Cardinal®

Cardinal Scale Manufacturing Co.

220

WEIGHT INDICATING INSTRUMENT

TECHNICAL and OPERATION MANUAL

8200-M502-O1 Rev B
03/02

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INTRODUCTION

Thank you for purchasing the Cardinal 220 Weight Indicating Instrument. This instrument was built with quality and reliability at our factory in Webb City, Missouri.

The 220 incorporates the latest in digital technology and innovative features for the weighing industry. Configuration and upgrades can easily be performed in the field, while still maintaining the rigid control the most demanding installations require. This flexibility insures the 220 will be able to meet your weight indicating needs for years to come.

The purpose of this manual is to provide you with a guide through installation, calibration, and operation of your new weight-indicating instrument. Please read it thoroughly before attempting to install or operate your 220 Indicator and keep it handy for future reference.

FCC COMPLIANCE STATEMENT

WARNING! This equipment generates, uses and can radiate radio frequency and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference in which case the user will be responsible to take whatever measures necessary to correct the interference.

You may find the booklet “How to Identify and Resolve Radio TV Interference Problems” prepared by the Federal Communications Commission helpful. It is available from the U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 001-000-00315-4.

SERIAL NUMBER _____

DATE OF PURCHASE _____

PURCHASED FROM _____

_____

_____

_____

RETAIN THIS INFORMATION FOR FUTURE USE

PRECAUTIONS

Before using this instrument, read this manual and pay special attention to all "WARNING" symbols:

IMPORTANT

ELECTRICAL WARNING

STATIC SENSITVE

SPECIFICATIONS

Power Requirements:	90 to 264 VAC (50/60 Hz) at 0.4A
Enclosure Type:	NEMA 4X/IP66:
Enclosure Size:	10 7/8"W x 8 3/16"H x 3 1/8"D (276mm W x 208mm H x 79mm D)
Weight:	9.2lbs (*Size and Weight DOES NOT include Gimbal*)
Operating Environment:	Temperature: 14 to 104 ºF (-10 to +40 ºC) Humidity: 90% non-condensing (maximum)
Display:	12-digit, 0.8" high, 14-segment LCD
Transducer Excitation:	12 VDC
Signal Input Range:	1.0 mV min. to 40 mV max. (with dead load boost)
Number of Load Cells:	14 each, 350 OHM minimum resistance
Load Cell Cable Length:	1500 feet maximum with sense lines. Consult factory for other requirements 30 feet maximum without sense lines
Maximum Displayed Weight Value	9,999,999
Division Value:	1, 2, or 5 x 10, 1, 0.1, 0.01, 0.001 and 0.0001 commercial 0 to 99, non-commercial
Sensitivity:	
NON-COMMERCIAL	0.15 uV/e
NTEP	0.3uV/e (Class III/IIIL)
CANADA	0.3uV/e (Class III/IIIHD)
OIML	0.7 uV/e (Class III)
Scale Divisions:	
NON-COMMERCIAL	100 to 240,000
NTEP	100 to 10,000 (Class III/IIIL)
CANADA	100 to 10,000 (Class III/IIIHD)
OIML	100 to 10,000 (Class III)
Internal Resolution:	1 part in 16,777,216
Tare Capacity:	Six Digits (999,999)
Sample Rate:	1 to 100 samples per second, selectable
Auto Zero Range:	0.5 or 1 through 9 divisions
Weighing Units:	Tons, Pounds, Metric Tons, Kilograms, Grams, Ounces, Custom
Keypad:	Membrane type with 27 color-coded keys
Standard I/O:	(1) Bi-directional RS232 and 20mA (1) RS232/20mA output only (1) Infrared (IR) Data Port
Optional I/O:	14 bit Analog Output (0 to 10v, 4 to 20mA)

SPECIFICATIONS

Standard Features:

- Time and Date with selectable 12 or 24 hour operation
- 200 ID Storage with an additional 100 temporary ID's
- Count Feature with accumulator
- Adjustable Filtering
- Multi-Point Calibration and High-Resolution Mode
- Selectable Key Disable
- Gross, Tare and Net Conversion
- Multi-Interval (Dual Range) Feature
- Gross, Net, 32 ID, 8 Bin and Piece Count Accumulators
- Remote Configuration Using *nControl* and a computer (desktop or laptop) or Personal Data Assistant (PDA)
- Field Re-Programmable via PC Interconnection
- Push Button and Keypad Tare Function
- Test Feature (Performs Display & Internal Tests)
- 8 Preset Weight Comparators
- Checkweigher (3 or 5 Zone, Setup Selectable)
- Digital Fill Control (1 or 2 Speed with Static or Dynamic Trim)
- Batcher (1 Speed, 7 Ingredient or 2 Speed, 3 Ingredient with Static or Dynamic Trim)
- 6 Programmable Print Formats Using *nControl*
- SMA Level 2 Compliant Serial Communications (For More Information See http://www.scalemanufacturers.org)
- Remote Input of Gross, Net, Tare, Print, Zero, Start Stop and Dump Commands
- 12 Digit Alphanumeric Backlit LCD Display
- Programmable LCD Backlight Turn-On
- NEMA 4x/IP66 Stainless Steel Enclosure
- 27 Key Keypad
- Universal Power Operation (90 to 264VAC)
- Infrared (IR) Data Port
- Programmable Weight Units (in non-commercial operations)
- User Programmable Serial Data Format

Optional Features:

- Analog Output
- Third Serial Port (*future*)
- 10 baseT Ethernet Port (*future*)
- Column Mounting Available

Certifications:

This equipment is certified to comply with the requirements for a Class III/IIIL device by the

- National Conference on Weights and Measurements (Certificate No. 01-011)
- Measurement Canada (Approval No. AM-5397)
- And for a Class III device by OIML R-76 (Certificate No. DK 0199.47).

MEASUREMENT CANADA

PRECAUTIONS

Static Electricity

CAUTION! This device contains static sensitive circuit cards and components. Improper handling of these devices or printed circuit cards can result in damage to or destruction of the component or card. Such actual and/or consequential damage IS NOT covered under warranty and is the responsibility of the device owner. Electronic components must be handled only by qualified electronic technicians who follow the guidelines listed below:

ATTENTION! ALWAYS use a properly grounded wrist strap when handling, removing or installing electronic circuit cards or components. Make certain that the wrist strap ground lead is securely attached to an adequate ground. If you are uncertain of the quality of the ground, you should consult a licensed electrician.

ALWAYS handle printed circuit card assemblies by the outermost edges. NEVER touch the components, component leads or connectors.

ALWAYS observe warning labels on static protective bags and packaging and NEVER remove the card or component from the packaging until ready for use.

ALWAYS store and transport electronic printed circuit cards and components in anti-static protective bags or packaging.

Environmental

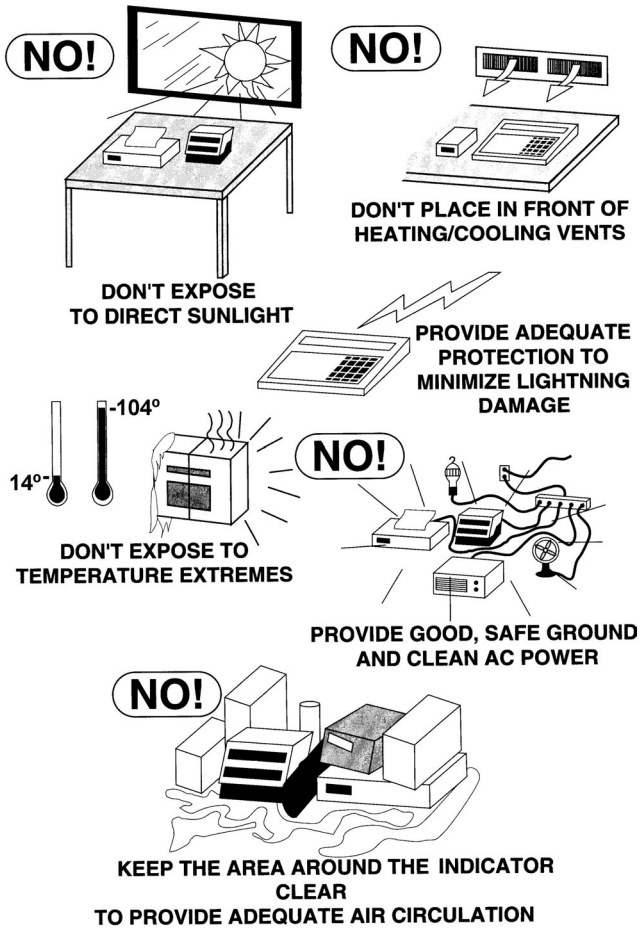
The 220 Indicator meets or exceeds all certification requirements within a temperature range of 14 to 104 °F (-10 to +40 °C).

In order to keep cooling requirements to a minimum, the indicator should be placed out of direct sunlight and to provide adequate air circulation, keep the area around the indicator clear.

Make certain the instrument is not directly in front of a heating or cooling vent. Such a location will subject the indicator to sudden temperature changes, which may result in unstable weight readings.

Insure that the indicator has good, clean AC power and is properly grounded.

In areas subject to lightning strikes, additional protection to minimize lightning damage, such as surge suppressors, should be installed.



PRECAUTIONS, Cont.

Care and Cleaning

1. **DO NOT** submerge indicator in water, pour or spray water directly on instrument.
2. **DO NOT** use acetone, thinner or other volatile solvents for cleaning.
3. **DO NOT** expose equipment to temperature extremes.
4. **DO NOT** place equipment in front of heating/cooling vents.
5. **DO** clean the indicator with a damp soft cloth and mild non-abrasive detergent.
6. **DO** remove power before cleaning with a damp cloth.

SITE PREPARATION REQUIREMENTS

The 220 Weight Indicator is a precision weight-measuring instrument. As with any precision instrument, it requires an acceptable environment to operate at its peak performance and reliability. This section is provided to assist you in obtaining such an environment.

Electrical Power

The 220 indicator has been designed to operate from 90 to 264 VAC at 50/60 Hz. Note that a special order is not required for operation at 230 VAC.

CAUTION! - To avoid electrical hazard and possible damage to the indicator, DO NOT, under any circumstance, cut, remove, alter, or in any way bypass the power cord grounding prong.

On models requiring 230 VAC power, **it is the responsibility of the customer** to have a qualified electrician install the proper power cord plug which conforms to national electrical codes and local codes and ordinances.

The power outlet for the indicator should be on a separate circuit from the distribution panel. This circuit should be dedicated to the exclusive use of the indicator. The wiring should conform to national and local electrical codes and ordinances and should be approved by the local inspector to assure compliance.

To prevent electrical noise interference, make certain all other wall outlets for use with air conditioning and heating equipment, lighting or other equipment with heavily inductive loads, such as welders, motors and solenoids are on circuits separate from the indicator. Many of these disturbances originate within the building itself and can seriously affect the operation of the instrument. These sources of disturbances must be identified and steps must be taken to prevent possible adverse effects on the instrument. Examples of available alternatives include isolation transformers, power regulators, uninterruptible power supplies, or simple line filters.

CAUTION! When in parallel runs, locate Load Cell cables a minimum of 24" away from all AC wiring.

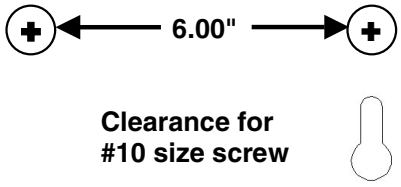
INSTALLATION

Before beginning installation of your Model 220 Weight Indicating Instrument, make certain that the instrument has been received in good condition. Carefully remove the instrument from the shipping carton and inspect it for any evidence of damage (such as exterior dents or scratches) that may have taken place during shipment. Keep the carton and packing material for return shipment if it should become necessary. It is the responsibility of the purchaser to file all claims for any damages or loss incurred during transit.

Mounting the 220

NOTE! Should your 220 indicator come already installed on a scale, the following information describing the installation of the instrument does not apply.

The Model 220 Indicator is housed in a NEMA 4X/IP66 stainless steel wall or desk-mount enclosure. The 220 gimbal may be mounted on a desktop or other smooth, flat, horizontal surface or may be mounted on a wall. Refer to Figure No. 1 for a layout of wall-mounting bolts.



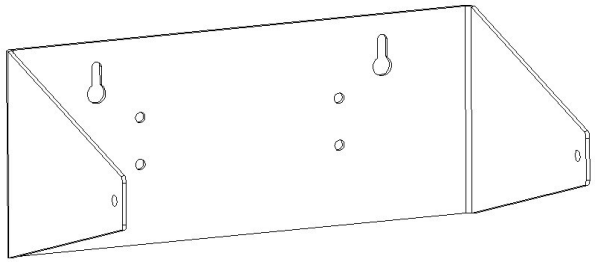


Figure No. 1

If wall mounted, make certain the mounting surface is strong enough to support the instrument. The mounting location should be where the display is easily viewed while being close enough to provide the operator easy access to the keypad. Carefully lay out the mounting hole locations, then drill and install the anchor bolts. Attach the gimbal to the wall and securely tighten the retaining bolts.

Load Cell Connection

CAUTION! Disconnect any external load cell power supply before connecting load cells to the instrument. Failure to do so will result in permanent damage to the instrument.

1. Remove the 14 acorn nuts securing the back panel to the main housing, then loosen the bottom-right cable gland connector for the load cell. This gland connector is located on the rear panel of the enclosure. Refer to Figure No. 2 for illustration of the connector layout.
2. Slip the single cable from the load cell or load cell junction box through the gland connector and into the enclosure.
3. Remove 2" of the outer insulation jacket then remove 1/4" of insulation from each of the 4 wires and shield without sense leads or 6 wires and shield with sense leads (refer to Figure No. 3).

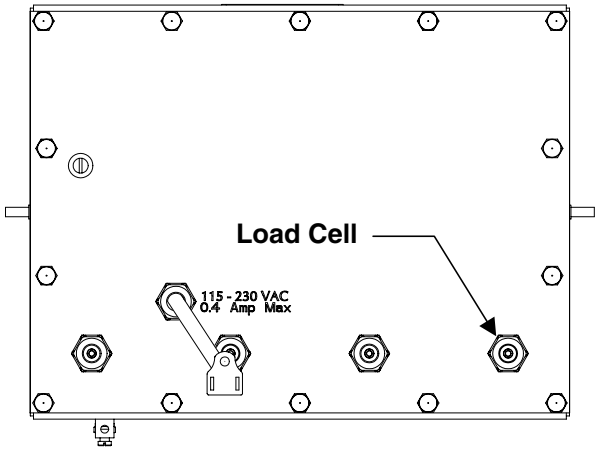


Figure No. 2

INSTALLATION, Cont.

4. Connect each of the wires to terminal block P6 referring to the table on the circuit board for terminal connections. Refer to Figure No. 7 for terminal block location.

5. To terminate a wire, first press down on the release bar for the terminal, insert the wire into the terminal opening then allow the release bar to return to its original position, locking the wire in place.

6. Repeat the procedure until all of the wires are in place.

7. Route the load cell cable through the two cable clips provided on the upper and left sides of the enclosure interior.

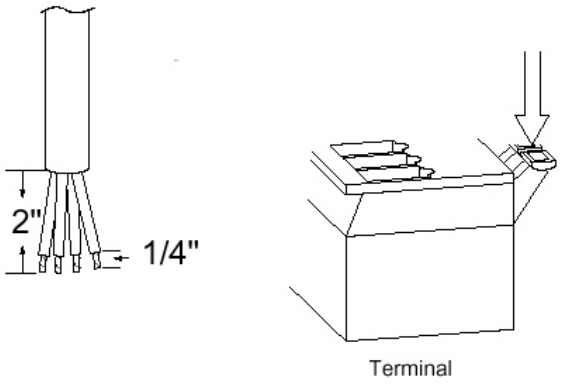


Figure No. 3

LOAD CELL CONNECTOR P7

PIN NO.	Function	PIN NO.	Function
1	+ EXCITATION	5	- SIGNAL
2	+ SENSE	6	- SENSE
3	+ SIGNAL	7	- EXCITATION
4	SHIELD		

Load Cell Connections With Over 30 Feet Of Cable

For installations with over 30 feet of cable between the indicator and the load cells, sense wires should be used. The sense wires must be connected between the +SENS, -SENS terminals on the indicator and the +EXCITATION, -EXCITATION wires of the load cells or the +SENS, -SENS terminals of the load cell trim board or the section seal trim board. For the indicator to use the sense wires, the +SENS jumper J12 and the -SENS jumper J13 must be open (see Figure No. 7).

Load Cell Cable Shield Wire Connection

The load cell cable shield wire should be connected to the threaded stud inside the indicator. This stud is located on the bottom inside of the indicator near the load cell connector P7. See Figure No.4.

The shield wire should be wrapped around the stud between the 2 flat washers and secured using the hex nut.

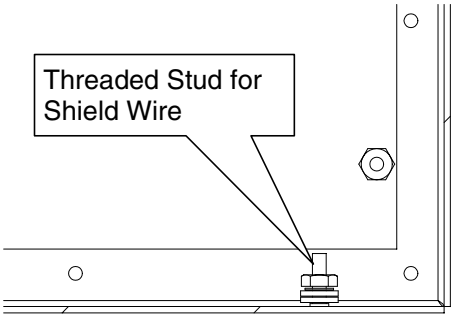


Figure No. 4

Serial I/O Cable Installation

The 220 may be connected to a printer to record weight and associated data or it may be connected to a remote display or even to a computer for transmission of weight data. The weight data may be transmitted continuously on demand (pressing the **PRINT** key or on receipt of a command from the computer). Refer to the Setup, SIO Serial I/O section of this manual.

1. Loosen the cable gland connector(s) for the serial cable. The gland connector(s) for the serial data are located on the rear panel of the enclosure. Refer to Figure No. 2 for an illustration of the gland connector layout.
2. Slip the serial cable through the gland connector and into the enclosure.

INSTALLATION, Cont.

Serial I/O Cable Installation, Cont.

3. Remove 2" of the outer insulation jacket then remove 1/4" of insulation from each of the wires (refer to Figure No. 3).
4. Connect each of the wires to the Serial I/O terminal block (P10) referring to Figure No. 7 for terminal block locations.
5. To terminate, first press down on the release bar for the terminal, insert the wire into the opening then allow the release bar to return to its original position, locking the wire in place. Repeat the procedure until all of the wires are in place.

BI-DIRECTIONAL SERIAL INTERFACE

PIN NO.	Function
1	TXD 1 - SRC
2	TXD 1 - 20 mA +
3	TXD 1 - 20 mA -
4	RXD 1 - SRC
5	RXD 1 - 20 mA +
6	RXD 1 - 20 mA -
7	TXD 1 - RS232

SERIAL OUTPUT

PIN NO.	Function
8	RXD 1 - RS232
9	TXD 1 - CTS
10	GND 1
11	TXD 2 - 20 mA Active
12	TXD 2 - RS232
13	GND 2

Optically Isolated Inputs

Included with the I/O are 7 programmable inputs that may be used to remotely (up to 100 feet) initiate various functions within the indicator. These inputs are accessed via a terminal block (P9) on the back of the PC board (see Figure No. 7). The 7 inputs are defined as follows:

PIN NO.	Function	PIN NO.	Function
1	+ SRC	6	Not Used
2	ZERO	7	STOP
3	TARE	8	START
4	GROSS / NET	9	DUMP
5	PRINT	10	GND / SHIELD

Remember that the input must be connected to Gnd to initiate the function.

AC Input Relay Board(s)

The AC Input Relay Board(s) are mounted in an external junction box for use with the 220 Indicator. The RB4-IN (115 VAC) or RB4-INV (230 VAC) contain one board and supports 4 inputs (jumper selectable). The RB8-IN (115 VAC) or RB8-INV (230 VAC) contain two boards and supports 7 inputs. The relay board used in the 115 VAC version is Cardinal p/n 8200-C324-0A. The 230 VAC version uses relay board Cardinal p/n 8200-C324-1A. Connect the devices as shown in Figure No. 5.

- INPUT (IAC-5) …….. 90 to 140 VAC @ 6mA maximum for each plug-in relay.
- INPUT (IAC-5A) …….. 180 to 280 VAC @ 6mA maximum for each plug-in relay.
- OUTPUT ..…….... 5VDC @ 12mA from the 220 main pc board assembly P9.
- CONNECTION ..... Removable plug-in screw terminals for up to 14 AWG wire.

INSTALLATION, Cont.

