applies to indicators using Version 2.1 of the *320IS* software.

Configuration and calibration of the indicator can be accomplished using the indicator front panel keys, the EDP command set, or the *320IS* configuration utility. See Section 3.1 on page 12 for information about configuration methods.

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

Improper specification, installation, or service of this equipment could result in personal injury or property damage.

The 320IS is a Factory Mutual-Entity approved component. This approval is valid only if the installation conforms to the guidelines described in this manual and FM-approved control drawing (PN 72717). If modifications are made to the installation procedure, or the instrumentation is changed in any way, including field repair or modification, Factory Mutual approval is void, and all warranties, expressed or implied are void. The customer becomes fully responsible and liable for such modifications.

WARNING *The non-metallic parts are considered to constitute an electrostatic discharge hazard. Clean only with a damp cloth.*

Manuals can be viewed or downloaded from the Rice Lake Weighing Systems website at www.ricelake.com.

1.0 Introduction

The *320IS* is a single-channel digital weight indicator designed and approved to operate as an intrinsically safe system in a wide variety of scale and weighing applications. The indicator is housed in a NEMA 4X/IP66-rated stainless steel sealed case. The standard unit is equipped with a tilt stand base for tabletop or wall mounting applications. The indicator front panel consists of a large (0.8 in, 20 mm, 16-segment), six-digit LED display, 6-button keypad and eight LED annunciators. Features include:

- Drives up to four 350Ω or eight 700Ω load cells
- Supports four-wire and six-wire load cell connections (six-wire remote sense recommended)
- Full-duplex fiber optic interface to attach an external I/O board located in the safe area

The *320IS* is NTEP-certified and pending Measurement Canada approval for Classes I, II and III at 10,000 divisions. See Section 8.9 on page 55 for detailed specifications.

Available with optional I/O Module (PN 72721):

- Four configurable digital inputs
- Four digitally-controlled single pole single throw-normally open non-latching relay contact outputs
- Electronic data processing (EDP) port communications at up to 38400 bps for full duplex RS-232/RS-422/RS-485 and Current loop
- Printer port communications at up to 38400 bps for full duplex RS-232/RS-422/RS-485 and Current loop
- Two 16-bit analog output channels provide ±10V or ±5V, 0-5V or 0-10V, and 4-20 mA tracking of gross or net weight values

1.1 Factory Mutual Approval

The *320IS* is Factory Mutual (FM) Entity approved for:

- Classes I, II, and III
- Divisions 1 and 2
- Groups A, B, C, D, E, F and G
- T-rating T4

Only devices that have FM Entity Approval with proper entity parameters may be used unless specifically listed in this manual or control drawing PN 72717 as part of the Rice Lake Factory Mutual systems approval. Failure to comply with this voids the FM approval.

The classification of hazardous materials are different in the US and European standards. Because of this, the safety class of the *320IS* is declared in the following regulations:

- US standards: Class I, II, III, DIV1, Groups A-G.

WARNING *Substitution of components may impair intrinsic safety.*

To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

1.2 Operating Modes

The *320IS* has three modes of operation.

Normal (Primary) Mode

Normal mode is the “default” mode of the indicator. The indicator displays gross or net weights as indicated by LED annunciators (see Figure 1-1) to indicate scale status and the type of weight value displayed.

Setup Mode

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

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

Test Mode

Test mode provides a number of diagnostic functions for the *320IS* indicator. Like setup mode, test mode is entered using the setup switch (Section 7.8 on page 46).

1.3 Front Panel Keypad

Figure 1-1 shows the *320IS* LED annunciators, keypad, and normal mode key functions. Table 1-1 on page 3 details the function of each key in different display modes.

The symbols shown above the keys (representing up, down, enter, left, right) describe the key functions assigned in setup mode. In setup mode, the keys are used to navigate through menus, select digits within numeric values, and increment/decrement values. See Section 3.1.3 on page 13 for information about using the front panel keys in setup mode.

Figure 1-1. 320IS Front Panel

Display Mode				
	Normal	**Setup**	**Test**	**Count**
Key Functions				
POWER	Turn the indicator on or off	Turn the indicator on or off	Turn the indicator on or off	Turn the indicator on or off
ZERO	Return gross weight display to zero	• Move up (vertically) • Increment value • Exit (top level only)	Exit	N/A
GROSS NET B/N	Toggle between gross, net and piece count mode	• Move down (vertically) • Decrement value	N/A	Toggle between gross, net and piece count mode
TARE	Press to enter an auto tare or keyed tare	Enter	Enter	Perform a piece count
UNITS Units	Toggle between primary and secondary units	• Move left (horizontally) • Previous	Move left (horizontally)	Select a sample size
PRIN	Print using GFMT	Move right (horizontally)	Print	Print using CFMT

Table 1-1. Indicator Display Key Functions

1.4 LED Annunciators

The *320IS* display uses a set of eight LED annunciators to provide additional information about the value being displayed (see Figure 1-1 on page 2):

- The *Gross* and *Net* annunciators are lit to show whether the displayed weight is a gross or net weight.
- Center of zero (→0←): Gross weight is ±0.25 graduations of zero. This annunciator lights when the scale is zeroed.
- Standstill (◺◿): Scale is at standstill or within the specified motion band. Some operations, including tare functions and printing, can only be done when the standstill symbol is shown.
- The Tare Acquired (TARE)lights to show that a tare value has been entered.
- The *Count* annunciator is lit to show that the indicator is in piece count mode.
- *lb and kg* annunciators indicate the units associated with the displayed value: lb=pounds, kg=kilograms. Two units of measurement can be chosen to toggle between.
- The displayed units can also be set to ounces (oz), short tons (tn), metric tons (t), grams (g), or they can be disabled. A user-defined unit can also be set as secondary unit by declaring a conversion factor in the setup menu. The *lb* and *kg* LED's function as primary and secondary units annunciators for some combinations of primary and secondary units. If neither primary nor secondary units are lb, kg, oz, or g, the *lb* annunciator is lit for primary units, *kg* for secondary units.

Table 1-2 shows which annunciators are used for all combinations of configured primary and secondary units. For example:

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

See Section 3.2.2 on page 17 for more information about configuring primary and secondary display units.

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

Table 1-2. Unit Annunciators, Primary/Secondary LEDs Used For All Configurations

1.5 Indicator Operations

Basic *320IS* operations are summarized below.

1.5.1 Toggle Gross/Net Mode

Press the **GROSS/NET** key to switch the display mode from gross to net, or from net to gross. If a tare value has been entered or acquired, the net value is the gross weight minus the tare. The *Tare*(TARE) annunciator shows when a tare value is currently stored in memory. Gross mode is shown by the *Gross* annunciator; net mode is shown by the *Net* annunciator.

1.5.2 Toggle Units

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

1.5.3 Zero Scale

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

1.5.4 Acquire Tare

1. Place container on scale and wait for the standstill annunciator (◺◿).
2. Press the **TARE** key to acquire the tare weight of the container. The indicator switches to net mode.
3. To display the current tare value, press the **DISPLAY TARE** key.

1.5.5 Remove Stored Tare Value

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

1.5.6 Acquire Parts Sample

1. Place empty parts container on scale. Wait for the standstill annunciator (◺◿), then press **TARE** to acquire the tare weight of the container.
2. Press **MODE (GROSS/NET)** key to enter piece count mode.

Note ***Press the*** **CLEAR** ***key to exit.***

3. Press the **SAMPLE (UNITS)** key to enter sample acquisition mode.

   The indicator display shows the message *Addnnn*, where *nnn* is the sample quantity to be placed on the scale. You can do one of the following:

   - Add the number of parts shown.
   - Choose a different sample size. Press the **SAMPLE** key to scroll through the selectable sample quantities (5, 10, 20, 50, 100) or use the numeric keypad to specify a custom sample size.
   - Specify a known piece weight. Press the **SAMPLE** key to scroll through the selectable sample quantities until the *PC WGT* prompt is shown. Use the numeric keypad to enter the piece weight.

4. Once the sample quantity is on the scale, press **ENTER** to calibrate the indicator for counting the new parts. If a sample size was specified, the indicator display shows the message *–CNT–* as it acquires the sample weight, then switches to count display mode and shows the part quantity. If a known piece weight was specified, the display switches to count display mode immediately.

1.5.7 Display Part Weight

To view gross and net weight parts, press **MODE** to switch from count display mode to normal weighing mode. To view the current piece weight while in count mode, press **DISPLAY TARE** key.

1.5.8 Print Ticket

Note *Requires optional I/O Module (PN 72721).*

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

2.0 Installation

This section describes procedures for connecting load cells, power supply, fiber optics, and ferrite bead installation in the *320IS* indicator.

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

It is mandatory to return the 320IS to Rice Lake Weighing Systems for circuit board level service. Component level repair, excluding board-swapping, is not permitted on Factory Mutual Approved equipment by anyone other than the manufacturer.

2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the *320IS* to ensure all components are included and undamaged. The shipping carton should contain the indicator with attached tilt stand, this manual, and a parts kit. If any parts are missing or were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

The parts kit contains the items listed below:

- Capacity, identification, and annunciator labels. Annunciator labels (PN 53374) provide replacement overlay decals for labeling primary and secondary units LEDs.
- Six-position screw terminal (PN 70599) for connector CN3 (see Figure 2-9 on page 11).
- Two 8-32NC x 7/16 fillister head screws (PN 30623). These screws occupy the holes below and on either side of the setup screw on the indicator backplate (see Figure 2-8 on page 11).
- Four 8-32NC x 3/8 machine screws (PN 14862) for the indicator backplate.
- Six neoprene washers (PN 45042) for backplate screws included in the parts kit.
- Four rubber bumpers (“feet”) for the tilt stand (PN 42149).
- Five cable ties (PN 15631).
- One 8/32NC hex kep nut (PN 14626) and two internal tooth lock washers (PN 15134).
- One, three-foot ground wire (PN 68444) for mounting to backplate for additional grounding (see Figure 2-8 on page 11).

2.2 Enclosure Disassembly

The indicator enclosure must be opened to connect cables for load cells, communications, and power.

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

Ensure power to the indicator is disconnected, then place the indicator face-down on an antistatic work mat. Remove the screws that hold the backplate to the enclosure body, then lift the backplate away from the enclosure and set it aside.

2.3 Hazardous Area Installation of the 320IS

The following information is provided to help the installer with the correct installation of the *320IS* system. See Figure 2-1 on page 7 for a diagram of a typical intrinsically safe system.

2.3.1 Power Supply to Indicator

The indicator should be powered by an FM-approved Rice Lake power supply or alternatively from an external battery pack. The power requirements of the *320IS* are as follows:

- Minimum input voltage: 5.8 V
- Maximum input voltage: 7.9 V
- Peak current consumption: 190 mA
- Average input current (with four load cells): 140 mA

The DC power cable should be attached to connector CN1 (see Table 2-1). Care must be taken to wire CN1 with the correct DC polarity. See Section 2.4 on page 8 for information on cabling through metal cord grips.

CN1 Pin	Function	Wire Color
1	+ Voltage (5.8 – 7.9 V)	Green
2	Ground (V–, Common)	Brown

Table 2-1. DC Power Supply Connections

A separate conduit system is recommended for installation. The type suggested for this application is 3/4" rigid steel conduit with pull boxes located at required intervals. The conduit provides additional noise protection for the low-level signals, while automatically complying with the requirements for two-inch separation between intrinsically safe circuits and other electrical cables. Conduit seals are necessary where a gas tight seal is required between hazardous area and safe area.

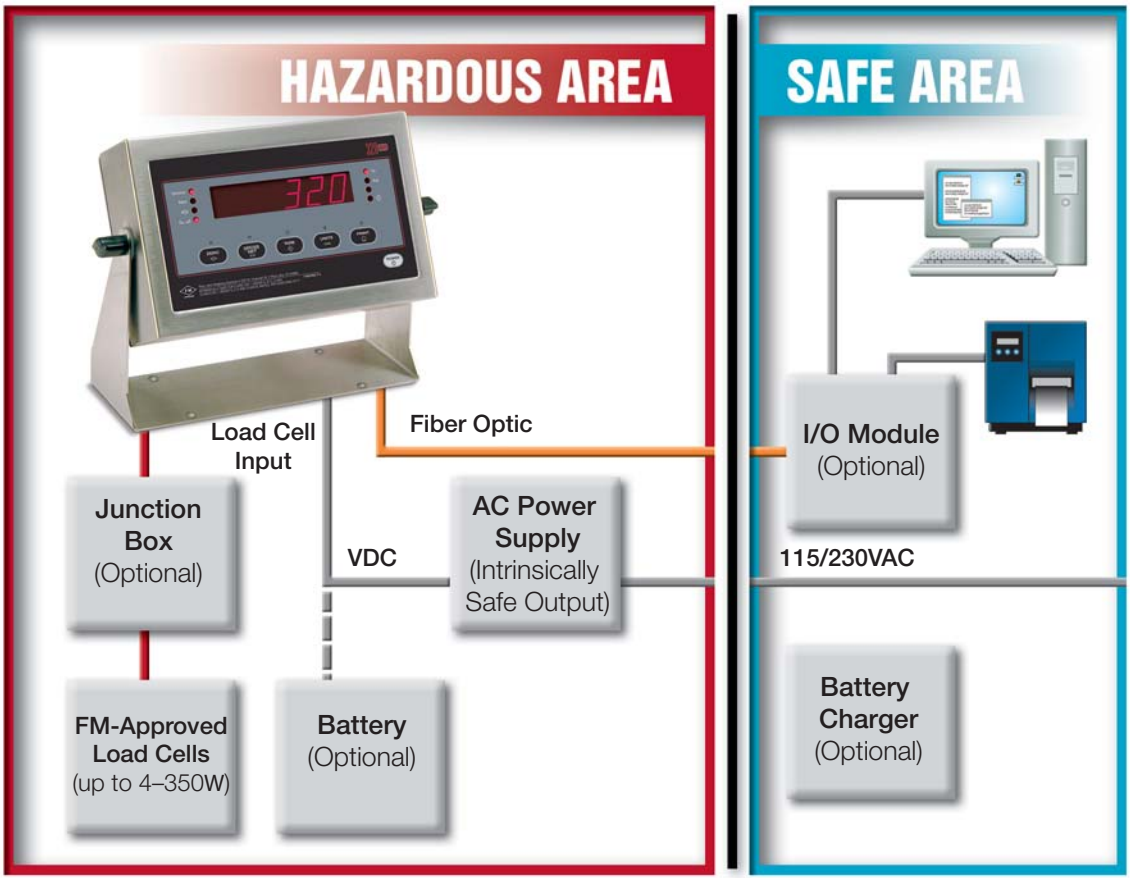


Figure 2-1. Intrinsically Safe System Diagram

2.3.2 AC Power Wiring

Standard units are powered by an entity-approved power supply. We recommend the 100–240 VAC into RLWS IS-EPS-100-240 Intrinsically safe DC output power supply (PN 72713).

See the IS-EPS-100-240 Power Supply Instruction Sheet (PN 79820) for information on wiring and power specifications.

2.3.3 Battery Option

Note ***Initial charge for battery lasts approximately eight hours.***

The optional battery package provides an intrinsically safe battery pack that can replace the power supply. The battery is approved for use in hazardous environments and is ideal for limited use operations such as bench scales and platform scales. A low battery error message will display to indicate that the battery needs to be recharged. The recommended initial battery charge time is eight hours.

Note ***See Battery Charging Instruction Sheet (PN 96567) for instructions on charging the battery.***

Load Cell Size	Quantity of cells	Operating Time
350Ω load cell	1	40 - 50 hours
	4	35 - 40 hours
700Ω load cell	1	45 - 55 hours
	4	40 - 50 hours

Table 2-2. Estimated Battery Operating Times

Note ***While connected to the DC battery pack power supply and the indicator is off, the 320IS still draws a small amount of current that will shorten battery run time. To preserve battery life, disconnect the battery when not in use.***

2.4 Cable Connections and Installation

The following sections contain information on cable connections and installation for the *320IS*.

Intrinsically safe cables are specified by control drawing. All cables must have appropriate internal inductance and capacitance. Cable lengths are based on group classifications.

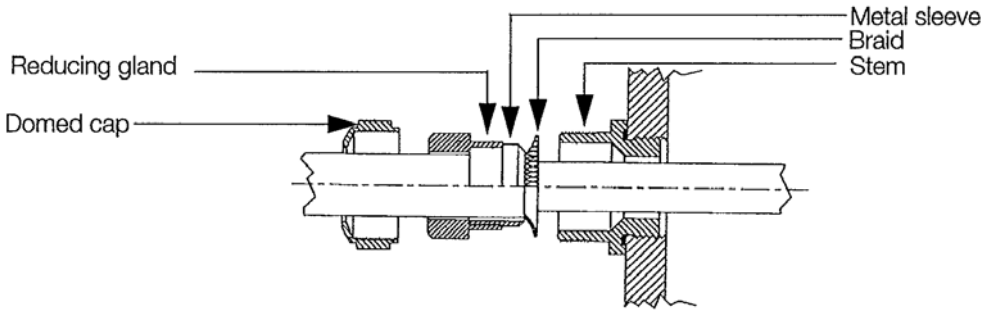


Figure 2-2. Metal Cord Grip

2.4.1 Braided Power Cable Connection

Use the following procedure for connecting braided power cable:

1. Remove domed cap, reducing gland and metal sleeve from the center cord grip of the 320IS, placing them on a work surface.
2. Remove the domed cap and reducing gland from the 320IS parts kit.

   Note that the domed cap and reducing gland from the parts kit have larger holes. DO NOT confuse these parts with the parts removed from the cord grip.
3. Take the metal sleeve (from step 1) and insert it into the reducing gland taken from the parts kit.
4. Place the domed cap and reducing gland that were removed from the 320IS cord grip, into the parts kit (to be used as spares).
5. Thread the DC cable through the domed cap and reducing gland/metal sleeve combination.
6. Lower the reducing gland assembly so that the end of the metal sleeve is at the edge of the insulation and fold the braid over the metal sleeve. See Figure 2-2. Trim the braid if necessary.
7. Thread the cable through the cord grip stem. Note that the chassis ground is made through the braid compressed between the metal sleeve and the cord grip stem.
8. Lower the domed cap onto the cord grip stem and tighten until a small swelling of the rubber of the reducing gland appears between the domed cap and cable (see Figure 2-3).

