

IQ plus® 355

Digital Weight Indicator
Version 1.17

Installation Manual



RICE LAKE®
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About This Manual

This manual is intended for use by service technicians responsible for installing and servicing IQ plus® 355 digital weight indicators. This manual applies to indicators using Version 1.1 of the IQ plus 355 software. See Section 7.10 on page 45 for a summary of software changes included in this release.

Configuration and calibration of the indicator can be accomplished using the indicator front panel keys, the EDP command set, or Version 2.5 or later of the Revolution™ 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.



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

The *Operator Card* included with this manual provides basic operating instructions for users of the IQ plus 355. Please leave the *Operator Card* with the indicator when installation and configuration are complete.

1.0 Introduction

The IQ plus 355 is a single-channel digital weight indicator housed in a NEMA 4X/IP66-rated stainless steel enclosure. The indicator front panel consists of a large (.8 in, 20 mm), six-digit, seven-segment LED display and five-button keypad. Features include:

- Drives up to eight 350Ω or sixteen 700Ω load cells
- Supports 4- and 6-wire load cell connections
- Two configurable digital inputs
- Electronic data processing (EDP) port for full duplex, RS-232 communications at up to 9600 bps
- Printer port for output-only RS-232 and 20 mA current loop communications at up to 9600 bps
- Optional analog output module provides 0–10 VDC or 4–20 mA tracking of gross or net weight values
- Available in 115 VAC and 230 VAC versions

The IQ plus 355 is NTEP-certified and Measurement Canada approved for Classes III, III HD, and III L at 10,000 divisions. See Section 7.11 on page 46 for detailed specifications.

1.1 Operating Modes

The IQ plus 355 has three modes of operation:

Normal (weighing) mode

Normal mode is the “production” mode of the indicator. The indicator displays gross or net weights as required, using the LED annunciations described in Section 1.3 on page 2 to indicate scale status and the type of weight value displayed. Once configuration is complete and a legal seal is affixed to the back of the indicator, this is the only mode in which the IQ plus 355 can operate.

Setup mode

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

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

Test mode

Test mode provides a number of diagnostic functions for the IQ plus 355 indicator. Like setup mode, test mode is entered using the setup switch. See Section 7.9 on page 44 for more information about entering and using test mode.

1.2 Front Panel Keypad

Figure 1-1 on page 2 shows the IQ plus 355 LED annunciations, keypad, and normal mode key functions.

The symbols shown under 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.

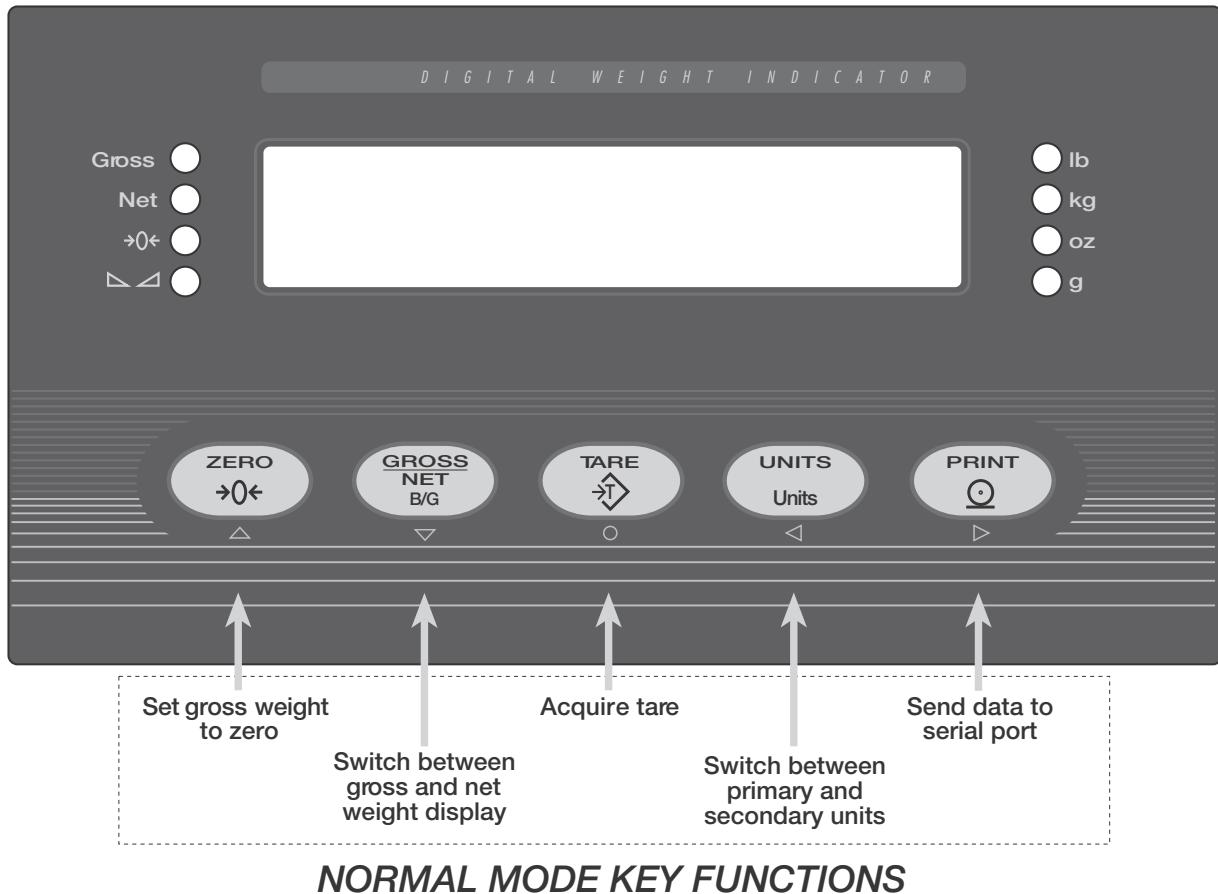


Figure 1-1. IQ plus 355 Front Panel, Showing LED Annunciations and Normal Mode Key Functions

1.3 LED Annunciations

The IQ plus 355 display uses a set of eight LED annunciations to provide additional information about the value being displayed:

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

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

Table 1-1 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 for more information about configuring primary and secondary display units.

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

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

1.4 Indicator Operations

Basic IQ plus 355 operations are summarized below.

1.4.1 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.

Gross mode is shown by the **Gross** annunciator; net mode is shown by the **Net** annunciator.

1.4.2 Toggle Units

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

1.4.3 Zero Scale

1. In gross mode, remove all weight from the scale and wait for the standstill annunciator ($\Delta \Delta$).
2. Press the **ZERO** key. The center of zero ($\rightarrow 0 \leftarrow$) annunciator lights to indicate the scale is zeroed.

1.4.4 Acquire Tare

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

1.4.5 Remove Stored Tare Value

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

1.4.6 Print Ticket

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

2.0 Installation

This section describes procedures for connecting load cells, digital inputs, and serial communications cables to the IQ plus 355 indicator. Instructions for field installation of the analog output option and replacement of the CPU board are included, along with assembly drawings and parts lists for the service technician.

Caution

- *Use a wrist strap to ground yourself and protect components from electrostatic discharge (ESD) when working inside the indicator enclosure.*
- *This unit uses double pole/neutral fusing which could create an electric shock hazard. Procedures requiring work inside the indicator must be performed by qualified service personnel only.*
- *The supply cord serves as the power disconnect for the IQ plus 355. The power outlet supplying the indicator must be installed near the unit and be easily accessible*

2.1 Unpacking and Assembly

Immediately after unpacking, visually inspect the IQ plus 355 to ensure all components are included and undamaged. The shipping carton should contain the indicator with attached tilt stand, this manual, and a parts kit. If any parts were damaged in shipment, notify Rice Lake Weighing Systems and the shipper immediately.

The parts kit contains the items listed below:

- Capacity, identification, and annunciator labels. Annunciator labels (PN 53374) provide replacement overlay decals for labeling primary and secondary units LEDs.
- 6-position screw terminal (PN 70599) for connector J1 and a 7-position screw terminal (PN 70600) for connector J4 (see Figure 2-3 on page 5).
- 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 2-4 on page 7).
- Four 8-32NC x 3/8 machine screws (PN 14862) for the indicator backplate (see #24 in Figure 2-5 on page 9).
- 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.

- Two ferrites (PN 66730), used to reduce susceptibility to radiate electromagnet interference and EMI installation instructions (PN 67970).
- Three each of grounding clamps (PN 67550), external tooth lock washers (PN 15133), and kep nuts (PN 14676) for cable shield grounding against the backplate.

2.2 Enclosure Disassembly

The indicator enclosure must be opened to connect cables for load cells, communications, digital inputs, and analog output.

Warning *The IQ plus 355 has no on/off switch. Before opening the unit, ensure the power cord 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 Cable Connections

The IQ plus 355 provides four cord grips for cabling into the indicator: one for the power cord, three to accommodate load cell, communications, digital inputs, and analog output cables. Two of the three free cord grips come with a plug installed to prevent moisture from entering the enclosure. Depending on your application, remove the plug from any cord grip that will be used and install cables as required.

NOTE: Because the IQ plus 355 has no on/off switch, the power cord serves as the power disconnect. The power outlet must be located close enough to the indicator to allow the operator to easily disconnect power to the unit.

Figure 2-1 shows the recommended assignments for the IQ plus 355 cord grips.

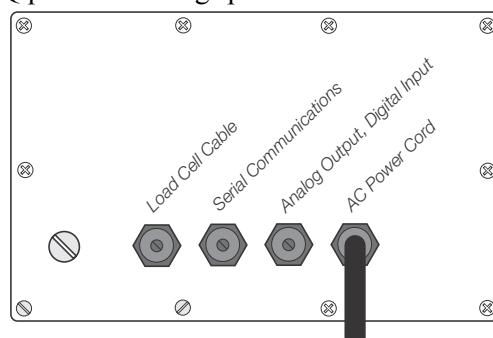


Figure 2-1. Recommended Cord Grip Assignments

2.3.1 Cable Grounding

Except for the power cord, all cables routed through the cord grips should be grounded against the indicator backplate. Do the following to ground shielded cables:

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

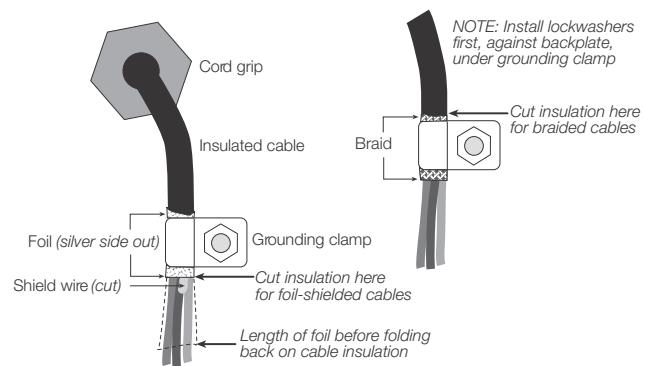


Figure 2-2. Grounding Clamp Attachment for Foil-Shielded and Braided Cabling

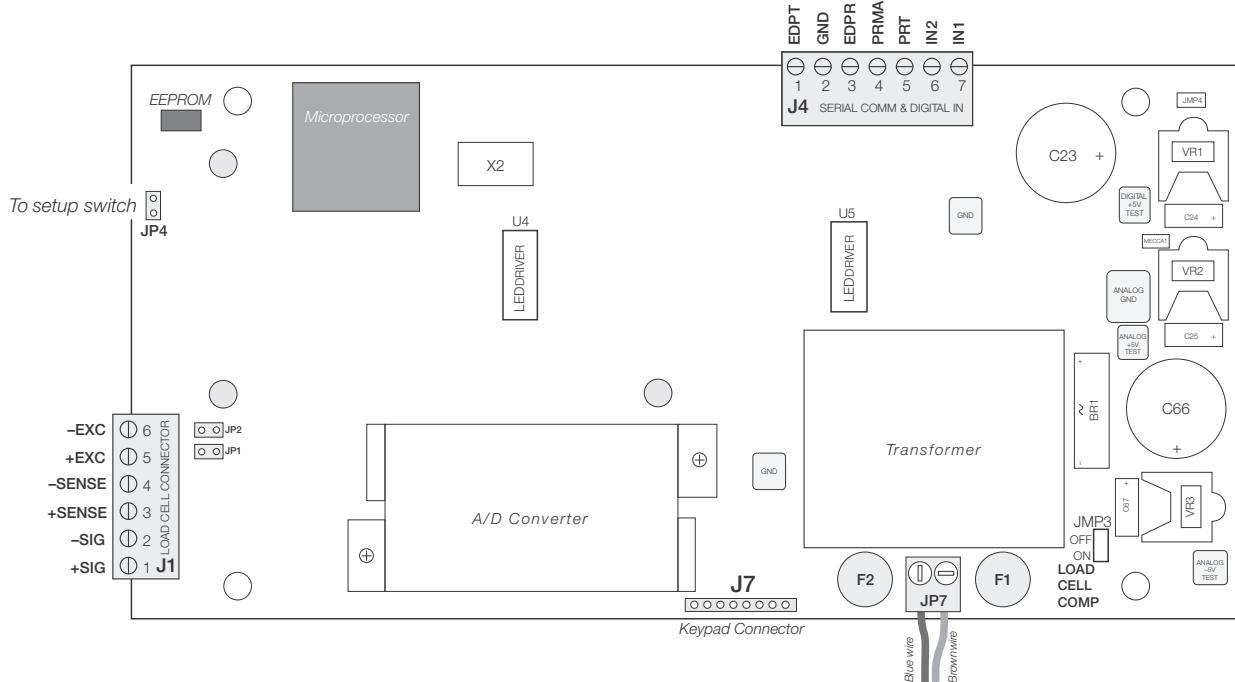


Figure 2-3. IQ plus 355 CPU and Power Supply Board

2.3.2 Load Cells

To attach cable from a load cell or junction box, remove connector J1 from the board. The connector plugs into a header on the board as shown in Figure 2-6 on page 10.