AC Input Relay Board(s)

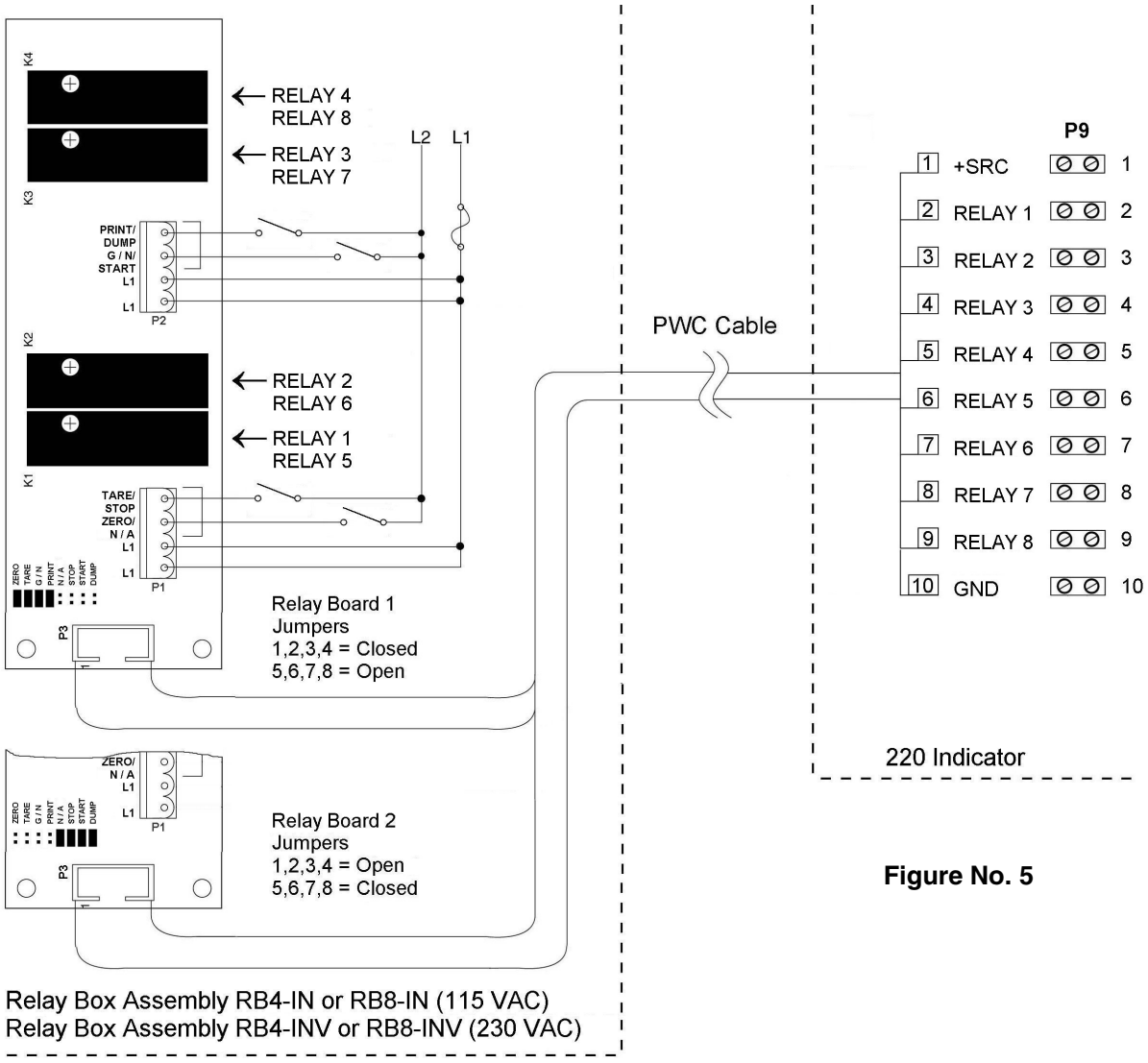


Figure No. 5

NOTE! AC INPUT RELAYS ARE VOLTAGE DEPENDENT. A DIFFERENT RELAY IS REQUIRED FOR 115 VAC AND 230 VAC!

Preset Weight Comparator/Checkweigher Logic Level Output

If you so choose, you may use the logic level outputs from your Model 220 indicator's preset weight comparators or checkweigher to control peripheral devices used to manage the flow of material or signal when the weight is within preset limits. Note that these outputs are at logic level and cannot drive external devices directly. Solid-state relays can be used to accept the logic level output from the 220 and in turn, drive the external device.

To connect the control cable to the preset weight comparator/checkweigher logic level output connector P8, first loosen a gland connector located on the back of the 220. Refer to Figure No. 2 for the location of the connectors. Slip the cable through this connector and into the enclosure. Remove 2 inches of the cable insulating jacket then 1/4 inch of insulation from each of the internal wires (refer to Figure No. 3). Make the proper terminations on terminal block P8. To terminate a wire, first press down on the terminal block release bar, insert the wire into the terminal and remove pressure from the release bar locking the wire in place.

INSTALLATION, Cont.

AC Output Relay Board(s)

The AC Output Relay Board(s) are mounted in an external junction box for use with the 220 Indicator. The RB4-OUT contains one board and supports 4 outputs (jumper selectable). The RB8-OUT contains two boards and supports 8 outputs. The relay board used in both is (Cardinal p/n 8539-C062-0A). Connect the devices to be controlled as shown in Figure No. 6.

The individual relays can be configured to be on (closed) or off (open) at weights under the preset weight then switch at the preset weight from on-to-off or off-to-on by setting the under weight condition to on or off during setup and calibration or setup review.

- OUTPUT (closed) ..... 28-240VAC @ 3A maximum for each plug-in relay.
- CONTROL INPUT ..... 5VDC @ 12mA from the 220 main pc board assembly P8.
- CONNECTION ..... Removable plug-in screw terminals for up to 14 AWG wire.

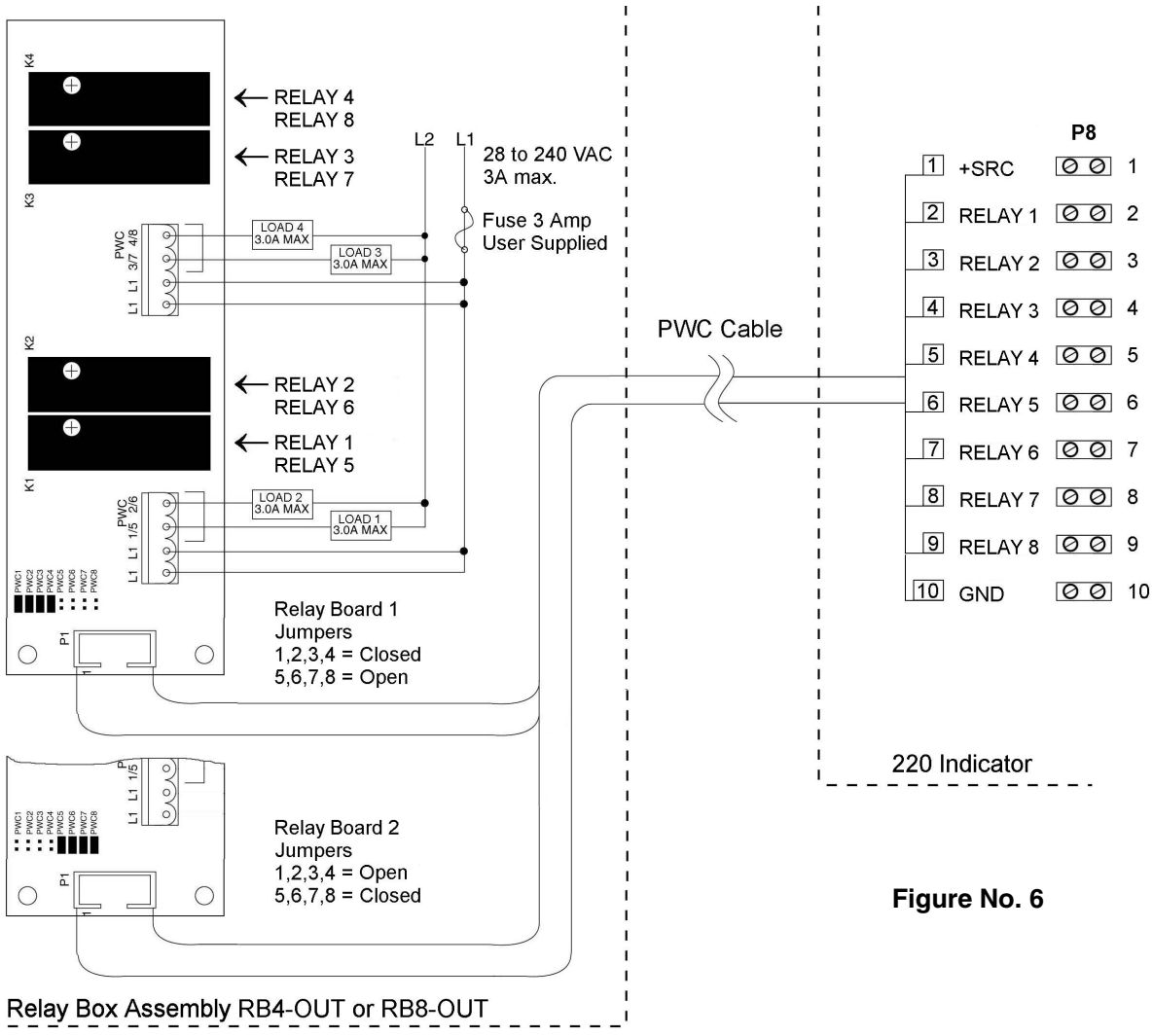


Figure No. 6

NOTE! All relays are the normally-open type that will open when power to indicator is lost.

Re-Installing The Rear Panel

After all terminations have been made, remove the excess cable from the instrument enclosure and securely tighten each of the cable gland connectors. Do not over-tighten these connectors but make certain they are snug. **DO NOT USE TOOLS!** Finger tighten only! Ensure any unused gland connectors are plugged. Replace the rear panel and secure with the 14 acorn nuts removed earlier. **NOTE!** Follow a diagonal pattern when tightening the acorn nuts.

INSTALLATION, CONT.

Main PC Board I/O Functions Table

INPUTS		OUTPUTS							
		PWC		CHECKWEIGHER		DFC		BATCHER	
P9	INPUTS	P8	Presets	Check 3	Check 5	Fill 1	Fill 2	Batch 1	Batch 2
2	ZERO	2	PWC 1	Under	Under	Fill	Fast	Fill 1	Fast 1
3	TARE	3	PWC 2	Accept	Lo Under		Slow	Fill 2	Slow 1
4	Gross/Net	4	PWC 3	Over	Accept			Fill 3	Fast 2
5	PRINT	5	PWC 4		Lo Over			Fill 4	Slow 2
6	N/A	6	PWC 5		Over			Fill 5	Fast 3
7	STOP	7	PWC 6					Fill 6	Slow 3
8	START	8	PWC 7					Fill 7	
9	DUMP	9	PWC 8			Dump	Dump	Dump	Dump

Refer to Figure No. 5 for the AC Input Relay board, Figure No. 6 for the AC Output Relay board and Figure No. 7 for the Main PCB.

Relay Box Cable Wire Number To Relay Number Table

CABLE WIRE NUMBER	RELAY NUMBER (Set Proper Jumpers)
2	1
3	2
4	3
5	4
6	5
7	6
8	7
9	8
10	+SRC (For AC Input Relays)
1	GND

The relay box cable wire numbers correspond to the indicator main PC board remote input and output connnector pins (P9 and P8).

EXAMPLES:

INPUT

If cable wire number 2 is connected to P9-2, then AC Input relay 1 or 5 (depending on the relay board jumper setting), will initiate a “zero” function on the indicator.

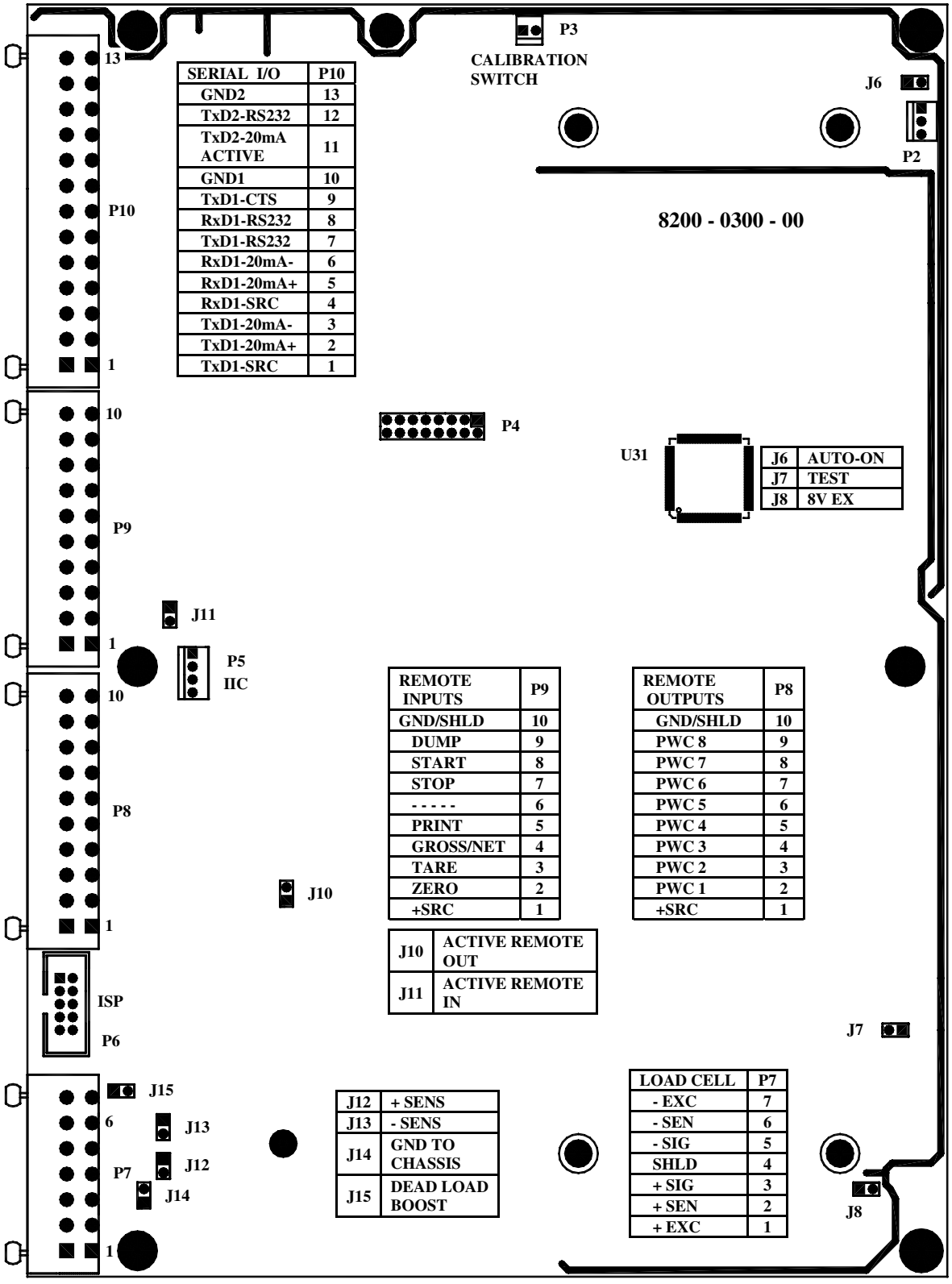
OUTPUT

If cable wire number 2 is connected to P8-2, then PWC 1 will activate AC Output relay 1 or 5, depending on the relay board jumper setting.

DFC OPERATION WITH A SINGLE RELAY BOARD

DFC operation can be accomplished using one relay board. By setting the relay board jumpers on PWC1, PWC2, PWC3 and PWC8 (see Figure No. 6), PWC1 will operate relay 1 at the Fill preset, PWC2 will operate relay 2 at the SLOW preset and DUMP will operate relay 4 with the dump command (see the tables above). Note, that PWC3 is not used.

INSTALLATION, CONT.



SERIAL I/O	P10
GND2	13
TxD2-RS232	12
TxD2-20mA ACTIVE	11
GND1	10
TxD1-CTS	9
RxD1-RS232	8
TxD1-RS232	7
RxD1-20mA-	6
RxD1-20mA+	5
RxD1-SRC	4
TxD1-20mA-	3
TxD1-20mA+	2
TxD1-SRC	1

J6	AUTO-ON
J7	TEST
J8	8V EX

REMOTE INPUTS	P9
GND/SHLD	10
DUMP	9
START	8
STOP	7
- - - - -	6
PRINT	5
GROSS/NET	4
TARE	3
ZERO	2
+SRC	1

REMOTE OUTPUTS	P8
GND/SHLD	10
PWC 8	9
PWC 7	8
PWC 6	7
PWC 5	6
PWC 4	5
PWC 3	4
PWC 2	3
PWC 1	2
+SRC	1

J10	ACTIVE REMOTE OUT
J11	ACTIVE REMOTE IN

J12	+ SENS
J13	- SENS
J14	GND TO CHASSIS
J15	DEAD LOAD BOOST

LOAD CELL	P7
- EXC	7
- SEN	6
- SIG	5
SHLD	4
+ SIG	3
+ SEN	2
+ EXC	1

Figure No. 7

INSTALLATION, Cont.

Main PCB Jumpers (See Figure No. 7)

J6 - AUTO-ON JUMPER

The AUTO-ON jumper J6, when connected, will cause the indicator to power on automatically whenever power is applied to the power input connector. If power is lost momentarily and then reapplied, the indicator will turn on without pressing the **ON** key. See Figure No. 7 for jumper location.

J7 - TEST JUMPER

The TEST jumper J7, when connected, will turn the backlight on, disregarding the LIGHT ON= setting (refer to Setup Review for explanation of LIGHT ON). See Figure No. 7 for jumper location.

J8 - 8V EX JUMPER

The 8V EX jumper J8, when connected, allows the 220 indicator to supply 8 VDC excitation voltage when a remote (external) 12 VDC battery is used to power the indicator. To operate from the 12 VDC battery, the load cell excitation voltage MUST be set to 8 VDC (J8 *closed*). Operating with the load cell excitation voltage set to 12 VDC will result in an unstable weight display. See Figure No. 7 for jumper location.

J10 - ACTIVE REMOTE OUT JUMPER

The Active Remote Out jumper J10, when connected, allows the 220 indicator to supply (source) 5 VDC to a solid-state relay or other load of 200 ohms or greater. To operate from the 5 VDC source, the positive connection from the relays must be connected to P8 pins 2 through 9 and the negative wire from the relays to P8 pin 10 (GND/SHLD). See Figure No. 7 for jumper and connector P7 location.

For completely isolated outputs, J10 must be open (positioned on one plug-in pin only or removed) and the user must provide 5 to 12 VDC to P8 pin 1 (+SRC) and a ground return to the load. The load must still be 200 ohms or greater. Note that P8 pin 10 (GND/SHLD) is not connected.

J11 - ACTIVE REMOTE IN JUMPER

The Active Remote In jumper J11, when connected, allows the 220 indicator to supply (source) 5 VDC to a remote input circuit. Connecting P9 pins 1 through 9 to P9 pin 10 (GND) through a switch will cause the selected action. See Figure No. 7 for jumper and connector P9 location.

For completely isolated inputs, J11 must be open (positioned on one plug-in pin only or removed) and the user must provide 5 to 12 VDC to P9 pin 1 (+SRC) and a ground return to the switch connected to P9 pin 2 through 9. Note that P9 pin 10 (GND) is not connected.

J12 AND J13 - SENSE JUMPERS

If the sense leads are NOT used, you must install plug-in jumpers at J12 and J13 adjacent to the terminal block. These jumpers attach the sense leads to the excitation leads. If sense leads ARE used (as in motor truck scales), these plug-in jumpers should be positioned on one plug-in pin only or removed and stored for later use. Refer to Figure No. 7 for the location of the jumpers.

J14 - GND TO CHASSIS JUMPER

This jumper when installed connects the analog circuit ground to the indicator chassis ground. Refer to Figure No. 7 for the location of the jumper.

J15 - DEAD LOAD BOOST JUMPER

For very low dead loads (less than 10% of the combined load cell capacity) connect the dead load boost jumper J15 on the printed circuit board. Refer to Figure No. 7 for the location of the jumper.

KEYPAD FUNCTIONS

The 220 is equipped with a 27 key keypad. The keypad is used to enter commands and data into the instrument. This section describes each key along with its normal function. It is helpful to refer to the actual instrument while reading this section.

The membrane keypad is not to be operated with pointed objects (pencils, pens, fingernails, etc). Damage to keypad resulting from this practice is NOT covered under warranty.