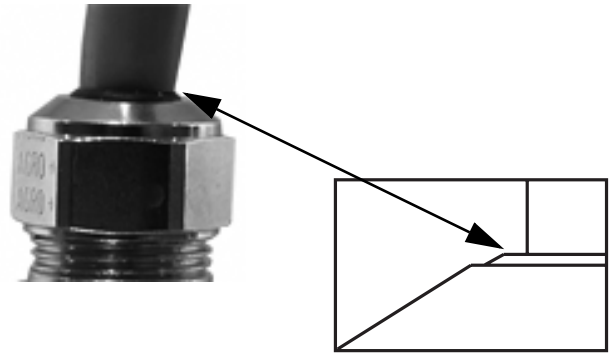


Figure 2-3. Proper Cord Grip Compression

9. Connect the green and brown wires to the connector for CN1, observing polarities (see Table 2-3 below).

CN Pin 1	Function	Color
1	+ Voltage (5.8 - 7.9)	Green
2	Ground (V-, Common)	Brown

Table 2-3. DC Power Supply Connections — CN1

10. Plug the cable onto CN1.

2.4.2 Braided Load Cell Cable Connection

Use the following procedure for connecting braided load cell cable:

If Using 6 Wire Load Cell Cable

1. Carefully remove 8" of outside insulation and 7 1/2" of braid from the load cell cable.
2. Remove the metal domed cap and reducing gland from cord grip, placing them on a work surface.
3. Remove the reducing gland and metal domed cap from the 320IS parts kit. Note that these have a larger hole than those removed from the cord grip — DO NOT confuse them.

4. Take the metal sleeve (shown in Figure 2-2), and insert it into the reducing gland taken from the parts kit.
5. Place the domed cap and reducing gland, that were removed from the 320IS cord grip, into parts kit (to be used as spares).
6. Thread the load cell cable through the domed cap, then through the reducing gland/metal sleeve assembly.
7. Lower the reducing gland assembly so that the end of the metal sleeve is at the edge of the insulation and fold the braid back over the sleeve (see Figure 2-2). Trim if necessary.
8. Thread the load cell cable through the cord grip stem. Note that ground is achieved when the braid is compressed between the metal sleeve and the cord grip stem.
9. Lower the domed cap onto the cord grip stem and tighten until a small swelling of the rubber of the reducing gland appears between the dome cap and the cable. See Figure 2-3 on page 8.
10. Thread the load cell cable through the ferrite core, from the parts kit, twice. Leave the ferrite core as close to the backplate as possible. See Figure 2-4.

If Using 4 Wire Load Cell Cable

1. Carefully remove 8" of outside insulation and 7 1/2" of braid from the load cell cable.
2. Remove the metal domed cap and reducing gland from cord grip, placing them on a work surface.
3. Thread the load cell cable through the domed cap, then through the reducing gland/metal sleeve assembly.
4. Lower the reducing gland assembly so that the end of the metal sleeve is at the edge of the insulation and fold the braid back over the sleeve (see Figure 2-2). Trim if necessary.
5. Thread the load cell cable through the cord grip stem. Note that ground is achieved when the braid is compressed between the metal sleeve and the cord grip stem.
6. Lower the domed cap onto the cord grip stem and tighten until a small swelling of the rubber of the reducing gland appears between the domed cap and the cable (see Figure 2-3 on page 8).
7. Thread the load cell cable through the ferrite core, from the parts kit, twice. Leave the ferrite core as close to the backplate as possible (see Figure 2-4).

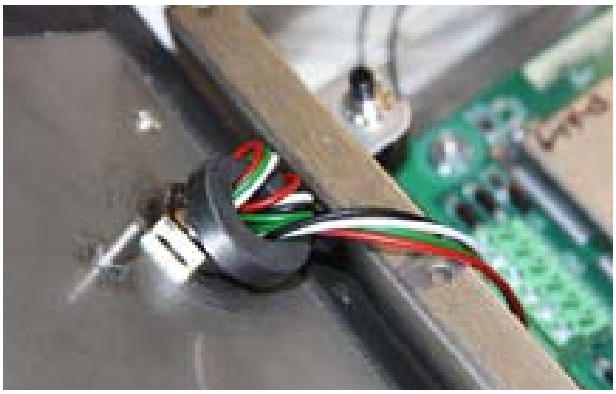


Figure 2-4. Ferrite Core Wire Wrap

2.4.3 Foil Load Cell Cable Connection

Use the following procedure for connecting foil load cell cable:

1. Carefully remove 8" of insulation and 7 1/2" of foil from cable.
2. Remove domed cap and reducing gland from cord grip and place them on the cable (see Figure 2-2).
3. Lower reducing gland to edge of insulation and wrap foil over metal sleeve of reducing gland leaving the silver side out.
4. Thread cable through cord grip stem. Note that ground is achieved when the braid is compressed between the metal sleeve and the cord grip stem.
5. Lower the domed cap onto cord grip stem.
6. Tighten until a small swelling of the rubber between the domed cap and the cable builds (see Figure 2-3 on page 8).
7. Wrap wires through ferrite core two times leaving ferrite as close to the backplate as possible (see Figure 2-4).
8. Wire cable to connector CN3.

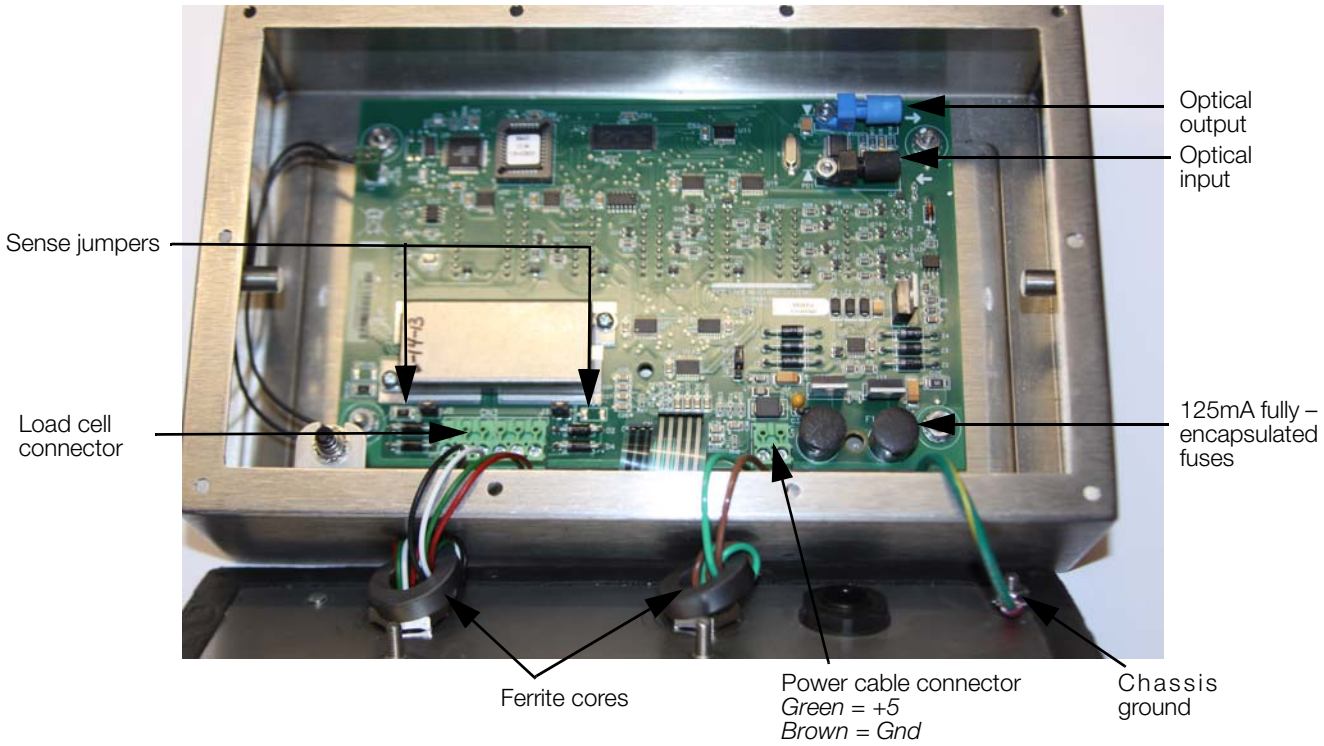


Figure 2-5. Cable Connections

2.4.4 Load Cells

To attach cable from a load cell or junction box, use six-position connector in parts kit. See Section 2.4 on page 8 for information on cabling through metal cord grips.

Wire the load cell cable from the load cell or junction box to connector CN3 as shown in Figure 2-5. If using 6-wire load cell cable (with sense wires), remove jumpers J1 and J2 before installing connector CN3. For four-wire installation, leave jumpers J1 and J2 on.

When connections are complete, reinstall connector CN3 on the board and use two cable ties to secure the load cell cable to the inside of the enclosure.

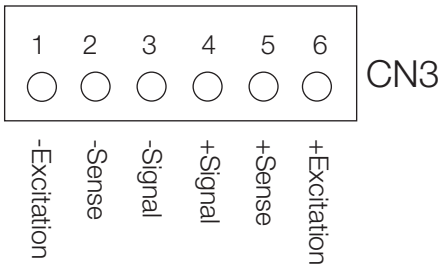


Figure 2-6. CN3 Load Cell Connections

CN3 Pin	Function
1	-Excitation
2	-Sense
3	-Signal
4	+Signal
5	+Sense
6	+Excitation
• For six-wire connections, remove jumpers J1 and J2. • For four-wire connections, leave jumpers J1 and J2 on.	

Table 2-4. CN3 Pin Assignments

2.5 Fiber Optics Installation

The *320IS* is equipped with a duplex fiber optic port for communicating with an I/O Module located outside the hazardous area. This is the only communications channel of the indicator. The indicator communicates with external devices through the optional I/O Module's physical interfaces (RS–232, RS–422, RS–485, Current Loop) and provides analog and digital I/O functions such as setpoint relays and analog outputs.

The fiber optics port is located on the indicator CPU board (see Figure 2-5).

2.5.1 Assembling Fiber Optics Connectors

Use the following steps for assembling the fiber optic connectors of the *320IS*:

1. Cut off the ends of the fiber optic cable (PN 74000) with a single-edge razor blade or hot knife (PN 85548). Try to obtain a precise 90º angle.
2. Insert the fiber through the locking nut and into the connector until the core tip seats against the internal micro-lens.
3. Screw the connector locking nut down to a snug fit, locking the fiber in place.
4. Secure fiber with 3-inch nylon cable ties in parts kit and 3/4-inch square nylon mounts.

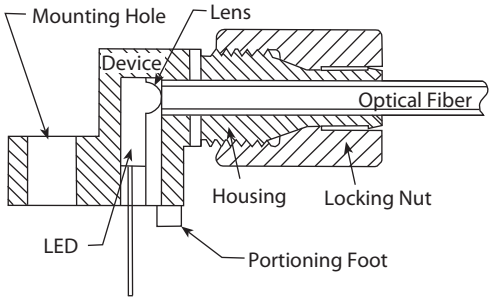


Figure 2-7. Fiber Optics Connector

2.6 Enclosure Reassembly

Once cabling is complete, position the backplate over the enclosure and reinstall the backplate screws. Use the torque pattern shown in Figure 2-8 to prevent distorting the backplate gasket. Torque screws to 15 in-lb (1.7 N-m).

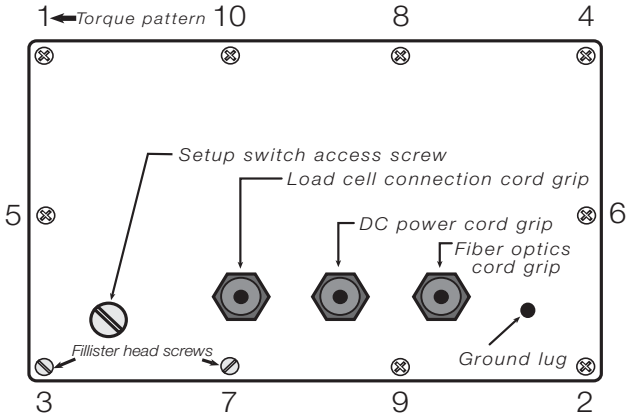


Figure 2-8. 320IS Enclosure Backplate

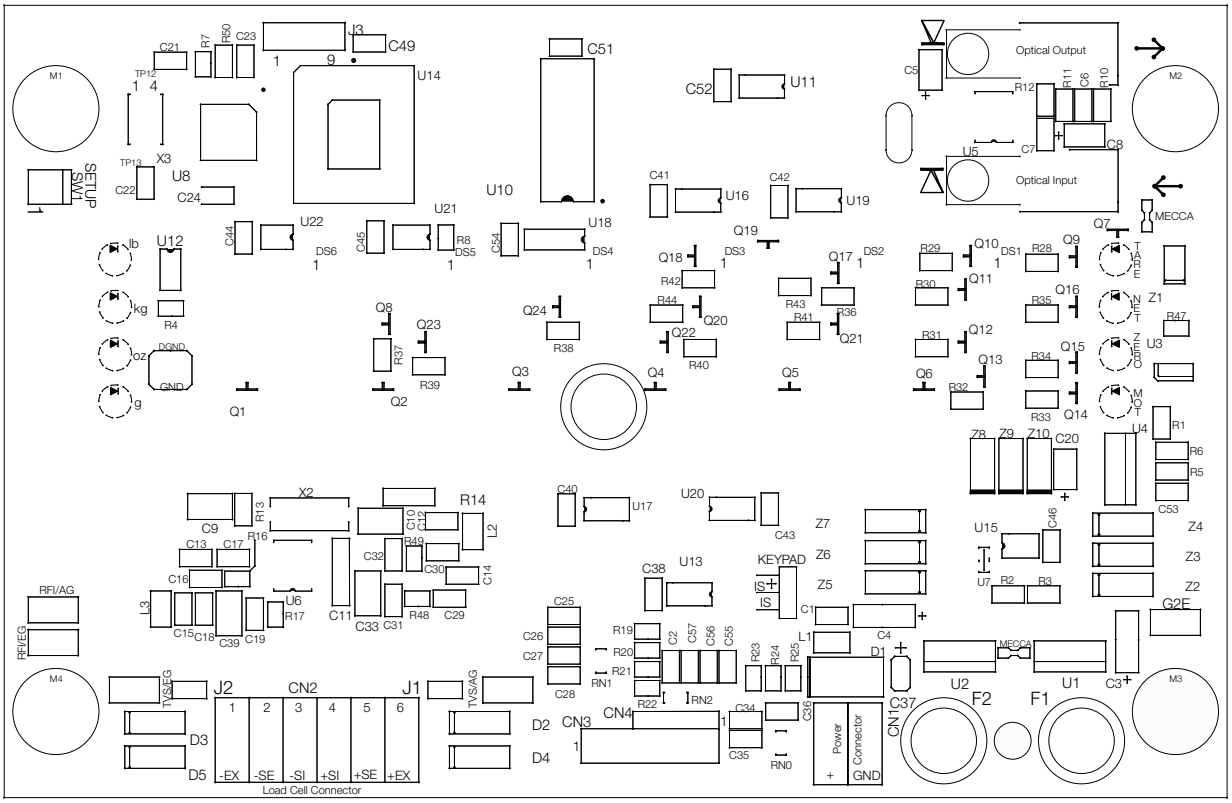


Figure 2-9. 320IS CPU Board

Part Number	Description (Quantity)	Part Number	Description (Quantity)
45043	4 in. W/No. 8 Ground Wire	14626	8–32NC Hex Kep Nut
16492	Earth Ground Label	19538	1.25 x 1 Slotted Black Post
15627	PG–9 Metal Lock Nut	91852	PG–9 Metal Cord Grip
15626	PG–9 Black Cord Grip	82432	125 mA Encapsulated Time–Lag Fuse
50962	PCN–9 Black Nut	72916	Backplate
45042	SS Bonded Sealing Washer, #8	14862	8–32NC x 3/8 Screw
39037	Backplate Gasket	68216	Rice Lake Nameplate
42640	1/4 – 28NF x 1/4 Screw	44676	Bonded Sealing Washer, 1/4"
29635	SS Tilt Stand	68403	1/4 – 20 Two-Prong Black Knob
15144	1/4 x 1 x 1/16 Nylon Washer		
100345	Reconditioned/Exchange 320IS Plus		

Table 2-5. Hardware Replacement List

3.0 Configuration

To configure the *320IS* indicator, the indicator must be placed in setup mode. The setup switch is accessed by removing the large fillister head screw on the enclosure backplate. Setup mode is enabled by inserting a non-metallic screwdriver into the access hole and pressing the pushbutton configuration switch.

Note ***SERIAL, PFORMT, SETPNT, DIGIN, and ALGOUT functions require fiber optics communications with I/O module in order to operate.***

When the indicator is placed in setup mode, the word *CONFIG* is shown on the display. The CONFIG menu is the first of nine main menus used to configure the indicator. Detailed descriptions of these menus are given in Section 3.2 on page 14. When configuration is complete, scroll to the CONFIG menu then press the △ (**ZERO**) key to exit setup mode. Replace the setup switch access screw.

3.1 Configuration Methods

The *320IS* indicator can be configured by using the front panel keys to navigate through a series of configuration menus or by sending commands or configuration data to the EDP port of the optional I/O Module. Configuration using the menus is described in Section 3.2 on page 14.

Configuration using the EDP port can be accomplished using either the EDP command set described in Section 5.0 on page 29 or Version 3.1 or later of the Revolution® configuration software.

3.1.1 Revolution Configuration

The Revolution configuration software is the preferred method for configuring the *320IS* indicator. Revolution runs on a personal computer to set the configuration parameters for the indicator. When Revolution configuration is complete, configuration data can be downloaded to the indicator through the optional I/O Module's EDP port.

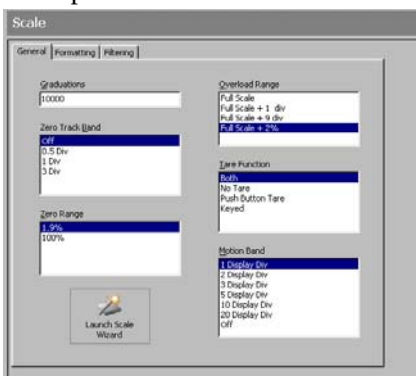


Figure 3-1. Sample Revolution Configuration Display

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

To use Revolution, do the following:

1. Install Revolution on an IBM-compatible personal computer running Windows® 98 or later. Minimum system requirements are 32MB of system RAM (64MB for NT4/2000/XP) and at least 40MB of available hard disk space.
2. With both the I/O Module and indicator powered off, connect the PC serial port to the RS-232 pins on the I/O Module's EDP port (See Section 8.0 on page 48 or the I/O Module Installation Manual, PN 78076 for terminal pin diagrams).
3. Power up the I/O Module and the indicator. Use the setup switch to place the indicator in setup mode.
4. Start the Revolution program.

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

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

3.1.2 EDP Command Configuration

The EDP command set can be used to configure the *320IS* indicator using a personal computer, terminal, or remote keyboard. Like Revolution, EDP command configuration sends commands to the indicator EDP port; commands can be sent using any external device capable of sending ASCII characters over a serial connection.

EDP commands duplicate the functions available using the indicator front panel and provide some functions not otherwise available. EDP commands can be used to simulate pressing front panel keys, to configure the indicator, or to dump lists of parameter settings. See Section 5.0 on page 29 for more information about using the EDP command set.

3.1.3 Front Panel Configuration

The *320IS* indicator can be configured using a series of menus accessed through the indicator front panel when the indicator is in setup mode. Table 3-1 summarizes the functions of each of the main menus.