NOTE: Early versions of the IQ plus 355 CPU board used a 7-pin load cell connector. The 7-pin connector is not compatible with the current 6-pin header.

Wire the load cell cable from the load cell or junction box to connector J1 as shown in Table 2-1. If using 6-wire load cell cable (with sense wires), remove jumpers JP1 and JP2 before reinstalling connector J1 (see Figure 2-3). For 4-wire installation, leave jumpers JP1 and JP2 on.

When connections are complete, reinstall connector J1 onto the header so that it snaps securely into place. Use two cable ties to secure the load cell cable to the inside of the enclosure.

J1 Pin	Function
1	+SIG
2	-SIG
3	+SENSE
4	-SENSE
5	+EXC
6	-EXC

NOTES:

- Use grounding procedure described in Section 2.3.1 on page 5.
- For 6-wire connections, remove jumpers JP1 and JP2.

Table 2-1. J1 Pin Assignments

Setting the Load Cell Compensation Jumper

The load cell compensation jumper (above the A/D converter location on the CPU board; see Figure 2-3 on page 5) must be set ON for load cells with unbalanced bridges. The compensation jumper has the effect of lowering the positive excitation voltage. Uncompensated unbalanced load cells can cause instability or calibration errors.

For RL1040 and RL1042 load cells, set the compensation jumper as follows:

- RL1040 load cells: jumper OFF
- RL1042 load cells: jumper ON

For other load cell types, use the following procedure to determine the correct jumper position:

1. Disconnect load cell from indicator and use an ohmmeter to measure the following:
 - +EXC to +SIG, +EXC to -SIG
 - -EXC to +SIG, -EXC to -SIG

Measured values between the excitation line and each of the signal lines should be within 2–3Ω.

2. If the +EXC measurements are ≥ 5% larger than the -EXC measurements, set the compensation jumper in the ON position. If the +EXC measurements are < 5% greater (or are less) than the -EXC measurements, set the jumper in the OFF position.

2.3.3 Serial Communications and Digital Inputs

To attach serial communications and digital input cables, remove connector J4 from the board. Connector J4 provides connections for the EDP (Electronic Data Processing) port, printer port, and two digital inputs. Connect communications and digital input cables to connector J4 as shown in Table 2-2.

Once cables are attached, reconnect J4 to the header on the board (see Figure 2-6 on page 10). Use cable ties to secure serial and digital input cables to the inside of the enclosure.

The EDP port supports RS-232 communications only; the printer port provides either active 20 mA output or RS-232 transmission. Both ports are configured using the SERIAL menu. See Section 3.0 on page 12 for configuration information.

Digital inputs can be set to provide several indicator functions, including all keypad functions. The inputs are active (on) with low voltage (0 VDC) and can be driven by TTL or 5V logic without additional hardware. Use the DIG IN menu to configure the digital inputs.

Port	J4 Pin	Label	Function
EDP Port	1	EDPT	RS-232 TxD
	2	GND	RS-232 Ground / -20 mA OUT
	3	EDPR	RS-232 RxD
Printer Port	4	PRMA	+20 mA OUT
	5	PRT	RS-232 TxD
Digital Inputs	6	IN2	Digital Input 2
	7	IN1	Digital Input 1

Table 2-2. J4 Pin Assignments

2.3.4 Analog Output

If the optional analog output module is installed, attach the output cable to connector J1 on the analog output board. Table 2-3 lists the analog output pin assignments.

Use the ALGOUT menu to configure and calibrate the analog output module when cabling is complete. See Section 2.4 for information about installing the analog output module.

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

Table 2-3. Analog Output Module Pin Assignments

2.4 Analog Output Module Installation

To install or replace the analog output module, follow the steps listed in Section 2.2 on page 4 for opening the IQ plus 355 enclosure.

Mount the analog output module on its standoffs in the location shown in Figure 2-3 on page 5 and plug the module input into connector J5 on the IQ plus 355 board. Connect output cable to the analog output module as shown in Table 2-3, then reassemble the enclosure (Section 2.5).

See Section 7.8 on page 43 for analog output calibration procedures.

2.5 Enclosure Reassembly

Once cabling is complete, position the backplate over the enclosure and reinstall the backplate screws. Use the torque pattern shown in Figure 2-4 to prevent distorting the backplate gasket. Torque screws to 15 in-lb (1.7 N-m).

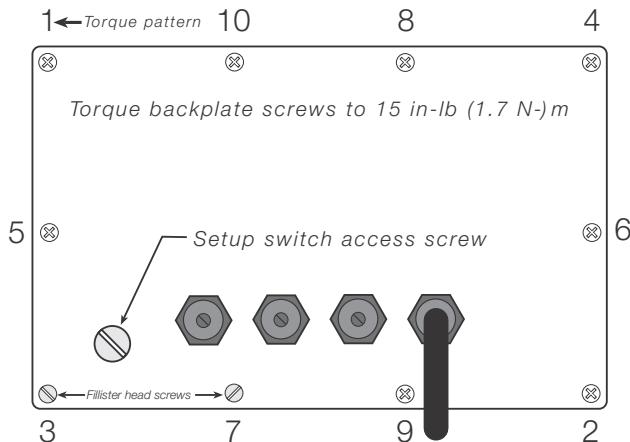


Figure 2-4. IQ plus 355 Enclosure Backplate

2.6 Board Removal

If you must remove the IQ plus 355 CPU board, use the following procedure:

1. Disconnect power to the indicator. Loosen cord grips and remove backplate as described in Section 2.2 on page 4.
2. Unplug connectors J1 (load cell cable), J4 (serial communications and digital inputs), J7 (keypad ribbon cable), and JP4 (setup switch). Remove blue and brown power input wires at JP7. If an analog output board is installed, disconnect the analog output cable. See Figure 2-3 on page 5 for connector locations.
3. Remove the four nuts from the corners of the CPU board, then lift the board out of the enclosure.

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

2.7 Replacement Parts

Table 2-4 lists replacement parts for the IQ plus 355, including all parts referenced in Figures 2-5 through 2-9.

Ref Number	PN	Description (Quantity)	Figure
1	14626	Kep nuts, 8-32NC hex (3)	Figure 2-5 on page 9, Figure 2-8 on page 11
2	52211	Display and CPU board assembly, 115 VAC (1)	Figure 2-6 on page 10
	52210	Display and CPU board assembly, 230 VAC (1)	
3	15365	Board mounting spacers (4)	
4	39017	Enclosure backplate (1)	Figure 2-5 on page 9
5	15626	Cable grips, PG9 (3)	
6	30375	Nylon seal rings for cable grips (3)	
7	15627	Locknuts, PCN9 (3)	
8	19538	Cable grip plugs (2)	
9	45042*	Sealing washers (4)	
10	44676	Sealing washer for setup switch access screw (1)	
11	42640	Setup switch access screw, 1/4 x 28NF x 1/4 (1)	
12	41965	Power cord assembly, 115VAC (1)	Figure 2-5 on page 9, Figure 2-7 on page 11
	45254	Power cord assembly, 230VAC (1)	
13	41964	Line filter assembly (1)	Figure 2-7 on page 11
14	14621	Kep nuts, 6-32NC hex (4)	Figure 2-6 on page 10
16	68403	Four-cornered wing knobs for tilt stand (2)	Figure 2-5 on page 9
	30342	Two-cornered wing knobs for tilt stand (2)	
17	29635	Tilt stand (1)	
18	15144	Nylon washers for tilt stand, 1/4x1x1/16 (2)	
20	15134	Lock washers, internal tooth, No. 8 , Type A (4)	
22	50556	Overlay membrane panel (1)	Figure 2-9 on page 11
23	50555	Enclosure (1)	
24	14862*	Screws, 8-32C x 3/8 (4)	Figure 2-5 on page 9
26	45043	Ground wire, 4-in., No. 8 (1)	
27	39037	Backplate gasket (1)	Figure 2-5 on page 9
28	51974	Setup switch assembly (1)	Figure 2-7 on page 11
29	16892	Ground/Earth Label (1)	
30	15650*	Cable tie mounts (8)	Figure 2-6 on page 10
31	45302	Line filter standoffs (2)	Figure 2-7 on page 11
33	15131	Lock washers, external tooth, No. 6, Type A (8)	Figure 2-6 on page 10
—	70600	7-position connectors for J4, and J12 (2)	Figure 2-3 on page 5
—	70599	6-position connectors for J1 (1)	
—	53848	200 mA TR5 subminiature fuses (2), 115 VAC	F1 and F2 in Figure 2-3 on page 5 (See Caution below)
	53881	100 mA TR5 subminiature fuses (2), 230 VAC	

* Additional parts included in parts kit.



Caution For protection against risk of fire, replace fuses only with same type and rating fuse.

See Section 7.11 on page 46 for complete fuse specifications.