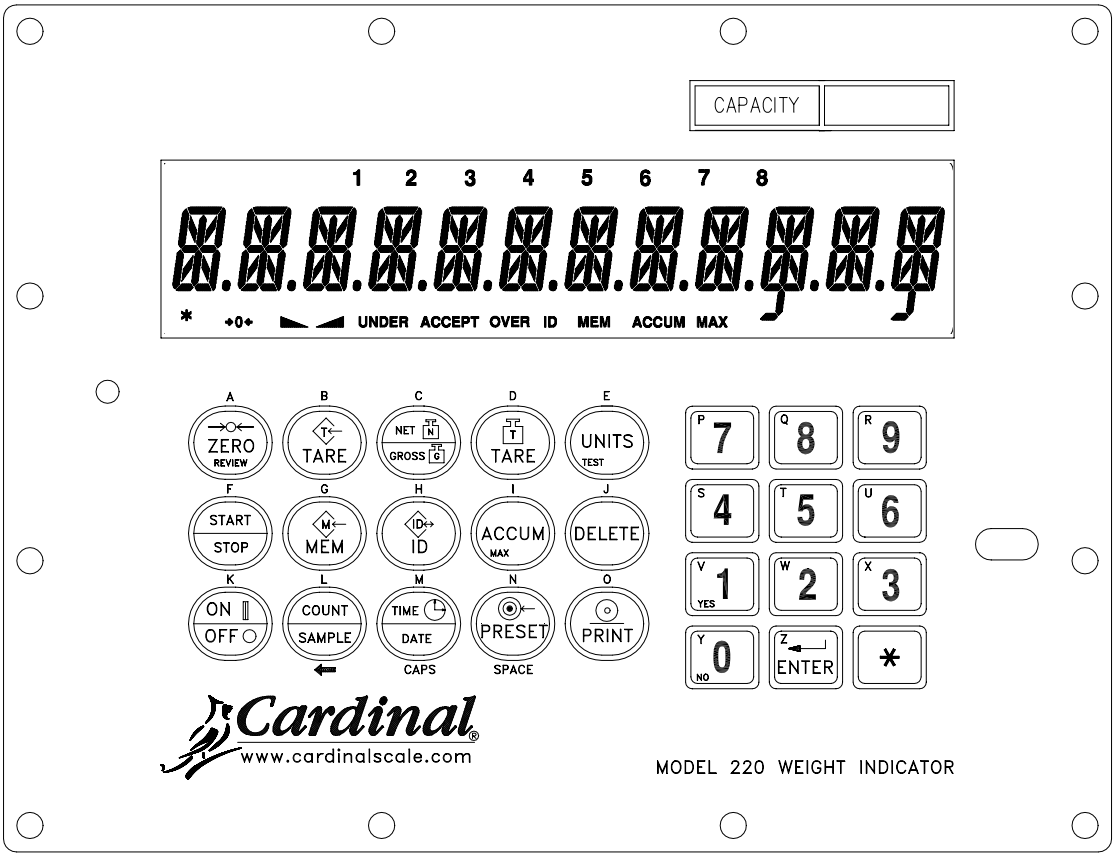


Figure No. 8

ON/OFF (K) KEY

Pressing this key when the indicator is off will apply power to the instrument. If the indicator is already on, pressing this key will turn the indicator off. In the alphanumeric mode, it is used to enter the letter “K”.

0 THROUGH 9 (P THROUGH Y) KEYS

These keys are used to enter numeric data during the setup and calibration as well as during normal operation of the instrument. **NOTE:** The 1 and 0 keys have dual functions. They are used to enter numeric data during setup and calibration as well as during normal operations and are also used to answer yes (1 = YES) or no (0 = NO) to various prompts. In the alphanumeric mode, they are used to enter the letters “P” through “Y”.

✱ ASTERISK KEY

This key is used for several functions. During Setup, when a setup parameter is displayed, pressing this key will "backup" to the previous prompt. Pressing this key during entry of data will toggle the keypad to the “alpha” mode. In normal operation, this key is used in conjunction with the other keys on the keypad to access additional indicator features. These features and their associated key combinations are as follows:

KEYPAD FUNCTIONS, Cont.

ASTERISK, ZERO/REVIEW KEY

This combination will enter the Review mode of Setup and Calibration. Refer to Setup Review section of this manual for details.

ASTERISK, NET/GROSS KEY

This combination will display the Net accumulator.

ASTERISK, NET/GROSS KEY, PRINT KEY

This combination will print the Net accumulator.

ASTERISK, NET/GROSS KEY, ZERO KEY

This combination will zero (clear) the Net accumulator.

ASTERISK, NET/GROSS KEY, NET/GROSS KEY

This combination will display the Gross accumulator.

ASTERISK, NET/GROSS KEY, NET/GROSS KEY, PRINT KEY

This combination will print the Gross accumulator.

ASTERISK, NET/GROSS KEY, NET/GROSS KEY, ZERO KEY

This combination will zero (clear) the Gross accumulator.

ASTERISK, UNITS KEY

This combination will enter the Test mode. The Test mode is used to conduct a test of all display elements. The test consists of 12 cycles, each lasting about one second:

1. The model number and the software version X.X.
2. All alphanumeric characters and annunciators will turn on.
3. The calibration numbers (C1 to C4).

ASTERISK, START/STOP KEY

This combination will energize the dump solenoid for filling and batching operations. Note that this key combination is valid only when MODE OF OP=2 or 5, (Digital Fill Control or Batcher), DUMP GATE = YES and AUTO DUMP=NO have been selected during setup.

ASTERISK, ACCUM/MAX KEY

The 220 indicator will retain and display on command the maximum weight value measured since the indicator has begun operation or since the maximum value was last cleared. The maximum value is displayed by pressing the **ASTERISK** key followed by pressing the **ACCUM/MAX** key. The value may be reset by pressing the **DELETE** key while the maximum value is displayed. Pressing any other key will exit the maximum weight display mode.

ASTERISK, PRESET KEY

If the Mode of Operation = 5 (Batcher), this combination is used to enter the batcher parameter setup values for the preset trim weight for each bin, TRM #=XXXXXXX, the zero tolerance, ZERO T=XXXXXXX, and the gate timer GATE TIMR=XX.

KEYPAD FUNCTIONS, Cont.

ASTERISK, PRINT KEY

This combination is used to *change* the selected print ticket format. Pressing the **ASTERISK** then the **PRINT** key will display the prompt PRT=X., where X is the current ticket format selected. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

0 = Print Tab Settings

1 = Default Print Format	2 = *nControl* Ticket	3 = *nControl* Ticket
4 = *nControl* Ticket	5 = *nControl* Ticket	6 = *nControl* Ticket

In addition to using the **ASTERISK**, **PRINT** key combination to change the print ticket format, the operator (just prior to printing the ticket) can change the print ticket format at the end of the weighing operation. This is accomplished by performing the normal weighing operation, then pressing the desired format number (0, 1, 2, 3, 4, 5 or 6), followed by pressing the **PRINT** key.

NOTE! When a print format is selected (by either method), it will remain active until changed by the operator.

ENTER (Z) KEY

The **ENTER** key serves several purposes. First, when reviewing setup parameters, pressing the **ENTER** key will display the current setting of the parameter. Second, the **ENTER** key is used to signal completion of the entry of data and causes the indicator to process the data entered. In the alphanumeric mode, it is used to enter the letter “Z”.

ZERO/REVIEW (A) KEY

This key performs several functions. In normal operation, pressing this key will cause an immediate zeroing of the weight display up to the selected limit of 4% or 100% of the scale’s capacity. Note that this selection is made during the setup and calibration of the instrument. Pressing this key after the **ASTERISK** key will enter the Review mode of Setup and Calibration. Refer to description of **ASTERISK** key and the Setup Review section of this manual for details. In the alphanumeric mode, this key is used to enter the letter “A”.

TARE (B) KEY (WITH DIAMOND "T" SYMBOL)

This key is a dual function key. Pressing the **TARE** key alone (Pushbutton Tare mode) will cause the current gross weight to be stored as the new tare weight and cause the weight display to change to the net weight display mode (Net annunciator will turn on). Pressing this key after entering a numeric value (Keypad Tare) will cause the value entered to be accepted as the new tare weight. In the alphanumeric mode, this key is used to enter the letter “B”.

NOTE: Tare weights equal to or greater than scale capacity cannot be entered. In addition, the keypad tare weight division value must be the same as the scale division value. For example, a unit with .005 lb as the division value will display ERROR if you attempt to enter 1.003 for the tare weight.

NET/GROSS (C) KEY

This key is used to toggle between the Net and Gross weight modes. The selected mode is indicated by turning on the appropriate annunciator on the display. Note that if no valid tare weight has been entered, pressing this key will cause a momentary NO TARE display error and the indicator will remain in the Gross weight mode. In the alphanumeric mode, this key is used to enter the letter “C”.

KEYPAD FUNCTIONS, Cont.

TARE (D) KEY (WITH WEIGHT "T"SYMBOL)

Pressing this key will display the current tare weight for three seconds. In the alphanumeric mode, this key is used to enter the letter “D”.

UNITS/TEST (E) KEY

This key performs two functions. In normal operation, this key is used to select the units in which the weight is to be displayed. The available units of measure (BASE UNITS= and CNVRT UNITS=) are enabled or disabled in setup. The available units include tons, pounds only, ounces, tonnes (metric tons), kilograms, grams and custom. Note that not all combinations are supported. Pressing this key after the **ASTERISK** key will enter the Test mode. The Test mode is used to conduct a test of all display elements. Refer to description of **ASTERISK** key for details. In the alphanumeric mode, this key is used to enter the letter “E”.

START/STOP (F) KEY

This key performs two functions. When used by the Digital Fill Control and Batcher features, it is used to signal the start of an operation. If the operation is already in progress, pressing this key will stop the operation. Pressing this key during the entry of alphanumeric characters will "backup" to the previous prompt. In the alphanumeric mode, this key is used to enter the letter “F”.

MEM (G) KEY

This key is used by the ID Storage feature to enter permanent identification (ID) strings and perform other ID functions. In the alphanumeric mode, this key is used to enter the letter “G”.

ID (H) KEY

This key is used to display and enter an alphanumeric identification (ID) string for use in printing and in the ID Storage feature. If the ID Storage feature was not enabled during the setup and calibration of the instrument, pressing this key will display the current ID string. If the displayed string is correct, press the **ENTER** key to retain it. If you choose to change the ID string, use the alpha numeric keys to enter up to a 12 digit ID string and press the **ENTER** key to save it. Note that the ID annunciator is turned on when the display is showing an ID string. In the alphanumeric mode, this key is used to enter the letter “H”.

ACCUM (I) KEY

This key is used to display the contents of the 32 ID accumulators, the total gross and net weight accumulators, the 200 ID storage accumulators, the Batcher bin accumulators and the Count function piece count accumulators. Note, that the Total Gross, Total Net and Count accumulators are updated with every print command.

To access the 32 ID accumulators, you must first disable the ID Storage feature in the 220 setup procedure (MODE OF OP=). Note, that although more than 32 ID’s can be used, only the first 32 ID’s entered will be accumulated. To use, simply press the **ID** key to set the ID before pressing the **PRINT** key. If only Gross weight is printed, the gross weight is added to the accumulator or, if the indicator is in the Net mode, the net weight will be added. Refer to the Operation section of this manual for instructions on printing and clearing the accumulators.

In the alphanumeric mode, this key is used to enter the letter “I”.

DELETE (J) KEY

This key is used by the ID Storage feature to delete ID numbers. In the alphanumeric mode, this key is used to enter the letter “J”.

KEYPAD FUNCTIONS, Cont.

COUNT/SAMPLE (L, ⬅) KEY

This key performs several functions. In a counting operation, the first time it is pressed, the indicator will count (unless piece weight is 0). The second time it is pressed (or if pcwt=0 on the first press) the display will show the prompt "ADD=5". Continued pressing of the key will toggle between the ADD=5, 10, 25, 50, 75 prompts to select a sample size. When desired sample size is displayed, add the number of pieces, then press the **ENTER** key ***OR*** with "ADD=XX" (5, 10 etc.) displayed, using the numeric keypad, key-in any desired sample value, add the number of pieces, then press the **ENTER** key. Press the **ASTERISK** key to abort the sample operation. To exit the count functions press the **NET/GROSS** or **COUNT/SAMPLE** key. Refer to the Operation, Counting section of this manual for details on using the counting feature.

Pressing this key during entry of alphanumeric data will *backspace* and delete the last character entered. In the alphanumeric mode, this key is used to enter the letter "L".

TIME/DATE (M, CAPS) KEY

This key is used to enter the clock mode to program the time, date and consecutive number. In the alphanumeric mode, it is used to enter the letter "M" and to toggle between lower and upper case alpha characters.

Pressing the **TIME/DATE** key will enter the clock mode with the 220 displaying TIME=XX.XX.XX, where XX.XX.XX is the current time.

12-Hour Format Selected In Setup (TIME=12)

1. If the time displayed is correct, press the **ENTER** key and proceed to step 3.
2. If the displayed time is incorrect, use the numeric keys to enter the correct time and press the **ENTER** key
3. The display will show AM=XX, where XX is the current setting. If the time is before noon (12:00 PM), press the **1/YES** key (display will show AM=YES), then press the **ENTER** key.
4. The display will show DATE=XX.XX.XX, where XX.XX.XX is the current date.
5. If the date displayed is correct, press the **ENTER** key to proceed to the consecutive number prompt, CNC NO=.
6. If the date displayed is incorrect, use the numeric keys to enter the correct date and press the **ENTER** key to proceed to the consecutive number prompt. Remember to enter the date in the same format (month-day-year or day-month-year) as selected by the USA setup parameter. Note that with the USA=YES setting, the date format is month-day-year.

24-Hour Format Selected In Setup (TIME=24)

1. If the time displayed is correct, press the **ENTER** key and proceed to step 3.
2. If the displayed time is incorrect, use the numeric keys to enter the correct time and press the **ENTER** key. Note that with the 24-hour format selected, entering all times after noon (12:00 PM), you must add 12 to the time, i.e. 3 PM would be 1500.
3. The display will show DATE=XX.XX.XX, where XX.XX.XX is the current date.
4. If the date displayed is correct, press the **ENTER** key to proceed to the consecutive number prompt, CNC NO=.
5. If the date displayed is incorrect, use the numeric keys to enter the correct date and press the **ENTER** key to proceed to the consecutive number prompt. Remember to enter the date in the same format (month-day-year or day-month-year) as selected by the USA setup parameter. Note that with the USA=YES setting, the date format is month-day-year.

Consecutive Number (CNC NO=)

If the consecutive number displayed is correct, press the **ENTER** key to resume normal operation. If the consecutive number displayed is incorrect, use the numeric keys to enter the correct number (6 digits max.) then press the **ENTER** key to resume normal operation.

KEYPAD FUNCTIONS, Cont.

PRESET (N, SPACE) KEY

This key is used to enter the weight values for the Preset Weight Comparators (PWC), the Checkweigher feature or the Digital Fill Control feature depending on which function was selected during setup and calibration. In the alphanumeric mode, it is used to enter the letter "N" or to insert a space between characters.

Preset Weight Comparator

Pressing the **PRESET** key will prompt for the value of the first preset (PSET1=). The value displayed can be saved by pressing the **ENTER** key or changed using the numeric keys to enter the new preset value, followed by pressing the **ENTER** key. In either case, pressing the **ENTER** key will advance to the next preset. This procedure is repeated for each preset to be used. Refer to the Operation, Preset Weight Comparator section of this manual for instructions on setting the preset values and using the PWC feature.

Checkweigher

Pressing the **PRESET** key will prompt for the UNDER= preset weight value. Refer to the Operation, Checkweigher section of this manual for instructions on setting the preset values and using the Checkweigher feature.

Digital Fill Control

Pressing the **PRESET** key will prompt for the value of the fast output target weight (FAST=), if two speed operation was selected during setup and calibration, or if single speed operation was selected, the prompt for the stored target weight (FILL=) will be displayed. Refer to the Operation, Digital Fill Control section of this manual for instructions on setting the preset values and using the Digital Fill Control feature.

Batcher

Pressing the **PRESET** key will prompt for the first ingredient/bin number (ING 1=X). Refer to the Operation, Batcher section of this manual for instructions on setting the preset values and using the Batcher feature.

PRINT (O) KEY

Pressing this key will add the displayed gross or net weight or piece count to the associated accumulator and initiate the transmission of weight and other data selected during setup of the Print menu items via the selected printer output port (see Port= under Print menu) unless the continuous data feature of this port was enabled during setup and calibration. In the alphanumeric mode, this key is used to enter the letter "O".

NOTE! The indicator will not respond to the Print command unless the weight display is stable. If displaying gross weight, the only weight printed is gross weight. If displaying net weight, the gross, tare, and net weights are printed.

The 220 includes support for *nControl*. *NControl* is a PC based program that can design a ticket then download the ticket information to the indicator. The 220 allows six programmable formats in addition to the standard print tab settings format. Print formats are selected by using the **ASTERISK** and **PRINT** keys in combination (refer to the Asterisk Key section for details). **NOTE!** When the **PRINT** key is pressed the indicator looks for the selected format. If no "nControl" ticket is found it reverts to the print tab settings. *For more information on nControl, refer to the nControl Fast Start Guide.*

```
#2
10:19   23/08/2000
100.00   lb   G
 20.00   lb   T
 80.00   lb   N
      0.00   lb   GROSS ACCUM
    272.00   lb   NET ACCUM
```

SAMPLE TICKET

ANNUNCIATORS

Annunciators are turned on to indicate that the display is in the mode corresponding to the annunciator label or that the status indicated by the label is active. The annunciators flash on and off to indicate that the 220 is waiting for an input from the keypad for the mode indicated by the flashing annunciator.

∗ (ASTERISK)
When the **ASTERISK** key is pressed, the ∗ (ASTERISK) annunciator is turned on to indicate either that the keyboard is in the alpha character input mode (for data input modes) or that a function key is to be pressed.

→0← (ZERO)
The **→0←** (ZERO) annunciator is turned on to indicate that the weight is within +/- 1/4 division of the center of zero.

◣◢ (STABLE)
The STABLE annunciator is identified with 2 small triangle shapes ◣◢ and is turned on when the weight display is stable. This means that the change in successive weight samples is less than the motion limits selected during setup and calibration of the instrument.

UNDER
The UNDER annunciator is used to signal that the displayed weight is less than the minimum value of acceptable weight used in the Checkweigher feature. Note that this annunciator is active only when the Checkweigher feature is enabled.

ACCEPT
The ACCEPT annunciator is used to signal that the displayed weight is within the acceptable weight limits for the Checkweigher feature. That is, it is equal to or greater than the minimum acceptable weight and equal to or less than the maximum acceptable weight. Note that this annunciator is active only when the Checkweigher feature has been enabled.

OVER
The OVER annunciator is used to signal that the displayed weight is equal to or greater than the minimum value of over weight used in the Checkweigher feature. Note that this annunciator is active only when the Checkweigher feature has been enabled.

ID
The ID annunciator is turned on to indicate that the value displayed is the identification number currently in use.

MEM
The MEM annunciator is used by the ID Storage feature and is turned on to show that the indicator is performing an ID storage function. It is used in conjunction with the ID annunciator to indicate when a permanent ID number is to be entered.

ACCUM
The ACCUM annunciator is turned on to indicate that the value displayed is the contents of the accumulator associated with the currently selected ID number.

MAX
The MAX annunciator is turned on to indicate that the value displayed is the maximum weight value measured since the indicator began operation or since the maximum value was last cleared.

ANNUNCIATORS, Cont.

1 THROUGH 8
These numeric annunciators are found above the line of characters and are used to indicate the status of the eight preset weight comparators or the (up to) seven batch ingredients and the dump gate (preset 8). The annunciator is turned on to signal that the discharged weight is equal to or less than the corresponding preset weight value.

8
In a fill or batching operation with the dump gate enable, the preset annunciator 8 is turned on to indicate the action.

N
The N symbol is located to the right of the weight display and is turned on to show that the displayed weight is the net weight (gross weight less tare weight).

G
The G symbol is located to the right of the weight display and is turned on to indicate that the displayed weight is the gross weight.

tn
The tn symbol is located to the right of the weight display and is turned on to show that the displayed weight units is avoirdupois tons, i.e. 10.72 tn G.

g
The g annunciator is located to the right of the weight display and is used to indicate that the displayed units of weight measurement is grams, i.e. 1100 g G.

lb
The lb annunciator is located to the left of the weight display and is turned on to show that the displayed weight units is pounds, i.e. 1100 lb G.

kg
The **kg** annunciator is located to the left of the weight display and is used to indicate that the displayed units of weight measurement is kilograms i.e. 1250 kg G.

t
The t annunciator is located to the right of the weight display and is used to indicate that the displayed units of weight measurement is metric tons, i.e. 13.45 t G.