Menu		Menu Function
CONFIG	Configuration	Configure grads, zero tracking, zero range, motion band, overload, tare function, push button enable, and digital filtering parameters.
FORMAT	Format	Set format of primary and secondary units, display rate.
CALIBR	Calibration	Calibrate indicator. See Section 4.0 on page 27 for calibration procedures.
SERIAL	Serial	Configure EDP and printer serial ports.
PROGRM	Program	Set regulatory mode, unit ID, auto zero, consecutive number values, and battery standby.
PFORMT	Print Format	Set print format used for gross and net tickets. See Section 6.0 on page 35 for more information.
DIGIN	Digital Input	Assign digital input functions. See Section Figure 3-11. on page 23 for more information.
ALGOUT	Analog Output	Configure analog output. See Section 3.2.7 on page 24 for analog output configuration.
VERS	Version	Display installed software version number.

Table 3-1. 320IS Menu Summary

SERIAL, PFORMT, SETPNT, DIG IN, and ALGOUT menu functions require fiber optics communications with I/O module to operate.

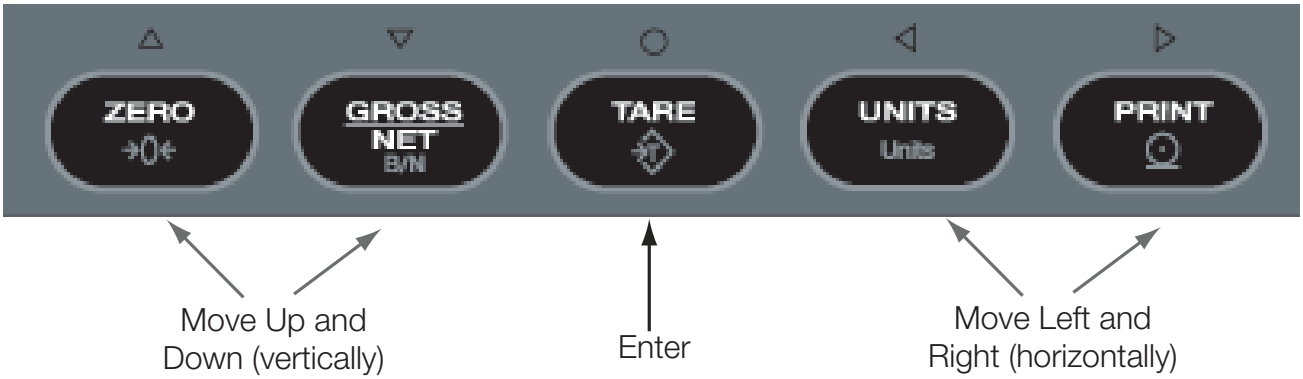


Figure 3-2. Front Panel Key Functions in Setup Mode

Four front panel keys are used as directional keys to navigate through the menus in setup mode (see Figure 3-2). The **UNITS** (◁) and **PRINT** (▷) keys scroll left and right (horizontally) on the same menu level; **ZERO** (△) and **GROSS/NET** (▽) move up and down (vertically) to different menu levels. The **TARE** key (○) serves as an enter key for selecting parameter values within the menus. A label above each of these keys identifies the direction provided by the key when navigating through the setup menus.

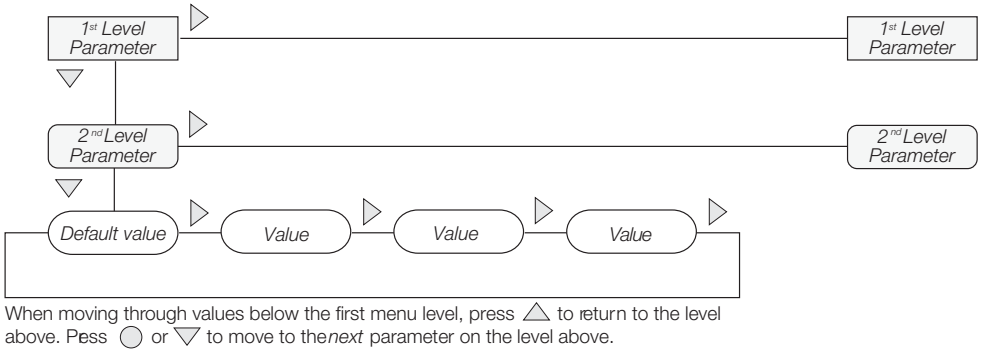


Figure 3-3. Setup Mode Menu Navigation

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

To change a parameter value, scroll left or right to view the values for that parameter. When the desired value appears on the display, press ○ to select the value and move back up one level. To edit numerical values, use the navigation keys to select the digit and to increment or decrement the value or use the numeric keypad (see Figure 3-4).

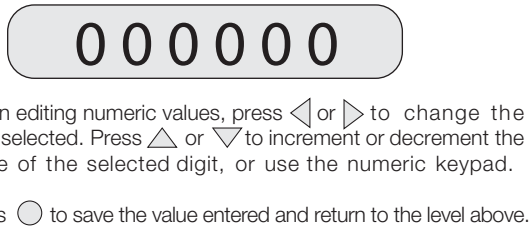


Figure 3-4. Editing Procedure for Numeric Values

3.2 Menu Structures and Parameter Descriptions

The following sections provide graphic representations of the *320IS* menu structures. In the actual menu structure, the settings you choose under each parameter are arranged horizontally. To save page space, menu choices are shown in vertical columns. The factory default setting appears at the top of each column.

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

To exit configuration mode, with the display showing *CONFIG.*, press the ZERO key to scroll up.

3.2.1 Configuration Menu

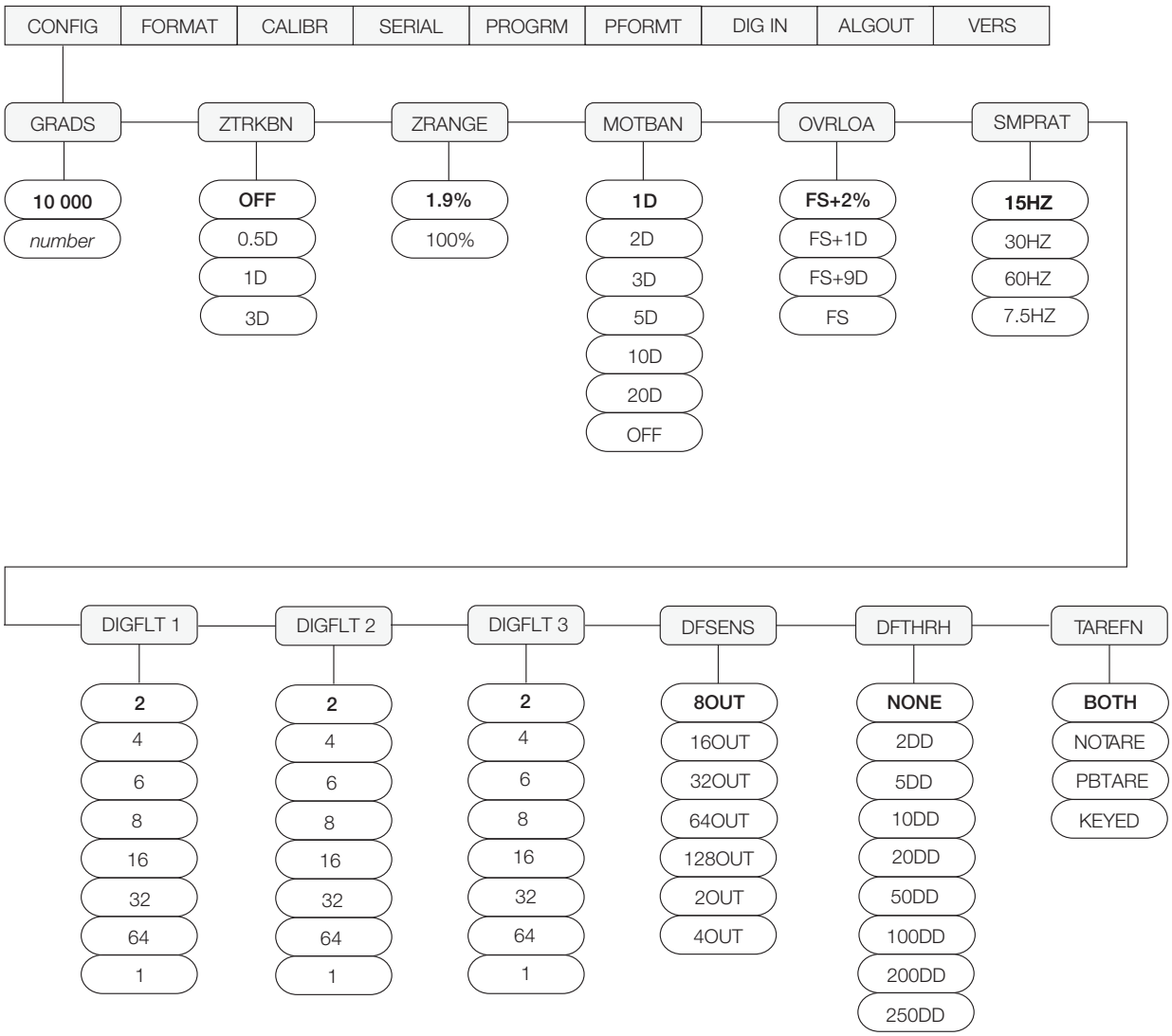


Figure 3-5. Configuration Menu

CONFIG Menu		
Parameter	**Choices**	**Description**
Level 2 submenus		
GRADS	**10000** *number*	Graduations. Specifies the number of full scale graduations. The value entered must be in the range 1–100 000 and should be consistent with legal requirements and environmental limits on system resolution. To calculate GRADS, use the formula, GRADS = *Capacity* / *Display Divisions*. Display divisions for primary and secondary units are specified on the FORMAT menu.
ZTRKBN	**OFF** 0.5D 1D 3D	Zero track band. Automatically zeroes the scale when within the range specified, as long as the input is within the configured zero range (ZRANGE parameter). Selections are ± display divisions. Maximum legal value varies depending on local regulations.

Table 3-2. Configuration Menu Parameters

CONFIG Menu		
Parameter	**Choices**	**Description**
ZRANGE	**1.9%** 100%	Zero range. Selects the range within which the scale can be zeroed. The 1.9% selection is ± 1.9% around the calibrated zero point, for a total range of 3.8%. Indicator must be at standstill to zero the scale. Use 1.9% for legal-for-trade applications.
MOTBAN	**1D** 2D 3D 5D 10D 20D OFF	Motion band. Sets the level, in display divisions, at which scale motion is detected. If motion is not detected for one second or more, the standstill symbol lights. Some operations, including print, tare, and zero, require the scale to be at standstill. Maximum legal value varies depending on local regulations. If OFF is selected, ZTRKBN should also be set to OFF.
OVRLOA	**FS+2%** FS+1D FS+9D FS	Overload. Determines the point at which the display blanks and an out-of-range error message is displayed. Maximum legal value varies depending on local regulations.
SMPRAT	**15HZ** 30HZ 60HZ 7.5HZ	Sample rate. Selects the analog to digital measurement rate of converted samples per second. Lower sample rate values provide greater signal noise immunity. If instability occurs, use lower sample rate to reduce signal noise.
DIGFLT1 DIGFLT2 DIGFLT3	**2** 4 6 8 16 32 64 1	Digital filtering. Selects the digital filtering rate used to reduce the effects of mechanical vibration from the immediate area of the scale. A higher number gives a more accurate display by minimizing the effect of a few noisy readings, but slows down the settling rate of the indicator.
DFSENS	**8OUT** 16OUT 32OUT 64OUT 128OUT 2OUT 4OUT	Digital filter cutout sensitivity. Specifies the number of consecutive readings that must fall outside the filter threshold (DFTHRH parameter) before digital filtering is suspended. If NONE is selected, the filter is always enabled.
DFTHRH	**NONE** 2DD 5DD 10DD 20DD 50DD 100DD 200DD 250DD	Digital filter cutout threshold. Specifies the filter threshold, in display divisions. When a specified number of consecutive scale readings (DFSENS parameter) fall outside of this threshold, digital filtering is suspended. If NONE is selected, the filter is always enabled.
TAREFN	**BOTH** NOTARE PBTARE KEYED	Tare function. Enables or disables push-button and keyed tares. Possible values are: BOTH: Both push-button and keyed tares are enabled NOTARE: No tare allowed (gross mode only) PBTARE: Push-button tares enabled KEYED: Keyed tare enabled

Table 3-2. Configuration Menu Parameters (Continued)

3.2.2 Format Menu

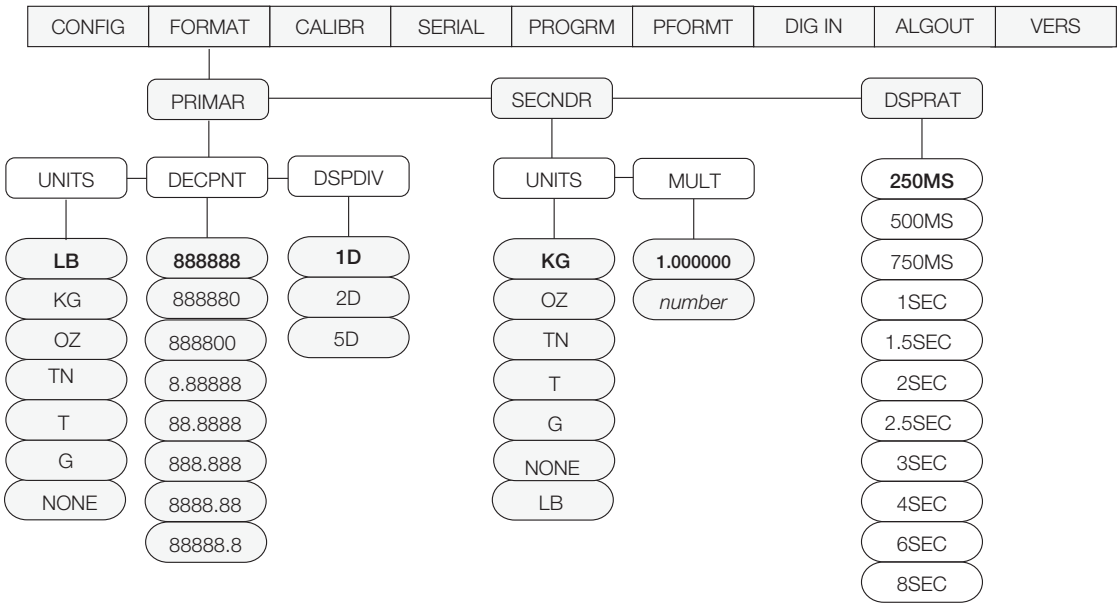


Figure 3-6. Format Menu

FORMAT Menu		
Parameter	**Choices**	**Description**
Level 2 submenus		
PRIMAR	UNITS DECPNT DSPDIV	Specifies the decimal position, display divisions, and units used for the primary units. See Level 3 submenu parameter descriptions.
SECNDR	UNITS MULT	Specifies the decimal position, display divisions, units, and conversion multiplier used for the secondary units. See Level 3 submenu parameter descriptions.
DSPRAT	**250MS** 500MS 750MS 1SEC 1.5SEC 2SEC 2.5SEC 3SEC 4SEC 6SEC 8SEC	Display rate. Sets the update rate for displayed values. Values are in milliseconds (MS) or seconds (SEC).
Level 3 Submenus		
DECPNT	**888888** 888880 888800 8.88888 88.8888 888.888 8888.88 88888.8	Decimal point location. Specifies the location of the decimal point or dummy zeroes in the primary unit display. Value should be consistent with local legal requirements.

Table 3-3. Format Menu Parameters

FORMAT Menu		
Parameter	**Choices**	**Description**
DSPDIV	**1D** 2D 5D	Display divisions. Selects the minimum division size for the primary units displayed weight.
UNITS	**LB** KG OZ TN T G NONE	Specifies primary unit for displayed and printed weight. Values are: LB=pound; KG=kilogram; OZ=ounce; G=gram; TN=short ton; T=metric ton. Selecting NONE, removes the primary units from print.
Secondary Units		
UNITS	**KG** OZ TN T G NONE LB	Specifies secondary units for displayed and printed weight. Values are: LB=pound; KG=kilogram; OZ=ounce; G=gram; TN=short ton; T=metric ton. An arbitrary unit may be used by selecting NONE and specifying a multiplier set under MULT.
MULT	**1.00000** *number*	If a unit other than the presets is to be used, an arbitrary unit may be selected for conversion to a desired unit. The value entered here is applied as a multiplier to the primary unit - or to the calibration unit if the primary unit is set to OFF. If the primary unit is changed after setting this value, the multiplier will also change. Only the first six significant (non-zero) digits of the set value are stored.

Table 3-3. Format Menu Parameters (Continued)

3.2.3 Calibration Menu

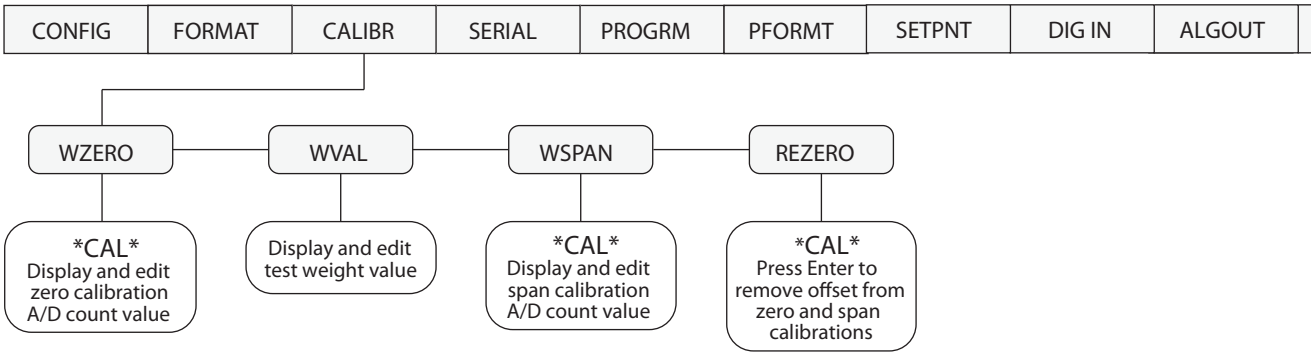


Figure 3-7. Calibration Menu

CALIBR Menu		
Parameter	**Choices**	**Description**
Level 2 submenus		
WZERO	—	Display and edit the zero calibration A/D count value. *DO NOT adjust this value after WSPAN has been set!*
WVAL	—	Display and edit the test weight value.
WSPAN	—	Display and edit the span calibration A/D count value.
REZERO	—	Press ENTER to remove an offset value from the zero and span calibrations. Use this parameter only after WZERO and WSPAN have been set. See Section 4.1 on page 27 for more information about using this parameter.

Table 3-4. Calibration Menu Parameters

3.2.4 Serial Menu

See Section 7.3 on page 40 for information about the *320IS* serial data format. The SERIAL menu is used only if the *320IS* is used with the I/O module (PN 72721).