Table 2-4. Replacement Parts

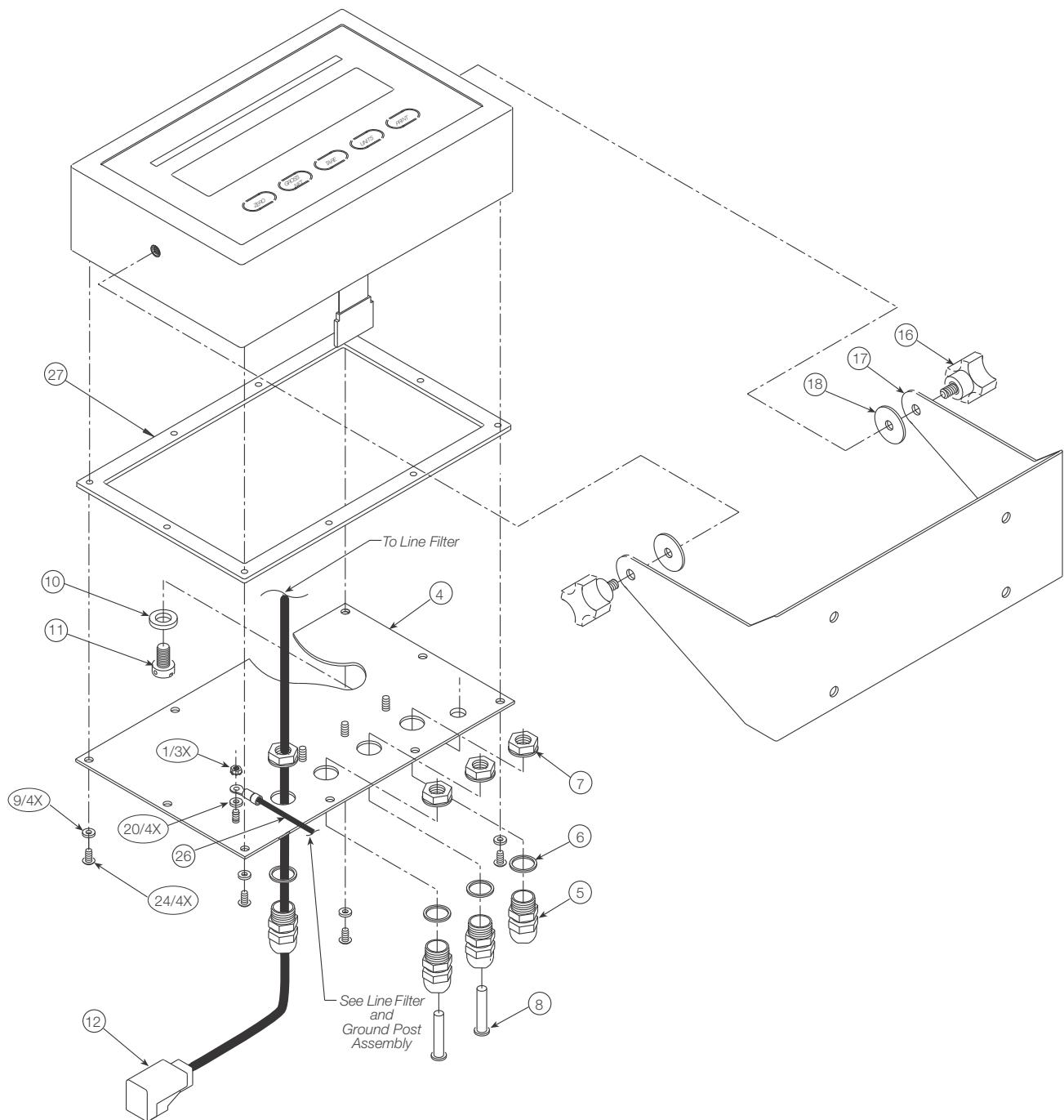


Figure 2-5. IQ plus 355 Backplate and Tilt Stand Assemblies

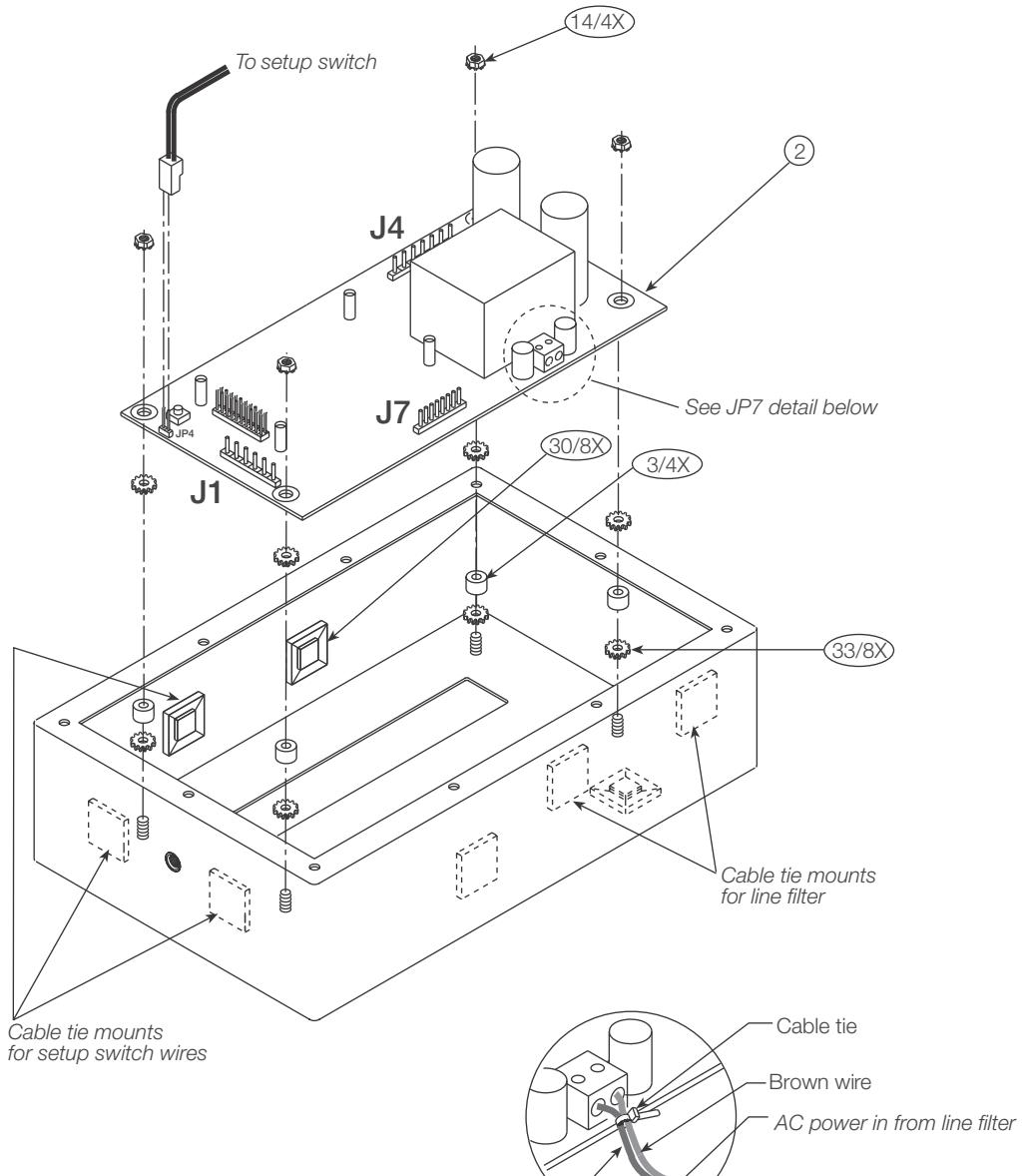


Figure 2-6. IQ plus 355 Enclosure and CPU Board

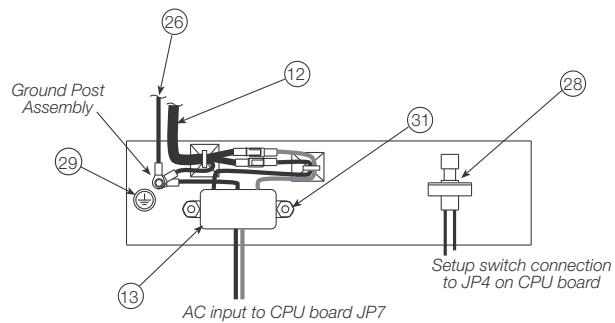


Figure 2-7. Line Filter Assembly

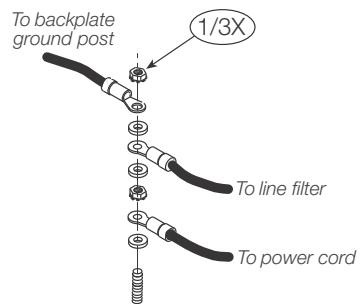


Figure 2-8. Ground Post Assembly

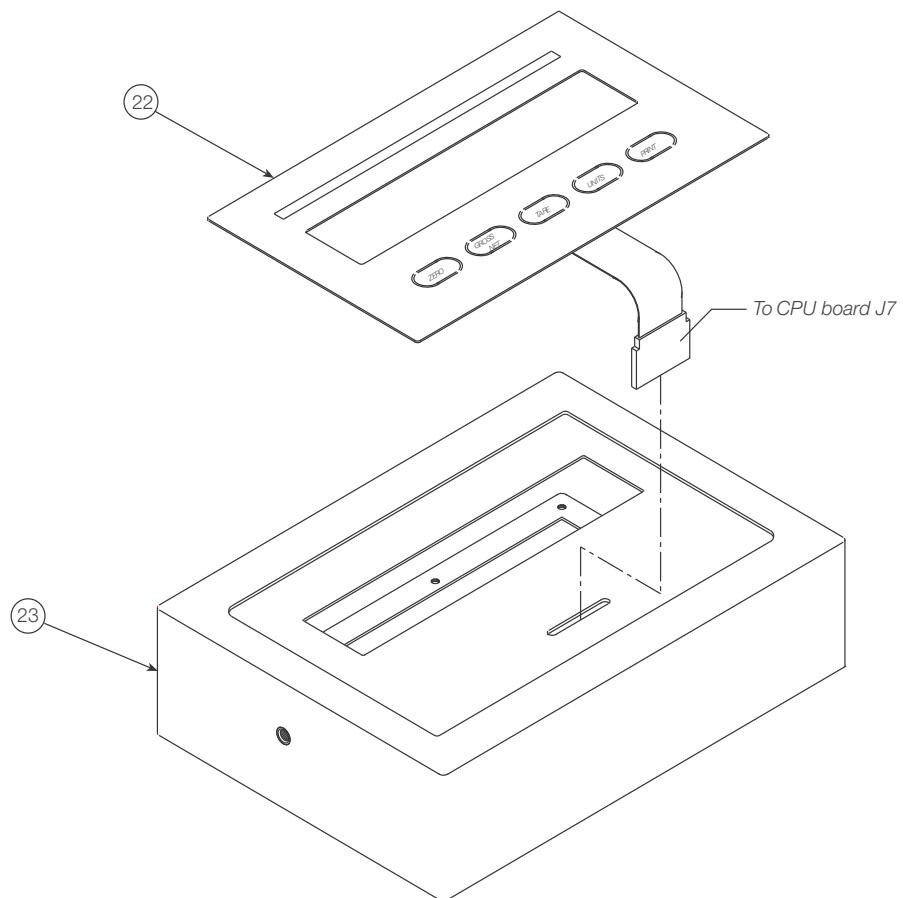


Figure 2-9. IQ plus 355 Enclosure and Overlay

3.0 Configuration

To configure the IQ plus 355 indicator, the indicator must be placed in setup mode. The setup switch is accessed by removing the large fillister head screw on the enclosure backplate. Switch position is changed by inserting a screwdriver into the access hole and pressing the switch.

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

3.1 Configuration Methods

The IQ plus 355 indicator can be configured by using the front panel keys to navigate through a series of configuration menus or by sending commands or configuration data to the EDP port. Configuration using the menus is described in Section 3.1.3.

Configuration using the EDP port can be accomplished using either the EDP command set described in Section 6.0 or Version 2.5 or later of the Revolution™ configuration utility.

3.1.1 Revolution Configuration

The Revolution configuration utility provides the preferred method for configuring the IQ plus 355 indicator. Revolution runs on a personal computer to set configuration parameters for the indicator. When Revolution configuration is complete, configuration data is downloaded to the indicator.

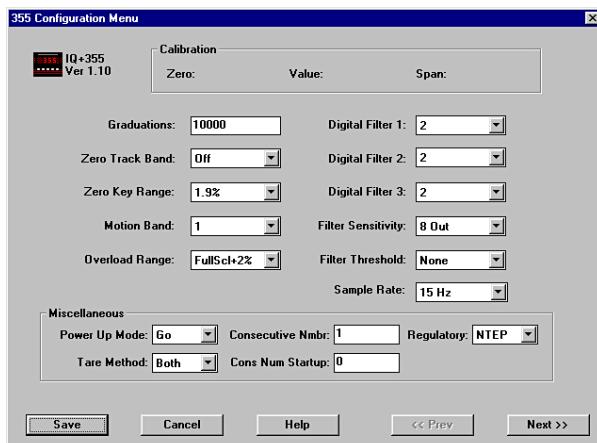


Figure 3-1. Sample Revolution Configuration Display

Revolution 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® 3.11 or Windows 95. Minimum system requirements are 4MB of extended memory and at least 5MB of available hard disk space.
2. With both indicator and PC powered off, connect the PC serial port to the RS-232 pins on the indicator EDP port.
3. Power up the PC and the indicator. Use the setup switch to place the indicator in setup mode.
4. Start the Revolution program.

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

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

3.1.2 EDP Command Configuration

The EDP command set can be used to configure the IQ plus 355 indicator using a personal computer, terminal, or remote keyboard. Like Revolution, EDP command configuration sends commands to the indicator EDP port; unlike Revolution, EDP commands can be sent using any external device capable of sending ASCII characters over a serial connection.

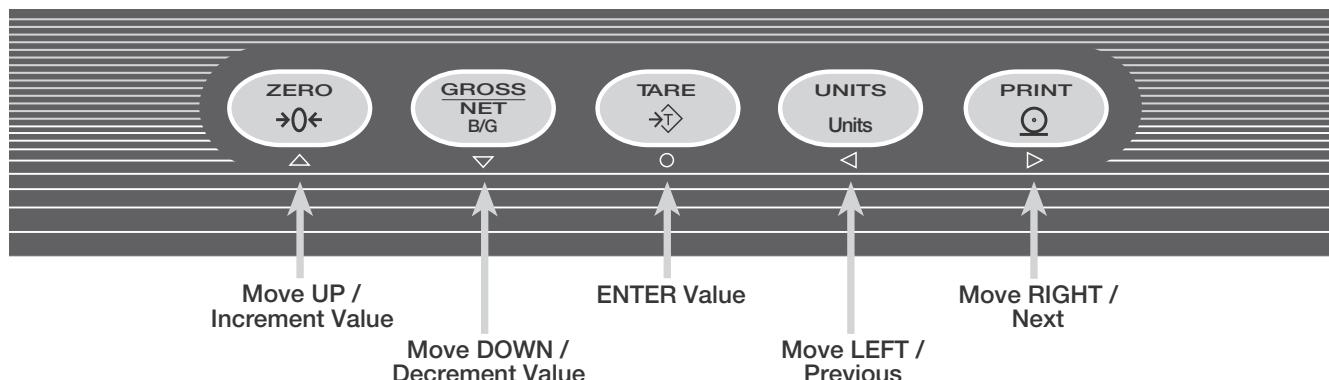
EDP commands duplicate the functions available using the indicator front panel and provide some functions not otherwise available. EDP commands can be used to simulate pressing front panel keys, to configure the indicator, or to dump lists of parameter settings. See Section 6.0 on page 29 for more information about using the EDP command set.

3.1.3 Front Panel Configuration

The IQ plus 355 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, sample rate, and digital filtering parameters.
FORMAT	Format	Set format of primary and secondary units, display rate.
CALIBR	Calibration	Calibrate indicator. See Section 4.0 on page 24 for calibration procedures.
SERIAL	Serial	Configure EDP and printer serial ports.
PROGRM	Program	Set power-up mode, regulatory mode, and consecutive number values.
P FORMT	Print Format	Set print format used for gross and net tickets. See Section 6.0 for more information.
DIG IN	Digital Input	Assign digital input functions.
ALGOUT	Analog Output	Configure analog output module. Used only if analog output option is installed.
VERSION	Version	Display installed software version number.