T
The T symbol is displayed to show that the displayed weight is the tare weight.

SETUP AND CALIBRATION

Your 220 indicator has been thoroughly tested and calibrated before being shipped to you. If you received the indicator attached to a scale, calibration is not necessary. If the indicator is being connected to a scale for the first time or recalibration is necessary for other reasons, proceed as indicated.

The calibration switch is located on the enclosure rear panel. You may gain access to this switch simply by removing the calibration switch access screw on the rear panel. Refer to Figure No. 9.

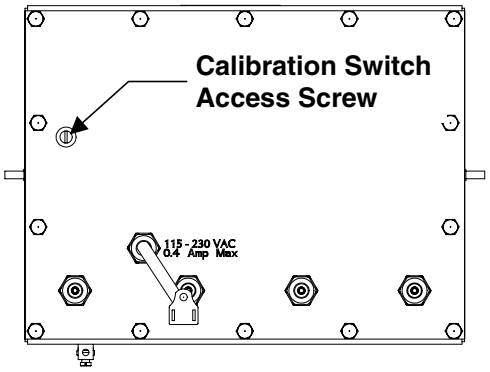


Figure No. 9

*During the setup and calibration process it is necessary to enter operational parameters via the 220's keypad. Pressing the **ENTER** key without entering a new value will retain the current setting and advance the 220 to the next prompt. To change a setting, enter a new value and press the **ENTER** key. This will save the new value and advance the 220 to the next prompt. Pressing the **ASTERISK** key will "backup" to the previous prompt or return to normal operation.*

CAUTION: The membrane keypad is not to be operated with pointed objects (pencils, pens, fingernails, etc). Damage to keypad resulting from this practice will NOT be covered under warranty.

Enter Setup Mode

To enter the setup mode, with the indicator ON, insert a small screwdriver or other tool through the calibration switch access hole on the rear panel. Press and release the calibration switch. The menu SETUP will be displayed. Continue to press and release (or hold) the switch to rotate through the beginning point for entering the setup mode.

SETUP	Setup Mode (starts at USA= prompt)
ANALOG	Analog to Digital Filtering (starts at FILTER= prompt)
CALIBRATE	Calibration (starts at CAL WT 1= prompt)
SERIAL	Serial Input/Output (starts at BAUD 1= prompt)
PRINT TABS	Print Tab Settings (starts at PORT= prompt)
FINE SPAN	Fine Span Adjustment
HIGH RES	Display High Resolution Weight Mode
KEY LOCK OUT	Key Lock Out Function
ANALOG OUT	Analog Output Option (If option board is installed, Calibration of 10 volt or 4 to 20 mA Analog Output)

If you press the **ENTER** key at the SETUP prompt, you may proceed through to the next section (up to and including FINE SPAN) by pressing the **ENTER** key.

NOTE! Setup may be interrupted at any time. ALL data previously entered and finalized with the ENTER key will be retained in the non-volatile memory.

Pressing the calibration switch *at any prompt* will return you to the SETUP menu. To exit setup, press the **ASTERISK** key with any of the above menu selections displayed or cycle power at any time (press the **ON/OFF** key twice).

SETUP AND CALIBRATION, Cont.

NOTE! With the exception of the SETUP prompt, the beginning prompt displayed for each section are different if you push the calibration switch instead of pressing the **ENTER** key to proceed through the section. *For example*, if you press the calibration switch with the SETUP displayed, the next prompt displayed will be ANALOG. If you step through the setup prompts by pressing the **ENTER** key, the next prompt displayed will be ANALOG=NO. In addition, you must press the **1/YES** key then the **ENTER** key to proceed with that section. To skip the section and advance you to the next menu selection, press the **ENTER** key.

SETUP - Setup Function

USA - DOMESTIC / INTERNATIONAL

With SETUP displayed, press the **ENTER** key. The display will change to USA=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

USA = YES (Domestic)
- DATE = mm/dd/yy
- Z LIMIT = no
- CAP + 5% to OC

USA = NO (International)
- DATE = dd/mm/yy
- Z LIMIT = yes
- CAP + 9 grads to OC
- ETR able = yes
- PT printed with tare
- Lamp test on power up

LFT - LEGAL FOR TRADE

The display will show LFT=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

LFT = YES

Interval Settings (INTERVAL) allowed are: 1, 2, 5, 10, 20, 50

NOTE! If LFT=YES and USA=YES
- Division must be 100 to 10,000
- Z TRACK = .5 or 0 to 3
- Inhibit serial data during input
- Disables the **COUNT** key
- DATE = mm/dd/yy
- Z LIMIT = no
- CAP + 5% to OC

NOTE! If LFT=YES and USA=NO
- STABLE = 1
- DATE = dd/mm/yy
- Z TRACK = 0.5
- Z LIMIT = yes
- CAP + 9 grads to OC
- PT printed with tare
- Lamp test on power up

LFT = NO

Interval Setting (INTERVAL) is selectable from 1 to 99.

NOTE! If LFT=NO
- Enables the **COUNT** key
- Enables the Converted Units
- Net Weight print feature

SETUP AND CALIBRATION, Cont.

BASE UNITS - BASE UNITS

The display will show BASE UNITS=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2, 3, 4, 5 or 6.

0 = none
1 = tn (tons)
2 = g (grams)
3 = lb (pounds)
4 = oz (ounces)
5 = kg (kilograms)
6 = tonnes (metric tons)

CNVT UNITS - CONVERTED UNITS

The display will show CNVT UNITS=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2, 3, 4, 5, 6 or 7. Note, that dependent upon the selection made for BASE UNITS, not all units are available. Also, if you select 7 (Custom Units) two additional prompts will be displayed.

0 = none
1 = tn (tons)
2 = g (grams)
3 = lb (pounds)
4 = oz (ounces)
5 = kg (kilograms)
6 = tonnes (metric tons)
7 = Custom Units (see note below)

NOTE! The following prompts, CNVF= (Conversion Factor) and LABEL= (Label) will only be displayed if you selected 7 (Custom Units) for the CNVT UNITS (Converted Units) prompt.

CNVF - CONVERSION FACTOR

The conversion factor is a number that the base units must be multiplied by to obtain the desired unit of measurement. The display will show CNVF=XX.XXXXX, where XX.XXXXX is the current setting for the converted units conversion factor.

EXAMPLE:
Water weighs 8 lb per 1 Gallon.

To compute the conversion factor, you would divide 1 gallon by 8 pounds, with the result being 0.125.

$$\frac{1\ \text{Gal}}{8\ \text{lb}} = 0.125$$

Therefore, if the weight displayed is 27.65 lb G, pressing the **UNITS/TEST** key would change the display to show 3.45625 gl G. (27.65 x 0.125 = 3.45625). *The gl in the example stands for gallons. Refer to the next prompt, LABEL, for information on entering the custom units label.*

To accept the value displayed, press the **ENTER** key, otherwise, use the numeric keys to enter a new value then press the **ENTER** key to save it.

LABEL – CUSTOM UNITS LABEL

The display will show LABEL=XX, where XX is the current setting for the custom units label. Press the **ENTER** key to keep the displayed value or use the alphanumeric keys to enter a new value and press the **ENTER** key to save the new setting. Note, that only 2 characters are allowed.

SETUP AND CALIBRATION, Cont.

MODE OF OP - MODE OF OPERATION

The display will show MODE OF OP=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

0 = Basic Indicator	4 = Checkweigher
1 = ID Storage	5 = Batcher
2 = Digital Fill Control	6 = For Future Use
3 = Preset Weight Comparators	7 = For Future Use

- If MODE OF OP = 0, (Basic Indicator) proceed to WT RANGES - Weight Ranges prompt.
- If MODE OF OP = 1 (ID Storage), proceed to the MODE OF OPERATION = 1 section, beginning with the ID COUNT - Number of ID prompts.
- If MODE OF OP = 2 (Digital Fill Control), proceed to MODE OF OPERATION = 2 section, beginning with the SPEED - Speed Setting prompt.
- If MODE OF OP = 3 (Preset Weight Comparators), proceed to MODE OF OPERATION = 3 section, beginning with the OUTPUTS - Outputs Setting prompt.
- If MODE OF OP = 4 (Checkweigher), proceed to MODE OF OPERATION = 4 section, beginning with the OUTPUTS - Outputs Setting prompt.
- If MODE OF OP = 5 (Batcher), proceed to MODE OF OPERATION = 5 section, beginning with the SPEED – Single or Two Speed Operation Setting prompt.

Mode Of Operation = 1 (ID Storage)

ID COUNT – NUMBER OF ID PROMPTS (Categories)

The ID COUNT is the number of categories each ID number can have. These categories will be displayed when the ID key is pressed. For example, if you need to track the truck and trailer, you would need 2 prompts (categories).

The display will show ID COUNT=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1, 2 or 3.

ID COUNT=1	ID COUNT=2	ID COUNT=3
One Prompt	Two Prompts	Three Prompts

NOTE! The value selected for ID COUNT will determine the number of additional prompts (PROMPT X) displayed following the ID COUNT prompt.

PROMPT 1 - PROMPT 1 NAME (12 Characters Alphanumeric)

The display will show PROMPT 1=XXXXXXXXXXX, where XXXXXXXXXXX is the current name for the first prompt. If the name displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the alphanumeric keys enter up to 12 characters to refer to the first prompt, then press the **ENTER** key to save it

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 1 (ID Storage, Cont.)

PROMPT 2 - PROMPT 2 NAME (12 Characters Alphanumeric)

The display will show *PROMPT 2=XXXXXXXXXXXX*, where XXXXXXXXXXXX is the current name for the second prompt. If the name displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the alphanumeric keys enter up to 12 characters to refer to the second prompt, then press the **ENTER** key to save it

PROMPT 3 - PROMPT 3 NAME (12 Characters Alphanumeric)

The display will show *PROMPT 3=XXXXXXXXXXXX*, where XXXXXXXXXXXX is the current name of the third prompt. If the value displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the alphanumeric keys enter up to 12 characters to refer to the third prompt, then press the **ENTER** key to save it

NOTE! When entering values for the prompts, the characters start displaying on the right side of the display and proceed to the left. When more than 3 characters are used, the *PROMPT X=* prompt will automatically scroll off the left side of the display to show the additional characters on the right as they are entered.

The display will show *WT RANGES=X.* Proceed to the WEIGHT RANGES (Dual Interval) section to continue setup.

Mode Of Operation = 2 (Digital Fill Control)

SPEED – SINGLE OR TWO SPEED FILL CONTROL

The 220 Digital Fill Control may be configured for either single speed or two speed filling operation. If the two-speed setting is selected, the indicator will prompt for the output configuration i.e. both outputs on for fast and one off for slow or one on for fast and the other on for slow.

The display will show *SPEED=X*, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 or 2.

SPEED =1
Single Speed Operation

SPEED=2
Two Speed Operation

If single speed operation is selected (*SPEED =1*), the next prompt displayed will be *AUTO TRIM=XXX*. Proceed to the AUTO TRIM section to continue setup. Otherwise, the display will show *GATE SEQ=X.* Proceed to that section to continue setup.

GATE SEQ - GATE SEQUENCE

The **AB then B** selection will begin the operation with both outputs on until the weight reaches the **FAST=** value. At that weight, the **A** (fast) output will be turned off. The **B** (slow) output will remain on until the **SLOW=** weight is reached. At that weight, the **B** (slow) output will be turned off.

With **A then B** selected, the operation will begin with only the **A** (fast) output on until the weight reaches the **FAST=** value. At that weight, the **A** (fast) output will be turned off and the **B** (slow) output will be turned on. The **B** (slow) output will remain on until the **SLOW=** weight is reached. At that weight, the **B** (slow) output will be turned off.

GATE SEQ=1
AB then B

GATE SEQ=2
A then B

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 2 (Digital Fill Control, Cont.)

AUTO TRIM – AUTO TRIM COMPENSATION

Automatic trim compensation may be selected in which case the 220 indicator will automatically re-calculate the required trim compensation based on the difference between the ingredient preset and the amount actually filled. The 220 indicator will allow the manual entry of a trim value for each ingredient. If automatic trim compensation is selected, this trim value will be changed automatically with each batch based on the error between the weight of the material discharged and the corresponding preset. If automatic trim is not selected, the entered trim values remain unchanged.

The display will show AUTO TRIM=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

AUTO TRIM = YES
Automatic Trim Compensation ON

AUTO TRIM = NO
Automatic Trim Compensation OFF

AUTO PRNT - AUTOMATIC PRINT

The automatic print feature will cause an optional printer to record the total weight of the fill automatically at the conclusion of the fill. The time and date is also included in the printed record.

The display will show AUTO PRNT=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

AUTO PRNT=YES
Automatic Print Enabled

AUTO PRNT=NO
Automatic Print Disabled

MULT DROP – MULTIPLE DROP CAPABILITY

This feature allows up to 9 (equal) drops to be made to achieve the preset weight value. Note, that although the drops are equal amounts, the last drop will compensate for the freefall of the previous drops *and* the trim value to equal the total preset weight value.

MULT DROP=YES
Multiple Drop Enabled

MULT DROP =NO
Multiple Drop Disabled

DUMP GATE – DUMP GATE ENABLE

This feature is used when filling a hopper instead of a truck on a scale. The optional dump gate can be manually, automatically or remotely controlled (uses output #8). Note that on the display, the annuciator 8 is turned on to indicate the dump is active.

DUMP GATE = YES
Enable Dump Gate

DUMP GATE = NO
Disabled Dump Gate

If the dump gate is enabled (DUMP GATE = YES), the next prompt displayed will be AUTO DUMP=XXX. Proceed to the AUTO DUMP section to continue setup. Otherwise, the display will show DCUMLATE = XXX. Proceed to that section to continue setup.

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 2 (Digital Fill Control, Cont.)

AUTO DUMP - AUTOMATIC DUMP MODE

Selection of this feature will cause the completed batch to discharge automatically. The word DUMP appears in the weight display to signal the operator that the batch discharge is taking place. The discharge will continue until the scale weight returns to a value within the predetermined range of zero when the discharge or dump output will be turned off. If the automatic dump feature was not selected, the indicator will halt after discharging the last enabled ingredient and will wait for the manual discharge of the material after which the next batch will be initiated if the automatic recycle feature was selected.

The display will show AUTO DUMP=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

AUTO DUMP=YES
Automatic Dump Enabled

AUTO DUMP=NO
Automatic Dump Disabled

DCUMLATE – DECUMULATIVE OPERATION

In a decumulative filling operation, the weigh hopper is filled first until the required amount of material has been placed in the hopper. When the operation is started, the material is dumped until the proper amount has been discharged.

The display will show DCUMLATE=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

DCUMLATE = YES
Weigh Out

DCUMLATE = NO
Weigh In

If the decumulative operation is <u>not</u> selected (DCUMULATE = NO), the next prompt displayed will be AUTO TARE=XXX. Advance to the AUTO TARE section to continue setup. Otherwise, the display will show INTERVAL=X. Proceed to the INTERVAL SETTING section to continue setup.

AUTO TARE – AUTOMATIC TARE

This feature is a two-position toggle that controls whether the fill operation fills to the gross or net weight on the scale. If the automatic tare is selected, the weight on the scale will be used as the TARE weight before beginning the fill operation. Note that with automatic tare enabled (ON), the operation will fill to the target net weight and with automatic tare disabled (OFF), the operation will fill to the gross weight.

AUTO TARE = YES
Automatic Tare Enable (ON)

AUTO TARE = NO
Automatic Tare Disabled (OFF)

The display will show INTERVAL=X. Proceed to the INTERVAL SETTING section to continue setup.

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 3 (Preset Weight Comparators)

OUTPUTS - NUMBER OF PRESET WEIGHT COMPARATOR (PWC) OUTPUTS

The display will show OUTPUTS=XX, where XX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values 1 through 8 or 11 through 18.

NOTE! If only one output is selected (OUTPUTS=1 or 11), an additional prompt BAL PRNT will be displayed. Otherwise, the display will show WT RANGES=X. Proceed to the WEIGHT RANGES (Dual Interval) section to continue setup.

OUTPUTS=XX

1	Low State before cutoff with 1 active Preset	Relay* Open
2	Low State before cutoff with 2 active Presets	
3	Low State before cutoff with 3 active Presets	
4	Low State before cutoff with 4 active Presets	
5	Low State before cutoff with 5 active Presets	
6	Low State before cutoff with 6 active Presets	
7	Low State before cutoff with 7 active Presets	
8	Low State before cutoff with 8 active Presets	
11	High State before cutoff with 1 active Preset	Relay* Closed
12	High State before cutoff with 2 active Presets	
13	High State before cutoff with 3 active Presets	
14	High State before cutoff with 4 active Presets	
15	High State before cutoff with 5 active Presets	
16	High State before cutoff with 6 active Presets	
17	High State before cutoff with 7 active Presets	
18	High State before cutoff with 8 active Presets	

* The relay state is based on using Cardinal Scale relays (p/n 6850-1013). If using relays other than those supplied by Cardinal Scale, refer to the relay manufacturers specifications.

NOTE! When power to the indicator is lost, the output returns to a Low State condition.

BAL PRNT – AUTOMATIC PRINT ON BALANCE

With only one PWC selected (OUTPUTS=1 or 11), an additional prompt BAL PRNT (Automatic Print on Balance) will be displayed. If selected (BAL PRNT=YES), when the weight equals the preset value and all motion stops, the weight will be printed (if a printer is attached). Note, that the weight must go below 50% of the preset value before another print operation can be performed.

The display will show BAL PRNT=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

BAL PRNT=YES
Automatic Print Enabled

BAL PRNT=NO
Automatic Print Disabled

The display will show INTERVAL=X. Proceed to the INTERVAL SETTING section to continue setup.

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 4 (Checkweigher)

OUTPUTS - NUMBER OF CHECKWEIGHER OUTPUTS

When selected, the checkweigher will compare the displayed weight with either high and low preset values or with high, high-accept, low-accept and low preset values.

- If the checkweigher feature is configured for a three-zone weight comparison, the indicator will make a comparison of the displayed weight with a high and low preset value. The results of that comparison will be indicated as Over, Under or Accept.
- If the checkweigher feature is configured for the five-zone weight comparison, the indicator will make a comparison of the displayed weight with the high, high-accept, low-accept and low preset values. The results of this comparison will be indicated as Over, High-Accept, Accept, Low-Accept or Under.

The display will show OUTPUTS=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are 3, or 5.

OUTPUTS=X

OUTPUTS=3

Low State before cutoff (Relay* Open)

Over
Under
Accept

OUTPUTS=5

Low State before cutoff (Relay* Open)

Over
High-Accept
Accept
Low-Accept
Under

* The relay state is based on using Cardinal Scale relays (p/n 6850-1013). If using relays other than those supplied by Cardinal Scale, refer to the relay manufacturers specifications.

NOTE! When power to the indicator is lost, the output returns to a Low State condition.

AUTO PRNT - AUTOMATIC PRINT

The automatic print feature will cause an optional printer to print when the weight is in the ACCEPT range and STABLE. To insure printing proper weights, the STABLE= and STBL CNT= parameters should be used.

The display will show AUTO PRNT=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

AUTO PRNT=YES
Automatic Print Enabled

AUTO PRNT=NO
Automatic Print Disabled

The display will show WT RANGES=X. Proceed to the WEIGHT RANGES (Dual Interval) section to continue setup.

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 5 (Batcher)

SPEED - SINGLE OR TWO SPEED OPERATION

The display will show SPEED=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 or 2.

SPEED =1
Single Speed Operation

SPEED=2
Two Speed Operation

If single speed operation is selected (SPEED =1), the next prompt displayed will be AUTO TRIM=XXX. Proceed to the AUTO TRIM section to continue setup. Otherwise, the display will show GATE SEQ=X. Proceed to that section to continue setup.

GATE SEQ - GATE SEQUENCE

The **AB then B** selection will begin the operation with both outputs on until the weight reaches the **FAST=** value. At that weight, the **A** (fast) output will be turned off. The **B** (slow) output will remain on until the **SLOW=** weight is reached. At that weight, the **B** (slow) output will be turned off.

With **A then B** selected, the operation will begin with only the **A** (fast) output on until the weight reaches the **FAST=** value. At that weight, the **A** (fast) output will be turned off and the **B** (slow) output will be turned on. The **B** (slow) output will remain on until the **SLOW=** weight is reached. At that weight, the **B** (slow) output will be turned off.