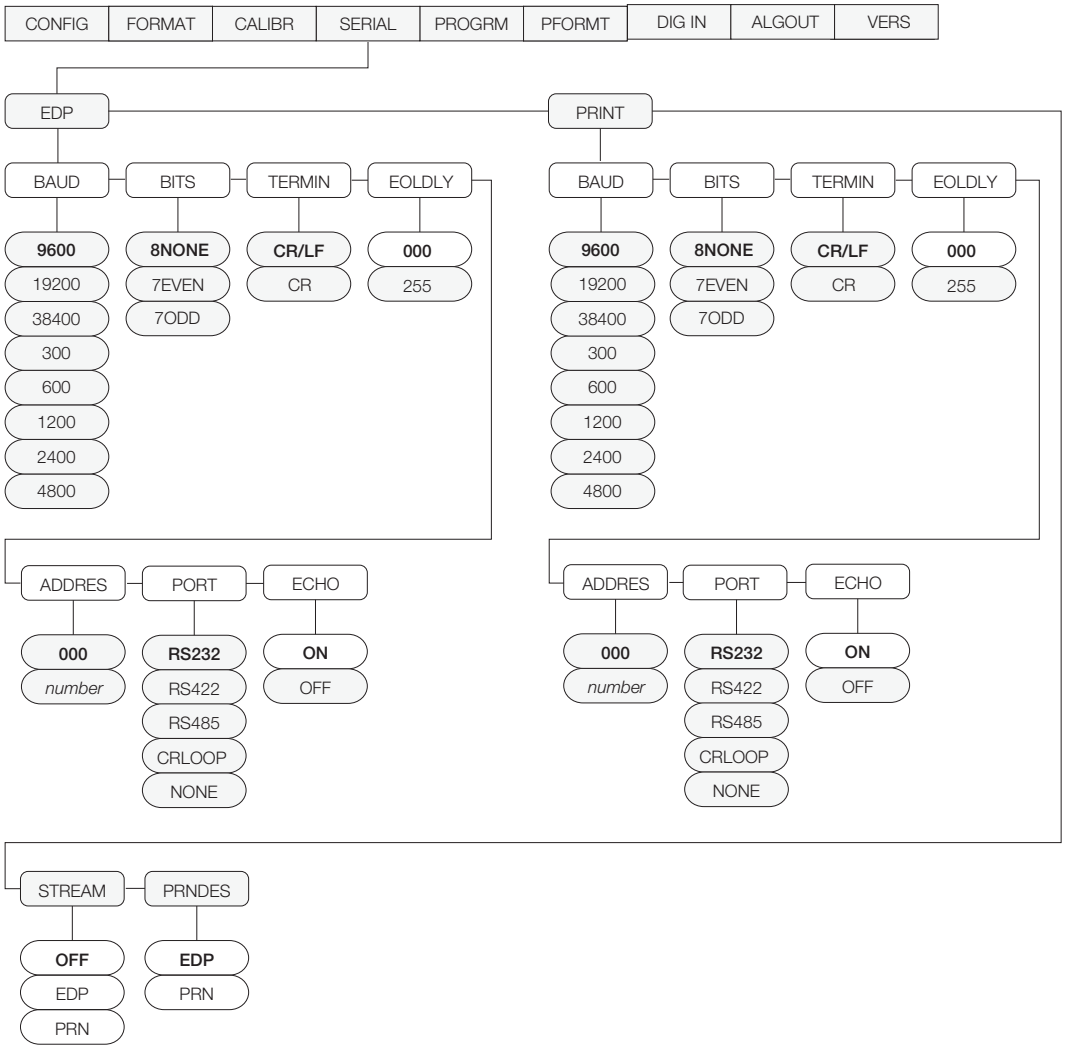


Figure 3-8. Serial Menu

SERIAL Menu		
Parameter	**Choices**	**Description**
Level 2 submenus		
EDP	BAUD BITS TERMIN EOLDLY ADDRES PORT ECHO	Specifies the settings for baud rate, data bits, termination characters, and end-of-line delay used by the EDP port.
PRINT	BAUD BITS TERMIN EOLDLY ADDRES PORT ECHO	Specifies the settings for baud rate, data bits, termination characters, and end-of-line delay used by the printer port.

Table 3-5. Serial Menu Parameters

SERIAL Menu		
Parameter	**Choices**	**Description**
STREAM	**OFF** EDP PRN	Selects the serial port used for continuous transmission. See Section 7.3 on page 40 for information about the *320IS* continuous data format.
PRNDES	**EDP** PRN	Print destination. Selects the port for data transmission when the PRINT key is pressed or the KPRINT EDP command is sent.
Level 3 Submenus		
EDP/Printer Ports		
BAUD	**9600** 19200 38400 300 600 1200 2400 4800	Baud rate. Selects the transmission speed for the EDP or printer port.
BITS	**8NONE** 7EVEN 7ODD	Selects the number of data bits and parity of data transmitted from the EDP or printer port.
TERMIN	**CR/LF** CR	Termination character. Selects the termination character for data sent from the EDP or printer port.
EOLDLY	**000** 255	End-of-line delay. Sets the delay period, in 0.1 second intervals, from when a formatted line is terminated to the beginning of the next formatted serial output. Value specified must be in the range 000-255, in tenths of a second. Example: 10 = 1 second.
ADDRES	**000** *number*	Specifies the decimal indicator address for RS-485 connections. RS-232 communications is disabled if an address other than zero is specified for this parameter.
PORT	**RS232** RS422 RS485 CRLOOP NONE	Selects the physical interface for the EDP or printer port.
ECHO	**ON** OFF	Enables or disables echoing of the serial commands sent to the indicator.

Table 3-5. Serial Menu Parameters (Continued)

3.2.5 Program Menu

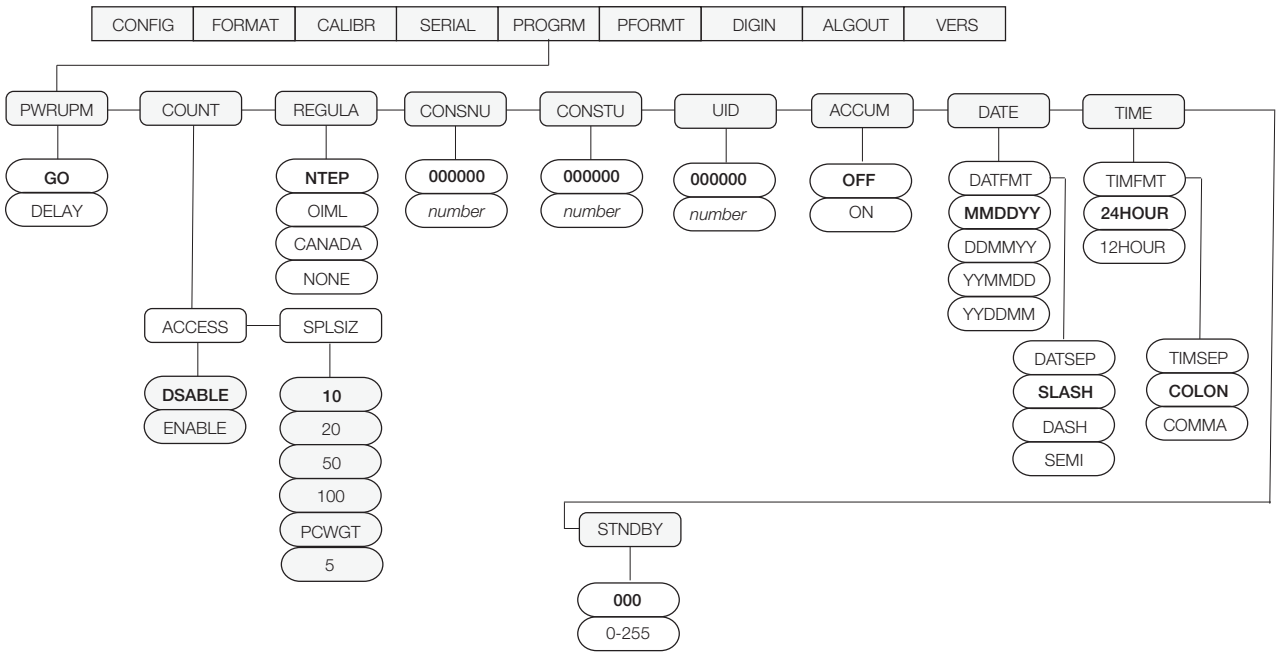


Figure 3-9. Program Menu

PROGRM Menu		
Parameter	**Choices**	**Description**
Level 2 submenus		
PWRUPM	**GO** DELAY	Power up mode. In GO mode, the indicator goes into operation immediately after a brief power up display test. In DELAY mode, the indicator performs a power up display test, then enters a 30–second warm up period. If no motion is detected during the warm up period, the indicator becomes operational when the warm up period ends; if motion is detected, the delay timer is reset and the warm up period is repeated.
COUNT	**ACCESS** SPLSIZ	Specifies whether operator has access to piece count mode and the default sample size used for parts counting. See Level three submenu for parameter descriptions.
REGULA	**NTEP** OIML CANADA NONE	Regulatory mode. Specifies the regulatory agency having jurisdiction over the scale site. • OIML, NTEP, and CANADA modes allow a tare to be acquired at any weight greater than zero. NONE allows tares to be acquired at any weight value. • OIML, NTEP, and CANADA modes allow a tare to be cleared only if the gross weight is at no load. NONE allows tares to be cleared at any weight value. • NTEP and OIML modes allow a new tare to be acquired even if a tare is already present. In CANADA mode, the previous tare must be cleared before a new tare can be acquired. • NONE, NTEP and CANADA modes allow the scale to be zeroed in either gross or net mode as long as the current weight is within the specified ZRANGE. In OIML mode, the scale must be in gross mode before it can be zeroed; pressing the ZERO key in net mode clears the tare.
CONSNU	**000000** *number*	Consecutive numbering. Allows sequential numbering for print operations. The consecutive number value is incremented following each print operation. The initial value of this parameter is set to the start up value specified on the CONSTU parameter. Changing either CONSTU or CONSNU immediately resets the consecutive number used for printing.
CONSTU	**000000** *number*	Consecutive number start up value in the range of 000000–999999. Specifies the initial consecutive number (CONSNU) value used when the indicator is powered on.

Table 3-6. Program Menu Parameters

PROGRM Menu		
Parameter	**Choices**	**Description**
UID	**000000** *number*	Specifies a unit identifier for the indicator in the range of 000000–999999. The unit ID can be added to print ticket formats to identify the indicator used to generate ticket formats.
ACCUM	**OFF** On	Accumulator. Specifies whether the accumulator is enabled. if enabled, accumulation occurs whenever a print operation is performed.
DATE	DATFMT DATSEP	Allows selection of date format and date separator. See level three parameter for descriptions.
TIME	TIMFMT TIMSEP	Allows selection of time format and time separator. See level three parameter for descriptions.
STNDBY	**000** 0-255	Standby mode delay. Specifies the number of minutes the indicator must be inactive before entering standby mode. Valid values are 000 (off) or 0-255 minutes. After typing a standby time value, press the TARE key to enter this value. The display will go into standby mode, confirmed by a blinking LED on the right side of the display. When in standby mode, power is still supplied to the CPU and draws 1/2 of the current as when the display is powered. Press any key to exit standby mode and reactivate the display. The indicator enters standby mode if no key presses, serial communications, or scale motion occur for the length of time specified on this parameter. Set this parameter to 000 to disable standby mode.
Level 3 submenus		
ACCESS	**DSABLE** ENABLE	Operator access to piece count mode. Specify DSABLE if piece count mode will not be used. With access disabled, pressing the GROSS/NET (MODE) key toggles between gross and net modes only.
SPLSIZ	**10** 20 50 100 PCWGT 5	Sample size. Specify the default size used for counting scale operations. Sample size can be changed in counting mode during sample acquisition.
DATFMT	**MMDDYY** DDMMYY YYMMDD	Specifies the format used to display or print the date.
DATSEP	**SLASH** DASH SEMI	Specifies the date separator character.
TIMFMT	**24HOUR** 12HOUR	Specifies the format used to display or print the time.
TIMSEP	**COLON** COMMA	Specifies the time separator character.

Table 3-6. Program Menu Parameters (Continued)

3.2.6 Print Format Menu

See Section 6.0 on page 35 for information about custom print formatting. The PFORMT menu is used only if the *320IS* is used with the I/O Module option.

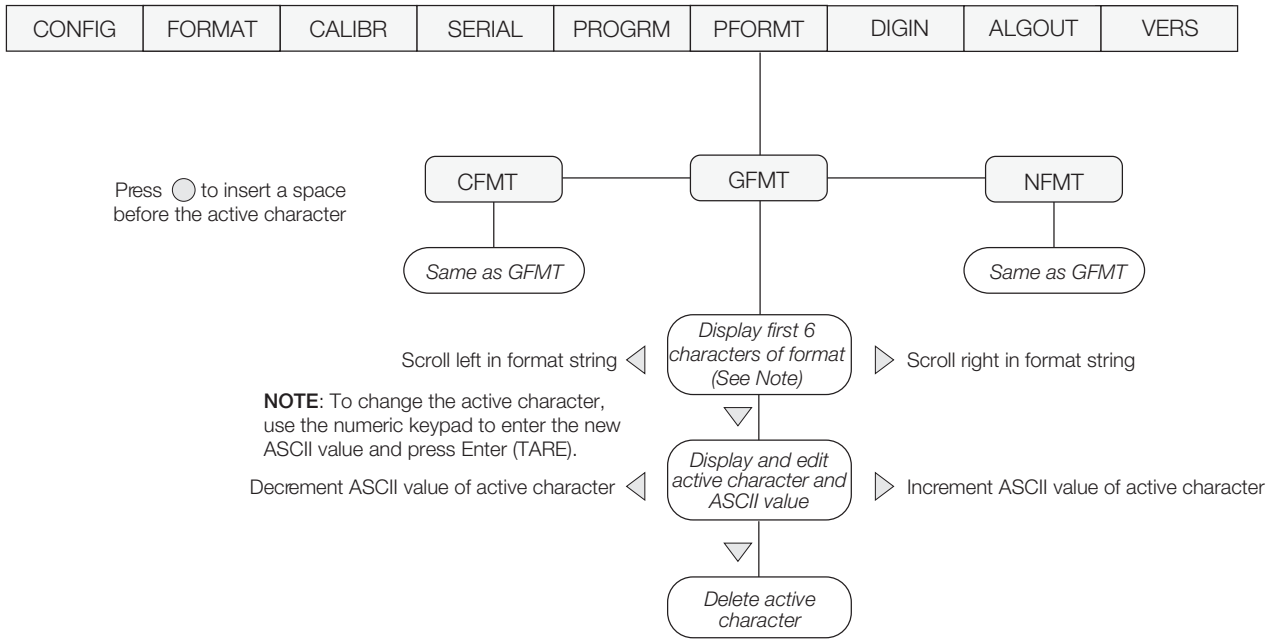


Figure 3-10. Print Format Menu

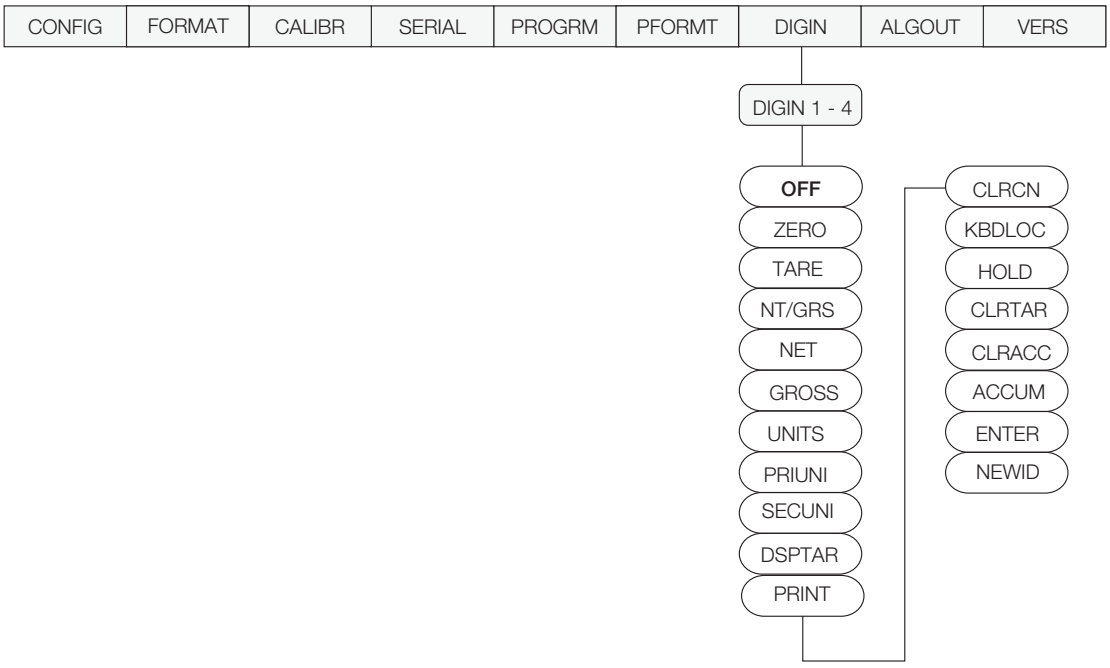


Figure 3-11. Digital Input Menu

DIG IN Menu		
Parameter	**Choices**	**Description**
Level 2 submenus		
DIGIN1 DIGIN2 DIGIN3 DIGIN4	OFF ZERO TARE NT/GRS NET GROSS UNITS PRIUNI SECUNI DSPTAR PRINT CLRCN KBDLOC HOLD CLRTAR CLRACC ACCUM ENTER NEWID	Specifies the function activated by digital inputs 1– 4. • ZERO, NT/GRS (net/gross mode toggle), TARE, UNITS, and PRINT provide the same functions as the front panel keys. • DSPTAR displays the current tare value. • CLRCN resets the consecutive number to the value specified on the CONSTU parameter (PROGRM menu). • KBDLOC disables the keypad while the digital input is held low. • HOLD holds the current display. Releasing this input clears the running average filter. • CLRTAR clears the current tare. • CLRACC clears the accumulator. • ACCUM displays the current accumulator value. • ENTER simulates pressing the ENTER key in weigh mode (for setpoint and checkweigh value changes from the front panel). • GROSS, NET, PRIUNI, and SECUNI select gross, net, primary units or secondary display modes. • NEWID enters the ID number.

Table 3-7. Digital Input Menu Parameters

3.2.7 Analog Output Menu

The ALGOUT menu is used only if the *320IS* is used with the I/O Module option. If the I/O Module is installed and the analog output is being used, configure all other indicator functions and calibrate the indicator (see See Section 4.0 on page 27) before configuring the analog output. See Section 7.8 on page 46 for analog output calibration procedures.