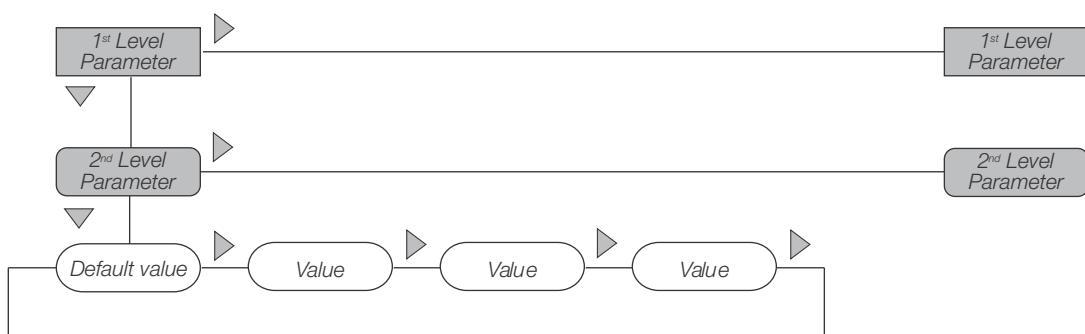
Table 3-1. IQ plus 355 Menu Summary



SETUP MODE KEY FUNCTIONS

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 under each of these keys identifies the direction provided by the key when navigating through the setup menus.



When moving through values below the first menu level, press ▲ to return to the level above. Press ○ or ▽ to move to the next parameter on the level above.

Figure 3-3. Setup Mode Menu Navigation

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

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



00000

When editing numeric values, press \triangleleft or \triangleright to change the digit selected. Press \triangleup or \triangledown to increment or decrement the value of the selected digit.

Press \circ to save the value entered and return to the level above.

Figure 3-4. Editing Procedure for Numeric Values

3.2 Menu Structures and Parameter Descriptions

The following sections provide graphic representations of the IQ plus 355 menu structures. In the actual menu structure, the settings you choose under each parameter are arranged horizontally. To save page space, menu choices are shown in vertical columns. The factory default setting appears at the top of each column.

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

3.2.1 Configuration Menu

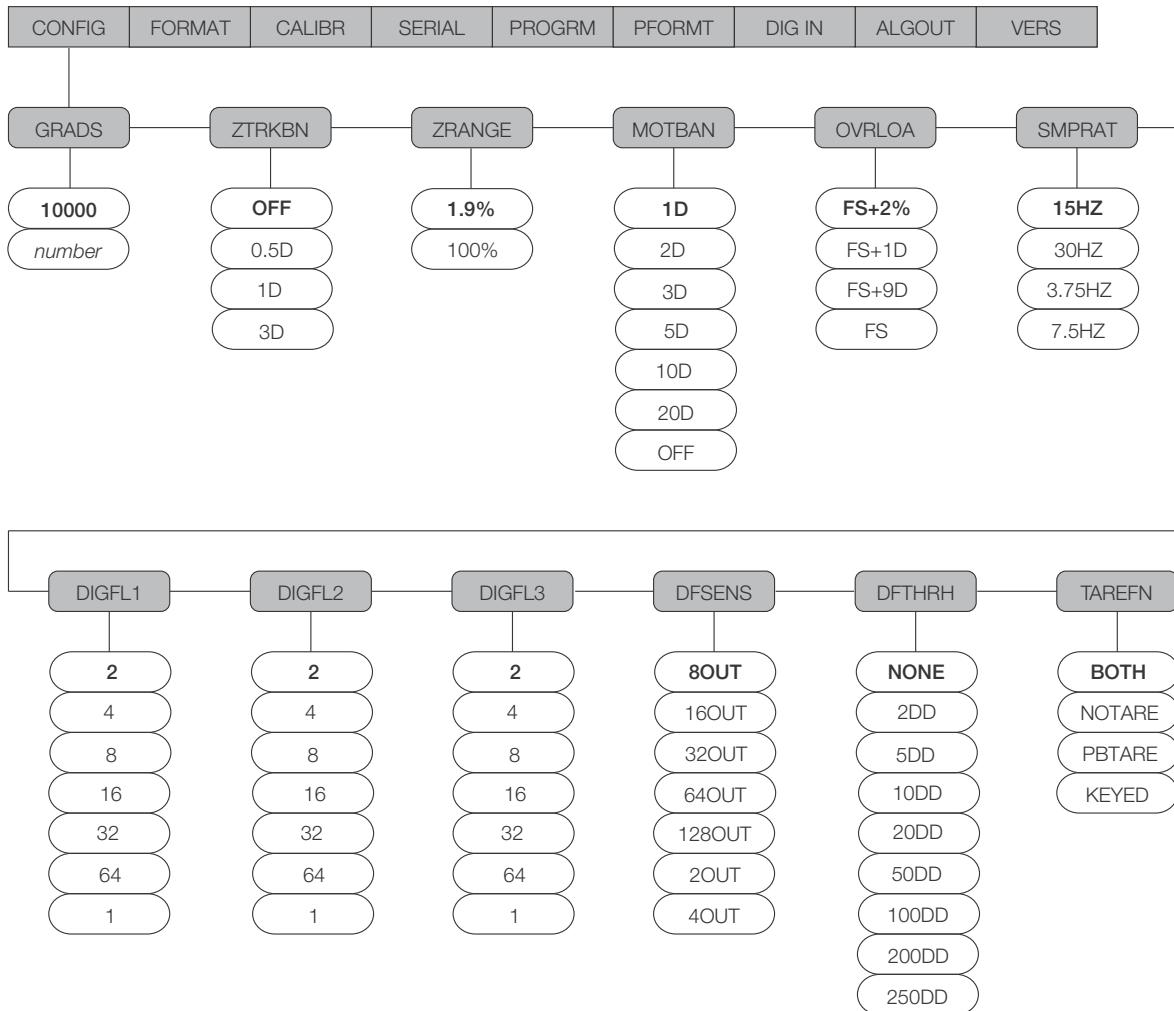


Figure 3-5. Configuration Menu

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 \pm 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 $\pm 1.9\%$ 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 1 second or more, the standstill symbol lights. Some operations, including print, tare, and zero, require the scale to be at standstill. Maximum legal value varies depending on local regulations. If 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 3.75HZ 7.5HZ	Sample rate. Selects measurement rate, in samples per second, of the analog-to-digital converter. Lower sample rate values provide greater signal noise immunity.
DIGFL1 DIGFL2 DIGFL3	2 4 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. Choices indicate the number of A/D conversions that are averaged to obtain the displayed reading. A higher number gives a more accurate display by minimizing the effect of a few noisy readings, but slows down the settling rate of the indicator. See Section 7.7 on page 42 for more information on digital filtering.
DFSENS	8OUT 16OUT 32OUT 64OUT 128OUT 256OUT 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

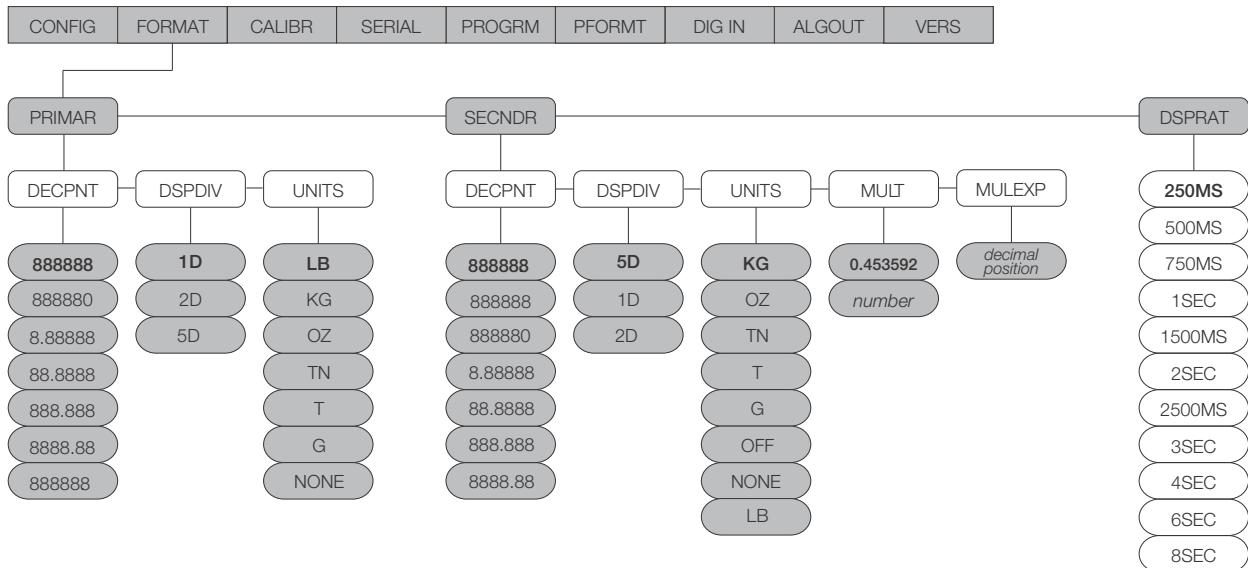


Figure 3-6. Format Menu

FORMAT Menu		
Parameter	Choices	Description
Level 2 submenus		
PRIMAR	DECPTN DSPDIV UNITS	Specifies the decimal position, display divisions, and units used for the primary units. See Level 3 submenu parameter descriptions.
SECNDR	DECPTN DSPDIV UNITS MULT MULEXP	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 1500MS 2SEC 2500MS 3SEC 4 SEC 6SEC 8SEC	Display rate. Sets the update rate for displayed values. Values are in milliseconds (MS) or seconds (SEC).

Table 3-3. Format Menu Parameters

FORMAT Menu		
Parameter	Choices	Description
<i>Level 3 submenus</i>		
Primary Units (PRIMAR Parameter)		
DECPNT	888888 888880 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.
DSPDIV	1D 2D 5D	Display divisions. Selects the minimum division size for the primary units displayed weight. Note: Additional display divisions are available by entering the EDP command 2349171 in configuration. Selection for 3,4,6,7,8,9,25, and 35 are available when this configuration command is saved.
UNITS	LB KG OZ TN T G NONE	Specifies primary units for displayed and printed weight. Values are: LB=pound; KG=kilogram; OZ=ounce; TN=short ton; T=metric ton; G=gram. NOTE: Indicators sold outside North America are configured with KG for both primary and secondary units.
Secondary Units (SECNDR Parameter)		
DECPNT	88888.8 888888 888880 8.88888 88.8888 888.888 8888.88	Decimal point location. Determines the location of the decimal point or dummy zeros in the secondary unit display.
DSPDIV	5D 1D 2D	Display divisions. Selects the value of minimum division size of the displayed weight.
UNITS	KG OZ TN T G OFF NONE LB	Specifies secondary units for displayed and printed weight. Values are: KG=kilogram; OZ=ounce; TN=short ton; T=metric ton; G=gram; LB=pound.
MULT	0.453592 <i>Enter other choices via keyboard</i>	Multiplier. Specifies the conversion factor by which the primary units are multiplied to obtain the secondary units. The default is 0.453592, which is the conversion factor for changing pounds to kilograms. NOTE: This parameter does not display the decimal point location for some values less than 1; use the MULEXP parameter to shift the decimal position of the multiplier. See Section 7.6 on page 41 for a list of multipliers. To toggle between primary and secondary units, press the UNITS key.
MULEXP	<i>decimal position</i>	Multiplier exponent. Sets the decimal position for multiplier values.

Table 3-3. Format Menu Parameters (Continued)

3.2.3 Calibration Menu

See Section 4.0 on page 24 for calibration procedures.

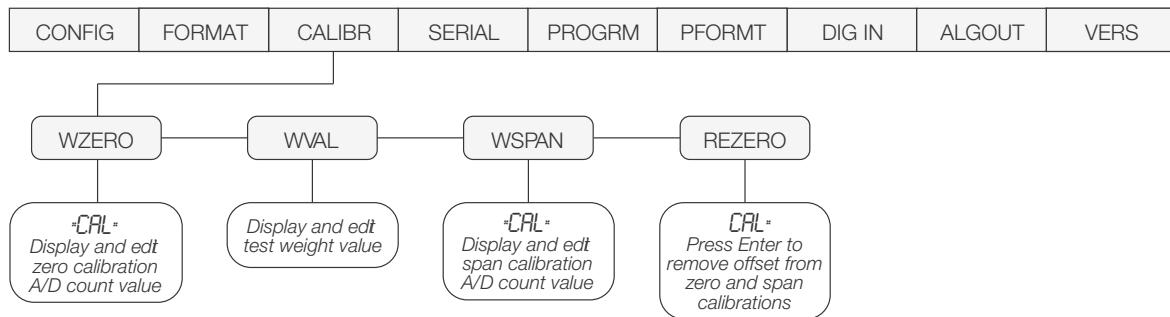


Figure 3-7. Calibration Menu

CALIBR Menu		
Parameter	Choices	Description
<i>Level 2 submenus</i>		
WZERO	—	Display and edit the zero calibration A/D count value. <i>DO NOT adjust this value after WSPAN has been set!</i>
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 24 for more information about using this parameter.

Table 3-4. Calibration Menu Parameters

3.2.4 Serial Menu

See Section 7.3 on page 37 for information about the IQ plus 355 serial data format.