GATE SEQ=1
AB then B

GATE SEQ=2
A then B

AUTO TRIM - AUTO TRIM COMPENSATION

Automatic trim compensation may be selected in which case the 220 indicator will automatically re-calculate the required trim compensation based on the difference between the ingredient preset and the amount actually filled. The 220 indicator will allow the manual entry of a trim value for each ingredient. If automatic trim compensation is selected, this trim value will be changed automatically with each batch based on the error between the weight of the ingredient discharged and the corresponding preset. If automatic trim is not selected, the entered trim values remain unchanged.

The display will show AUTO TRIM=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

AUTO TRIM = YES
Automatic Trim Compensation ON

AUTO TRIM = NO
Automatic Trim Compensation OFF

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 5 (Batcher), Cont.

BIN COUNT - NUMBER OF INGREDIENT BINS

The batcher may have as few as one or as many as seven ingredients. Once the batcher has been enabled during setup, the indicator will prompt for the number of ingredients. Any number less than one or greater than seven will cause the instrument to indicate an error.

The display will show *BIN COUNT=X*, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values 1 through 7.

- If two-speed operation was selected (*SPEED=2*), a maximum of 3 bins are available.
- If one speed operation was selected (*SPEED=1*), up to 7 bins are available.

AUTO PRNT - AUTOMATIC PRINT

The automatic print feature will cause an optional printer to record the weight of each ingredient and total weight of the batch automatically at the conclusion of each batch. The time and date is also included in the printed record.

The display will show *AUTO PRNT=XXX*, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

AUTO PRNT=YES
Automatic Print Enabled

AUTO PRNT=NO
Automatic Print Disabled

DUMP GATE – DUMP GATE ENABLE

This feature is used when filling a hopper instead of a truck on a scale. The optional dump gate can be manually, automatically or remotely controlled (uses output #8).

DUMP GATE = YES
Enable Dump Gate

DUMP GATE = NO
Disabled Dump Gate

If the dump gate is enabled (*DUMP GATE = YES*), the next prompt displayed will be *AUTO DUMP=XXX*. Proceed to the AUTO DUMP section to continue setup. Otherwise, the display will show *ACCUMLATE = XXX*. Proceed to that section to continue setup.

AUTO DUMP - AUTOMATIC DUMP MODE

Selection of this feature will cause the completed batch to discharge automatically. The word *DUMP* appears in the weight display to signal the operator that the batch discharge is taking place. The discharge will continue until the scale weight returns to a value within the predetermined range of zero when the discharge or dump output will be turned off. If the automatic dump feature was not selected, the indicator will halt after discharging the last enabled ingredient and will wait for the manual discharge of the material after which the next batch will be initiated if the automatic recycle feature was selected.

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 5 (Batcher), Cont.

The display will show AUTO DUMP=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

AUTO DUMP=YES
Automatic Dump Enabled

AUTO DUMP=NO
Automatic Dump Disabled

DCUMLATE – DECUMULATIVE OPERATION

In a decumulative batch process, the weigh hopper is filled first until the required amount of material has been placed in the hopper. When the batch operation is started, the material is dumped until the proper amount has been discharged.

The display will show DCUMLATE=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

DCUMLATE = YES
Weigh Out

DCUMLATE = NO
Weigh In

The display will show INTERVAL=X. Proceed to the INTERVAL SETTING section to continue setup.

SETUP AND CALIBRATION, Cont.

WT RANGES - WEIGHT RANGES (DUAL INTERVAL)

The display will show WT RANGES=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 or 2.

WT RANGES = 1	WT RANGES = 2
One weight range (Single Interval)	Two weight ranges (Dual Interval)

NOTE! If WT RANGES = 1 (single interval) advance to the INTERVAL setting, otherwise continue to LOW INT.

CAUTION: When using the dual interval feature of the 220, do not attempt to use a division value in the low range that is too small to provide adequate signal strength for stable operation of the instrument. Most scale installations will allow the smaller division to be 1/2 of the larger division value when the dual range feature is used.

The inherent sensitivity and capabilities of the 220 will allow you to select combinations that are beyond the practical limits of today's load cells for dependable, stable performance. The appearance of such a situation will be instability in the lower range, while the higher range will operate as it should.

LOW INT - LOW INTERVAL SETTING

The display will show LOW INT=X, where X is the current value.

If LFT=YES (Legal For Trade = YES), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1, 2, 5, 10, 20 or 50.

If LFT=NO (Legal For Trade = NO), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 through 99.

In either case, if the setting displayed is acceptable, press the **ENTER** key to save it.

LOW DPP - LOW DECIMAL POINT SETTING

The display will show LOW DPP=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3.

0 = XXXXXX 1= XXXXX**.**X 2 = XXXX**.**XX 3 = XXX**.**XXX

LOW RNG - LOW RNG (LOW RANGE or CAPACITY)

The display will show LOW RNG=XXXXXX, where XXXXXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 through 9,999,999.

Capacity cannot exceed 9,999,999.

NOTE! When entering values for LOW RNG, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 4 digits), the LOW RNG prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.

SETUP AND CALIBRATION, Cont.

HI INT - HIGH INTERVAL SETTING

The display will show *HI INT=X*, where X is the current value.

If *LFT=YES* (Legal For Trade = YES), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1, 2, 5, 10, 20 or 50.

If *LFT=NO* (Legal For Trade = NO), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 through 99.

In either case, if the setting displayed is acceptable, press the **ENTER** key to save it.

HI DPP - HIGH DECIMAL POINT SETTING

The display will show *HI DPP=X*, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3.

0 = XXXXXX 1= XXXXX.X 2 = XXXX.XX 3 = XXX.XXX

INTERVAL - INTERVAL SETTING

The display will show *INTERVAL=X*, where X is the current value.

If *LFT=YES* (Legal For Trade = YES), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1, 2, 5, 10, 20 or 50.

If *LFT=NO* (Legal For Trade = NO), using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 through 99.

In either case, if the setting displayed is acceptable, press the **ENTER** key to save it.

DPP - DECIMAL POINT SETTING

The display will show *DPP=X*, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3.

0 = XXXXXX 1= XXXXX.X 2 = XXXX.XX 3 = XXX.XXX

CAP - CAPACITY

The display will show *CAP=XXXXXX*, where XXXXXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 through 9,999,999.
NOTE! Capacity cannot exceed 9,999,999.

Z TRACK - ZERO TRACKING RANGE

The display will show *Z TRACK=X.X*, where X.X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0 (disables Zero Tracking), 0.5, or 1 through 9.

Z LIMIT – ZERO LIMIT RANGE

The display will show *Z LIMIT=XXX*, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

Z LIMIT = YES
5% of scale capacity

Z LIMIT = NO
Full capacity (no limit)

SETUP AND CALIBRATION, Cont.

PUO - POWER-UP ZERO FEATURE

The display will show PUO=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

PUO = YES
Automatic Re-Zero on Power-Up

PUO = NO
No Re-Zero on Power-Up

TIME - CLOCK TIME FORMAT (12 or 24 hour)

The display will show TIME=XX, where XX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to select the format of the clock operation, then press the **ENTER** key to save it.

TIME = 12
12 hour clock (AM/PM)
(3PM displays 3:00)

TIME = 24
24 hour clock
(3PM displays 15:00)

CLR TARE - CLEAR TARE

The Clear Tare feature allows the indicator to clear the Stored Tare weight when the Net weight goes below zero (a negative net weight after display of a positive net weight). With this feature enabled, the operator must re-set the tare after completion of a transaction when the load (container plus item) is removed from the scale.

The display will show CLR TARE=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

CLR TARE= Yes
Automatically clears Stored Tare when Net weight goes below zero

CLR TARE = NO
Stored Tare is not cleared when Net weight goes below zero

The following is a typical example of the Clear Tare feature in use.

1. Place container on scale, then press **TARE** key (with diamond "T" symbol on 220).
2. Load container with item to be weighed and perform normal weighing operation.
3. Remove load (item *AND* container) from scale.
4. Scale weight returns to below zero (the weight of the container) and is then reset to zero.
5. Operator is required to repeat step 1 before next weighing operation.

CLR ID - CLEAR ID

The Clear ID feature allows the indicator to clear the ID string after printing is complete. Note that this feature is available to all modes of operation, however Mode 1 operation will always clear the ID regardless of the Clear ID setting.

The display will show CLR ID=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

CLR ID= Yes
Automatically clears ID after print

CLR ID = NO
ID is not cleared after print

SETUP AND CALIBRATION, Cont.

ANALOG - Analog to Digital Filtering

The display will show A-D? NO. If analog to digital filtering setup is desired, press the **1/YES** key (display will show A-D? YES), then press the **ENTER** key to continue to the FILTER setting, otherwise press the **ENTER** key to advance to CALIBRATE?.

FILTER - DIGITAL FILTERING

The display will show FILTER=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3. Note, that if you select 3 (Custom Filtering) two additional prompts will be displayed.

0	Disabled – NO Filtering
1	MINIMAL FILTERING (sample rate = 2)
2	MODERATE FILTERING (sample rate = 1)
3	CUSTOM FILTERING

NOTE! The prompts, F= (Filter Level) and B= (Break Range) will only be displayed if you selected 3 (Custom Filtering) for the FILTER (Digital Filtering) prompt.

F - FILTER LEVEL

The display will show F=XXX, where XXX is the current setting for the filter level. The filter level is a number from 0 to 255 that corresponds to the level of filtering with 0 equal to no filtering and 255 being the greatest filtering. To accept the value displayed, press the **ENTER** key, otherwise, use the numeric keys to enter a new value then press the **ENTER** key to save it.

B - BREAK RANGE

The display will show B=XXX, where XXX is the current setting for the break range. The break range is a number from 1 to 255 that corresponds to the number of division change to break out of the filtering. Press the **ENTER** key to keep the displayed value or use the numeric keys to enter a new value and press the **ENTER** key to save the new setting.

SAMPLES - SAMPLE RATE

The display will show SAMPLES =XX, where XX is the current setting for the sample rate. The value displayed is the sample rate in samples per second. If the displayed value is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter a new value and press the **ENTER** key to save it. Allowable values for the sample rate are: 1 through 100.

STABLE - STABLE (MOTION RANGE)

The display will show STABLE=X, where X is the current setting for the range of motion detection. If the displayed value is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new range (the number of divisions of change permitted before indicating unstable), then press the **ENTER** key to save the new setting. Allowable range values are: 0 through 99 divisions.

SETUP AND CALIBRATION, Cont.

STBL CNT - STABLE COUNT (MOTION RANGE)

The display will show STBL CNT=XXX, where XXX is the current setting for the number of consecutive stable weight readings before indicating stable weight. This helps filter weight readings for stability for use with Auto Print on Balance, Digital Fill Control, traffic control, and anything else trying to capture stable weight.

If the displayed value is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter a new value and press the **ENTER** key to save it. Allowable values for the stable count are: 1 through 255.

Filter Setting Recommendations

Non-Critical Sample Rate

If the sample rate is not critical, as in static weighing, set FILTER to:

- FILTER=0, (no filtering)
- FILTER=1, (F=6, B=12, SAMPLES= 2/Sec)
- FILTER=2, (F=6, B=8, SAMPLES= 1/Sec).

Critical Sample Rate

If the sample rate is critical, as in a filling operation, use the Custom Filtering (set FILTER= to "3").

1. SAMPLE= SAMPLE RATE (1 to 100 samples/second) determination:

   Set the sample rate as close as possible to produce a display graduation change for every graduation of material added to the scale.

   $$\frac{\text{Material Flow Rate (lbs/second)}}{\text{Resolution}} = \text{SAMPLE}$$

   EXAMPLE: $\frac{100\text{lbs/sec}}{10\text{lbs}} = 10\text{s/s} = \text{SAMPLE}$

2. B= BREAK RANGE (1 to 255 graduations) determination:

   Turn the filtering off by setting the FILTER= setting to "0". Operate the system as it will be normally used and, by observation, determine the number of grads of instability that needs to be filtered out. Set the break range (B=) to that value.

   $$\frac{\text{Weight Change}}{\text{Graduation Value}} = B$$

   EXAMPLE: 20,000 x 10lb capacity scale with 800lb variation in the weight display.

   $$\frac{800}{10} = B = 80$$

3. F= FILTER SETTING (1 to 99) determination: Set to desired results.

4. If stability is unacceptable with any setting of F=, reduce the sample rate and/or increase the break range, B= setting for increased filtering.

SETUP AND CALIBRATION, Cont.

CALIBRATION? - Calibration

The display will show CALIBRATE? N. If calibration is desired, press the **1/YES** key (display will show CALIBRATE? Y), then press the **ENTER** key to continue to the CAL WT 1 setting, otherwise press the **ENTER** key to advance to SERIAL?.

NOTE! If the indicator was calibrated previously and the four calibration "C" numbers were recorded, you may enter the values for c1 through c4 instead of using test weights. By entering the previously recorded "C" numbers, you can return to that calibration setting without having to use test weights. *Refer to the Calibration "C" Number section of this manual for instructions on viewing the "C" numbers*.

ENTERING CALIBRATION "C" NUMBERS

1. With CAL WT 1=X (where X is the current value) displayed, press the "diamond T" TARE key.
2. The display will show C1=XXX, where X is the current value of the C1 number.
3. If the C1= number displayed is acceptable, press the **ENTER** key again to save it.
4. Otherwise, use the numeric keys to enter a new c1= number, then press the **ENTER** key to save it.
5. Repeat steps 2 through 4 for C2=, C3= and C4=.

If you wish to use test weights (*or are required to*) for calibration, proceed to the CAL WT 1= prompt.

If any components have been changed that affect calibration and/or your scale is used in a commercial application and must be "Legal for Trade" you cannot use "C" numbers to re-calibrate.

CAL WT 1 - FIRST CALIBRATION WEIGHT

The display will show CAL WT 1=0.

Two Point Calibration:
This is the first of two calibration weights. This weight could be ZERO (NO LOAD) or the TEST WEIGHTS / TEST LOAD.

Three Point Calibration:
This is the first of three calibration weights. This weight could be ZERO (NO LOAD), the TEST WEIGHTS / TEST LOAD or the MID-POINT WEIGHT.

- If the first calibration weight is to be ZERO (NO LOAD), press the **ENTER** key.
- If the first calibration weight is to be the TEST WEIGHTS / TEST LOAD or MID-POINT WEIGHT, use the numeric keys to input the value of the calibrated test weights.
  NOTE! When entering values for CAL WT 1, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 3 digits), the CAL WT 1 prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.
- Place the weights on the scale platform, then press the **ENTER** key.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: CAL WT 2.

SETUP AND CALIBRATION, Cont.

CAL WT 2 - SECOND CALIBRATION WEIGHT

The display will show CAL WT 2=0.

Two Point Calibration:
This is the second of two calibration weights. This weight could be ZERO (NO LOAD) or the TEST WEIGHTS / TEST LOAD.

Three Point Calibration:
This is the second of three calibration weights. This weight could be ZERO (NO LOAD), the TEST WEIGHTS / TEST LOAD or the MID-POINT WEIGHT.

- If the second calibration weight is to be ZERO (NO LOAD), press the **ENTER** key.
- If the second calibration weight is to be the TEST WEIGHTS / TEST LOAD or MID-POINT WEIGHT, use the numeric keys to input the value of the calibrated test weights.
  NOTE! When entering values for CAL WT 2, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 3 digits), the CAL WT 2 prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.
- Place the weights on the scale platform, then press the **ENTER** key.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: CAL WT 3.

CAL WT 3 - LAST CALIBRATION WEIGHT

The display will show CAL WT 3=0.

Two Point Calibration:
This weight is not used. Press the **ENTER** key to skip CAL WT 3 and advance to SERIAL?.

Three Point Calibration:
This is the last of three calibration weights. This weight could be ZERO (NO LOAD), the TEST WEIGHTS / TEST LOAD or the MID-POINT WEIGHT.

- If using 3 point calibration and the last calibration weight is to be ZERO (NO LOAD), press the **ENTER** key.
- If using 3 point calibration and the last calibration weight is to be the TEST WEIGHTS / TEST LOAD or MID-POINT WEIGHT, use the numeric keys to input the value of the calibrated test weights. **NOTE!** When entering values for CAL WT 3, the digits start displaying on the right side of the display and proceed to the left. When large values are used (more than 3 digits), the CAL WT 3 prompt will automatically scroll off the left side of the display to show the additional digits on the right as they are entered.
- Place the weights on the scale platform, then press the **ENTER** key.
- Starting at the left and proceeding right, a series of dashes will appear on the display. The dashes will stay on the display momentarily, then disappear, after which the display will show: SERIAL?.

SETUP AND CALIBRATION, Cont.

SERIAL? - Serial Input/Output

The display will show SERIAL? NO. If serial input/output setup is desired, press the **1/YES** key (display will show SERIAL? YES), then press the **ENTER** key to continue to the BAUD 1 setting, otherwise press the **ENTER** key to advance to TABS?.

BAUD 1 - SERIAL PORT 1 BAUD RATE

The display will show BAUD 1=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

12 = 1200 Baud	24 = 2400 Baud	48 = 4800 Baud
96 = 9600 Baud	19 = 19.2k Baud	38 = 38.4k Baud
115 = 115.2k Baud		

PARITY 1 - SERIAL PORT 1 PARITY

The display will show PARITY 1=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, or 2.

0 = NONE (No Parity)	1 = Odd Parity	2 = Even Parity

BITS 1 - SERIAL PORT 1 DATA BITS

The display will show BITS 1=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 7 or 8.

STOPS 1 - SERIAL PORT 1 STOP BITS

The display will show STOPS 1=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 or 2.

ETR able – ELECTRONIC TALLEY ROLL

If you selected USA=YES or MODE OF OP=1, the ETR able=XXX prompt will not be shown. Proceed to the CONT 1=XXX, SERIAL PORT 1 CONTINUOUS OUTPUT section to continue setup.

The 220 is equipped with a Electronic Talley Roll (ETR) feature which stores the weight and a consecutive transaction number each time the indicator receives a talley command from the computing peripheral. The data is maintained in non-volatile memory and is available for use by a weights and measures inspector.

When enabled, each time the indicator receives an ETR request (SMA XT command), the current weight and an internal consecutive transaction number (that can not be modified) will be stored in memory. The 220 has sufficient memory to create an ETR file that will store up to 7000 transactions. The ETR file is structured such that when its capacity is reached, the newest transaction will replace the oldest. The ETR file can only be displayed and cannot be manually cleared or printed. Refer to the Setup Review mode for instructions on displaying the ETR file contents.

The SMA XT command is called TALLEY ON STABLE. This command will wait for a stable weight reading then transmit and store the data into non-volatile memory.

The display will show ETR able=XXX, where XXX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

ETR able=YES	ETR able= NO
Transaction Storage Enabled	Transaction Storage disabled

Electronic Talley Roll (ETR) Format

The host device (computer) sends:

0ah XT Odh (SMA XT command)

The 220 will respond:

<s><xxxxxx><d><uu><m><cc>#nnnnnn<cr>

Where:

s =	Sign	"-" = negative, " " (*blank*) = positive
xxxxxx =	Weight	Six digits
d =	Decimal point	Added to string if enabled in setup
uu =	Units	tn, lb, l/o, oz, t, kg, g
m =	Mode	G = Gross, N = Net
cc =	Weight Status	OC = over capacity BZ = below zero MO = motion ee = weight not currently being displayed
#nnnnnn	Consecutive Number	
cr =	Carriage Return	(hex 0D)

NOTE! A TALLEY PRINT can be performed by sending a CTRL T followed by a (02h 434 03h) command. This will print the current weight and consecutive number, however it is the consecutive number that may be modified using the **TIME/DATE** key and not the internal consecutive number. This procedure WILL NOT record the transaction.

CONT 1 - SERIAL PORT 1 CONTINUOUS OUTPUT

The display will show CONT 1=XX, where XX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

CONT 1=YES	CONT 1= NO
Continuous Output	No Continuous Output

- If you selected ETR able=YES and CONT 1=YES, the TYPE=X prompt will not be shown. The type is forced to the ETR format. Proceed to the BAUD 2=XX, SERIAL PORT 2 BAUD RATE section to continue setup.
- If you selected ETR able=YES and CONT 1=NO, proceed to the WEIGHT ON DEMAND FORMAT section, then to the BAUD 2=XX, SERIAL PORT 2 BAUD RATE section to continue setup.

SETUP AND CALIBRATION, Cont.

NOTE! When an ETR request is received (with ETR able=YES and CONT 1=YES), the continuous output will stop until the weight becomes stable. With stable weight, the transaction will be recorded, the internal consecutive number will be advanced, and then the continuous output will start sending again. Note, that the first weight sent will be the recorded transaction.

TYPE - SERIAL PORT 1 CONTINUOUS OUTPUT FORMAT

The display will show TYPE=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3.