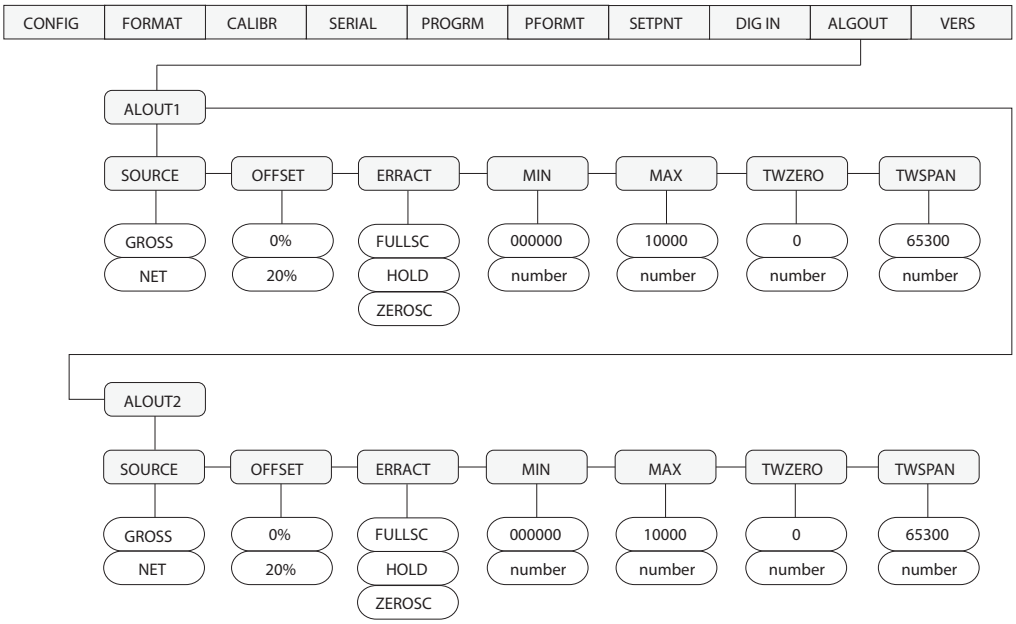


Figure 3-12. Analog Output Menu

ALG OUT Menu		
Parameter	**Choices**	**Description**
ALOUT1 ALOUT2	**SOURCE** OFFSET ERRACT MIN MAX TWZERO TWSPAN	Specifies settings for source, offset, error action, minimum, maximum, tweak zero and tweak span value used by the analog outputs.
Level 2 submenus		
SOURCE	**GROSS** NET	Specifies the source tracked by the analog output.
OFFSET	0% 20%	Zero offset. Selects whether the analog output supplies voltage (0-5 V, ±5 V, ±10 V) or current (4–20 mA) output. Select 0% for 0-5 V, ±5 V, ±10 V output, 20% for 4–20 mA output.
ERRACT	**FULLSC** HOLD ZEROSC	Error action. Specifies how the analog output responds to system error conditions. Possible values are: FULLSC Set to full value HOLD: Hold current value ZEROSC: Set to zero value
MIN	**000000** *number*	Specifies the minimum weight value tracked by the analog output. Specify a weight value (in primary units) in the range 000000–999 990.
MAX	**010000** *number*	Specifies the maximum weight value tracked by the analog output. Specify a weight value (in primary units) in the range 0–999 990.
TWZERO	**65300** *number*	Tweak zero. Adjust the analog output zero calibration. Use a multimeter to monitor the analog output value. Press and hold △ or ▽ to adjust the output. Press ○ to save the new value. ***NOTE: Default value becomes 11000 if OFFSET is set to 20%.***
TWSPAN	**65300** *number*	Tweak span. Adjust the analog output span calibration. Use a multimeter to monitor the analog output value. Press and hold △ or ▽ to adjust the output. Press ○ to save the new value. ***NOTE: Default value becomes 54900 if OFFSET is set to 20%.***

Table 3-8. Analog Output Menu Parameters

3.2.8 Version Menu

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

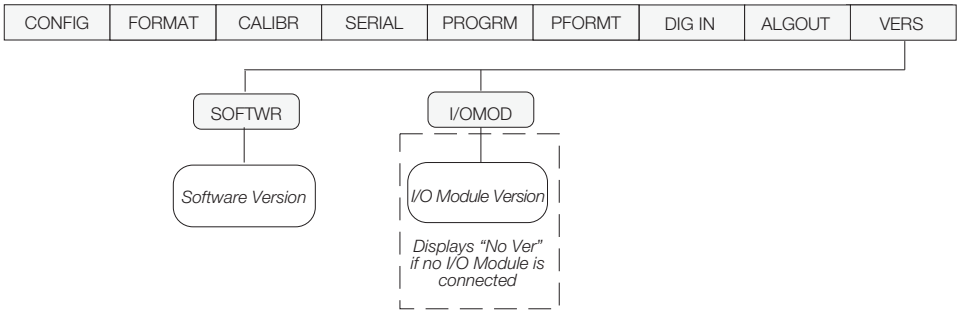


Figure 3-13. Version Menu

4.0 Calibration

The *320IS* can be calibrated using the front panel, EDP commands, or the Revolution® configuration utility. Each method consists of the following steps:

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

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

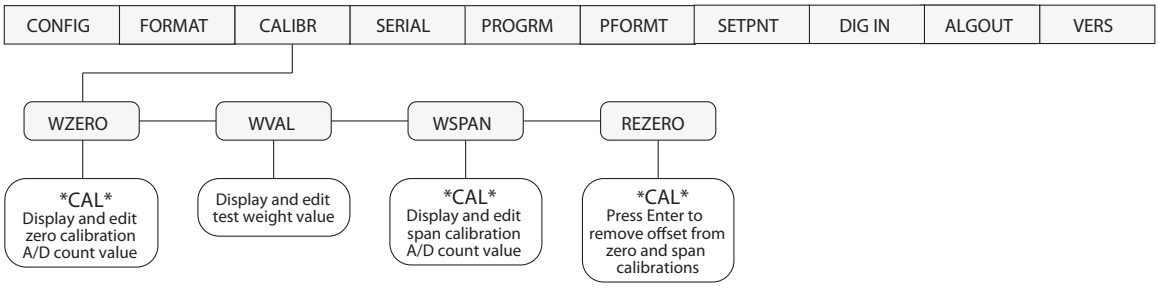


Figure 4-1. Calibration (CALIBR) Menu

4.1 Front Panel Calibration

To calibrate the indicator using the front panel, do the following (see Figure 3-2 on page 13 for front panel key functions.):

1. Place the indicator in setup mode (display reads *CONFIG*) and remove all weight from the scale platform. If your test weights require hooks or chains, place the hooks or chains on the scale for zero calibration.
2. Press ▷ until the display reads *CALIBR* (see Figure 4-1). Press ▽ to go to zero calibration (*WZERO*).
3. With *WZERO* displayed, press ○ to calibrate zero. The indicator displays **CAL** while calibration is in progress. When complete, the A/D count for the zero calibration is displayed. *DO NOT adjust this value after WSPAN has been set!* Press ○ again to save the zero calibration value and go to the next prompt (*WVAL*).
4. With *WVAL* displayed, place test weights on the scale and press ○ to show the test weight value. Use the numeric keypad or the procedure shown in Figure 4-2 to enter the actual test weight, then press ○ to save the value and go to span calibration (*WSPAN*).
5. With *WSPAN* displayed, press ○ to calibrate span. The indicator displays **CAL** while calibrating. When complete, the A/D count for the span calibration is displayed. Press ○ again to save the span calibration value and go to the next prompt (*REZERO*).
6. The rezero function is used to remove a calibration offset when hooks or chains are used to hang the test weights.
   - If no other apparatus was used to hang the test weights during calibration, remove the test weights and press △ to return to the CALIBR menu.
   - If hooks or chains were used during calibration, remove these and the test weights from the scale. With all weight removed, press ○ to rezero the scale. This function adjusts the zero and span calibration values. The indicator displays **CAL** while the zero and span calibrations are adjusted. When complete, the adjusted A/D count for the zero calibration is displayed. Press ○ to save the value, then press △ to return to the CALIBR menu.
7. Press ◁ until the display reads *CONFIG*, then press △ to exit setup mode.

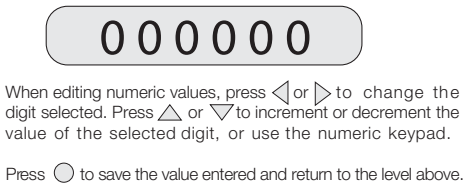


Figure 4-2. Editing Procedure for Numeric Values

Note ***When calibrating to a new scale, after exiting setup mode, press the ZERO key to set Zero and adjust for deadload.***

4.2 EDP Command Calibration

***Note** EDP command calibration requires the use of an I/O Module.*

To calibrate the indicator using EDP commands, the I/O Module EDP port must be connected to a terminal or personal computer. See Section 5.0 on page 29 for more information about using EDP commands.

Once the I/O Module is connected to the sending device, do the following:

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

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

4.3 Revolution® Calibration

To calibrate the indicator using Revolution, the I/O Module EDP port must be connected to a PC running the Revolution configuration software.

Use the following procedure to calibrate the indicator:

1. Select *Calibration Wizard* from the Revolution tools menu.
2. Revolution uploads calibration data from the indicator then presents the information in a display like that shown in Figure 4-3.

Figure 4-3. Revolution Calibration Wizard

3. Enter the *Value of Test Weight* to be used for span calibration then click *OK*.
4. The Zero Calibration dialog box prompts you to remove all weight from the scale. Clear the scale and click *OK* to begin zero calibration.

***Note** If your test weights require hooks or chains, place the hooks or chains on the scale for zero calibration.*

5. When zero calibration is complete, the Span Calibration dialog box prompts you to place test weights on the scale for span calibration. Place tests weights on the scale then click *OK*.
6. When calibration is complete, the *New Settings* fields of the Indicator Calibration display are filled in. Click *Exit* to save the new values and return to the Revolution main menu; to restore the previous calibration values, click *Restore Settings*.

5.0 EDP Commands

The *320IS* indicator can be controlled by a personal computer or remote keyboard connected to the I/O Module's EDP port. Control is provided by a set of EDP commands that can simulate front panel key press functions, display and change setup parameters, and perform reporting functions. The EDP port provides the capability to print configuration data or to save that data to an attached personal computer. This section describes the EDP command set and procedures for saving and transferring data using the EDP port.

5.1 The EDP Command Set

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

When the indicator processes an EDP command, it responds with the message *OK*. The *OK* response verifies that the command was received and has been executed. If the command is unrecognized or cannot be executed, the indicator responds with*??*.

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

5.1.1 Key Press Commands

Key press EDP commands (see Table 5-1) simulate pressing the keys on the front panel of the indicator. Most commands can be used in both setup and weighing mode. Several of the commands serve as "pseudo" keys, providing functions that are not represented by a key on the front panel.

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

Note *Scale must be at zero gross.*

1. Type K1 and press **ENTER** (or **RETURN**).
2. Type K5 and press **ENTER**.
3. Type KTARE and press **ENTER**. The display shifts to net mode when the tare is entered.

Command	Function
KZERO	In weighing mode, press the ZERO key
KGROSSNET	In weighing mode, press the GROSS/ NET key
KTARE	Press the TARE key
KUNITS	In weighing mode, press the UNITS key
KPRINT	In weighing mode, press the PRINT key
KLEFTARROW	In setup mode, move left in the menu
KRIGHTARROW	In setup mode, move right in the menu
KUPARROW	In setup mode, move up in the menu
KDOWNARROW	In setup mode, move down in the menu
K0-K9	Enters the number in the entry buffer, used for keyed tare entry.
KDOT	Press the decimal point (.)
KENTER	Press the ENTER key
KEXIT	Exit setup
KSAVE	Saves configuration without exit
KTIMEDATE	*Display time and date
KTIME	*Display time (pseudo key)
KDATE	*Display date (pseudo key)
KDISPACCUM	Press ACCUM key
KCLRACCUM	Clears accumulated register
KDISPTARE	Display tare (pseudo key)
KID	Display unit ID entry screen
KCOUNT	Go to piece count mode (pseudo key)
KCLR	Press the clear key
** I/O module required*	

Table 5-1. EDP Key Press Commands

5.1.2 Reporting Commands

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

Command	Function
DUMPALL	List all parameter values
IOVERSION	Display *I/O Module* software version
P	Display current displayed weight with units identifier. See Section 7.2.1 on page 39 for more information.
ZZ	Display current weight and annunciator status. See Section 7.2.2 on page 39 for more information.
S	Display one frame of stream format

Table 5-2. EDP Reporting Commands

5.1.3 The RESETCONFIGURATION Command

The RESETCONFIGURATION command can be used to restore all configuration parameters to their default values. Before issuing this command, the indicator must be placed in test mode (press and hold setup switch until *TEST* is displayed).

This command is equivalent to using the DEFLT function on the TEST menu. See Section 7.8 on page 46 for more information about test mode and using the TEST menu.

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

5.1.4 Parameter Setting Commands

Parameter setting commands allow you to display or change the current value for a particular configuration parameter See Tables 5-3 through 5-12 for more information on menu parameters.

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

command<ENTER>

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

command=value<ENTER>

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

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

MOTBAND=5D<ENTER>

Command	Description	Values
GRADS	Graduations	*1–100 000*
ZTRKBND	Zero track band	OFF, 0.5D, 1D, 3D
ZRANGE	Zero range	1.9%, 100%
MOTBAND	Motion band	1D, 2D, 3D, 5D, 10D, 20D, OFF
OVRLOAD	Overload	FS+2%, FS+1D, FS+9D, FS
DIGFLTRX*	Digital filtering	1, 2, 4, 8, 16, 32, 64
DFSENS	Digital filter cutout sensitivity	2OUT, 4OUT, 8OUT, 16OUT, 32OUT, 64OUT, 128OUT
DFTHRH	Digital filter cutout threshold	NONE, 2DD, 5DD, 10DD, 20DD, 50DD, 100DD, 200DD, 250DD
TAREFN	Tare function	BOTH, NOTARE, PBTARE, KEYED
SMPRAT	Sample rate	15Hz, 30Hz, 60Hz, 7.5Hz
NOTE: * X = 1, 2, 3		

Table 5-3. CONFIG EDP Commands

Command	Description	Values
PRI.DECPNT	Primary units decimal position	8.88888, 88.8888, 888.888, 8888.88, 88888.8, 888888, 888880, 888800
PRI.DSPDIV	Primary units display divisions	1D, 2D, 5D
PRI.UNITS	Primary units	LB, KG, OZ, TN, T, G, NONE
SEC.UNITS	Secondary units	LB, KG, OZ, TN, T, G, NONE
SEC.MULT	Secondary units multiplier	*0.00000–9999.99*
DSPRATE	Display rate	250MS, 500MS, 750MS, 1SEC, 1500SEC, 2SEC, 2500MS, 3SEC, 4SEC, 6SEC, 8SEC

Table 5-4. FORMAT EDP Commands

Command	Description	Values
WZERO	Zero calibration	*-999999 – 999999*
WVAL	Test weight value	*0 – 999999*
WSPAN	Span calibration	*-999999 – 999999*
REZERO	Rezero	*-999999 – 999999*
LC.CD	Set deadload coefficient	*±268435455*
LC.CW	Set span coefficient	*±268435455*

Table 5-5. CALIBR EDP Commands

Command	Description	Values
EDP.BAUD	EDP port baud rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400
EDP.BITS	EDP port data bits/parity	8NONE, 7EVEN, 7ODD
EDP.TERMIN	EDP port termination character	CR/LF, CR
EDP.EOLDLY	EDP port end-of-line delay	*0–255* (0.1-second intervals)
EDP.ADDRESS	EDP port address	*0-255*
EDP.PORT	EDP port selection	RS232, RS422, RS485, CRLOOP, NONE
EDP.ECHO	EDP port echo	ON, OFF
PRN.BAUD	Printer port baud rate	300, 600, 1200, 2400, 4800, 9600, 19200, 38400
PRN.BITS	Printer port data bits/parity	8NONE, 7EVEN, 7ODD
PRN.TERMIN	Printer port termination character	CR/LF, CR
PRN.EOLDLY	Printer port end-of-line delay	*0–255* (0.1-second intervals)
PRN.ADDRESS	Printer port address	*0-255*
PRN.PORT	Printer port selection	RS232, RS422, RS485, CRLOOP, NONE
PRN.ECHO	Printer port echo	ON,OFF
STREAM	Streaming port	OFF, EDP, PRN
PRNDEST	Print destination	EDP, PRN

Table 5-6. SERIAL EDP Commands

Command	Description	Values
REGULAT	Regulatory compliance	NTEP, OIML, CANADA, NONE
CONSNUM	Consecutive number	*0–999 999*
CONSTUP	Consecutive number start-up value	*0–999 999*

Table 5-7. PROGRM EDP Commands

Command	Description	Values
PWRUPMD	Power up mode	GO, DELAY
SAMPSIZ	Sample size	5, 10, 20, 50, 100, PCWGT
CNTMOD	Count mode access	DISABLE, ENABLE
UID	Unit identifier	*000000–999999*
STNDBY	Standby	*0-255*
DATEFMT	Date format	MMDDYY, DDMMYY, YYMMDD, YYDDMM
DATESEP	Date Separator	SLASH, DASH, SEMI
TIMEFMT	Time format	12HOUR, 24HOUR
TIMESEP	Time separator	COLON, COMMA

Table 5-7. PROGRM EDP Commands (Continued)

Command	Description	Values
GFMT	Gross demand print format string	See Section 6.0 on page 35 for detailed information
NFMT	Net demand print format string	
CFMT	Count demand print format	

Table 5-8. PFORMT EDP Commands

Command	Description	Values
DIGIN1 DIGIN2 DIGIN3 DIGIN4	Digital input function	OFF, ZERO, TARE, NT/GRS, UNITS, DSPTAR, PRINT, CLRCN, KBDLOC, HOLD, CLRTAR, CLRACC, ACCUM, ENTER, GROSS, NET, PRIM, SEC, NEWID

Table 5-9. DIG IN EDP Commands

EDP digital output commands only function in TEST mode (see Figure 7-4 on page 46).

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

Table 5-10. DIG OUT EDP Commands

Command	Description	Values
AO1.SOURCE	Analog output source	GROSS, NET
AO1.OFFSET	Zero offset	0%, 20%
AO1.ERRACT	Error action	FULLSC, HOLD, ZEROSC
AO1.MIN	Minimum value tracked	*0–999 990*
AO1.MAX	Maximum value tracked	*0–999 990*
AO1.TWZERO	Zero calibration	*0–65535*
AO1.TWSPAN	Span calibration	*0–65535*

Table 5-11. ALGOUT 1 EDP Commands

Command	Description	Values
AO2.SOURCE	Analog output source	GROSS, NET
AO2.OFFSET	Zero offset	0%, 20%
AO2.ERRACT	Error action	FULLSC, HOLD, ZEROSC
AO2.MIN	Minimum value tracked	*0–999 990*
AO2.MAX	Maximum value tracked	*0–999 990*
AO2.TWZERO	Zero calibration	*0–65535*
AO2.TWSPAN	Span calibration	*0–65535*

Table 5-12. ALGOUT 2 EDP Commands

5.1.5 Normal Mode Commands

The serial transmit weight data commands (see Table 5-13) transmit data to the EDP port on demand. The SX and EX commands are valid only in normal operating mode; all other commands are valid in either setup or normal mode.