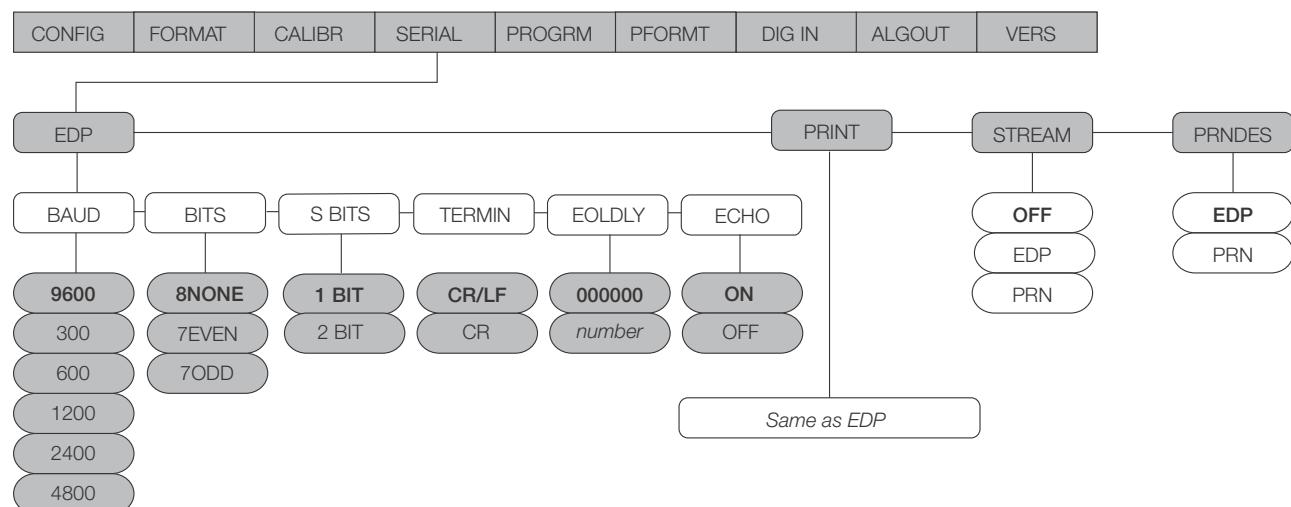


Figure 3-8. Serial Menu

SERIAL Menu		
Parameter	Choices	Description
Level 2 submenus		
EDP	BAUD BITS TERMIN EOLDLY	Specifies settings for baud rate, data bits, termination characters, and end-of-line delay used by the EDP port.
PRINT	BAUD BITS TERMIN EOLDLY	Specifies settings for baud rate, data bits, termination characters, and end-of-line delay used by the printer port.
STREAM	OFF EDP PRN	Selects the serial port used for continuous transmission. See Section 7.3 on page 37 for information about the IQ plus 355 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		
BAUD	9600 300 600 1200 2400 4800	Baud rate. Selects the transmission speed for the EDP or printer port.
BITS	8NONE 7EVEN 7ODD	Selects number of data bits and parity of data transmitted from the EDP or printer port.
S BITS	1 BIT 2 BIT	Selects the number of bits transmitted after each character.
TERMIN	CR/LF CR	Termination character. Selects termination character for data sent from the EDP or printer port.
EOLDLY	0 number	End-of-line delay. Sets the delay period, in 0.1-second intervals, from when a formatted line is terminated to the beginning of the next formatted serial output. Value specified must be in the range 0-255, in tenths of a second (10 = 1 second).
ECHO	ON OFF	This command enables or disables echoing of the serial commands sent to the indicator.

Table 3-5. Serial Menu Parameters

3.2.5 Program Menu

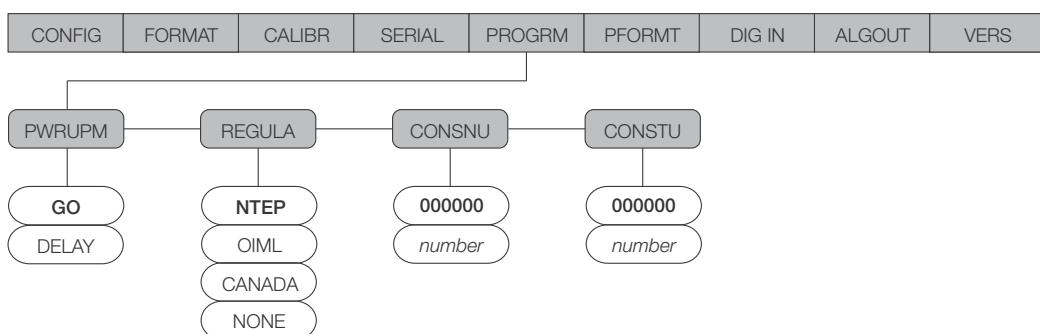


Figure 3-9. Program Menu

PROGRM Menu		
Parameter	Choices	Description
Level 2 submenus		
PWRUPM	GO DELAY	<p>Power up mode. In GO mode, the indicator goes into operation immediately after a brief power up display test.</p> <p>In DELAY mode, the indicator performs a power up display test, then enters a 30-second warm up period. If no motion is detected during the warm up period, the indicator becomes operational when the warm up period ends; if motion is detected, the delay timer is reset and the warm up period repeated.</p>
REGULA	NTEP OIML CANADA NONE	<p>Regulatory mode. Specifies the regulatory agency having jurisdiction over the scale site.</p> <ul style="list-style-type: none"> 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	<p>Consecutive numbering. Allows sequential numbering for print operations. The consecutive number value is incremented following each print operation.</p> <p>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.</p>
CONSTU	000000 number	Consecutive number start up value. Specifies the initial consecutive number (CONSNU) value used when the indicator is powered on.

Table 3-6. Program Menu Parameters

3.2.6 Print Format Menu

See Section 5.0 on page 27 for information about custom print formatting.

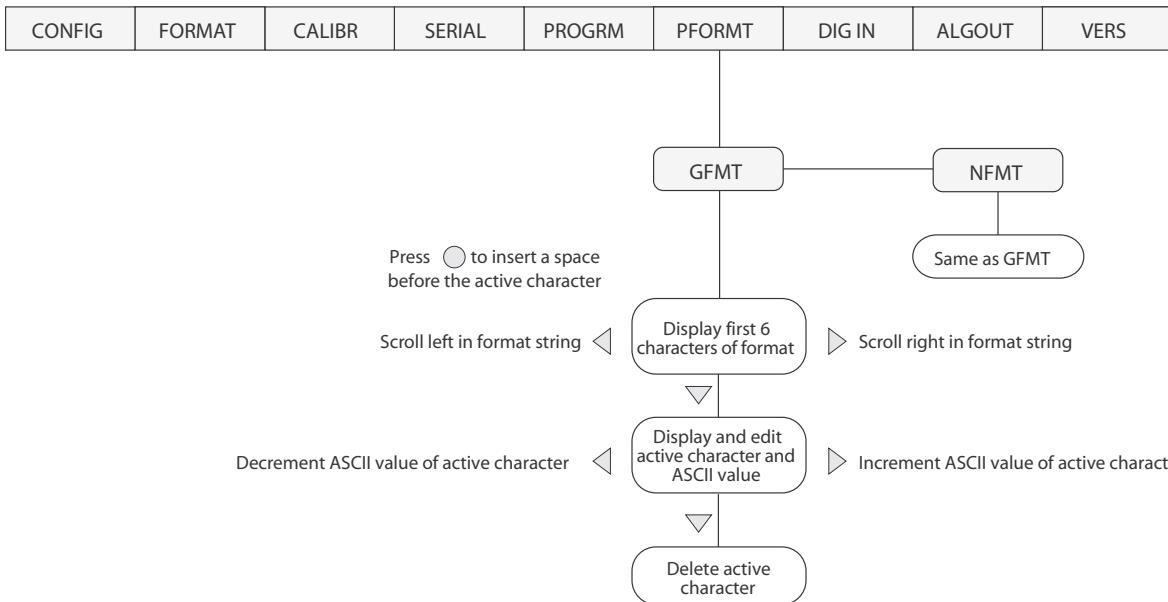


Figure 3-10. Print Format Menu

3.2.7 Digital Input Menu

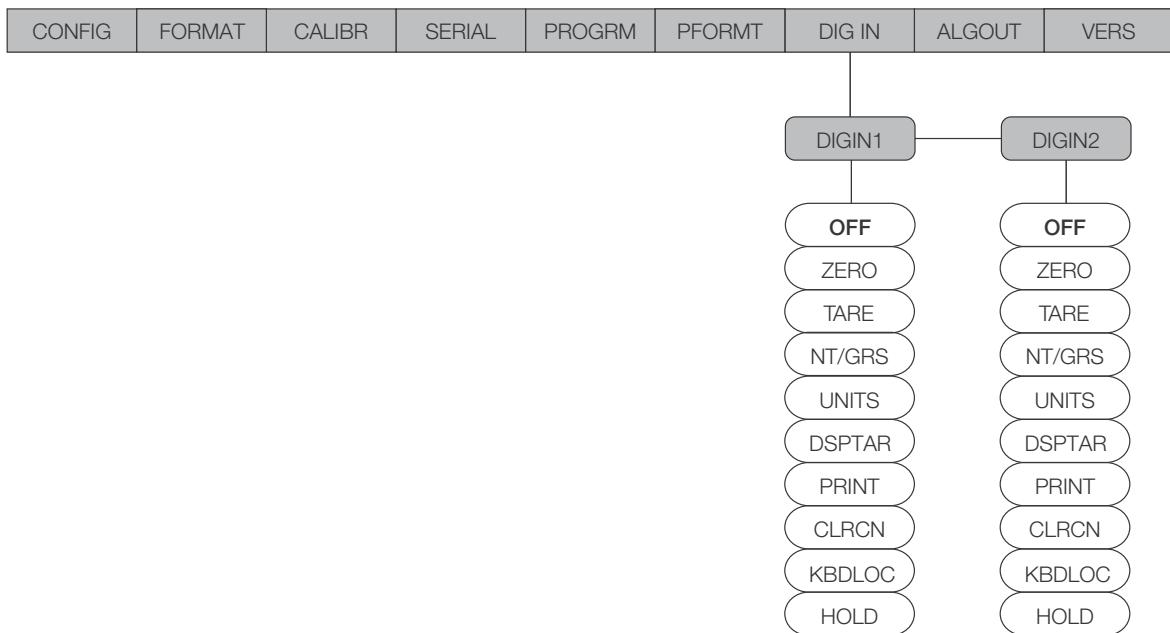


Figure 3-11. Digital Input Menu

DIG IN Menu		
Parameter	Choices	Description
<i>Level 2 submenus</i>		
DIGIN1 DIGIN2	OFF ZERO TARE NT/GRS UNITS DSPTAR PRINT CLRCN KBDLOC HOLD	<p>Specifies the function activated by digital inputs 1 and 2.</p> <ul style="list-style-type: none"> 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.

Table 3-7. Digital Input Menu Parameters

3.2.8 Analog Output Menu

The ALGOUT menu is used only if the analog output option is installed. If the analog output option is installed, configure all other indicator functions and calibrate the indicator (see Section 4.0 on page 24) before configuring the analog output. See Section 7.8 on page 43 for analog output calibration procedures.

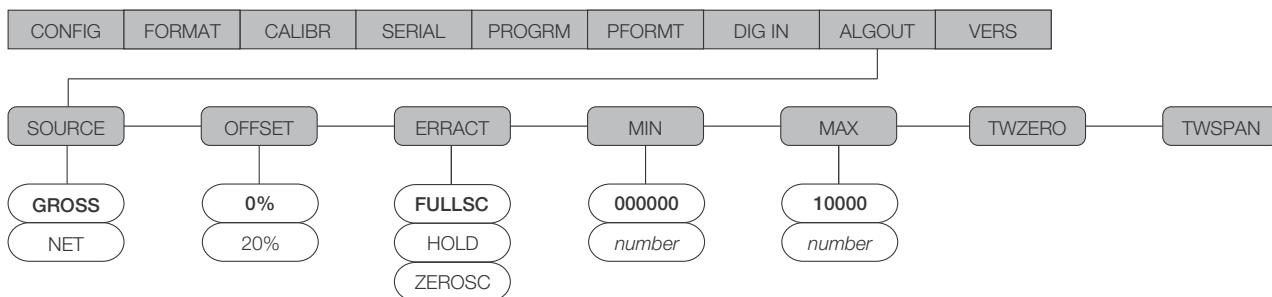


Figure 3-12. Analog Output Menu

ALG OUT Menu		
Parameter	Choices	Description
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 (0–10 V) or current (4–20 mA) output. Select 0% for 0–10 V output; select 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 (10 V or 20 mA) HOLD: Hold current value ZEROSC: Set to zero value (0 V or 4 mA)
MIN	000000 number	Specifies the minimum weight value tracked by the analog output. Specify a weight value (in primary units) in the range 0–999 990.
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	—	Tweak zero. Adjust the analog output zero calibration. Use a multimeter to monitor the analog output value. Press and hold Δ or ∇ to adjust the output. Press \circ to save the new value.
TWSPAN	—	Tweak span. Adjust the analog output span calibration. Use a multimeter to monitor the analog output value. Press and hold Δ or ∇ to adjust the output. Press \circ to save the new value.