0 = SMA 1 = SB-400 2 = SB-200 3 = Rice Lake IQ355

Continuous Output Formats

If SMA is selected, the data will be transmitted in the following format:

<lf><s><r><n><m><f><xxxxxx.xxx><uuu><cr>

Where:

lf =	Line Feed	
s =	Flags	Z= center of Zero, O = Over cap, E = zeroError, e = weight not currently being displayed
r =	Range	1, 2, 3, ...
n =	Mode	G = Gross, T = Tare, N = Net
m =	Motion	M = Motion, " "(*blank*) = no motion
f =	Custom	Custom flag
xxxxxx.xxx =	Weight	Six digits with decimal point
uuu =	Units	ton, lb, oz, t, kg, g
cr =	Carriage Return	(hex 0D)

If SB-400* or Computer is selected, the data will be transmitted in the following format:

<s><xxxxxx><d><uu><m><cc><cr>

Where:

s =	Sign	"-" = negative, " " (*blank*) = positive
xxxxxx.xxx =	Weight	Six digits
d =	Decimal point	Added to string if enabled in setup
uu =	Units	tn, lb, oz, t, kg, g
m =	Mode	G = Gross, N = Net
cc =	Weight Status	OC = over capacity BZ = below zero MO = motion ee = weight not currently being displayed
cr =	Carriage Return	(hex 0D)

*The SB-80, SB-300 (*multiple displays not supported*) and WinVRS use the SB-400 format.

SETUP AND CALIBRATION, Cont.

Continuous Output Formats, Cont.

If SB-200 is selected, the data will be transmitted in the following format:

<cr><s><xxxxxx><d><c><uu><m> ETX

Where:

cr =	Carriage Return	(hex 0D)
s =	Sign	"-" = negative, " " (*blank*) = positive
xxxxxx.xxx =	Weight	(with leading zeros)
d =	Decimal point	Embedded into weight (after weight dpp=0)
c =	Status	m = motion o = over cap e = weight not currently being displayed
uu =	Units	tn, lb, oz, t, kg, g
m =	Mode	G = Gross, N = Net
ETX =	End of TeXt	(hex 03) MUST terminate ALL serial commands

If Rice Lake IQ355 is selected, the data will be transmitted in the following format:

<stx><polarity><wwwwwww><units><g/n><status><crlf>

Where:

stx =	Start of TeXt	(hex 02)
polarity =	Sign	"-" = negative, " " (*blank*) = positive
wwwwwww =	Weight	Seven digits
units =	Units	" "(*blank*) = none, L = lb, K = kg, T = tons, G = grams, O = ounces
g/n	Mode	G = Gross, N = Net
status	status	" "(*blank*) = valid I = invalid M = motion O = over cap
CRLF =	Carriage Return with Line Feed	(hex 0D) with (hex 0A)

SETUP AND CALIBRATION, Cont.

Weight On Demand Format

If continuous output has not been selected for Serial Port 1 (CONT1=NO) and Transaction Storage disabled (TALLEY= NO), the 220 indicator will respond to a weight request (ENQ) as follows.

The host device (computer) sends:

ENQ - (hex 05)

The 220 will respond:

<s><xxxxxx><d><uu><m><cc><cr>

Where:

s =	Sign	"-" = negative, " " (*blank*) = positive
xxxxxx.xxx =	Weight	Six digits
d =	Decimal point	Added to string if enabled in setup
uu =	Units	tn, lb, oz, t, kg, g
m =	Mode	G = Gross, N = Net
cc =	Weight Status	OC = over capacity BZ = below zero MO = motion ee = weight not currently being displayed
cr =	Carriage Return	(hex 0D)

SMA Weight On Demand Format

If continuous output has not been selected for Serial Port 1 (CONT1=NO) and Transaction Storage disabled (TALLEY= NO), the 220 indicator will respond to a SMA weight request as follows.

The host device (computer) sends:

<lf> W <cr>

The 220 will respond:

<lf><s><r><n><m><f><xxxxxx.xxx><uuu><cr>

Where:

lf =	Line Feed	
s =	Flags	Z= center of Zero, O = Over cap, E = zeroError, e = weight not currently being displayed
r =	Range	1, 2, 3, ...
n =	Mode	G = Gross, T = Tare, N = Net
m =	Motion	M = Motion, " "(*blank*) = no motion
f =	Custom	Custom flag
xxxxxx.xxx =	Weight	Six digits with decimal point
uuu =	Units	ton, lb, oz, t, kg, g
cr =	Carriage Return	(hex 0D)

NOTE! The Weight On Demand function is not available for Serial Port 2.

SETUP AND CALIBRATION, Cont.

BAUD 2 - SERIAL PORT 2 BAUD RATE

The display will show BAUD 2=XX, where XX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are:

12 = 1200 Baud	24 = 2400 Baud	48 = 4800 Baud
96 = 9600 Baud	19 = 19.2k Baud	38 = 38.4k Baud
115 = 115.2k Baud		

PARITY 2 - SERIAL PORT 2 PARITY

The display will show PARITY 2=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, or 2.

0 = NONE (No Parity)	1 = Odd Parity	2 = Even Parity

BITS 2 - SERIAL PORT 2 DATA BITS

The display will show BITS 2=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 7 or 8.

STOPS 2 - SERIAL PORT 2 STOP BITS

The display will show STOPS 2=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 or 2.

CONT 2 - SERIAL PORT 2 CONTINUOUS OUTPUT

The display will show CONT 2=XX, where XX is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

CONT 2=YES	CONT 2= NO
Continuous Output	No Continuous Output

If you selected CONT 2=YES (Continuous Output), an additional prompt, TYPE will be displayed.

TYPE - SERIAL PORT 2 CONTINUOUS OUTPUT FORMAT

The display will show TYPE=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 0, 1, 2 or 3.

0 = SMA	1 = SB-400	2 = SB-200	3 = Rice Lake IQ355

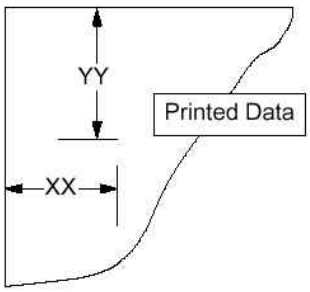
NOTE! See Continuous Output Serial Port 1, TYPE for description of output formats.

SETUP AND CALIBRATION, Cont.

TABS? - Print Tab Settings

The display will show TABS? NO. To configure the Print Tab Settings, press the **1/YES** key (display will show TABS? YES), then press the **ENTER** key to continue to the PORT setting, otherwise press the **ENTER** key to advance to FINE SPAN?.

The general format for the input is A = YY.XX where A is the character identifying the data printed, YY is the number of lines down and XX is the number of spaces to the right.



NOTE! Enter 00 in either location, YY or XX, to disable the data from printing.

PORT - SELECT PORT FOR PRINTER

The display will show PORT=X, where X is the current value. If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it. Allowable values are: 1 or 2.

NOTE! Although either port can be used for the printer port, it is recommended to use the bi-directional port 1 with a bi-directional cable.

PRT BEG - PRINT BEGINNING

The display will show PRT BEG=XXXXXX, where XXXXXX is a string of HEX numbers sent to the printer before anything else. If the string displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the alphanumeric keys to enter a new string then press **ENTER** to save it.

NOTE! HEX numbers are always 2 digits. For example 7 is entered as 07. The maximum entry is 6 numbers (12 characters). Valid entries are 01 to FF. Note that 00 is not valid.

EXAMPLE:

To send the command to a P400 to print upside down, set PRT BEG=1B7B11. This would be entered on the 220 by pressing the following keys:

1 ✱ B ✱ 7 ✱ B ✱ 1 1 then pressing the **ENTER** key.

NOTE! If MODE OF OP=1 (ID Storage) continue to the TMP ID1 setting, otherwise advance to the ID= prompt.

SETUP AND CALIBRATION, Cont.

Mode Of Operation = 1 (Temporary ID Tabbing)

TMP ID1 - TEMPORARY ID PROMPT 1 PRINT LOCATION

The display will show TMP ID1=XX.XX, where XX.XX is the current position for printing of the first temporary ID prompt. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

TMP ID2 - TEMPORARY ID PROMPT 2 PRINT LOCATION

The display will show TMP ID2=XX.XX, where XX.XX is the current position for printing of the second temporary ID prompt. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

TMP ID3 - TEMPORARY ID PROMPT 3 PRINT LOCATION

The display will show TMP ID3=XX.XX, where XX.XX is the current position for printing of the third temporary ID prompt. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

TP TIME - TEMPORARY TICKET TIME PRINT LOCATION

The display will show TP TIME=XX.XX, where XX.XX is the current position for printing of the temporary ID time. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

TP DATE - TEMPORARY TICKET DATE PRINT LOCATION

The display will show TP DATE=XX.XX, where XX.XX is the current position for printing of the temporary ID date. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

STO WT – TEMPORARY ID STORED WEIGHT PRINT LOCATION

The display will show STO WT=XX.XX, where XX.XX is the current position for printing of the ID stored weight. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

If MODE OF OP = 0, 2, 3, or 4, (Basic Indicator, Digital Fill Control, Preset Weight Comparators or Checkweigher) begin Print Tab settings with the ID= prompt.

Mode Of Operation = 0, 2, 3, 4

ID – ID PRINT LOCATION

The display will show ID=XX.XX, where XX.XX is the current position for printing of the identification. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

TIME - TIME PRINT LOCATION

The display will show TIME=XX.XX, where XX.XX is the current position for printing of the time. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

SETUP AND CALIBRATION, Cont.

DATE - DATE PRINT LOCATION

The display will show *DATE=XX.XX*, where XX.XX is the current position for printing of the date. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

CNC NO - CONSECUTIVE NUMBER PRINT LOCATION

The display will show *CNC NO=XX.XX*, where XX.XX is the current position for printing of the consecutive number. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

GROSS - GROSS WEIGHT PRINT LOCATION

The display will show *GROSS=XX.XX*, where XX.XX is the current position for printing of the Gross weight. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

TARE - TARE WEIGHT PRINT LOCATION

The display will show *TARE=XX.XX*, where XX.XX is the current position for printing of the Tare weight. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

NET - NET WEIGHT PRINT LOCATION

The display will show *NET=XX.XX*, where XX.XX is the current position for printing of the Net weight. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

G ACCUM - GROSS WEIGHT ACCUMULATOR PRINT LOCATION

The display will show *G ACCUM=XX.XX*, where XX.XX is the current position for printing of the Gross weight accumulator. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

N ACCUM – NET WEIGHT ACCUMULATOR PRINT LOCATION

The display will show *N ACCUM=XX.XX*, where XX.XX is the current position for printing of the Net weight accumulator. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

COUNT - COUNT PRINT LOCATION (Number Of Pieces On The Scale)

The display will show *COUNT=XX.XX*, where XX.XX is the current position for printing of the Count (number of pieces on the scale). If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

PCS WT - PIECE WEIGHT PRINT LOCATION

The display will show *PCS WT=XX.XX*, where XX.XX is the current position for printing of the Piece weight. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

SETUP AND CALIBRATION, Cont.

CNV NET - CONVERTED UNITS NET WEIGHT PRINT LOCATION

You must select *LFT=NO*, during Setup and Calibration to enable the Converted Units Net Weight print feature.

The display will show *CNV NET=XX.XX*, where XX.XX is the current position for printing of the Converted Units Net weight. If the position displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new position then press **ENTER** to save it.

NOTE! *CNV NET* weight will only print if the converted weight is greater than zero and the 220 in is the Net mode.

AUTO LF – AUTOMATICE LINE FEEDS (Data Format Termination)

Data transmitted from the serial I/O port can be terminated with a single carriage return and either no line feed or a single line feed command.

The display will show *AUTO LF=XX*, where XX is the current value. A *YES* on the display means the data will be terminated with a carriage return AND a line feed while a *NO* on the display means the data will be terminated with a single carriage return only.

If the setting displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the numeric keys, **0/NO** or **1/YES**, enter the new setting, then press the **ENTER** key to save it.

ENDING LF - ENDING LF (Linefeeds Printed After Last Line)

At the end of a data transmission to a printer, the indicator can transmit a pre-selected number of linefeed commands to space the paper in the printer to the desired position for withdrawal or for the next print.

The display will show *ENDING LF=X*, where X is the current setting. If the displayed value is acceptable, press the **ENTER** key to save it. Otherwise, use the numeric keys to enter the new the number of linefeeds to be executed after the last printed line, then press the **ENTER** key to save the new setting. Allowable values are: 0 through 99.

PRT END - PRINT ENDING

The display will show *PRT END=XXXXXX*, where XXXXXX is a string of HEX numbers sent to the printer after the ENDING LF. If the string displayed is acceptable, press the **ENTER** key to save it. Otherwise, use the alphanumeric keys to enter a new string then press **ENTER** to save it.

NOTE! HEX numbers are always 2 digits. For example 7 is entered as 07. The maximum entry is 6 numbers (12 characters). Valid entries are 01 to FF. Note that 00 is not valid.

EXAMPLE:

To send a paper release to a P400, set *PRT END=*1B71. This would be entered on the 220 by pressing the following keys:

1 ✱ B ✱ 7 1 then pressing the **ENTER** key.

SETUP AND CALIBRATION, CONT.

FINE SPAN - Fine Span Adjustment (after the last Print Tabs prompt)

After pressing the **ENTER** key at the last Print Tabs prompt, the display will show FINE SPAN? N.

- If Fine Span Adjustment is not desired, press the **ENTER** key to return to SETUP.
- If Fine Span Adjustment is desired, press the **1/YES** key (display will show FINE SPAN? Y), place a calibrated test weight on the scale and then press the **ENTER** key.

After pressing the **ENTER** key, the display will change to ADJ=XXXXXX, where XXXXXX is the displayed weight. Press the **1/YES** to increase the span *OR* press the **0/NO** key to decrease the span. Press the **ASTERISK** key to return to the previous prompt, TABS? *OR* press the **ENTER** key to exit FINE SPAN and return to SETUP.

FINE SPAN - Fine Span Adjustment (using the Calibration Switch)

Press the Calibration switch until the display shows FINE SPAN.

- If Fine Span Adjustment is not desired, press the **ASTERISK** key to reset the indicator and return to the normal operation weight display.
- If Fine Span Adjustment is desired, place a calibrated test weight on the scale and press the **ENTER** key.

After pressing the **ENTER** key, the display will change to ADJ=XXXXXX, where XXXXXX is the displayed weight. Press the **1/YES** to increase the span *OR* press the **0/NO** key to decrease the span. Press the **ASTERISK** key to return to the previous prompt, TABS? *OR* press the **ENTER** key to exit FINE SPAN and return to SETUP.

NOTE! The menu selections HIGH RES and KEY LOCK OUT can only be selected using the calibration switch.

HIGH RES - Display High Resolution Weight

Press the Calibration switch until the display shows HIGH RES.

- If High Resolution Weight adjustment is not desired, press the **ASTERISK** key to reset the indicator and return to the normal operation weight display.
- If High Resolution Weight adjustment is desired, place a calibrated test weight on the scale and press the **ENTER** key. The display will change to HI Res=XXXXXX, where XXXXXX is the active weight in "high resolution" mode (in 1/10 interval).

Press the **1/YES** to increase the span *OR* press the **0/NO** key to decrease the span. Press the **ASTERISK** key to return to the previous prompt, HIGH RES *OR* press the **ENTER** key to exit HIGH RES and return to SETUP. Press the **PRINT** key to print the weight (followed by the text TEST) via the selected printer output port enabled during setup and calibration.

KEY LOCK OUT - Key Lock Out Function

Press the Calibration switch until the display shows KEY LOCK OUT.

- Press the key(s) to be locked out (display will show -LOCKED-) *OR*
- Press the key(s) to be unlocked (display will show -UNLOCKED-).
- Press the calibration switch or cycle power (press the **ON/OFF** key twice) to exit the KEY LOCK OUT function.

During normal operation, pressing a locked key will results in a 1/2 second display -LOCKED- and the key will be ignored.

CALIBRATION “C” NUMBERS

The “C” numbers are displayed only during the Test mode operation by pressing the **ASTERISK** key then the **UNITS/TEST** key. The "C" numbers are shown at the end of the test operation and each number is displayed for approximately 4 seconds, allowing you to record them. Each number may be up to three (3) digits in length. By recording these numbers you will be able to return the indicator to its present calibration settings without using test weights simply by entering the “C” numbers. Refer to the Setup and Calibration, *CALIBRATION?* section of this manual for instructions on using the "C" numbers.

If any components have been changed that affect calibration and/or your scale is used in a commercial application and must be "Legal for Trade" you cannot use "C" numbers to re-calibrate.

SETUP REVIEW

The 220 allows several operational parameters to be reviewed and changed without breaking the calibration seal.

To enable the Setup Review feature, with the indicator ON:

1. Press the **ASTERISK** key. The indicator will respond by showing the *FUNCTION=* prompt.
2. Press the **ZERO/REVIEW** key. The display will change to the *LIGHT* prompt.
3. If the setting displayed is acceptable, press the **ENTER** key to save it and proceed to the next prompt. Otherwise, using the numeric keys enter the new setting, then press the **ENTER** key to save it and proceed to the next prompt. Refer to the Setup and Calibration section of this manual, for the procedures to make the required changes.
4. To exit Setup Review, press the **ENTER** key to step through the remaining prompts *OR* at any prompt, cycle the power (press the **ON/OFF** key twice).

The operational parameters that can be reviewed and changed are:

LIGHT= Current Light Level

LIGHT ON= Backlight Turn-On Level

- The *LIGHT ON=* value must be less than *LIGHT=* to activate.
- Enter 0 for *LIGHT ON=* to have backlight always ON.
- Enter 99 for *LIGHT ON=* to never turn on backlight (always OFF).

FIND ETR= View Electronic Talley Roll File

- If *ETR able=YES*, see the next section, Viewing The Electronic Talley Roll (ETR) File.

PWR UP Z= Power Up Zero Reset Enable/Disable

TIME= Time Format (12 or 24 hour Clock)

CLR TARE= Clear Tare Enable/Disable

SERIAL? Serial Input / Output Configuration (both ports)

- *BAUD X=* Baud Rate
- *PARITY X=* Parity
- *BITS X=* Number of Data Bits
- *STOPS X=* Number of Stop Bits
- *CONT X=* Continuous Output
  - *TYPE=* Continuous Output Format (only if, *CONT X=YES*)

SETUP REVIEW, Cont.

TABS? Print Tab Settings

PORT= Printer Port Selection

PRT BEG Print Beginning

If MODE OF OP=1 (ID Storage)

TMP ID1= Temporary ID Prompt 1

TMP ID2= Temporary ID Prompt 2

TMP ID3= Temporary ID Prompt 3

TP TIME= Temporary Ticket Time

TP DATE= Temporary Ticket Date

STO WT= Temporary ID Stored Weight

ID= ID Prompt

If MODE OF OP=1 (ID Storage)

ID2= ID Prompt 2

ID3= ID Prompt 3

TIME= Time

DATE= Date

CNC NO= Consecutive Number

GROSS= Gross Weight

TARE= Tare Weight

NET= Net Weight

G ACCUM= Gross Weight Accumulator

N ACCUM= Net Weight Accumulator

COUNT= Count

PCS WT= Piece Weight

CNV NET= Converted Units Net Weight

AUTO LF= Auto Linefeed Enable/Disable

ENDING LF= Ending Linefeeds Printed

PRT END Print Ending

Viewing The Electronic Talley Roll (ETR) File

1. If ETR able=YES, after the LIGHT ON= prompt, the display will show FIND ETR=0.
2. Using the numeric keys, enter the transaction number to find, then press the **ENTER** key.
3. The 220 will display ETR=XXXXX$_{yy}$ for 3 seconds, where XXXXX is the weight and yy is the units of measurement.
4. After displaying the record, the display will show MODE OF OP =X.
5. To exit Setup Review, press the **ENTER** key to step through the remaining prompts *OR* at any prompt, cycle the power (press the **ON/OFF** key twice).

OPERATION

Accumulators

To print the Net Weight accumulator:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **GROSS/NET** key. The indicator will display the Net Weight accumulator value and turn on the Net Weight annunciator.
3. Press the **PRINT** key.
4. The value for the Net Weight accumulator will be printed.
5. The indicator will return to normal operation when printing has been completed.

To zero the Net Weight accumulator:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **GROSS/NET** key. The indicator will display the Net Weight accumulator value and turn on the Net Weight annunciator.
3. Press the **ZERO** key.
4. The value for the Net Weight accumulator will be reset to zero.
5. The indicator will return to normal operation when the Net Weight accumulator has been zeroed.