Command	Description	Response Format
SX	Start EDP streaming	OK *or* ??
EX	Stop EDP streaming	OK *or* ??
RS	Reset system	—
XG	Transmit gross weight in displayed units	*nnnnnn UU* where *nnnnnn* is the weight value, *UU* is the units.
XN	Transmit net weight in displayed units	
XT	Transmit tare weight in displayed units	
XG2	Transmit gross weight in non-displayed units	
XN2	Transmit net weight in non-displayed units	
XT2	Transmit tare weight in non-displayed units	
XE	Query system error conditions	*xxxxx yyyyy* See Section 7.1.2 on page 39 for detailed information about the XE command response format.
XA	Transmit accumulation value	
UID	set unit ID	*nnnnnn*
CONSNUM	Set consecutive number	

Table 5-13. Normal Mode EDP Commands

5.2 Saving and Transferring Data

Note *Saving and transferring data requires the use of an I/O Module.*

Connecting a personal computer to the *320IS* EDP port allows you to save indicator configuration data to the PC or to download configuration data from the PC to an indicator. The following sections describe the procedures for these save and transfer operations.

Note *Saving and transferring data requires the optional I/O module. See Section 8.0 on page 48 for more information on the I/O module.*

5.2.1 Saving Indicator Data to a Personal Computer

Configuration data can be saved to a personal computer connected to the EDP port. The PC must be running a communications program such as ProComm Plus®[1] or Revolution®. See the I/O Module Installation Manual (PN 78076) OR, Section 8.0 on page 48, for information about serial communications wiring and EDP port pin assignments.

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

To save all configuration data, place the indicator in setup mode and send the DUMPALL EDP command to the indicator. The *320IS* responds by sending all configuration parameters to the PC as ASCII-formatted text.

5.2.2 Downloading Configuration Data from PC to Indicator

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

To download configuration data, connect the PC to the EDP port as described in Section 5.2.1. Place the indicator in setup mode and use the PC communications software to send the saved configuration data to the indicator. When transfer is complete, calibrate the indicator as described in Section 4.0 on page 27.

Note *Calibration settings are included in the configuration data downloaded to the indicator.*

If the receiving indicator is a direct replacement for another 320IS and the attached scale is not changed, recalibration is not required.

1. ProComm Plus is a registered trademark of Symantec Corporation.

6.0 Print Formatting

The *320IS* provides four print formats, GFMT, NFMT, and CFMT that determine the format of the printed output when the **PRINT** key is pressed or when a KPRINT EDP command is received. If a tare has been entered or acquired, NFMT is used; otherwise, GFMT is used.

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

6.1 Print Formatting Commands

Table 6-1 lists commands you can use to format the gross and net print formats. Commands included in the format strings must be enclosed between < and > delimiters. Any characters outside of the delimiters are printed as text on the ticket. Text characters can include any ASCII character that can be printed by the output device.

Command	Description	Ticket Format
		GFMT/NFMT/CFMT
<G>	Gross weight in displayed units	√
<G2>	Gross weight in non-displayed units	√
<N>	Net weight in displayed units	√
<N2>	Net weight in non-displayed units	√
<T>	Tare weight in displayed units	√
<T2>	Tare weight in non-displayed units	√
<A>	Accumulated weight in displayed units	√
<AC>	Number of accumulator event (5-digit counter)	√
<AT>	Time of last accumulator event	√
<AD>	Date of last accumulator event	√
<TI>	Time	√
<DA>	Date	√
<TD>	Time and date	√
<UID>	ID number	√
<CN>	Consecutive number	√
<W>	Average piece weight in count mode	Ö
<C>	Piece count	Ö
<NL>	New line, end of line termination	

Table 6-1. Print Format Commands

The default GFMT and NFMT print formats use only the new line (<NL>) command and the commands for gross, net, and tare weights in displayed units (<G>, <N>, and <T>).

The default *320IS* print formats are shown in Table 6-2:

Format	Default Format String	Sample Output
GFMT	<G> GROSS<NL>	2046.81 LB GROSS
NFMT	<G> GROSS<NL> <T> TARE<NL> <N> NET<NL>	4053.1 LB GROSS 15.6 LB TARE 4037.5 LB NET

Table 6-2. GFMT and NFMT Formats

Format	Default Format String	Sample Output
CFMT	GROSS<G><NL>TARE<SP><T><NL>NET<SP2><N><NL>COUNT<C><NL>APW<SP2><W><NL>	
NOTE: In OIML and CANADA modes, the letters PT (preset tare) are automatically inserted after the printed tare weight.		

Table 6-2. GFMT and NFMT Formats

Note

The <G2>, <N2>, and <T2> commands listed in Table 6-1 print the gross, net, and tare weights in non-displayed units—that is, in the units not currently displayed on the indicator.

ID numbers included in the print format string (<UID> command) must be set using the UID=VAL EDP command.

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

6.2 Customizing Print Formats

The following sections describe procedures for customizing the GFMT, NFMT and formats using the EDP port, the front panel (PFORMT menu), and the Revolution® configuration utility.

6.2.1 Using the EDP Port

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

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

GFMT=<G> GROSS<NL>

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

GFMT=FINE TRANSFER CO<NL>32400 WEST HIGHWAY ROAD<NL>SMALLTOWN<NL2><G> GROSS<NL>

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

FINE TRANSFER CO
32400 WEST HIGHWAY ROAD
SMALLTOWN

1345 LB GROSS

6.2.2 Using the Front Panel

If you have no access to equipment for communication through the EDP port or are working at a site where such equipment cannot be used, you can use the PFORMT menu (see Figure 6-1 on page 37) to customize the print formats.

Using the PFORMT menu, you can edit the print format strings by changing the decimal values of the ASCII characters in the format string.

Note

Lowercase letters and some special characters cannot be displayed on the 320IS front panel (see the ASCII character chart on Table 7-4 on page 41 and Table 7-5 on page 42) and are shown as blanks. The 320IS can send or receive any ASCII character; the character printed depends on the particular ASCII character set implemented for the receiving device.

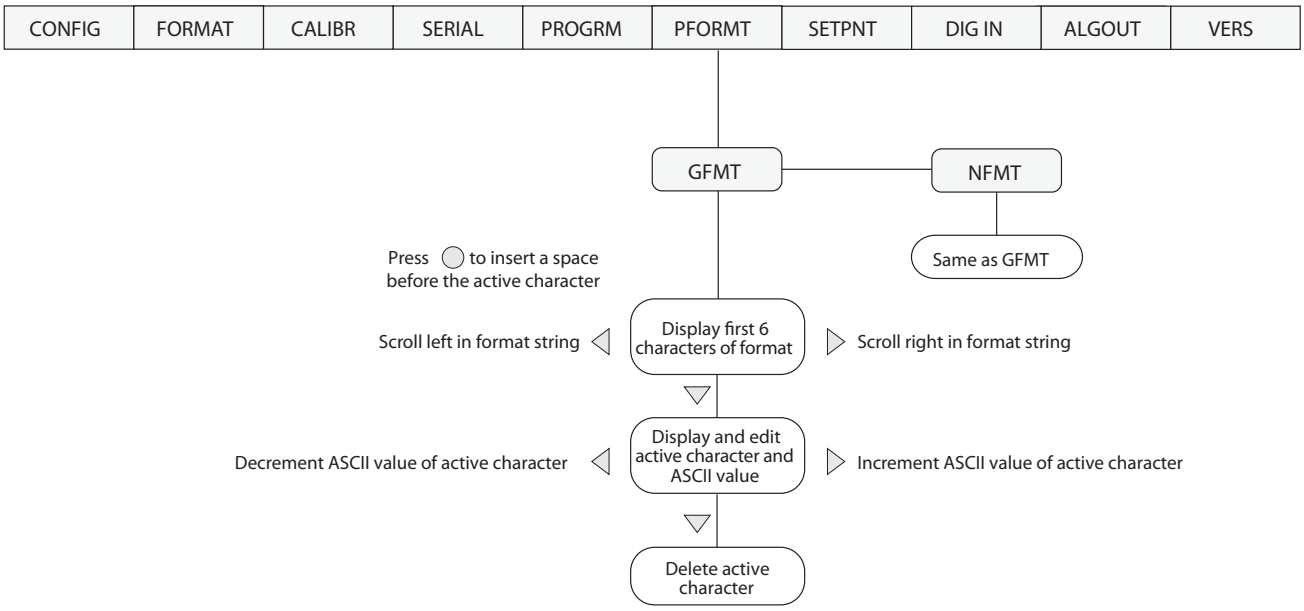


Figure 6-1. PFORMT Menu

6.2.3 Using Revolution®

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

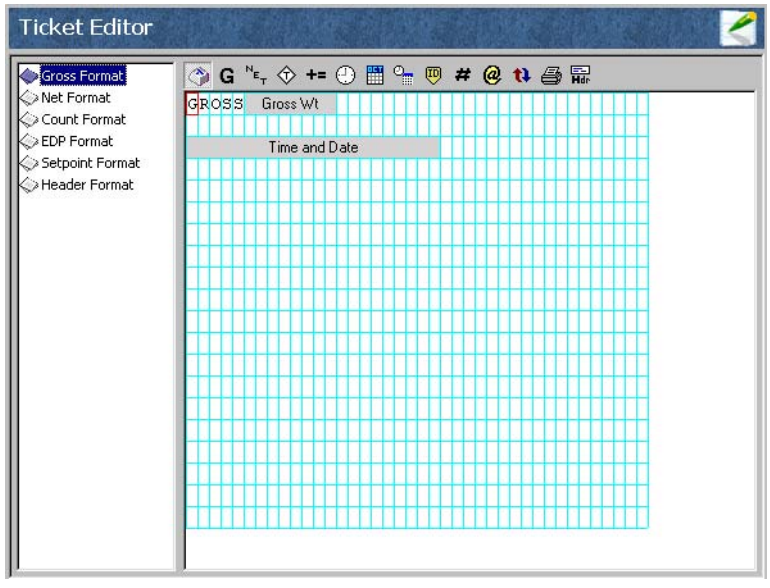


Figure 6-2. Revolution Ticket Editor

7.0 Appendix A

7.1 Error Messages

The *320IS* indicator provides a number of error messages. When an error occurs, the message is shown on the indicator LED display. Error conditions can also be checked remotely by using the XE EDP command as described in Section 7.1.2.

7.1.1 Displayed Error Messages

The *320IS* provides a number of front panel error messages to assist in problem diagnosis. Table 7-1 lists these messages and their meanings.

Error Message	Description	Solution
E A/D	A/D physical error	Call Rice Lake Weighing Systems (RLWS) Service.
EEPERR	EEPROM physical error	
EVIREE	Virgin EEPROM	Use TEST menu to perform DEFLT (restore defaults) procedure, then recalibrate load cells.
EPCKSM	Parameter checksum error	
EACKSM	A/D calibration checksum error	A/D converter requires recalibration. Call RLWS Service.
EFCKSM	Printer format checksum error	Call RLWS Service.
ELCKSM	Load cell calibration checksum error	Recalibrate load cells.
EIDATA	Internal RAM error	Call RLWS Service.
EREF	A/D reference error	A/D converter requires recalibration. Call RLWS Service.
LOBTRY	Low battery	
ENOOPC	No optical communication	
OVRFLW	Overflow	Weight value too large to be displayed.
EXDATA	External RAM error	
CNTERR	Count error	
DSPERR	Display error	
Error	Internal program error	Check configuration. Run XE command (see Section 7.1.2 on page 39) to determine error type. Call RLWS Service if unable to clear error by cycling power or if error recurs.
^^^^^^	Overflow error	
_____	A/D underrange	A/D reading < –4 mV. Check scale for binding or damage.

Table 7-1. 320IS Error Messages

7.1.2 Using the XE EDP Command

The XE EDP command can be used to remotely query the *320IS* for the error conditions shown on the front panel. The XE command returns two 5-digit numbers in the format:

xxxxx yyyyy

where *xxxxx* contains a decimal representation of any existing error conditions as described in Table 7-2.

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

The second number returned (*yyyyy*) uses the same bit assignments as shown in Table 7-2 to indicate whether the test for the error condition was run. For example, the value *yyyyy* = 63487 represents the decimal equivalent of the binary value 1111 0111 1111 1111. Using the bit assignments in Table 7-2, this value indicates all tests were run.

Error Code	Description	Binary Value
1	EEPROM physical error	0000 0000 0000 0001
2	Virgin EEPROM	0000 0000 0000 0010
4	Parameter checksum error	0000 0000 0000 0100
8	Load cell calibration checksum error	0000 0000 0000 1000
16	A/D calibration checksum error	0000 0000 0001 0000
32	Print format checksum error	0000 0000 0010 0000
64	Internal RAM checksum error	0000 0000 0100 0000
128	External RAM error	0000 0000 1000 0000
256	No optical communication	0000 0001 0000 0000
512	A/D physical error	0000 0010 0000 0000
1024	A/D reference error	0000 0100 0000 0000
2048	Count error	0000 1000 0000 0000
4096	Low battery	0001 0000 0000 0000
8192	Display error	0010 0000 0000 0000
16384	A/D underrange	0100 0000 0000 0000
32768	Overflow	1000 0000 0000 0000

Table 7-2. Error Codes Returned on XE Command

7.2 Status Messages

Two EDP commands, P and ZZ, can be used to provide status about the indicator. These commands are described in the following sections.

7.2.1 Using the P EDP Command

The P EDP command returns the current displayed weight value to the EDP port, along with the units identifier. If the indicator is in an underrange or overload condition, the weight value is replaced with ^^^^^^ (overload) or _ _ _ _ _ _(under range).

7.2.2 Using the ZZ EDP Command

The ZZ EDP command can be used to remotely query which annunciators are currently displayed on the indicator front panel. The ZZ command returns the currently displayed weight and a decimal number representing the LED annunciators currently lit. The format of the returned data is;

wwwwww uu zzz

where **wwwwww uu** is the current displayed weight and units, **zzz** is the annunciator status value (see Table 7-3). If more than one annunciator is lit, the second number returned is the sum of the values representing the active annunciators.

For example, if the annunciator status value returned on the ZZ command is 148, the gross, standstill, and lb annunciators are lit: 148 represents the sum of the values for the standstill annunciator (16), gross mode annunciator (128), and the lb/primary units annunciator (4).

Decimal Value	Annunciator
1	Tare
2	Count
4	lb
8	kg
16	Standstill
32	Center of zero
64	Net
128	Gross

Table 7-3. Status Codes Returned on the ZZ Command

7.3 Continuous Output (Stream) Format

Figure 7-1 shows the continuous output format sent to the *320IS* EDP or printer port when the STREAM parameter (SERIAL menu) is set to either EDP or PRN.

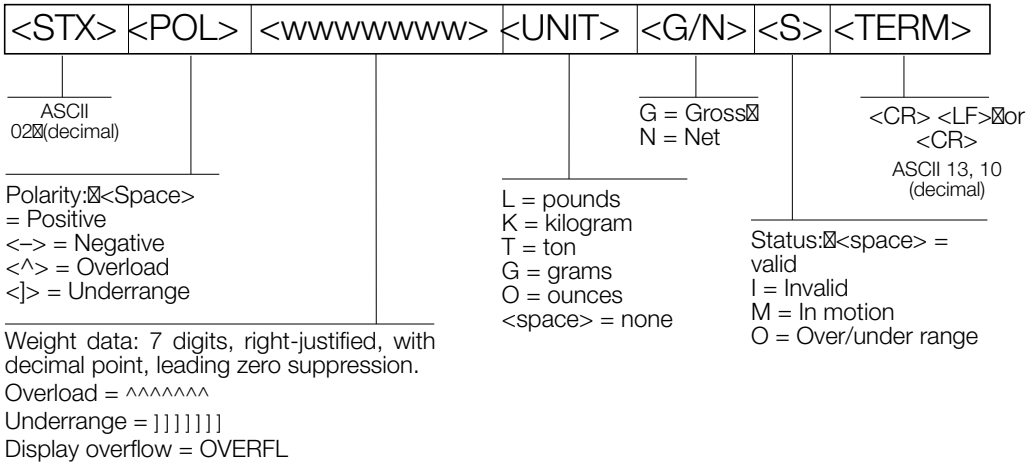


Figure 7-1. Continuous Output Data Format

7.4 ASCII Character Chart

Use the decimal values for ASCII characters listed in Tables 7-4 and 7-5 when specifying print format strings on the *320IS* PFORMT menu. The actual character printed depends on the character mapping used by the output device.

The *320IS* connected to an I/O Module can send or receive any ASCII character value (decimal 0–255), but the indicator display is limited to numbers, upper-case, unaccented letters, and a few special characters.

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

Table 7-4. ASCII Character Chart (Part 1)

ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex	ASCII	Dec	Hex
Ç	128	80	á	160	A0		192	C0	a	224	E0
ü	129	81	í	161	A1		193	C1	b	225	E1
é	130	82	ó	162	A2		194	C2	G	226	E2
â	131	83	ú	163	A3		195	C3	p	227	E3
ä	132	84	ñ	164	A4		196	C4	S	228	E4
à	133	85	Ñ	165	A5		197	C5	s	229	E5
å	134	86	ª	166	A6		198	C6	m	230	E6
ç	135	87	º	167	A7		199	C7	t	231	E7
ê	136	88	¿	168	A8		200	C8	F	232	E8
ë	137	89		169	A9		201	C9	Q	233	E9
è	138	8A	¬	170	AA		202	CA	W	234	EA
ï	139	8B	1/2	171	AB		203	CB	d	235	EB
î	140	8C	1/4	172	AC		204	CC	¥	236	EC
ì	141	8D	¡	173	AD		205	CD	f	237	ED
Ä	142	8E	«	174	AE		206	CE	Î	238	EE
Å	143	8F	»	175	AF		207	CF	Ç	239	EF
É	144	90		176	B0		208	D0	º	240	F0
æ	145	91		177	B1		209	D1	±	241	F1
Æ	146	92		178	B2		210	D2	³	242	F2
ô	147	93		179	B3		211	D3	£	243	F3
ö	148	94		180	B4		212	D4	ó	244	F4
ò	149	95		181	B5		213	D5	õ	245	F5
û	150	96		182	B6		214	D6	¸	246	F6
ù	151	97		183	B7		215	D7	»	247	F7
ÿ	152	98		184	B8		216	D8	°	248	F8
Ö	153	99		185	B9		217	D9	·	249	F9
Ü	154	9A		186	BA		218	DA		250	FA
¢	155	9B		187	BB		219	DB		251	FB
£	156	9C		188	BC		220	DC		252	FC
¥	157	9D		189	BD		221	DD	²	253	FD
Pts	158	9E		190	BE		222	DE		254	FE
ƒ	159	9F		191	BF		223	DF		255	FF

Table 7-5. ASCII Character Chart (Part 2)

7.5 Conversion Factors for Secondary Units

The *320IS* has the capability to mathematically convert a weight into many different types of units and instantly display those results with a press of the **UNITS** key.