Table 3-8. Analog Output Menu Parameters

3.2.9 Version Menu

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

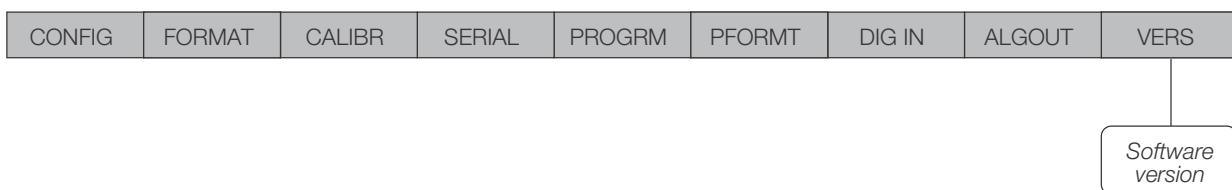


Figure 3-13. Version Menu

4.0 Calibration

The IQ plus 355 can be calibrated using the front panel, EDP commands, or the Revolution™ configuration utility. Each method consists of the following steps:

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

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

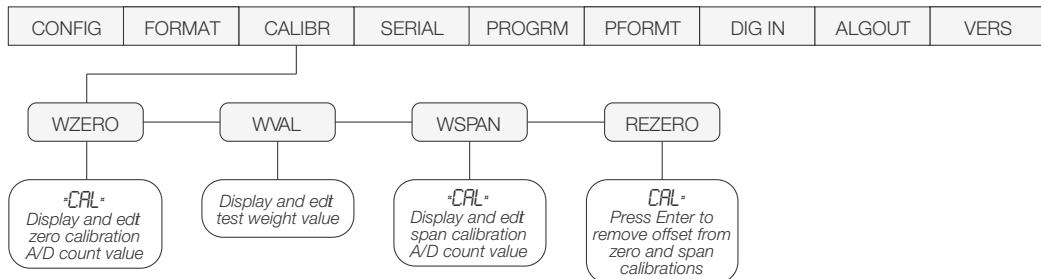


Figure 4-1. Calibration (CALIBR) Menu

4.1 Front Panel Calibration

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

1. Place the indicator in 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 \triangleright until the display reads *CALIBR* (see Figure 4-1). Press \triangledown to go to zero calibration (*WZERO*).
3. With *WZERO* displayed, press \circ 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 \circ 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 \circ to show the test weight value. Use the procedure shown in Figure 4-2 to enter the actual test weight, then press \circ to save the value and go to span calibration (*WSPAN*).
5. With *WSPAN* displayed, press \circ to calibrate span. The indicator displays **CAL** while calibration is in progress. When complete, the A/D count for the span calibration is displayed. Press \circ 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 Δ 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 \circ 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 \circ to save the value, then press Δ to return to the *CALIBR* menu.
7. Press \triangleleft until the display reads *CONFIG*, then press Δ to exit setup mode.

0 0 0 0 0

When editing numeric values, press \triangleleft or \triangleright to change the digit selected. Press Δ or ∇ to increment or decrement the value of the selected digit.

Press \circ to save the value entered and return to the level above.

Figure 4-2. Editing Procedure for Numeric Values

4.2 EDP Command Calibration

To calibrate the indicator using EDP commands, the indicator EDP port must be connected to a terminal or personal computer. See Section 2.3.3 on page 6 for EDP port pin assignments; see Section 6.0 on page 29 for more information about using EDP commands.

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

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

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

WVAL=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 indicator EDP port must be connected to a PC running the Revolution configuration utility.

Use the following procedure to calibrate the indicator:

1. Select *Calibrate Indicator* from the Revolution main menu.
2. On the Indicator Calibration display, select the indicator model (*IQ+355*) and communications port then click *OK*.
3. Revolution uploads calibration data from the indicator then presents the information in a display like that shown in Figure 4-3.

4. Enter the *Value of Test Weight* to be used for span calibration then click *OK*.
5. 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.
6. 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*.
7. 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*.

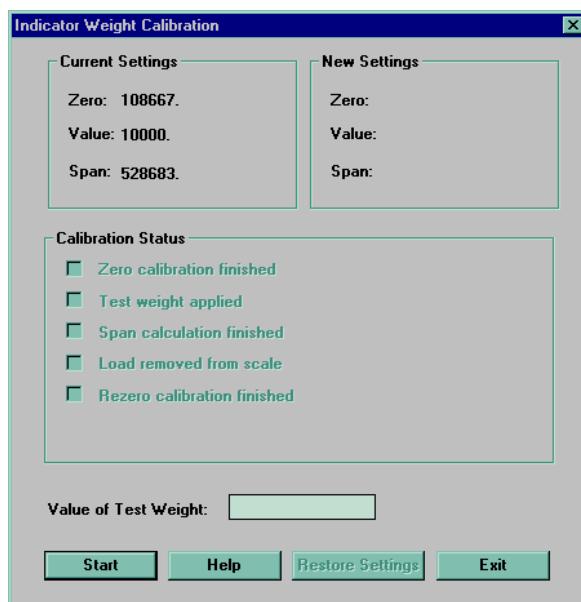


Figure 4-3. Revolution Calibration Display

4.4 More About Calibration

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

4.4.1 Adjusting Final Calibration

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

To adjust the final calibration, return to the *WVAL* prompt and press \circ to show the test weight value. Press Δ or ∇ to adjust calibration up or down. Press \circ to save the value, then press Δ to return to the CALIBR menu.

4.4.2 Zero Deadload A/D Counts

Table 4-1 lists the ideal A/D counts that result from input signals of 0–45 mV with zero deadload. Actual values will typically be higher than the values shown in Table 4-1 but the ideal values can be used when calibrating the indicator with no attached scale.

Input Signal (mV)	Raw A/D Count
0	105 000
1	126 000
2	147 000
3	168 000
4	189 000
5	210 000
6	231 000
7	252 000
8	273 000
9	294 000
10	315 000
15	420 000
20	525 000
30	735 000
45	1 050 000

Table 4-1. Ideal A/D Raw Counts

4.4.3 Calculating the Span Coefficient

The span coefficient value displayed by the WSPAN parameter can be calculated using the following formula:

$$(21000 * \text{mV_signal_input}) + \text{zero_coefficient}$$

where mV_signal_input is the change in the signal input when the test weight is applied and the zero_coefficient is the WZERO value. Actual values typically vary from the calculated value.

5.0 Print Formatting

The IQ plus 355 provides two print formats, GFMT and NFMT, 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 (PFORMAT menu), EDP commands, or the Revolution™ configuration utility to customize the print formats.

5.1 Print Formatting Commands

Table 5-1 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
<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
<ID>	ID number
<CN>	Consecutive number
<NLnn>	New line (nn = number of termination (<CR/LF> or <CR>) characters)*
<SPnn>	Space (nn = number of spaces)*
<SU>	Toggle weight data format (formatted/unformatted)**
Gross, net, and tare weights are 9 digits in length, including sign (10 digits with decimal point), followed by a space and a two-digit units identifier. Total field length with units identifier is 12 (or 13) characters.	
ID and consecutive number (CN) fields are 1–6 characters in length, as required.	
* If nn is not specified, 1 is assumed. Value must be in the range 1–99.	
** After receiving an SU command, the indicator sends unformatted data until the next SU command is received. Unformatted data omits decimal points, leading and trailing characters.	

Table 5-1. 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 IQ plus 355 print formats are shown in Table 5-2:

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

NOTE: In OIML and CANADA modes, the letters *PT* (preset tare) are automatically inserted after the printed tare weight.

Table 5-2. GFMT and NFMT Formats

NOTES:

- The <G2>, <N2>, and <T2> commands listed in Table 5-1 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 (<ID> command) must be set using the KNEWID 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.

5.2 Customizing Print Formats

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

5.2.1 Using the EDP Port

With a personal computer, terminal, or remote keyboard attached to the IQ plus 355 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

5.2.2 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 PFORMAT menu (see Figure 5-1) to customize the print formats.

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

NOTE: Lower-case letters and some special characters cannot be displayed on the IQ plus 355 front panel (see the ASCII character chart on page 39) and are shown as blanks. The IQ plus 355 can send or receive any ASCII character; the character printed depends on the particular ASCII character set implemented for the receiving device.

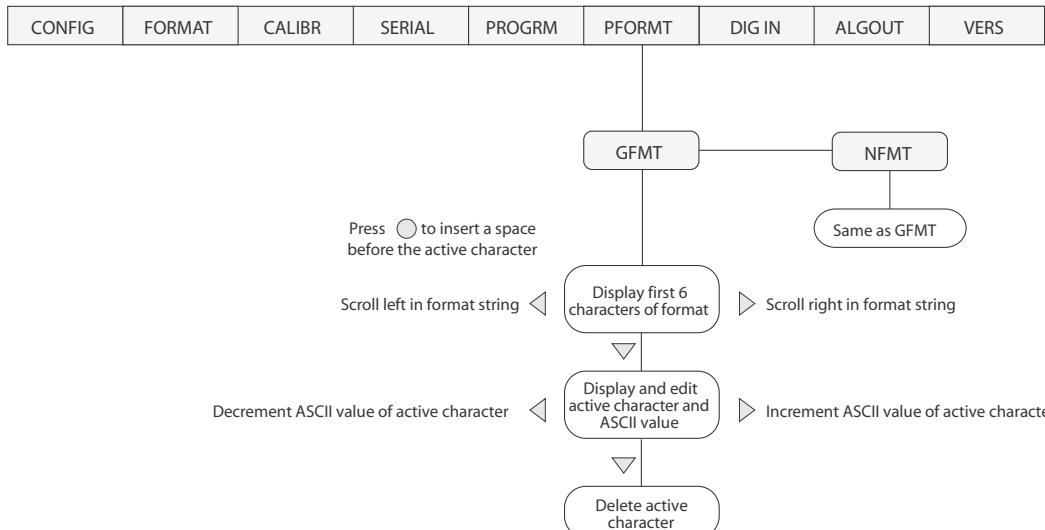


Figure 5-1. PFORMAT Menu, Showing Alphanumeric Character Entry Procedure

5.2.3 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 5-2 shows an example of the Revolution print formatting grid.

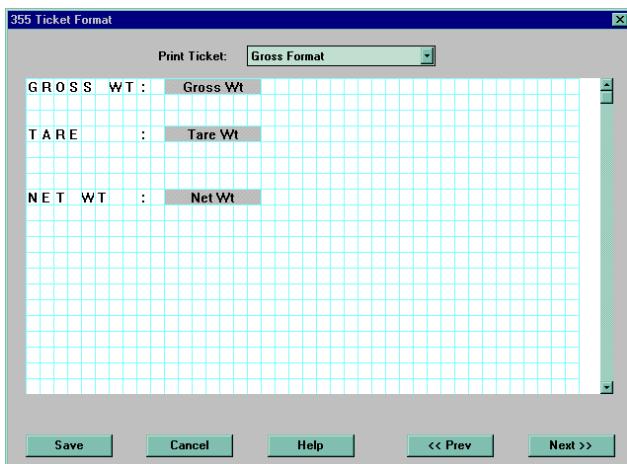


Figure 5-2. Revolution Print Format Grid

6.0 EDP Commands

The IQ plus 355 indicator can be controlled by a personal computer or remote keyboard connected to the indicator EDP port. Control is provided by a set of EDP commands that can simulate front panel key press functions, display and change setup parameters, and perform reporting functions. The EDP port provides the capability to print configuration data or to save that data to an attached personal computer. This section describes the EDP command set and procedures for saving and transferring data using the EDP port.

6.1 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.

6.1.1 Key Press Commands

Key press EDP commands (see Table 6-1) 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:

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
KGROSS	Go to gross mode (pseudo key)
KNET	Go to net mode (pseudo key)
KTARE	Press the TARE key
KUNITS	In weighing mode, press the UNITS key
KPRIM	Go to primary units (pseudo key)
KSEC	Go to secondary units (pseudo key)
KNEWID	Enter new ID (pseudo 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	Press number 0 (zero)
K1	Press number 1
K2	Press number 2
K3	Press number 3
K4	Press number 4
K5	Press number 5
K6	Press number 6
K7	Press number 7
K8	Press number 8
K9	Press number 9
KDOT	Press the decimal point (.)
KENTER	Press the ENTER key

Table 6-1. EDP Key Press Commands

6.1.2 Reporting Commands

Reporting commands (see Table 6-2) 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
VERSION	Write IQ plus 355 software version
P	Write current displayed weight with units identifier. See Section 7.2 on page 36 for more information.
ZZ	Write current weight and annunciator status. See Section 7.2 on page 36 for more information.
S	Write one frame of stream format

Table 6-2. EDP Reporting Commands

6.1.3 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 for approximately three seconds to show TEST menu).

This command is equivalent to using the DEFLT function on the TEST menu. See Section 7.9 on page 44 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.

6.1.4 Parameter Setting Commands

Parameter setting commands allow you to display or change the current value for a particular configuration parameter (Tables 6-3 through 6-10).