To print the Gross Weight accumulator:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **GROSS/NET** key twice. The indicator will display the Gross Weight accumulator value and turn on the Gross Weight annunciator.
3. Press the **PRINT** key.
4. The value for the Gross Weight accumulator will be printed.
5. The indicator will return to normal operation when printing has been completed.

To zero the Gross Weight accumulator:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **GROSS/NET** key twice. The indicator will display the Gross Weight accumulator value and turn on the Gross Weight annunciator.
3. Press the **ZERO** key.
4. The Gross Weight accumulator will be reset to zero.
5. The indicator will return to normal operation when the Gross Weight accumulator has been zeroed.

OPERATION, Cont.

ID Storage

The ID Storage feature has been designed to control three different types of transactions and weighing operations. The first type of transaction assigns a permanent ID string, has a stored tare weight, and accumulates net weight totals for the ID. The second type assigns a permanent ID string and accumulates net weight totals for the ID, but doesn't have a permanent stored weight. The third type temporarily assigns an ID string (while weighing in) and does not accumulate any net weight totals for the ID.

The first type of permanent transaction is a "single pass" transaction and is used to weigh loaded containers with a permanent ID string and a previously stored tare weight. The stored tare weight requires weighing the empty container in advance or if the weight of the empty container is known, by entering that value as a manual tare weight. The single pass transaction completes a ticket and accumulates the net weight for the ID associated with the container with a "one step" weighing operation.

The second type of permanent transaction is a "two pass" transaction and is used to weigh the loaded container once when it is empty and once when it is loaded. A permanent ID string and a previously stored zero (0) tare weight is required. In the two pass transaction, the zero tare weight is replace by the new tare weight after the first pass and returned to zero after the second pass when the transaction has been completed. The two-pass transaction requires a "two step" weighing operation. On the first step, the incoming weight will be stored and an interim ticket will be printed. On the second step, during the outgoing transaction, a complete ticket will be printed and the net weight for the ID associated with the container will be added to the accumulator.

The third type is a temporary "two pass" transaction that also requires a "two step" operation. However, the ID string is only in memory while the container is weighed in and out and the net weight will not be accumulated. In this type of transaction, on the first pass, the container will be place on the scale and an ID will be selected either by the operator entering a string in through the keyboard. The weight will be stored and an interim ticket will be printed. On the second pass, the ID string is entered and the stored weight is recalled for printing the complete ticket. After the ticket has printed, the ID number and the stored weight will be removed from memory.

PERMANENT IDENTIFICATION (ID) STRINGS

To Add Or Edit Permanent ID Strings:

1. Press the **MEM** key. The display will change to ID= and the ID and MEM annunciators will turn on.
2. Enter up to a 12 digit alphanumeric ID string and press the **ENTER** key.
3. The display will show REF=XXXXXXXXXXXX, where XXXXXXXXXXXX is the name associated with the ID
4. If the name displayed is acceptable, press the **ENTER** key to save it. Otherwise, using the alphanumeric keys enter up to 12 characters for the name and press the **ENTER** key.
5. The display will change to show the current value of weight stored. This weight value is the tare or empty weight.
6. If the displayed value is correct, press the **ENTER** key and proceed to step 7. If the value displayed is in incorrect, enter the correct weight value and then press the **ENTER** key or to use the current scale weight, press the **GROSS** key then the **ENTER** key.
7. The ACCUM annunciator will turn on (the MEM annunciator is still on).
8. The display will change to show the current value of the accumulator associated with the ID string.
9. If the displayed value is correct, press the **ENTER** key to save it. Otherwise, enter the correct value and then press the **ENTER** key to save it.
10. To reset the accumulator to zero, press the **DELETE** key then the **ENTER** key.
11. The indicator will return to normal operation.

OPERATION, Cont.

ID Storage, Cont.

To Print A Permanent ID String:

1. Press the **MEM** key. The display will change to ID= with the ID and MEM annunciators turned on.
2. Key in the desired ID string and press the **PRINT** key.
3. A ticket containing the stored weight, the accumulated weight along with the ID string will be printed and the 220 will return to normal operation.
4. If the ID string entered does not exist, the display will show ID NOT FOUND and the 220 will return to normal operation.

To Delete A Permanent ID String:

1. Press the **MEM** key. The display will change to ID= with the ID and MEM annunciators turned on.
2. Enter the ID string to be deleted then press the **DELETE** key.
3. The display will show ID deleted momentarily.
4. The ID string entered along with its associated accumulator will be deleted and the 220 will return to normal operation.

To Delete All Permanent ID Strings:

1. Press the **MEM** key. The display will change to ID= with the ID and MEM annunciators turned on.
2. Press the **DELETE** key. The display will show Del All?NO, which asks if all ID strings are to be deleted.
3. To delete all ID strings, press the **1/YES** key to change the display to Del All?YES, then press the **ENTER** key.
4. The display will show ID deleted momentarily, then the 220 will return to normal operation.
5. If deleting all ID strings is not desired, with the display showing Del All?NO, press the **ENTER** key to return to return to normal operation.

To Print All ID Strings:

1. Press the **MEM** key. The display will change to ID= with the ID and MEM annunciators turned on.
2. Press the **PRINT** key. The display will show Printing while the printer records all currently stored ID strings and the 220 will return to normal operation.

OPERATION, Cont.

ID Storage, Cont.

TEMPORARY IDENTIFICATION (ID) STRINGS

To Store A Temporary ID String And Print A Ticket - Two Pass Transaction (Two-Step" Operation)

- Press the **ID** key. The display will show ID= and the ID annunciator will turn on.
- Enter up to a 12 digit alphanumeric ID string and press the **PRINT** key.
- If this is the first pass for the ID string, the 220 will store the current scale weight under this ID string, print a ticket and display Print Pass 1.

- If this is the second pass for the ID string, the 220 will print a ticket, display Print Pass 2, and delete the ID string.

To Automatically Assign A Temporary ID String

- Press the **ID** key. The display will show ID= and the ID annunciator will turn on.
- Press the **ENTER** key. A temporary ID string will be assigned and the weight stored. A temporary ticket showing the ID string and weight will be printed.

OPERATION, Cont.

ID Storage, Cont.

PERMANENT ID - SINGLE PASS TRANSACTION (ONE-STEP OPERATION)

The single pass transaction (one step operation) is used to weigh LOADED containers with a permanent ID string and a previously stored tare weight associated with that ID string. This requires weighing the empty container in advance or if the empty weight is known, by entering that value as a manual tare weight.

Three ID Prompts Selected In Setup

1. Place the loaded container on the scale
2. Press the **ID** key. The display will show XXXXXXXXXXXX= (the Prompt 1 Name selected in Setup) and the ID annunciator will turn on.
3. Enter up to a 12 digit alphanumeric ID string and press the **ENTER** key.
4. The display will momentarily show REF=ABCDEFGHJKLM, (the name associated with the ID) then change to YYYYYYYYYYYY= (the Prompt 2 Name selected in Setup).
    a. If only one ID prompt is needed, press the **PRINT** key to store the weight and print the ticket. Proceed to Step 9.
5. If two ID prompts are required, enter up to a 12 digit alphanumeric string for the second ID prompt.
    a. If only two ID prompts are needed, press the **PRINT** key to store the weight and print the ticket. Proceed to Step 9.
    b. If three ID prompts are required press the **ENTER** key to proceed to the third prompt.
6. The display will show ZZZZZZZZZZZZ= (the Prompt 3 Name selected in Setup).
7. Enter up to a 12 digit alphanumeric string for the third ID prompt.
8. Press the **PRINT** or **ENTER** key to store the tare weight and print the ticket.
9. The 220 will print a ticket, display Print Pass 2, and then display Accumulating before returning to the Gross weight display.
10. The Net weight will be added to the accumulator of the entered ID string and the ticket printed will show the TIME, DATE, ID, TIME/DATE of Stored Tare weight, the Gross, Tare, and Net weights.

Two ID Prompts Selected In Setup

1. Place the loaded container on the scale
2. Press the **ID** key. The display will show XXXXXXXXXXXX= (the Prompt 1 Name selected in Setup) and the ID annunciator will turn on.
3. Enter up to a 12 digit alphanumeric ID string and press the **ENTER** key.
4. The display will momentarily show REF=ABCDEFGHJKLM, (the name associated with the ID) then change to YYYYYYYYYYYY= (the Prompt 2 Name selected in Setup).
    a. If only one ID prompt is required, press the **PRINT** key to store the weight and print the ticket. Proceed to Step 7.
5. If two ID prompts are required, enter up to a 12 digit alphanumeric string for the second ID prompt.
6. Press the **PRINT** or **ENTER** key to store the tare weight and print the ticket.
7. The 220 will print a ticket, display Print Pass 2, and then display Accumulating before returning to the Gross weight display.
8. The Net weight will be added to the accumulator of the entered ID string and the ticket printed will show the TIME, DATE, ID, TIME/DATE of Stored Tare weight, the Gross, Tare, and Net weights.

OPERATION, Cont.

ID Storage, Cont.

PERMANENT ID - SINGLE PASS TRANSACTION (ONE-STEP OPERATION) Cont.

One ID Prompt Selected In Setup

1. Place the loaded container on the scale.
2. Press the **ID** key. The display will show XXXXXXXXXXXX= (the Prompt 1 Name selected in Setup) and the ID annunciator will turn on.
3. Enter up to a 12 digit alphanumeric ID string and press the **ENTER** key.
4. The display will momentarily show REF=ABCDEFGHJKLM, (the name associated with the ID), change to Print Pass 2, and then display Accumulating before returning to the Gross weight display.
5. The Net weight will be added to the accumulator of the entered ID string and the ticket printed will show the TIME, DATE, ID, TIME/DATE of Stored Tare weight, the Gross, Tare, and Net weights.

PERMANENT ID - TWO PASS TRANSACTION (TWO-STEP OPERATION)

The two-pass transaction is a two-step operation used to weigh the container once when it is empty and once when it is loaded. A permanent ID string and a previously stored zero (0) tare weight associated with that ID string are required. In the two pass transaction, the zero (0) tare weight will be replaced by the new tare weight after the first pass and the stored weight will return to zero (0) after the second pass. On the first step, the incoming weight will be stored and an interim ticket will be printed. On the second step, during the outgoing transaction, a complete ticket will be generated and the net weight will be added to the permanent ID string accumulator.

Step 1 - Empty or Loaded Container With Three ID Prompts Selected In Setup

1. Place the loaded container on the scale
2. Press the **ID** key. The display will show XXXXXXXXXXXX= (the Prompt 1 Name selected in Setup) and the ID annunciator will turn on.
3. Enter up to a 12 digit alphanumeric ID string and press the **ENTER** key.
4. The display will momentarily show REF=ABCDEFGHJKLM, (the name associated with the ID) then change to YYYYYYYYYYYY= (the Prompt 2 Name selected in Setup).
   a. If only one ID prompt is needed AND a ticket is desired, press the **PRINT** key to store the weight and print the ticket. The display will show Print Pass 1. Proceed to Step 8.
5. If two ID prompts are required, enter up to a 12 digit alphanumeric string for the second ID prompt.
   b. If only two ID prompts are needed AND a ticket is desired, press the **PRINT** key to store the weight and print the ticket. The display will show Print Pass 1. Proceed to Step 8.
   c. If three ID prompts are required press the **ENTER** key to proceed to the third prompt.
6. The display will show ZZZZZZZZZZZZ= (the Prompt 3 Name selected in Setup).
7. Enter up to a 12 digit alphanumeric string for the third ID prompt.
   a. If a ticket is desired, press the **PRINT** key to store the weight and print the ticket. The display will show Print Pass 1. Proceed to Step 8.
   b. If a ticket is NOT desired, press the **ENTER** key to store the weight. Proceed to Step 8.
8. The 220 will return to the Gross weight display.

OPERATION, Cont.

ID Storage, Cont.

PERMANENT ID - TWO PASS TRANSACTION (TWO-STEP OPERATION, Cont.)

Step 1 - Empty or Loaded Container With Two ID Prompts Selected In Setup

1. Place the loaded container on the scale
2. Press the **ID** key. The display will show XXXXXXXXXXXX= (the Prompt 1 Name selected in Setup) and the ID annunciator will turn on.
3. Enter up to a 12 digit alphanumeric ID string and press the **ENTER** key.
4. The display will momentarily show REF=ABCDEFGHJKLM, (the name associated with the ID) then change to YYYYYYYYYYYY= (the Prompt 2 Name selected in Setup).
   a. If only one ID prompt is needed AND a ticket is desired, press the **PRINT** key to store the weight and print the ticket. The display will show Print Pass 1. Proceed to Step 6.
5. If two ID prompts are required, enter up to a 12 digit alphanumeric string for the second ID prompt.
   a. If a ticket is desired, press the **PRINT** key to store the weight and print the ticket. The display will show Print Pass 1. Proceed to Step 6.
   b. If a ticket is NOT desired, press the **ENTER** key to store the weight. Proceed to Step 6.
6. The 220 will return to the Gross weight display.

Step 1 - Empty or Loaded Container With One ID Prompt Selected In Setup

1. Place the loaded container on the scale
2. Press the **ID** key. The display will show XXXXXXXXXXXX= (the Prompt 1 Name selected in Setup) and the ID annunciator will turn on.
3. Enter up to a 12 digit alphanumeric ID string.
   a. If a ticket is desired, press the **PRINT** key to store the weight and print the ticket. The display will show Print Pass 1. Proceed to Step 4.
   b. If a ticket is NOT desired, press the **ENTER** key to store the weight. Proceed to Step 4.
4. The display will momentarily show REF=ABCDEFGHJKLM, (the name associated with the ID), then return to the Gross weight display.

Step 2 - Empty or Loaded Container with One, Two or Three ID Prompts Selected In Setup

1. Place loaded container on the scale.
2. Press the **ID** key. The display will show XXXXXXXXXXXX= (the Prompt 1 Name selected in Setup) and the ID annunciator will turn on.
3. Enter up to a 12 digit alphanumeric ID string and press the **PRINT** key.
4. The 220 will print a ticket, display Print Pass 2, and then display Accumulating before returning to the Gross weight display.
5. The Net weight will be added to the accumulator of the entered ID string and the ticket printed will show the TIME, DATE, ID, TIME/DATE of Stored Tare weight, the Gross, Tare, and Net weights.

OPERATION, Cont.

ID Accumulators

To view the ID accumulators:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **ID** or **NET** keys to select the type of accumulator to view.

   To view a single ID accumulator, press the **ID** key. The display will show ID=. Input the ID string to be viewed and press the **ENTER** key. The accumulator value of the ID entered will be displayed or if the accumulator value is greater than (>) 999,999,999, OVERFLOW will be displayed.

   To view the Net accumulator, press the **GROSS/NET** key. The Net accumulator value will be displayed without any additional prompts or if the accumulator value is greater than (>) 999,999,999, OVERFLOW will be displayed.

   To view the Gross accumulator, press the **GROSS/NET** key twice. The Gross accumulator value will be displayed without any additional prompts or if the accumulator value is greater than (>) 999,999,999, OVERFLOW will be displayed.
3. Press the **ENTER** key to return to normal operation.

To print a single ID accumulator

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **ID** key.
3. Input the ID string and press the **ENTER** key.
4. Press the **PRINT** key.
5. The accumulator value for the ID entered will be printed.
6. The indicator will return to normal operation when printing has been completed.

To print all active ID accumulators:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **ID** key.
3. Press the **PRINT** key.
4. The accumulator values for ALL active ID's will be printed.
5. The indicator will return to normal operation when printing has been completed.

To zero a single ID accumulator:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **ID** key.
3. Input the ID string and press the **ENTER** key.
4. Press the **ZERO** key.
5. The accumulator value for the ID entered will be reset to zero.
6. The indicator will return to normal operation when the ID entered has been zeroed.

To zero all active ID accumulators:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **ID** key.
3. Press the **DELETE** key.
4. The accumulator values for ALL active ID's will be reset to zero.
5. The indicator will return to normal operation when all active ID's have been zeroed.

OPERATION, Cont.

Digital Fill Control

The Digital Fill Control (DFC) feature has been designed to control the filling or discharge of material automatically. The DFC feature controls relays in an external enclosure and adds a number of features to the 220 indicator. Those features include:

Start Verification

Pressing the **START** key changes the display to START=YES to verify you are sure you want to start the fill operation.

One or Two Speed Operation

- The single speed operation is a fast output only, fill operation.
- The two speed operation will begin the fill operation with both outputs on until the weight reaches the FAST= value. At that weight, the fast output will be turned off and only the slow output will remain on until the SLOW= weight is reached. At that weight, the slow output will be turned off and the fill operation is complete.

Auto Trim

Auto Trim is a feature that when enabled, will adjust for differences in the preset trim and the actual trim weight. For example, if the preset SLOW= weight is set at 5000 lbs and the TRIM= is set at 100 lbs, the cut-off will be at 4900 lbs. If the actual weight of the trim is 50 lbs, the total weight of the material discharged will be 4950 lbs, not 5000. With Auto Trim enabled, starting with the next operation, the TRIM= will be adjusted until the 5000 lbs preset weight total is achieved. Depending on how much difference there is between the programmed trim and the actual trim, it may take several operations before the full preset weight amount is reached.

Auto Print

This feature, when enabled, allows automatic print of the delivered net or gross weight at the end of the fill operation.

DUMP GATE PARAMETERS - (One Or Two Speed Operation)

If DUMP GATE = YES was selected during setup:

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **ASTERISK** key then the **PRESET** key.
2. The display will show ZERO T=XXXXXXX, where XXXXXXX is the current value of the Zero Tolerance. Zero tolerance is a range of weight within which the scale is considered empty.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are 0 through scale capacity.
4. The display will show GATE TIMR=XX, where XX is the current value of the gate timer. The gate timer is used to control the amount of time (in seconds) the gate is left open <u>after</u> the weight falls below the zero tolerance (ZERO T) weight value.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are: 0 through 99 seconds.

OPERATION, Cont.

Digital Fill Control, Cont.

ONE SPEED OPERATION

Parameter Setup

1. With the indicator showing Gross Weight (G annunciator displayed), press the **PRESET** key.
2. The display will show FILL=, the prompt for the stored target weight.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new target weight, then press the **ENTER** key to save it.
4. The display will change to TRIM=, the prompt for the trim weight.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter the new trim weight, then press the **ENTER** key to save it. Note, that the TRIM= weight is to compensate for material in transit.
6. If MULT DROP=YES was selected during setup, the display will show DROP CNT=X, where X is the number of drops to perform.
7. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are: 1 through 9.

NOTE! The target (FILL=) and TRIM= weights are stored in non-volatile memory.

ONE SPEED OPERATION

To Start a Fill Operation

1. Press the **START/STOP** key. The display will show START=YES.
2. Press the **ENTER** key to start the fill operation, *or* press the **0/NO** key to abort the operation.
3. The preset (1) annunciator and relay will turn on and the fill operation will begin.
4. The weight will increase to the FILL= value (minus the TRIM= value). When the displayed weight reaches that value, the relay and preset (1) annunciator are turned off.
5. When all motion stops, the weight will be printed (if a printer is attached and automatic print was enable in setup).
6. The trim weight will be recalculated, stored in memory and the displayed weight value added to the PRESET and GROSS or NET accumulators.

To Suspend (Pause) or Stop (Abort) a Fill Operation in Progress

The fill operation can be suspended (paused) or stopped (aborted) by the operator if needed by pressing the **START/STOP** key

1. Press the **START/STOP** key.
2. The fill operation will be suspended (paused) and the display will change to CONTINUE=YES.
3. To continue the fill operation where it was before it was suspended, press the **ENTER** key.
4. To stop (abort) the fill operation, press the **0/NO** key and then the **ENTER** key.
5. The 220 will return to normal operation.

OPERATION, Cont.

Digital Fill Control, Cont.

TWO SPEED OPERATION

Parameter Setup

1. With the indicator showing Gross Weight (G annunciator displayed), press the **PRESET** key.
2. The display will show FAST=, the prompt for the fast output target weight.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new target weight, then press the **ENTER** key to save it.
4. The display will change to SLOW=, the prompt for the slow output target weight.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new target weight, then press the **ENTER** key to save it.
6. The display will change to TRIM=, the prompt for the trim weight.
7. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter the new trim weight, then press the **ENTER** key to save it. Note, that the TRIM= weight is to compensate for material in transit.
8. If MULT DROP=YES was selected during setup, the display will show DROP CNT=X, where X is the number of drops to perform.
9. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are: 1 through 9.

> **NOTE!** The target weights (FAST= and SLOW=) and the TRIM= weights are stored in non-volatile memory.