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

- SEC.MULT only applies if UNITS parameter (SECNDR) is set to NONE.
- To configure secondary units using the front panel, use Table 7-6 to find the conversion multiplier for the MULT parameter. For example, if the primary unit is pounds and the secondary unit is short tons, set the MULT parameter to 0.000500.

  You must use the MULT parameter to set the decimal point position. Use the numeric keypad or the **LEFT/RIGHT** keys to select the digit; Use the **UP/DOWN** keys to increment and decrement (see Figure 3-4 on page 14). **LEFT/RIGHT** keys also select decimal placement.
- To configure secondary units using EDP commands, use the Table 7-6 to find the conversion multiplier for the SEC.MULT command. For example, if the primary unit is pounds and the secondary unit is short tons, send the EDP command SEC.MULT= 0.0005<CR> to set the multiplier for the secondary units.
- Long tons and grains units listed in Table 7-6 cannot be directly specified as primary or secondary units on the *320IS* indicator. For these or other unlisted units of weight, specify NONE on the UNITS parameter.

Note ***Ensure that the secondary decimal point position is set appropriately for the scale capacity in the secondary units. If the converted value requires more digits than are available, the indicator will display an overflow message (OVERFL).***

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

Primary Unit	*x Multiplier*	Secondary Unit
grains	0.064799	grams
	0.002286	ounces
	0.000143	pounds
	0.000065	kilograms
ounces	437.500	grains
	28.3495	grams
	0.06250	pounds
	0.02835	kilograms
pounds	7000.00	grains
	453.592	grams
	16.0000	ounces
	0.453592	kilograms
	0.000500	short tons
	0.000446	long tons
	0.000453	metric tons
short tons	2000.00	pounds
	907.185	kilograms
	0.892857	long tons
	0.907185	metric tons
grams	15.4324	grains
	0.035274	ounces
	0.002205	pounds
	0.001000	kilograms
kilograms	15432.4	grains
	35.2740	ounces
	1000.00	grams
	2.20462	pounds
	0.001102	short tons
	0.000984	long tons
	0.001000	metric tons
metric tons	2204.62	pounds
	1000.00	kilograms
	1.10231	short tons
	0.984207	long tons
long tons	2240.00	pounds
	1016.05	kilograms
	1.12000	short tons
	1.01605	metric tons

Table 7-6. Conversion Factors

7.6 Digital Filtering

The *320IS* uses RATTLETRAP™ digital filtering to reduce the effect of vibration on weight readings. Adjustable threshold and sensitivity functions allow quick settling by suspending filter averaging, allowing the weight reading to jump to the new value. Figure 7-2 shows the digital filter parameters on the CONFIG menu.

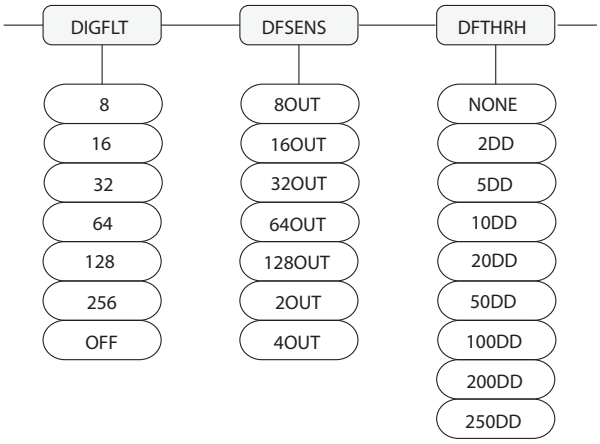


Figure 7-2. Digital Filtering Parameters on the Configuration (CONFIG) Menu

7.6.1 DFSENS and DFTHRH Parameters

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

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

7.6.2 Setting the Digital Filter Parameters

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

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

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

   threshold_weight_value / DSPDIV

   In the example in Step 2, with a threshold weight value of 50 lb and a display division value of 5D: *50 / 5D = 10*. DFTHRH should be set to 10DD for this example. See Figure 3-6 on page 17 for more information on display divisions.
5. Finally, set the DFSENS parameter high enough to ignore transient peaks. Longer transients (typically caused by lower vibration frequencies) cause more consecutive out-of-band readings, so DFSENS should be set higher to counter low frequency transients.

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

7.7 Analog Output Calibration

The following calibration procedure requires a multimeter to measure voltage or current output from the analog output of the I/O module. If the option is not already installed, see Section 3.2.7 on page 24.

Note *The analog output must be calibrated after the indicator itself has been configured (Section 3.0 on page 12) and calibrated (Section 4.0 on page 27).*

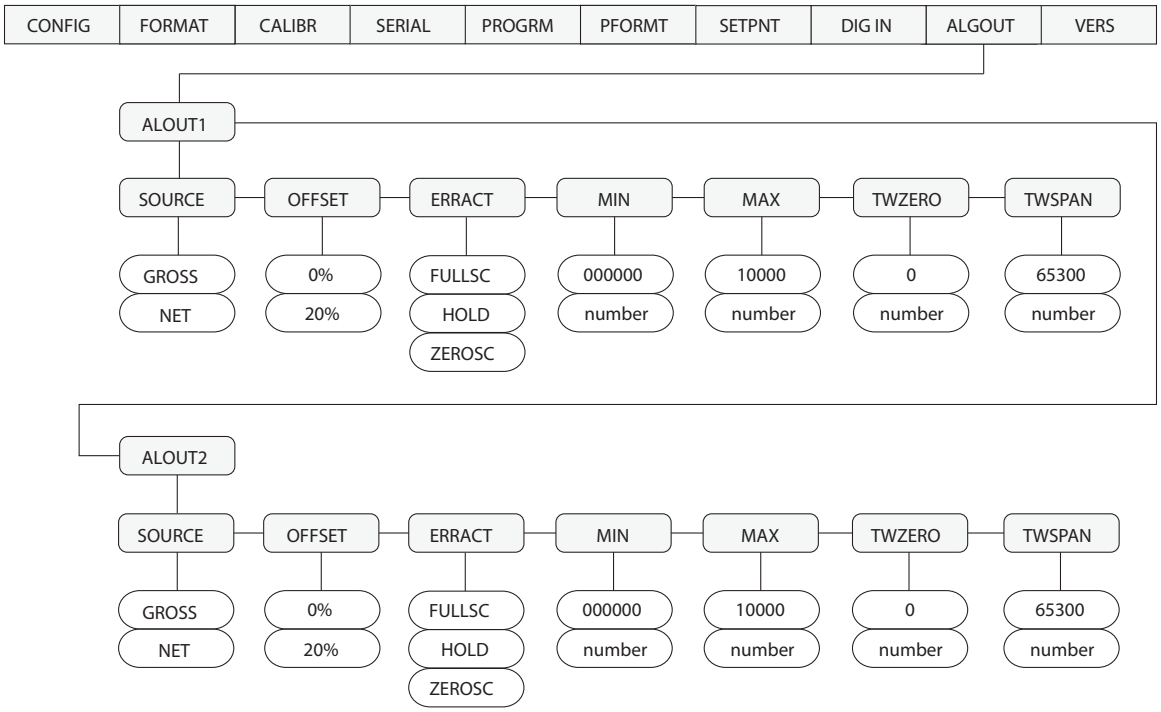


Figure 7-3. Analog Output Menu

1. Enter setup mode and go to the ALGOUT menu (see Figure 7-3). See Table 8-7 on page 51 for information on switch settings.
   - Set OFFSET to 0% for 0-5 V, ±5 V, ±10 V output, 20% for 4–20 mA output
   - Set MIN to lowest weight value to be tracked by the analog output
   - Set MAX to highest weight value to be tracked by the analog output
2. Connect multimeter to desired analog output:
   - For voltage output, connect voltmeter leads to pins 1 and 3 for ALOUT1 or pins 6 and 5 for ALOUT2
   - For current output, connect ampmeter leads to pins 1 and 2 ALOUT1 or pins 4 and 6 for ALOUT2
3. Adjust zero calibration: Scroll to the TWZERO parameter. Check voltage or current reading on multimeter. Press and hold △ or ▽ to adjust the zero value up or down. Press **Enter** to save the displayed value.
4. Adjust span calibration: Scroll to the TWSPAN parameter. Check voltage or current reading on multimeter. Press and hold △ or ▽ to adjust the span value up or down. Press **Enter** to save the displayed value.
5. Final zero calibration: Return to the TWZERO parameter and verify that the zero calibration has not drifted. Press and hold △ or ▽ to re-adjust the zero value as required. Press **Enter** to save the displayed value.
6. Return to normal mode. Analog output function can be verified using test weights.

7.8 Test Mode

In addition to normal and setup modes, test mode provides a number of diagnostic functions for the *320IS*, including:

- Display raw A/D count
- Calibrate A/D offset and gain
- Display digital input states
- Reset configuration parameters to default values
- Transmit test character (“U”) from serial port
- Display characters received by external serial port
- Set analog output state to zero or full scale

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

Figure 7-4 shows the Test Menu structure; Figure 7-5 shows the front panel key functions in test mode. Note that, because the Test Menu functions are all on a single menu level, the **GROSS/NET** (▽) key has no function. Press the **ZERO** (△) key to exit test mode.

Table 7-7 on page 47 summarizes the test menu functions.

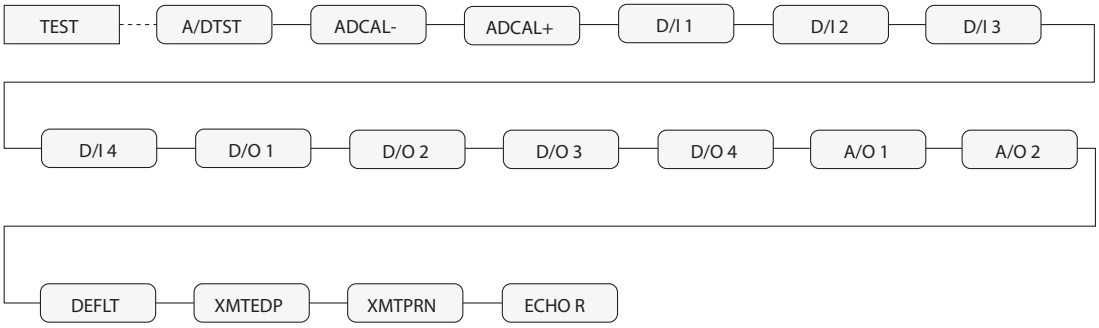


Figure 7-4. Test Menu

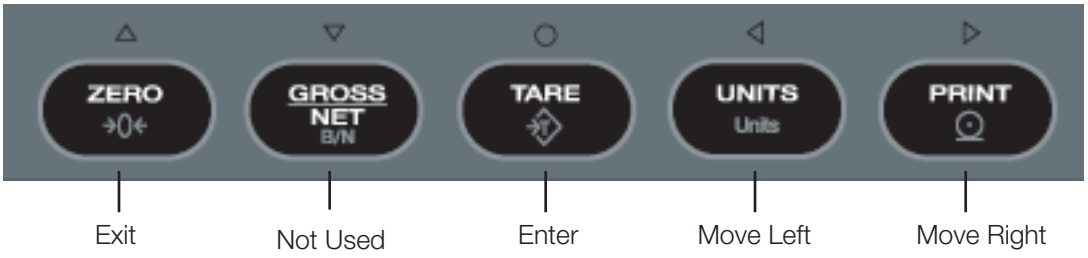


Figure 7-5. Front Panel Key Functions in Test Mode

TEST Menu	
Function	**Description**
A/DTST	Display A/D test Press and hold ENTER key to display raw counts from A/D converter.
ADCAL-	(ADOFFS) A/D calibration functions must only be used by qualified service personnel. Improper A/D calibration may render indicator unusable.
ADCAL+	(ADGAIN) **WARNING** A/D calibration functions must only be used by qualified service personnel. Improper A/D calibration may render indicator unusable.
D/I 1	Display digital input 1 Press and hold ENTER key to show status of DIGIN1 (DIN1=1 or DIN1=0).
D/I 2	Display digital input 2 Press and hold ENTER key to show status of DIGIN2 (DIN2=1 or DIN2=0).
D/I 3	Display digital input 3 Press and hold ENTER key to show status of DIGIN3 (DIN3=1 or DIN3=0).
D/I 4	Display digital input 4 Press and hold ENTER key to show status of DIGIN4 (DIN4=1 or DIN1=0).
D/O 1	Set digital output 1 to High Press and hold ENTER key to set digital output 1 to High (DO1=HI).
D/O 2	Set digital output 2 to High Press and hold ENTER key to set digital output 2 to High (DO2=HI).
D/O 3	Set digital output 3 to High Press and hold ENTER key to set digital output 3 to High (DO3=HI).
D/O 4	Set digital output 4 to High Press and hold ENTER key to set digital output 4 to High (DO4=HI).
A/O 1	Set analog output 1 to full scale Press and hold ENTER key to set analog output 1 to its full-scale value.
A/O 2	Set analog output 2 to full scale Press and hold ENTER key to set analog output 2 to it full-scale value.
DEFLT	Default parameters Press setup switch and ENTER key at the same time to reset configuration and calibration parameters to factory default values. Load cells must be recalibrated before using the indicator (see Section 4.0 on page 27).
XMTEDP	Transmit “U” through EDP port Press and hold ENTER key to send ASCII “U” characters (decimal 85) from the serial port.
XMTPRN	Transmit “U” through PRN port Press and hold ENTER key to send ASCII “U” characters (decimal 85) from the serial port.
ECHO R	Echo received characters Press and hold ENTER key to view a string of characters terminated with a carriage return <CR> received at either serial port.

Table 7-7. Test Menu Functions

8.0 Appendix B

This section describes procedures for connecting the analog and digital I/Os, fiber optic and serial communication cables to the *320IS* .

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

8.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the *320IS* to ensure all components are included and undamaged. The shipping carton should contain the *320IS* , Installation Manual (PN 78076), and a parts kit. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

8.2 Enclosure Disassembly

The *320IS* enclosure must be opened to connect cables for load cells, communications, and power.

WARNING ***The I/O Module has does not have an on/off switch. Before opening the unit, ensure the power is disconnected.***

8.3 Installation of the I/O Module

The following section describes the wiring of various ports of the *320IS* . Table 8-1 below lists the connectors of the main board of the *320IS* . See Figure 8-1 for port locations.

Connector	Description
CN1	Analog Outputs
CN2	EDP Port
CN3	Printer Port
CN4	Digital Inputs
CN5	Relay Outputs
CN8	DC Power
Optical Input	Light Port
Optical Output	Light Port

Table 8-1. I/O Module Wiring Ports

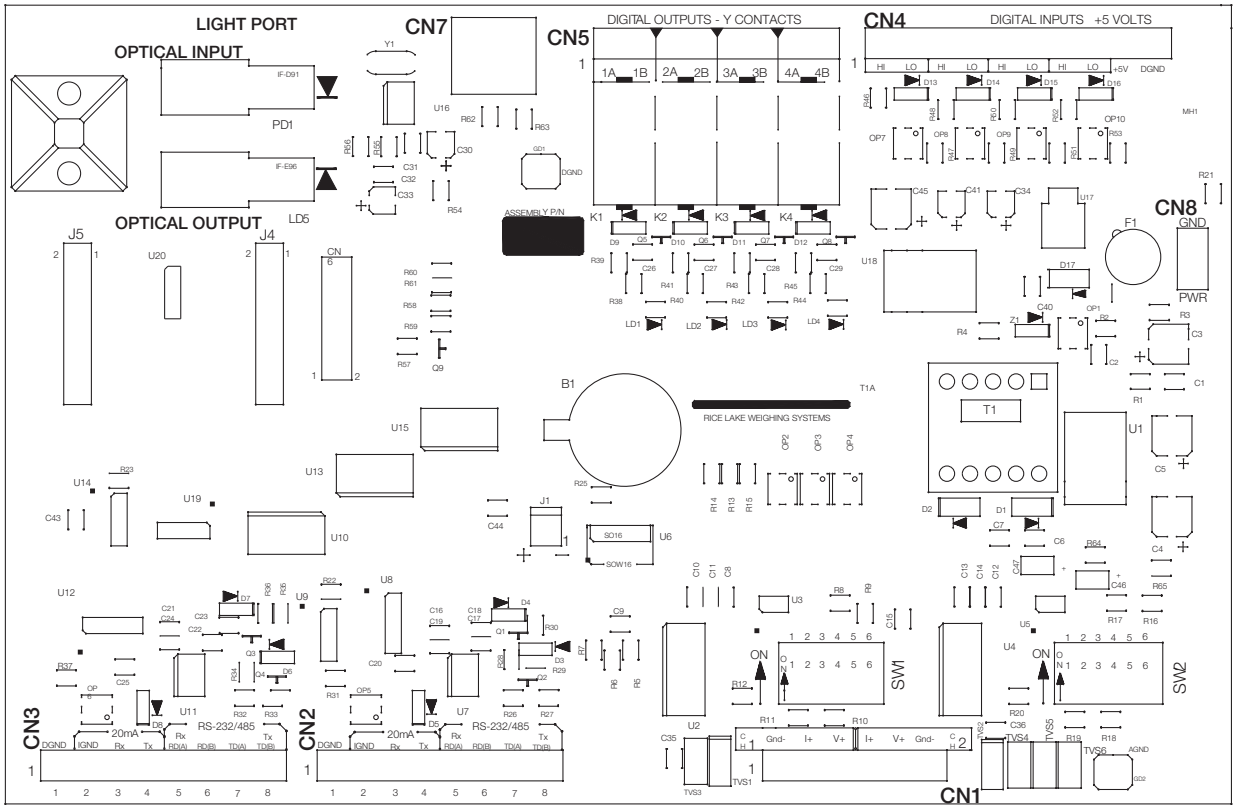


Figure 8-1. I/O Module Board

The *320IS* must be installed in a safe area. The internal power supply unit provides DC voltage for the *320IS* 's main board. The DC power requirements of the I/O panel are as follows:

- Nominal input voltage: 7.5V
- Peak current consumption: 930mA
- Average input current: 630mA

The DC power cable should be attached to connector CN8. Care should be taken to apply the correct DC polarity. Power connection of the main board is listed in Table 8-2.

Pin	Description	Wire Color
1	+VDC	Green
2	Ground	Brown

Table 8-2. Power Connections (CN8)

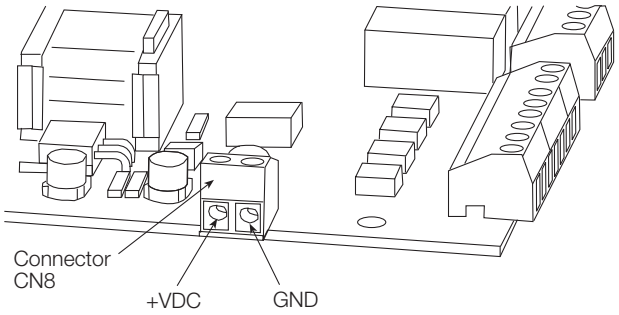


Figure 8-2. CN8 - DC Power Connector

8.3.1 AC Wiring/Installation

The *320IS* is to be permanently mounted with a readily accessible disconnect device incorporated in the building installation wiring. All wiring is to be done in accordance with the National Electric Code (NEC).