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
OVERLOAD	Overload	FS+2%, FS+1D, FS+9D, FS
SMPRAT	Sample rate	15HZ, 30HZ, 7.5HZ, 3.75HZ
DIGFLTR1 DIGFLTR2 DIGFLTR3	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

Table 6-3. CONFIG EDP Commands

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

Table 6-4. FORMAT EDP Commands

Command	Description	Values
WZERO	Zero calibration	—
WVAL	Test weight value	<i>test_weight_value</i>
WSPAN	Span calibration	—
REZERO	Rezero	—
LC.CD	Set deadload coefficient	<i>value</i>
LC.CW	Set span coefficient	<i>value</i>

Table 6-5. CALIBR EDP Commands

Command	Description	Values
EDP.BAUD	EDP port baud rate	300, 600, 1200, 2400, 4800, 9600
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)
PRN.BAUD	Printer port baud rate	300, 600, 1200, 2400, 4800, 9600
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)
STREAM	Streaming port	OFF, EDP, PRN
PRNDEST	Print destination	EDP, PRN

Table 6-6. SERIAL EDP Commands

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

Table 6-7. PROGRM EDP Commands

Command	Description	Values
GFMT	Gross demand print format string	See Section 6.0 on page 32 for detailed information
NFMT	Net demand print format string	

Table 6-8. PFORMAT EDP Commands

Command	Description	Values
DIGIN1	Digital input function	OFF, ZERO, TARE, NT/GRS, UNITS, DSPTAR, PRINT, CLRCN, KBDLOC, HOLD
DIGIN2		

Table 6-9. DIG IN EDP Commands

Command	Description	Values
SOURCE1	Analog output source	GROSS, NET
OFFSET	Zero offset	0%, 20%
ERRACT	Error action	FULLSC, HOLD, ZEROOSC
MIN	Minimum value tracked	0–999 990
MAX	Maximum value tracked	0–999 990
ZERO1	Zero calibration	0–16 383
SPAN1	Span calibration	0–16 383

Table 6-10. ALGOUT EDP Commands

6.1.5 Normal Mode Commands

The serial transmit weight data commands (see Table 6-11) 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 ??
KNEWID	Set or query product ID number	nnnnnnn
RS	Reset system	—
XG	Transmit gross weight in displayed units	nnnnnn UU
XN	Transmit net weight in displayed units	where nnnnnnn is the weight value, UU is the 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	nnnnn nnnnn See Section 7.1.2 on page 36 for detailed information about the XE command response format.

Table 6-11. Normal Mode EDP Commands

310 Command	355 Command	Description
AZ	KZERO	Sets scale to zero. Valid only in Operate Mode.
FT	KTARE	Performs a front panel tare operation. Entering “FT <EOL>” acquires a tare like pressing the TARE key.
CT	Clear Tare	Tare out (removes the tare value)
LB	KPRIM	Selects “lb” for weight units (if set up for “lb” or “kg” units mode)
KG	KSEC	Selects “kg” for weight units (if set up for “lb” or Kg” units mode)
GN	KGROSSNET	Simulates a GROSS/NET key press. Entering “GN <EOL>” toggles between the gross and net display mode.
PR	KPRINT	Sends formatted weight data to either or both serial ports.
RS	RS	Resets system.
SX	SX	Starts continuous serial transmission on the EDP port using the selected serial output data format. Serial transmission stops in SETUP mode.
EX	EX	Ends continuous serial transmission on the EDP port.
XG	XG	Transmits GROSS [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit]. Valid only in Operate Mode.
XN	XN	Transmits NET [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit]. Valid only in Operate Mode.
XT	XT	Transmits TARE [9 characters, leading zeros suppressed (spaces), decimal point if applicable, minus sign to left of first active digit]. Valid only in Operate Mode.
XD	P command	Transmits the value currently displayed.
XS	S command	Transmits a single serial string from the EDP port in the selected output format.

Table 5-12 IQ310A Commands

6.2 Saving and Transferring Data

Connecting a personal computer to the IQ plus 355 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.

6.2.1 Saving Indicator Data to a Personal Computer

Configuration data can be saved to a personal computer connected to the EDP port. The PC must be running a communications program such as PROCOMMPLUS®. See Section 2.3.3 on page 6 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 IQ plus 355 responds by sending all configuration parameters to the PC as ASCII-formatted text.

6.2.2 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 6.2.1. 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 24.

NOTES:

- Calibration settings are included in the configuration data downloaded to the indicator. If the receiving indicator is a direct replacement for another IQ plus 355 and the attached scale is not changed, recalibration is not required.
- When downloading configurations that include changed serial communications settings, edit the data file to place the serial communications changes at the end of the file. Communication between the PC and indicator will be lost once the indicator receives settings for baud rate (BAUD parameter) or data bits and parity (BITS parameter) that do not match those configured for the PC.

7.0 Appendix

7.1 Error Messages

The IQ plus 355 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 IQ plus 355 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.
EEEROM	EEPROM physical error	
EVIREE	Virgin EEPROM	Use TEST menu to perform DEFULT (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 checksum error	Call RLWS Service.
E REF	A/D reference error	A/D converter requires recalibration. Call RLWS Service.
Error	Internal program error	Check configuration. Run XE command (see Section 7.1.2 on page 36) to determine error type. Call RLWS Service if unable to clear error by cycling power or if error recurs.
OVERFL	Overflow error	Weight value too large to be displayed.
-----	Gross > overload limit	Gross value exceeds overload limit. Check configuration or signal input level. Overload can be caused by input signal > 45mV or common mode voltage > 950 mV.
-----	A/D underrange	A/D reading < -4 mV. Check scale for binding or damage.

Table 7-1. IQ plus 355 Error Messages

7.1.2 Using the XE EDP Command

The XE EDP command can be used to remotely query the IQ plus 355 for the error conditions shown on the front panel. The XE command returns two 5-digit numbers in the format:

xxxxx yyyy

where xxxx 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 (yyyy) 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 yyyy = 50815 represents the decimal equivalent of the binary value 1100 0110 0111 1111. Using the bit assignments in Table 7-2, this value indicates all tests were run.

Error Code	Description	Binary Value
0	No error	0000 0000 0000 0000
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	<i>not assigned</i>	0000 0000 1000 0000
256	<i>not assigned</i>	0000 0001 0000 0000
512	A/D physical error	0000 0010 0000 0000
1024	A/D reference error	0000 0100 0000 0000
2048	Non-maskable interrupt (NMI) error	0000 1000 0000 0000
4096	Stack overflow error	0001 0000 0000 0000
8192	Zero division error	0010 0000 0000 0000
16384	A/D underrange	0100 0000 0000 0000
32768	Gross > overload limit	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 ::::: (underrange).

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 wwwwuu 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 145, the gross, standstill, and lb annunciators are lit: 145 represents the sum of the values for the standstill annunciator (128), gross mode annunciator (16), and the lb/primary units annunciator (1).

Decimal Value	Annunciator
1	lb/primary units
2	kg/secondary units
4	oz
8	g
16	Gross
32	Net
64	Center of zero
128	Standstill

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 IQ plus 355 EDP or printer port when the STREAM parameter (SERIAL menu) is set to either EDP or PRN.

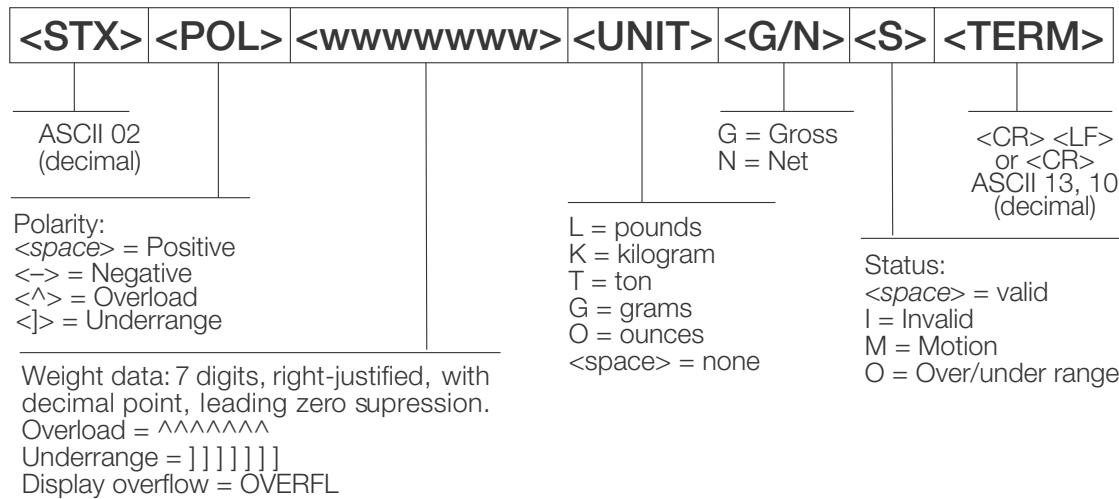


Figure 7-1. Continuous Output Data Format

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 IQ plus 355 PFORMAT menu. The actual character printed depends on the character mapping used by the output device.

The IQ plus 355 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. See Section 7.5 on page 40 for information about the IQ plus 355 LED display.

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	α	224	E0
ú	129	81	í	161	A1		193	C1	β	225	E1
é	130	82	ó	162	A2		194	C2	Γ	226	E2
â	131	83	ú	163	A3		195	C3	π	227	E3
ä	132	84	ñ	164	A4		196	C4	Σ	228	E4
à	133	85	Ñ	165	A5		197	C5	σ	229	E5
å	134	86	ª	166	A6		198	C6	μ	230	E6
ç	135	87	º	167	A7		199	C7	τ	231	E7
ê	136	88	¿	168	A8		200	C8	Φ	232	E8
ë	137	89		169	A9		201	C9	Θ	233	E9
è	138	8A	¬	170	AA		202	CA	Ω	234	EA
ï	139	8B	1/2	171	AB		203	CB	δ	235	EB
†	140	8C	1/4	172	AC		204	CC	∞	236	EC
ì	141	8D	í	173	AD		205	CD	ϕ	237	ED
Ä	142	8E	«	174	AE		206	CE	ε	238	EE
Å	143	8F	»	175	AF		207	CF	∩	239	EF
É	144	90		176	B0		208	D0	≡	240	F0
æ	145	91		177	B1		209	D1	±	241	F1
Æ	146	92		178	B2		210	D2	≥	242	F2
ô	147	93		179	B3		211	D3	≤	243	F3
ö	148	94		180	B4		212	D4	∫	244	F4
ò	149	95		181	B5		213	D5	J	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	º	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
f	159	9F		191	BF		223	DF		255	FF

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

7.5 Front Panel Display Characters

Figure 7-2 shows the 7-segment LED character set used to display alphanumeric characters on the IQ plus 355 front panel.

-	9	9	E	E	Q	9
.	:	:	F	E	R	8
/	2	;	G	6	S	5
0	8	<	H	8	T	8
%	1	8	=	0	I	8
&	2	2	>	0	J	8
,	3	3	?	2	K	6
(	4	9	@	8	L	8
)	5	5	A	8	M	0
*	6	6	B	8	N	0
+	7	0	C	0	O	0
,	8	8	D	8	P	2
					\	5

Figure 7-2. IQ plus 355 Display Characters

7.6 Conversion Factors for Secondary Units

The IQ plus 355 has the capability to mathematically convert a weight into many different types of units and instantly display those results with a press of the **UNITS** key.

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

- To configure secondary units using the front panel menus, use the Table 7-6 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 MULEXP parameter to set the decimal point position. For example, if the primary unit is ounces and the secondary unit is grams, the conversion factor shown in Table 7-6 is 28.3495. To enter this value using the menus, first enter 283495 for the MULT parameter, then use the MULEXP parameter to adjust the decimal point to 28.3495.
- To configure secondary units using EDP commands, use the Table 7-6 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 IQ plus 355 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	<i>x Multiplier</i>	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

7.7 Digital Filtering

The IQ plus 355 uses averaged digital filtering to reduce the effect of vibration on weight readings. Adjustable threshold and sensitivity functions allow quick settling by suspending filter averaging, allowing the weight reading to jump to the new value. Figure 7-3 shows the digital filter parameters on the CONFIG menu.

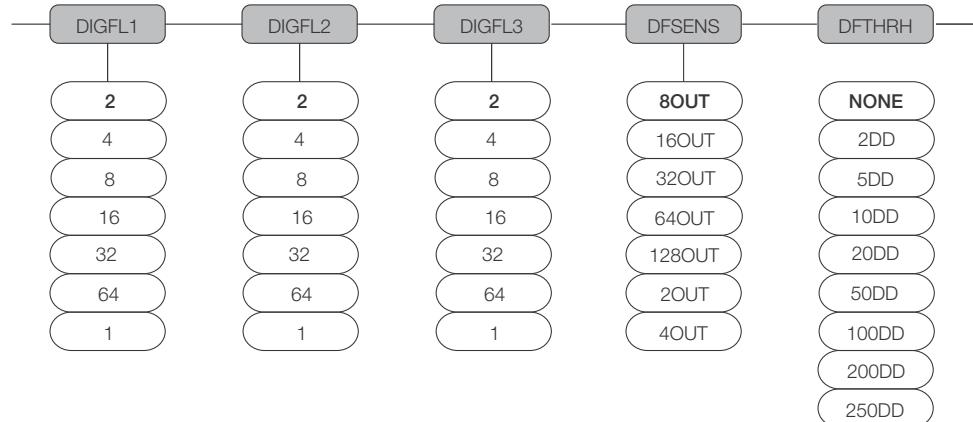


Figure 7-3. Digital Filtering Parameters on the Configuration (CONFIG) Menu

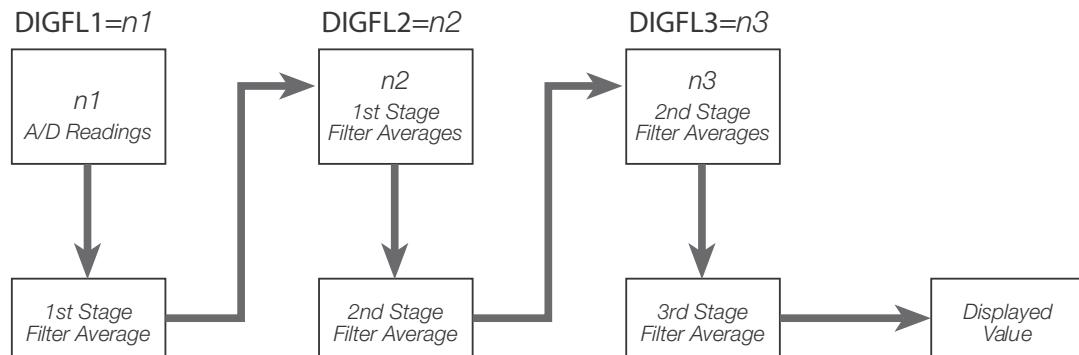


Figure 7-4. Flow Diagram for IQ plus 355 Digital Filters

7.7.1 DIGFLx Parameters

The first three digital filtering parameters, DIGFL1, DIGFL2, and DIGFL3, are configurable filter stages that control the effect of a single A/D reading on the displayed weight. The value assigned to each parameter sets the number of readings received from the preceding filter stage before averaging (see Figure 7-4).

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

$$DIGFL1 + DIGFL2$$

For example, if the filters are configured as DIGFL1=16, DIGFL2=8, the overall filtering effect is 24 (16 + 8). With this configuration, each A/D reading has a 1-in-24 effect on the displayed weight value. Setting the filters to 1 effectively disables digital filtering.

7.7.2 DFSENS and DFTHR Parameters

The three digital filters can be used by themselves to eliminate vibration effects, but heavy filtering also increases settling time. The DFSENS (digital filter sensitivity) and DFTHR (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 (DFTHR) before digital filtering is suspended.
- DFTHR 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 DFTHR to NONE to turn off the filter override.

7.7.3 Setting the Digital Filter Parameters

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

1. In setup mode, set all three digital filters (DIGFL1, DIGFL2, DIGFL3) to 1. Set DFTHRH to NONE. Return indicator to normal mode.
2. Remove all weight from the scale, then watch the indicator display to determine the magnitude of vibration effects on the scale. Record the weight below which all but a few readings fall. This value is used to calculate the DFTHRH parameter value in Step 4.
For example, if a heavy-capacity scale produces vibration-related readings of up to 50 lb, with occasional spikes to 75 lb, record 50 lb as the threshold weight value.
3. Place the indicator in setup mode and set the digital filters (DIGFLx) to eliminate the

vibration effects on the scale. (Leave DFTHRH set to NONE.) Reconfigure as necessary to find the lowest effective values for the DIGFLx parameters.

4. With optimum values assigned to the DIGFLx parameters, calculate the DFTHRH parameter value by converting the weight value recorded in Step 2 to display divisions:

$$\text{threshold_weight_value} / \text{DSPDIV}$$

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

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

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

7.8 Analog Output Calibration

The following calibration procedure requires a multimeter to measure voltage or current output from the analog output module. If the option is not already installed, see Section 2.4 on page 7.

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

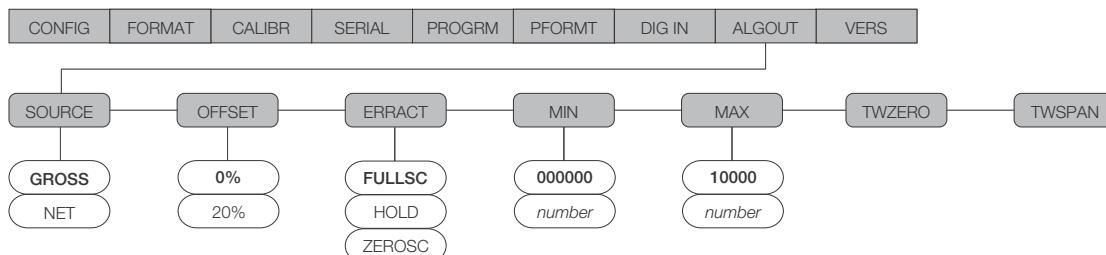


Figure 7-5. Analog Output Menu

1. Enter setup mode and go to the ALGOUT menu (see Figure 7-5).
 - Set OFFSET to 0% for 0–10 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 analog output:
 - For voltage output, connect voltmeter leads to pins 3 and 4
 - For current output, connect ammeter leads to pins 1 and 2
3. Adjust zero calibration: Scroll to the

TWZERO parameter. Check voltage or current reading on multimeter. Press and hold Δ or ∇ to adjust the zero value up or down. The minimum setting should be 50mV above true zero to prevent erratic output at zero.

4. Adjust span calibration: Scroll to the TWSPAN parameter. Check voltage or current reading on multimeter. Press and hold Δ or ∇ to adjust the span value up or down.
5. Final zero calibration: Return to the TWZERO parameter and verify that the zero calibration has not drifted. Press and hold Δ or ∇ to re-adjust the zero value as required.
6. Return to normal mode. Analog output function can be verified using test weights.

7.9 Test Mode

In addition to normal and setup modes, test mode provides a number of diagnostic functions for the IQ plus 355, including:

- Display raw A/D count
- Display digital input states
- Reset configuration parameters to default values
- Transmit test character (“U”) from serial port
- Display characters received by 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 7-6 shows the Test Menu structure; Figure 7-7 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 45 summarizes the test menu functions.

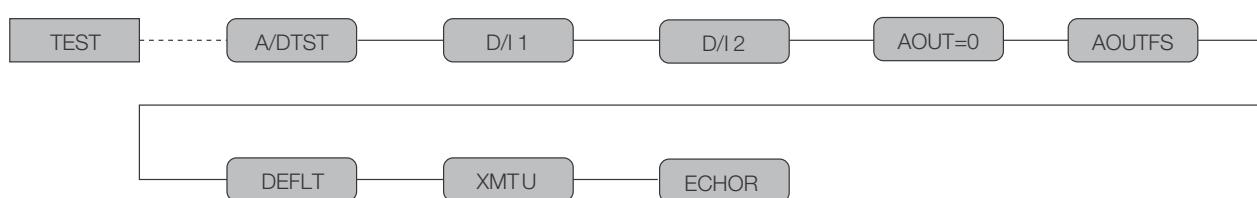
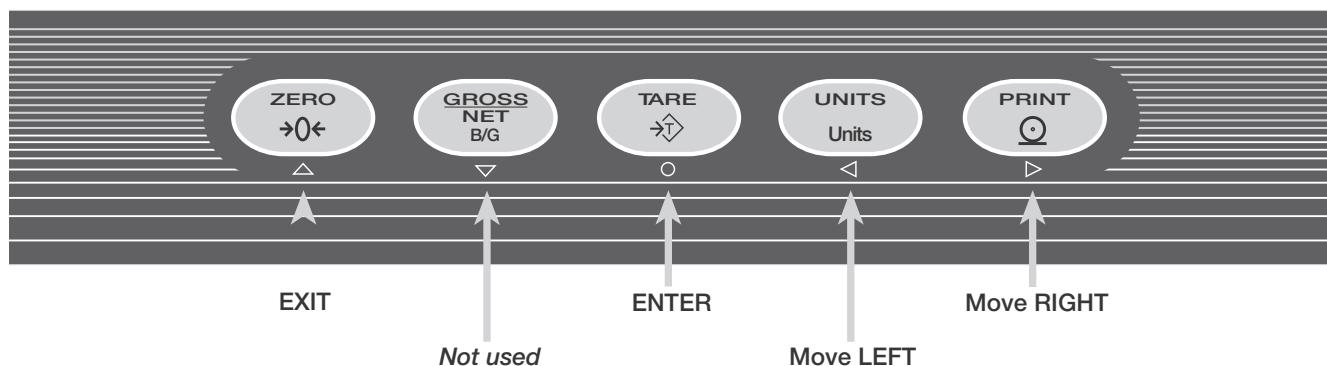


Figure 7-6. Test Menu



TEST MODE KEY FUNCTIONS

Figure 7-7. 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 count from A/D converter.
D/I 1	Display digital input 1 Press and hold Enter key to show status of DIGIN1 (DI1=HI or DI1=LO).
D/I 2	Display digital input 2 Press and hold Enter key to show status of DIGIN2 (DI2=HI or DI2=LO).
AOUT=0	Set analog output to zero Press and hold Enter key to set analog output to its zero value.
AOUTFS	Set analog output to full scale Press and hold Enter key to set analog output to its 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 24).
XMT U	Transmit “U” 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 characters received at serial port. NOTE: IQ plus 355 display shows lower-case characters as blanks.

Table 7-7. Test Menu Functions

7.10 Software Revision History

For a complete description of recent software revisions, visit our web site at www.rlws.com. The following list summarizes principal revision software changes:

Version 1.10

- Entering setup mode now clears any tare value in the system.
- The configured end-of-line delay (EOLDLY) now functions in both demand and continuous mode.
- A/D gain (ADGAIN) and A/D offset (ADOFFS) functions removed from TEST menu.

Version 1.12

- New SMPRAT parameter on the CONFIG menu provides selectable A/D conversion rate ranging from 3.75–30 Hz.
- Default value for REGULAT parameter (on PROGRM menu) changed to NTEP.

Version 1.15

- This parameter added in SERIAL menu under EDP port (EDP.ECHO=On/Off) to enable or disable echoing of serial commands sent to indicator.

Version 1.16

- This version corrects an issue introduced in Version 1.15 where the primary unit with a fixed zero was divided by 10 when displaying secondary units.

Version 1.17

- Added an OFF selection for secondary units to disable the secondary mode.
- Added a selection in the Serial Menus for 1 or 2 Stop Bits.
- Added the capability to use 3, 4, 5, 6, 9, 25, and 35 Display Divisions. Contact RLWS for details.
- The IQ355 is now fully compatible with the IQ310A EDP command set

7.11 Specifications

Power

Line Voltages	115 or 230 VAC
Frequency	50 or 60 Hz
Power Consumption	70 mA @ 115 VAC (8W) 35 mA @ 230 VAC (8W)
Fusing	
115 VAC	2 x 200 mA TR5 subminiature fuses Wickmann Time-Lag 19374 Series UL Listed, CSA Certified
230 VAC	2 x 100 mA TR5 subminiature fuses Wickmann Time-Lag 19372 Series UL Recognized, VDE Approved

Analog Specifications

Full Scale Input Signal	Up to 45 mV
Excitation Voltage	10 \pm 0.5 VDC, 8 x 350 Ω or 16 x 700 Ω load cells
Sense Amplifier	Differential amplifier with 4- and 6-wire sensing
Analog Signal Input Range	0.6 mV/V – 4.5 mV/V
Analog Signal Sensitivity	0.3 μ V/graduation minimum, 1.5 mV/grad recommended
Input Impedance	200 M Ω , typical
Noise (ref to input)	0.3 μ V p-p with digital filters at 4-4-4
Internal Resolution	308,000 counts
Display Resolution	100,000 dd
Measurement Rate	Up to 30 measurements/sec
Input Sensitivity	150 nV per internal count
System Linearity	Within 0.01% of full scale
Zero Stability	150 nV/ $^{\circ}$ C, maximum
Span Stability	3.5 ppm/ $^{\circ}$ C, maximum
Calibration Method	Software, constants stored in EEPROM
Common Mode Voltage	-0.15 to +0.95 V, referred to earth
Common Mode Rejection	130 dB minimum @ 50 or 60 Hz
Normal Mode Rejection	90 dB minimum @ 50 or 60 Hz
Input Overload	\pm 12 V continuous, static discharge protected
RFI Protection	Signal, excitation, and sense lines protected by capacitor bypass
Analog Output	Optional: fully isolated, voltage or current output, 14-bit resolution. Voltage output: 0 – 10 VDC Load resistance: 1 K Ω minimum Current output: 4–20 mA External loop resistance: 500 Ω maximum

Digital Specifications

Microcomputer	Phillips 80C51XA-G49 main processor @ 9.8304 MHz
Digital Inputs	2 inputs, TTL or switch closure, active-low
Digital Filters	3 filters, software selectable

Serial Communications

EDP Port	Full duplex RS-232
Printer Port	Output-only RS-232 or active 20 mA current loop
Both Ports	9600, 4800, 2400, 1200, 600, 300 bps; 7 or 8 data bits; even, odd, or no parity

Operator Interface

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

Environmental

Operating Temperature	-10 to +40 $^{\circ}$ C (legal); -10 to +50 $^{\circ}$ C (industrial)
Storage Temperature	-25 to +70 $^{\circ}$ C
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

Certifications and Approvals



NTEP	
CoC Number	97-130A1
Accuracy Class	III/III L
	n_{max} : 10 000
Measurement Canada	
Approval	AM-5213
Accuracy Class	III/III HD
	n_{max} : 10 000



OIML	
R76-2 Test Certificate	TC6008
Approval	T5692
Accuracy Class	III
	n_{max} : 3 000



IQ plus 355 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 two years.

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

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

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