8.3.2 EDP and Printer Ports

The indicator communicates with external devices through the *320IS* located in a remote location. The I/O board serves as a gateway with several types of communication interfaces (RS-232, RS-422, RS-485, and 20mA current loop). The following sections explain how to install and configure the communication interfaces to establish serial communications with peripheral devices.

8.3.3 RS-232 Communications

To attach a PC or other device to the *320IS* 's RS-232 ports, select RS-232 standard in the indicator SERIAL menu for the appropriate port (EDP and/or printer). EDP and printer ports should be configured separately. See Table 8-3 below for information on connecting RS-232 communications.

Pin	Description (Sign)
1	Signal Ground (GND)
2	—
3	—
4	—
5	Receive Data (RXD)
6	—
7	—
8	Transmit Data (TXD)

Table 8-3. RS-232 Connections (CN2 and CN3)

8.3.4 RS-485 Communications

To attach a PC or other device to the *320IS*'s RS-485 ports, select RS-485 standard in the indicator SERIAL menu for the desired port (EDP and/or printer). EDP and printer ports should be configured separately. See Table 8-4 below for information on connecting RS-485.

Pin	Description (Sign)
1	Signal Ground (GND)
2	—
3	—
4	—
5	—
6	—
7	RS-485 line (A)
8	RS-485 line (B)

Table 8-4. RS-485 Connections (CN2 and CN3)

8.3.5 RS-422 Communications

To attach a PC or other device to the *320IS* 's RS-422 ports, select RS-422 standard in the indicator SERIAL menu for the desired port (EDP and/or printer). EDP and printer ports should be configured separately. See Table 8-5 below for information on connecting RS-422 communications.

Pin	Description (Sign)
1	Signal Ground (GND)
2	—
3	—
4	—
5	RS-422 input (R+)
6	RS-422 input (R-)
7	RS-422 output (T+)
8	RS-422 output (T-)

Table 8-5. RS-422 Connections (CN2 and CN3)

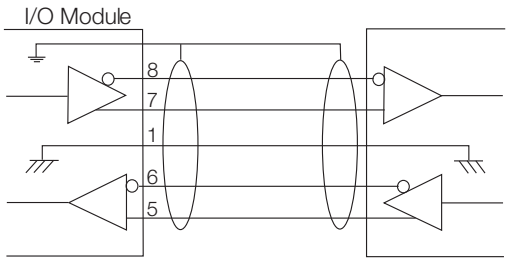


Figure 8-3. Typical RS-422 Wiring Paths

8.3.6 20mA Current Loop

To attach a PC or other device to the *320IS* 's 20mA ports, select current loop (CRLOOP) standard in the indicator SERIAL menu for the desired port (EDP and/or printer). EDP and printer ports should be configured separately. See Table 8-6 below for information on connecting 20mA current loop.

Pin	Description (Sign)
1	Signal Ground (GND)
2	Isolated Ground (GNDx)
3	Receive Data (RCL) Passive
4	Transmit Data (TCL) Active
5	—
6	—
7	—
8	—

Table 8-6. 20mA Current Loop Connections (CN2 and CN3)

8.4 Fiber Optics Assembly

The *320IS* is equipped with duplex fiber optic ports for communicating with other devices located in the safe or hazardous area. It provides electrical isolation and eliminates the use of I/O barriers commonly used in intrinsically safe systems. The fiber optic wires are plastic; no polishing or further preparation is required. See Figure 8-1 on page 48 for the location of the fiber optic ports on the *320IS* main board.

Note ***The fiber optic connections between the indicator and the 320IS need to be cross-linked. The optical output of the indicator should be attached to the input of the320IS , and the indicator's input to the module's output.***

Use the following steps for assembling the fiber optics connectors of the *320IS* :

1. Cut off the ends of the fiber optic cable with a single-edge razor blade or sharp knife. Try to obtain a precise 90º angle.
2. Insert the fiber through the locking nut and into the connector until the core tip seats against the internal micro-lens.
3. Screw the connector locking nut down to a snug fit, locking the fiber in place.
4. Secure duplex fiber optic cable to wire tie mounting button located on I/O Module circuit board (see Figure 8-1 on page 48) using wire ties included in parts kit.

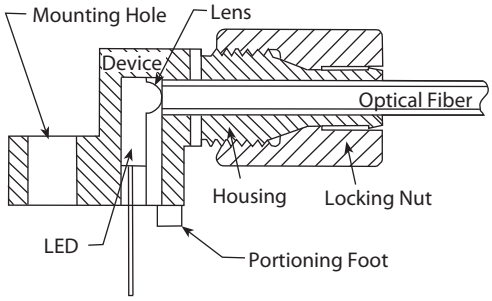


Figure 8-4. Fiber Optics Connector

8.5 Analog Outputs

The *320IS* uses two 16-bit isolated analog output channels with 4-20mA and voltage (0-5V/±5V/0-10V/±10V) outputs supplied from a DC/DC converter. The output voltage ranges are DIP-switch selectable (see Figure 8-1 on page 48). Analog output configuration is done via setup mode in the indicator used with the *320IS* (see the applicable indicator installation manual).

The analog output circuitry consists of two identical channels that can be assigned to gross or net weight values. The analog outputs can be configured to operate as either current or voltage outputs. The voltage output range is selected by configuring DIP switches SW1 (1-6) for channel 1 and SW2 (1-6) for channel 2 (see Figure 8-1 on page 48).

Range	SW1-1 SW2-1	SW1-2 SW2-2	SW1-3 SW2-3	SW1-4 SW2-4	SW1-5 SW2-5	SW1-6 SW2-6
0–5V	OFF	OFF	OFF	ON	X	X
0–10V	OFF	ON	X	OFF	ON	X
±5V	ON	OFF	OFF	OFF	ON	X
±10V	ON	OFF	ON	OFF	OFF	ON

Table 8-7. Analog Output Range Configurations

The analog output port is powered by an isolated DC-DC converter. The outputs available on connector CN1 are listed in Table 8-8 below. See Figure 8-1 on page 48 for the location of CN1 and DIP switches.

Pin	Name
1	Ground (Analog Output 1 Common)
2	Analog Output 1 (current)
3	Analog Output 1 (voltage)
4	Analog Output 2 (current)
5	Analog Output 2 (voltage)
6	Ground (Analog Output 2 Common)

Table 8-8. CN1 Connectors

8.6 Digital Inputs

The *320IS* has four digital inputs that can be used to control pre-defined operations in the indicator. Table 8-9 outlines the various functions for the digital inputs.

Digital inputs are available on connector CN4 (see Figure 8-1 on page 48). All inputs are individually isolated via optocouplers. Table 8-9 outlines the pin connections for CN4.

Pin	State	Description
1	Hi	Digital Input 1 (+V)
2	Low	Ground 1 (–V)
3	Hi	Digital Input 2 (+V)
4	Low	Ground 2 (–V)
5	Hi	Digital Input 3 (+V)
6	Low	Ground 3 (–V)
7	Hi	Digital Input 4 (+V)
8	Low	Ground 4 (–V)
9	Hi	+5V
10	Low	DGND

Table 8-9. CN4 Connections

The digital inputs are designed to receive 0-24V/TTL signals on the incoming lines. Care should be taken to apply the right DC polarity. Pins 9 and 10 (+5V and DGND) can be used to supply power to the digital inputs. Maximum current draw should not exceed 0.25A.

See the applicable indicator installation manual for information on checking current digital input states.

8.7 Relay Contact Outputs

The *320IS* features four relay contact outputs, which default to open. This allows switching of maximum +30VDC, 5A or 250VAC, 5A for each of the four digital channels.

The relay contact outputs are controlled by user-configurable setpoints. The setpoint values and operating parameters can be defined in the SETPNT menu of the host indicator. See the indicator installation manual for information on configuring setpoints.

Table 8-10 show pin connections for CN5 of the *320IS* board.

Pin	Description
1	Output 1_A
2	Output 1_B
3	Output 2_A
4	Output 2_B
5	Output 3_A
6	Output 3_B
7	Output 4_A
8	Output 4_B

Table 8-10. CN5 Connections

The states of the relay contacts are indicated by LEDs LD1–LD4 (see Figure 8-1 on page 48). When an LED is lit, the contacts of the corresponding relay are closed. See the applicable indicator installation manual for information on checking relay contact functionality.

8.8 I/O Module Mounting

The *320IS* is capable of being mounted to any surface in the safe area using the mounting holes of the enclosure (see Figure 8-5 on page 53). Use 1/4" or larger mounting hardware.

Note *Mounting surface must be capable of holding four times the weight of the 320IS and wiring.*

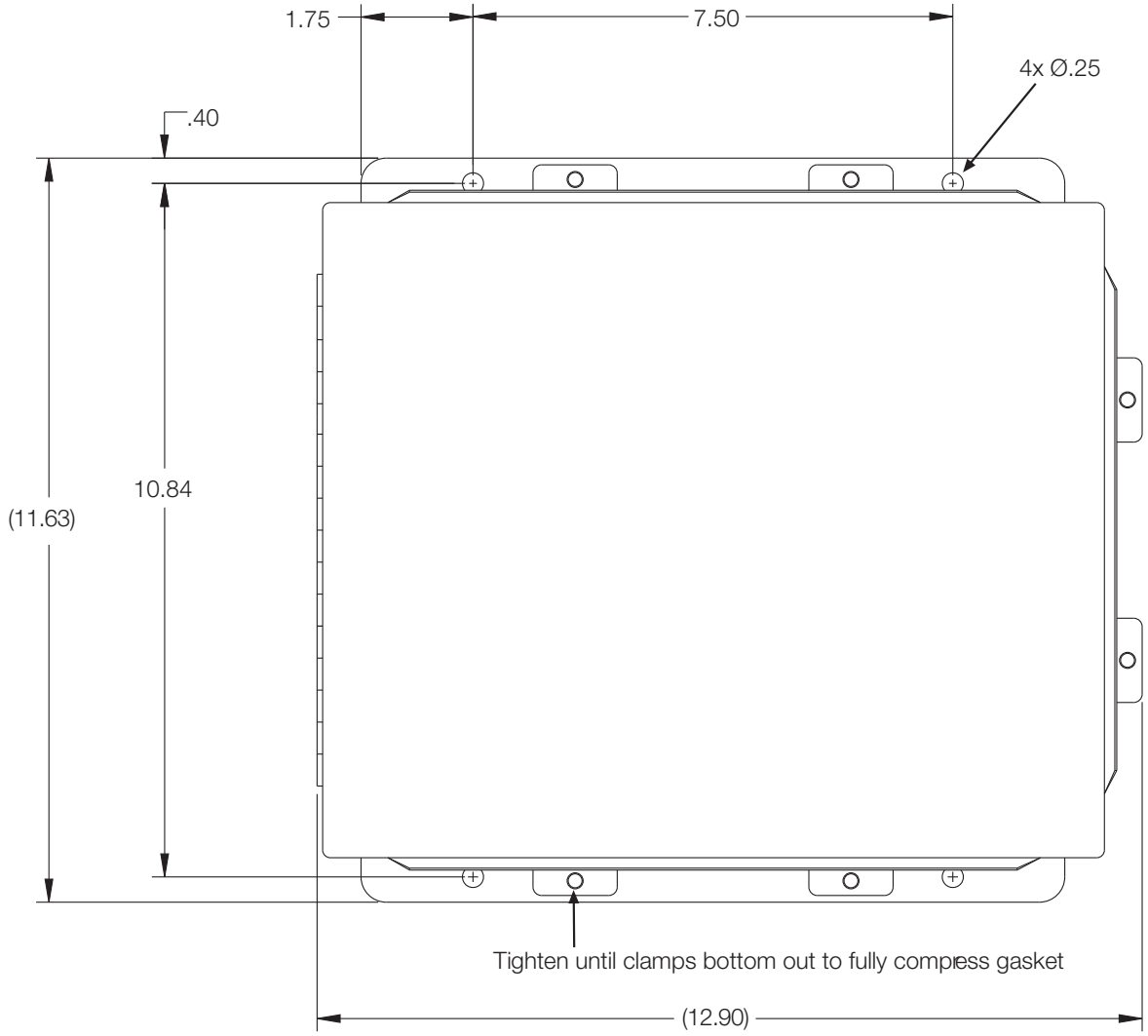


Figure 8-5. 320IS Enclosure Dimensions

Refer to 320IS Installation Manual (PN 78076) for a complete parts list.

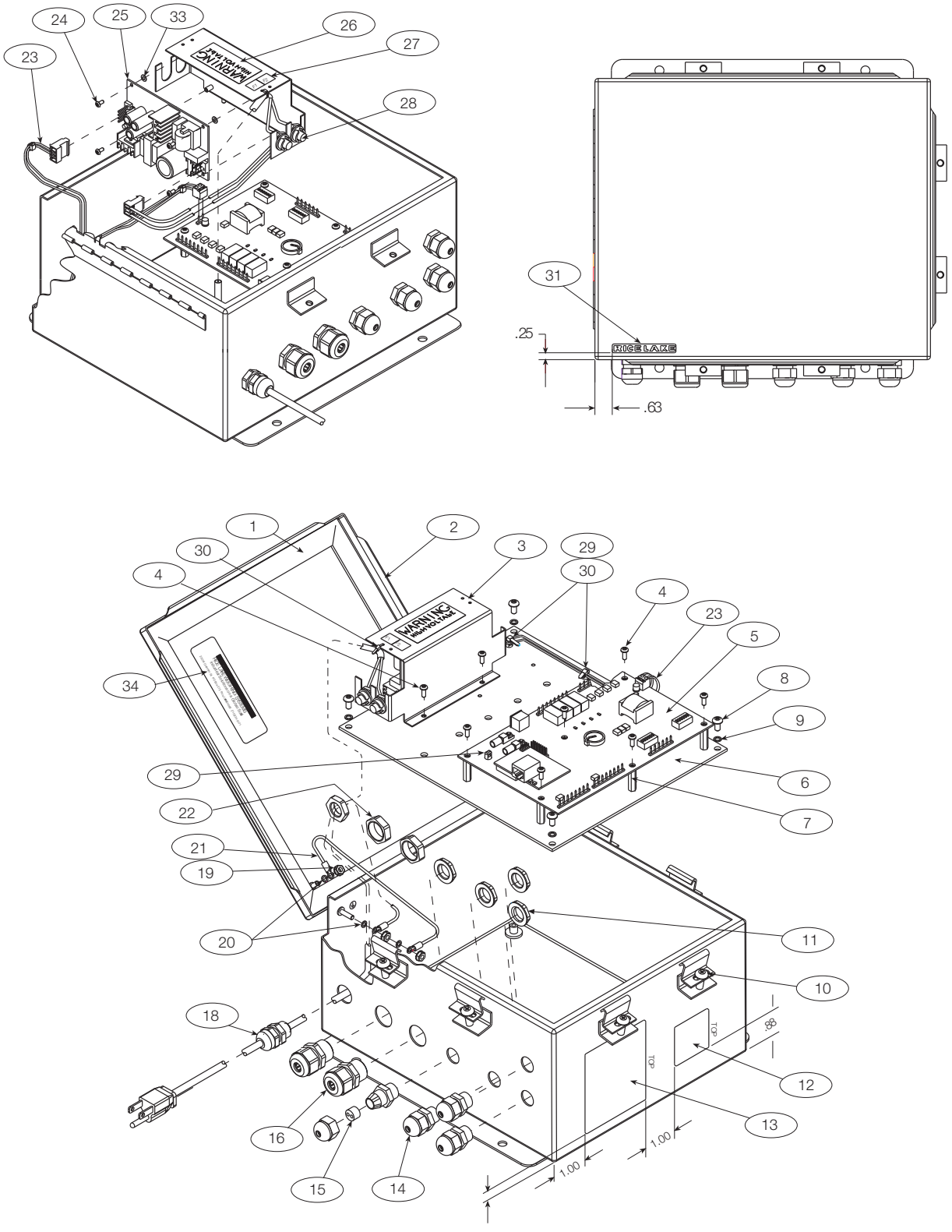


Figure 8-6. 320IS Assembly

8.9 320IS Specifications

Power

Nominal Voltage	Intrinsically safe power supply (7.5 VDC output) or optional 6 VDC battery
Minimum Voltage	5.8 VDC
Maximum Voltage	7.9 VDC
Current Consumption	100 mA average 175 mA maximum (4 x 350Ω load cells)
Maximum Surface Temperature	T4
Fusing	2 x 125 mA, fully-encapsulated (RLWS PN 82432)

Analog Specifications

Full Scale Input Signal	Up to 22.5 mV
Load Cell Excitation	4.3VDC (350Ω); 4.6VDC (700Ω)
Load Cell Current	34 mA (4 x 350Ω or 8 x 700Ω load cells)
Analog Signal Input Range	-0.5 mV/V to 4.5 mV/V
Analog Signal Sensitivity	0.3 µV/graduation minimum, 1.5 µV/grad. recommended
Input Impedance	200 MΩ typical
Internal Resolution	8,000,000 count
Display Resolution	100 000 dd maximum
Measurement Rate	Up to 60 measurements/sec.
System Linearity	Within 0.01% of full scale
Zero Stability	150 nV/°C, maximum
Span Stability	3.5 ppm/°C, maximum
Calibration Method	Software, constants stored in EEPROM
RFI Protection	Signal, excitation, and sense lines protected by capacitor bypass
ESD/Transient Protection	600 watt PPD, Transient voltage suppressors IEC 6100-4-2 ± 8 kv contact ± 15 kv air discharge

Digital Specifications

Microcomputer	Phillips PXAG30K processor @ 22.1184 MHz
Digital Filter	RATTLETRAP™ digital filtering

Optical Port

Physical Medium	2.2mm plastic fiber @ 640 nm
Max Transmission Length	246 ft. (75 m)

Operator Interface

Display	6-digit LED display. 16-segment, 0.8 in (20 mm) digits
LED annunciators	Gross, net, center of zero, standstill, lb/ primary units, kg/secondary units, count, tare
Front Panel	6-key flat membrane panel (including power on/off button)

Environmental

Operating Temperature	–10 to +40°C (14 to +104°F)
Storage Temperature	–25 to +70°C (-13 to +158°F)
Humidity	0–95% relative humidity

Enclosure

Enclosure Dimensions	9.5 in x 6 in x 2.75 in 24 cm x 15 cm x 7 cm
Weight	2.8 Kg (6.1 lb)
Rating/Material	UL Type 4X/IP-66

Certifications and Approvals

FM APPROVED FM #0Z0AZ.AX

NTEP
CoC Number 03-078
Accuracy ClassIII/III L
n_{max}: 10 000

c UL us LISTED File Number: E151461

320IS 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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