To Start a Fill Operation

If GATE SEQ=1 was selected during setup:

1. Press the **START/STOP** key. The display will show START=YES.
2. Press the **ENTER** key to start the fill operation, *or* press the **0/NO** key to abort the operation.
3. The 1 and 2 preset annunciators and both relays will turn on beginning the fill operation.
4. The weight will increase to the FAST= value. When the displayed weight reaches that value, the first relay and the preset (1) annunciator are turned off.
5. The fill operation will continue until the weight reaches the SLOW= value (minus the TRIM= value). When the weight reaches that value, the second relay and preset (2) annunciator are turned off.
6. When all motion stops, the weight will be printed (if a printer is attached and automatic print was enable in setup).
7. The trim weight will be recalculated, stored in memory and the displayed weight value added to the PRESET and GROSS or NET accumulators.

OPERATION, Cont.

Digital Fill Control, Cont.

TWO SPEED OPERATION

If GATE SEQ=2 was selected during setup:

1. Press the **START/STOP** key. The display will show START=YES.
2. Press the **ENTER** key to start the fill operation, *or* press the **0/NO** key to abort the operation.
3. The first preset annunciator and relay will turn on beginning the fill operation.
4. The weight will increase to the FAST= value. When the displayed weight reaches that value, the first relay and the preset annunciator are turned OFF and the second relay and preset annunciator are turned ON.
5. The fill operation will continue until the weight reaches the SLOW= value (minus the TRIM= value). When the weight reaches that value, the second relay and preset (2) annunciator are turned off.
6. When all motion stops, the weight will be printed (if a printer is attached and automatic print was enable in setup).
7. The trim weight will be recalculated, stored in memory and the displayed weight value added to the PRESET and GROSS or NET accumulators.

To Suspend (Pause) or Stop (Abort) a Fill Operation in Progress

The fill operation can be suspended (paused) or stopped (aborted) by the operator if needed by pressing the **START/STOP** key

1. Press the **START/STOP** key.
2. The fill operation will be suspended (paused) and the display will change to CONTINUE=YES.
3. To continue the fill operation where it was before it was suspended, press the **ENTER** key.
4. To stop (abort) the fill operation, press the **0/NO** key and then the **ENTER** key.
5. The 220 will return to normal operation.

OPERATION, Cont.

Digital Fill Control, Cont.

DECUMULATIVE FILL OPERATION

The decumulative operation is used when weighing material out of a weigh hopper. The fill signal will be used to open and close a weigh hopper gate. The settings for the DFC decumulative operation to function properly are as follows:

MODE OF OP = 2
DUMP GATE = NO
ACUMULATE = YES
CLR TARE = NO

To Start a Decumulative Fill Operation

The weigh hopper must be filled with material that equals or exceeds the amount of the preset value to be removed, otherwise an error message -CHECK MATL- will be displayed. This message indicates that the weigh hopper does not have enough material to meet the requirement of the preset weight value. Either more material has to be added to the weigh hopper or the preset weight value must be reduced.

1. With the indicator showing Gross Weight (G annunciator displayed), press the **START/STOP** key.
2. The display will show START=YES.
3. Press the **ENTER** key to start the fill (discharge) operation, *or* press the **0/NO** key to abort the operation.
4. The indicator will switch to the Net Weight mode (N annunciator displayed) displaying zero weight, and the first preset annunciator and relay will turn on beginning the operation.
5. The weight will increase on the display. The weight is actually being discharged from the weigh hopper.
6. When the displayed weight reaches the preset value, the operation will stop. The first preset annunciator and relay will turn off.
7. When all motion stops, the weight will be printed (if a printer is attached and automatic print was enable in setup).
8. The indicator will remain in the NET mode. The Gross Weight can be viewed by pressing the **NET/GROSS** key to select the Gross Weight.
9. The operation is repeated until the weigh hopper weight goes below the preset weight value. At that time, more material must be placed into the weigh hopper.

NOTE! If the decumulative operation is used for multiple material in a compartmentalized weigh hopper, the 220 can only check the total weight of material to verify there is sufficient amount to meet the preset values.

OPERATION, Cont.

Preset Weight Comparators

The weight indicator has eight outputs, which can be configured during the setup of the weight indicator to perform as Preset Weight Comparators. If the preset weight comparator feature was selected during setup, the indicator will compare each enabled preset weight value with the displayed weight and then output a signal for each preset based on the results of that comparison.

Enter the Preset values using the following procedure:

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **PRESET** key.
2. The display will show PSET1=XXXXXXX, where XXXXXXX is the current value of the first preset.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
4. The display will show TRIM=XXXXXXX, where XXXXXXX is the current value of the first preset trim weight.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.

> Remember that the trim weight is to compensate for material in transit and causes the preset to turn on when the displayed weight equals or exceeds the Preset weight value LESS its associated Trim weight value. Also remember that the preset is based on the displayed weight, which can be either gross or net weight.

6. The display will show PSET2=XXXXXX, where XXXXXX is the current value of the second preset.
7. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
8. Continue with this procedure until a value for each preset (and trim) to be used has been entered.
9. After the last preset value is entered, the 220 will return to normal operation.

> **NOTE!** Enter a zero (0) then press the **ENTER** key if the preset weight comparator is not to be used.

After entry of the presets is complete, operation may begin. The PWC's are always active unless a zero preset value has been entered for the preset.

Remember that the preset weight comparators function operates on the absolute value of the weight ignoring the polarity.

OPERATION, Cont.

Checkweigher

When selected, the checkweigher will compare the displayed weight with preset values.

- If the checkweigher feature is configured for a 3-zone weight comparison, the indicator will make a comparison of the displayed weight with a high (over) and low (under) preset value. The results of that comparison will be indicated as Over, Under or Accept.
- If the checkweigher feature is configured for the 5-zone weight comparison, the indicator will make a comparison of the displayed weight with the high (over), high-accept (high ok), low-accept (low ok) and low (under) preset values. The results of this comparison will be indicated as Over, High-Accept, Accept, Low-Accept or Under.

Enter the Preset values for a 3 zone Checkweigher using the following procedure:

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **PRESET** key.
2. The display will show UNDER=XXXXXX, where XXXXXX is the current value of the under preset.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
4. The display will show OVER=XXXXXX, where XXXXXX is the current value of the over preset
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Note that the over value must be greater than the under value.
6. After the over preset value is entered, the 220 will return to normal operation.

Enter the Preset values for a 5 zone Checkweigher using the following procedure:

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **PRESET** key.
2. The display will show UNDER=XXXXXX, where XXXXXX is the current value of the under preset.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
4. The display will show LOW OK=XXXXXX, where XXXXXX is the current value of the low accept preset.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Note that this value must be greater than the under value.
6. The display will show HIGH OK=XXXXXX, where XXXXXX is the current value of the high accept preset.
7. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Note that this value must be greater than the under value, but less than the over value.
8. The display will show OVER=XXXXXX, where XXXXXX is the current value of the over preset
9. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Note that the over value must be greater than the high accept value.
7. After the over preset value is entered, the 220 will return to normal operation.

Remember that the checkweigher function operates on the absolute value of the weight ignoring the polarity.

OPERATION, Cont.

Batcher (Two Speed Operation)

INGREDIENT/BIN SETUP (Maximum of 3 Ingredients/bins)

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **PRESET** key.
2. The display will show ING 1=X, where X is the bin number for the first ingredient.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
4. The display will show FAST=, the prompt for the first cutoff weight.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new target weight, then press the **ENTER** key to save it. Allowable values are 0 through scale capacity.
6. The display will change to SLOW=, the prompt for the total weight desired for this ingredient.
7. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new target weight, then press the **ENTER** key to save it. Allowable values are 0 through scale capacity.
8. The display will show ING 2=X, where X is the bin number for the second ingredient.
9. Repeat steps 4 through 7 for each ingredient.

NOTE! With the display showing ING X=, entering a 0 (zero) and pressing the **ENTER** key will stop prompting for ingredient data and advance you to the BATCH CNT= (batch count) prompt.

10. The display will show BATCH CNT=XX, where X is the number of batches to perform.
11. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are: 0 through 99. Note the next batch will automatically start after closing the dump gate.

BATCHER PARAMETER SETUP

Remember that the trim weight is to compensate for material in transit and causes the preset to turn on when the displayed weight equals or exceeds the Preset weight value LESS its associated Trim weight value. Also remember that the preset is based on the displayed weight, which can be either gross or net weight.

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **ASTERISK** key then the **PRESET** key.
2. The display will show TRM 1=XXXXXXX, where XXXXXXX is the current value of the first preset trim weight.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
4. The display will show TRM 2=XXXXXXX, where XXXXXXX is the current value of the second preset trim weight.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.

OPERATION, Cont.

Batcher (Two Speed Operation), Cont.

6. The display will show TRM 3=XXXXXXX, where XXXXXXX is the current value of the third preset trim weight.
7. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
8. The display will show ZERO T=XXXXXXX, where XXXXXXX is the current value of the Zero Tolerance. Zero tolerance is a range of weight within which the scale is considered empty.
9. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are 0 through scale capacity.
10. The display will show GATE TIMR=XX, where XX is the current value of the gate timer. The gate timer is used to control the amount of time (in seconds) the gate is left open after the weight falls below the zero tolerance (ZERO T) weight value.
11. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are: 0 through 99 seconds.

TO START A BATCH OPERATION

1. Press the **START/STOP** key. The display will show START=YES.
2. Press the **ENTER** key to start the operation, *or* press the **0/NO** key to abort the operation.
3. The preset annunciators (1 and 2) and both relays will turn on and the operation will begin.
4. The weight will increase to the FAST= value. When the displayed weight reaches that value, the first relay and the preset (1) annunciator are turned off.
5. The operation will continue until the weight reaches the SLOW= value (minus the TRIM= value). When the displayed weight reaches that value, the second relay and preset (2) annunciator are turned off.
6. When all motion stops, the weight will be printed (if Auto Print is enabled and a printer is attached).
7. The trim weight will be recalculated, stored in memory and the displayed weight value added to the GROSS or NET accumulators.

NOTE! The target weights (FAST= and SLOW=) and the TRM X= weight are stored in non-volatile memory.

OPERATION, Cont.

Batcher (Single Speed Operation)

INGREDIENT/BIN SETUP (Maximum of 7 Ingredients/bins)

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **PRESET** key.
2. The display will show ING 1=X, where X is the bin number for the first ingredient.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
4. The display will show FILL=, the prompt for the total weight desired for this ingredient.
5. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new target weight, then press the **ENTER** key to save it. Allowable values are 0 through scale capacity.
6. The display will show ING 2=X, where X is the bin number for the second ingredient.
7. Repeat steps 4 and 5 for each ingredient/bin used.

NOTE! With the display showing ING X=, entering 0 (zero) then pressing the **ENTER** key will stop the ingredient data prompts and advance to the BATCH CNT= prompt.

8. The display will show BATCH CNT=XX, where X is the number of batches to perform.
9. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are: 0 through 99. Note the next batch will automatically start after closing the dump gate.

BATCHER PARAMETER SETUP

Remember that the trim weight is to compensate for material in transit and causes the preset to turn on when the displayed weight equals or exceeds the Preset weight value LESS its associated Trim weight value. Also remember that the preset is based on the displayed weight, which can be either gross or net weight.

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **ASTERISK** key then the **PRESET** key.
2. The display will show TRM 1=XXXXXXX, where XXXXXXX is the current value of the first preset trim weight.
3. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it.
4. The display will show TRM 2=XXXXXXX, where XXXXXXX is the current value of the second preset trim weight.
5. Repeat step 3 for each ingredient/bin used.
6. The display will show ZERO T=XXXXXXX, where XXXXXXX is the current value of the Zero Tolerance. Zero tolerance is a range of weight within which the scale is considered empty.
7. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are 0 through scale capacity.
8. The display will show GATE TIMR=XX, where XX is the current value of the gate timer. The gate timer is used to control the amount of time (in seconds) the gate is left open <u>after</u> the weight falls below the zero tolerance (ZERO T) weight value.
9. If the displayed value is acceptable, press the **ENTER** key to save it, otherwise use the numeric keys to enter a new value, then press the **ENTER** key to save it. Allowable values are: 0 through 99 seconds.

OPERATION, Cont.

Batcher (Single Speed Operation), Cont.

TO START A BATCH OPERATION

1. Press the **START/STOP** key. The display will show START=YES.
2. Press the **ENTER** key to start the operation, *or* press the **0/NO** key to abort the operation.
3. The preset (1) annunciator and relay will turn on and the operation will begin.
4. The weight will increase to the FILL= value (minus the TRIM= value). When the displayed weight reaches that value, the relay and preset (1) annunciator are turned off.
5. When all motion stops, the weight will be printed (if Auto Print is enabled and a printer is attached).
6. The trim weight will be recalculated, stored in memory and the displayed weight value added to the PRESET and GROSS or NET accumulators.

NOTE! The target (FILL=) and TRM X= weights are stored in non-volatile memory.

DECUMULATIVE BATCHER OPERATION

The decumulative operation is used when weighing material out of a weigh hopper. The weigh hopper has multiple compartments with a gate for each compartment. The fill signal will be used to open and close the different weigh hopper gates. The settings for the Batcher decumulative operation to function properly are as follows:

MODE OF OP = 5	DUMP GATE = NO
DCUMULATE = YES	CLR TARE = NO

To Start a Decumulative Batch Operation

The weigh hopper must be filled with material that equals or exceeds the amount of the preset value to be removed, otherwise an error message -CHECK MATL- will be displayed. This message indicates that the weigh hopper does not have enough material to meet the requirement of the preset weight value. Either more material has to be added to the weigh hopper or the preset weight value must be reduced.

1. With the indicator showing Gross Weight (G annunciator displayed), press the **START/STOP** key. The display will show START=YES.
2. Press the **ENTER** key to start the fill (discharge) operation, *or* press the **0/NO** key to abort the operation.
3. The indicator will switch to the Net Weight mode (N annunciator displayed) displaying zero weight, and the first preset annunciator and relay will turn on beginning the operation.
4. The weight will increase on the display. The weight is actually being discharged from the weigh hopper. When the displayed weight reaches the preset value, the operation will stop. The first preset annunciator and relay will turn off. (If more than one material is selected, the display will change to zero weight Net and the second preset annunciator and relay will turn on. The next material will start filling (discharging) to the preset value.)
5. When all motion stops, the weight will be printed (if a printer is attached and automatic print was enable in setup).
6. The indicator will change to the GROSS mode.
7. The operation is repeated until the weigh hoppers weight goes below the preset weight value for all of the materials required in the batch. At that time, more material must be placed into the weigh hopper.

NOTE! When using the decumulative operation for multiple material in a compartmentalized weigh hopper, the 220 can only check the total weight of material to verify there is sufficient amount to meet the preset values.

OPERATION, Cont.

Batcher Bin Accumulators

To view the BIN accumulators:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **PRESET** key. The display will show BIN=.
3. Input the bin number to be viewed and press the **ENTER** key.
4. The accumulator value of the bin number entered will be displayed or if the accumulator value is greater than (>) 999,999,999, OVERFLOW will be displayed.
5. Press the **ENTER** key to return to normal operation.

To print a single BIN accumulator

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **PRESET** key. The display will show BIN=.
3. Input the bin number to be printed and press the **ENTER** key.
4. Press the **PRINT** key.
5. The accumulator value for the bin number entered will be printed.
6. Press the **ENTER** key to return to normal operation.

To zero a single BIN accumulator

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **PRESET** key. The display will show BIN=.
3. Input the bin number to be zeroed and press the **ENTER** key.
4. Press the **ZERO** key.
5. The accumulator value for the bin number entered will be reset to zero.
6. Press the **ENTER** key to return to normal operation.

To print ALL BIN accumulators

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **PRESET** key. The display will show BIN=.
3. Press the **PRINT** key.
4. The accumulator values for ALL bins will be printed.
5. Press the **ENTER** key to return to normal operation.

OPERATION, CONT.

Counting

You must select LFT=NO, during Setup and Calibration to enable the COUNT key and counting functions.

Sampling and Counting

1. With the indicator in the Gross Weight mode (Gross annunciator, G on the display), press the **COUNT/SAMPLE** key. The display will show ADD 5 PCS if no previous sample has been taken *or* COUNT= if a sample has previously been taken.
2. If ADD 5 PCS is displayed, proceed to step 4.
3. If COUNT= is displayed, press the **COUNT/SAMPLE** key again to change the display to show ADD 5 PCS then continue to step 4.
4. If needed, press the **COUNT/SAMPLE** key again to step to the next sample quantity. Continue pressing the **COUNT/SAMPLE** key until the desired value is displayed.

Note, that pressing the **COUNT/SAMPLE** key repeatedly will cause the sample quantity to step in the following sequence: 5, 10, 25, 50, 75, 5, 10, etc.

5. When the displayed value (for the sample size) is acceptable, press the **ENTER** key *OR*
6. Use the numeric keys to enter a new value (for the sample size), then press the **ENTER** key to save it and proceed with the counting operation.
7. Add the indicated sample quantity and press the **ENTER** key.
8. Add the pieces to be counted and read total the count.
9. Press the **NET/GROSS** key to complete the counting operation and return the 220 to normal operation.

Counting Out From A Container

1. Place the filled container on the scale platform and press the **TARE** key.
2. The display will show zero weight and turn on the Net Weight annunciator.
3. Press the **COUNT/SAMPLE** key.
4. Remove a sample piece from the container and press the **ENTER** key.
5. Remove the pieces from the container and read the total number removed.
6. Press the **NET/GROSS** key to complete the counting operation and return the 220 to normal operation.

NOTES:

- As your need for counting accuracy increases, the size of your samples must also increase.
- As individual uniformity of your parts decreases, sample size must increase.
- Manual counting errors may occur if samples larger than necessary are used.
- Because of variation of individual container weights, be certain to "tare off" each container by placing the empty container on the scale and pressing the **ZERO** key before proceeding with the count operation.

OPERATION, CONT.

Count Accumulators

To view the COUNT accumulators:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **COUNT/SAMPLE** key.
3. The indicator will display XXXXXXXXX PCS, the piece count accumulator value.
4. Press the **ENTER** key to return to normal operation.

To print the COUNT accumulator:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **COUNT/SAMPLE** key. The indicator will display the piece count accumulator value.
3. Press the **PRINT** key.
4. The value for the Piece Count accumulator will be printed.
5. Press the **ENTER** key.
6. The indicator will return to normal operation when printing has been completed.

To zero the COUNT accumulator:

1. Press the **ACCUM** key. The display will show ACCUMULATOR= and turn on the ACCUM annunciator.
2. Press the **COUNT/SAMPLE** key. The indicator will display the piece count accumulator value.
3. Press the **ZERO** key.
4. The value for the Piece Weight accumulator will be reset to zero.
5. Press the **ENTER** key to return to normal operation.

INFRARED (IR) DATA PORT

This section describes the infrared (IR) data port, standard on the model 220 weight-indicating instrument. The IR port is located on the front panel of the indicator on the right side of the numeric keypad (see Figure No. 14)

The IR port transmits and receives data at 19.2k baud, 8 data bits, No parity and 1 stop bit and can send and receive data in all the formats supported by serial port COM 1.

To use the IR port, you need the following:

- A computer (such as a desktop or laptop) or a Personal Digital Assistant (PDA) equipped with an IR port.
- An infrared port driver that allows the computer or PDA to communicate with IR port in the 220.
- Application software for the computer or PDA to send and receive the data.

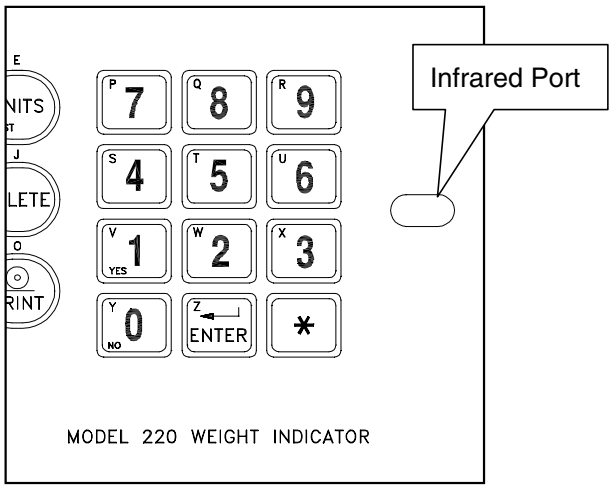


Figure No. 14

USING THE IR PORT

1. Make sure the 220 is on and the computer or PDA is ready to communicate.
2. Align the computer within 3 feet (1 meter) of the IR port.
3. Ensure that the ports are facing each other (line-of-sight) with no more than a 15º angle to either the left and right or above and below.
4. Send the command to the 220.
5. The 220 will perform the command (e.g. change from Gross to Net weight on the display) or the data requested will be sent to the computer or PDA.

ANALOG OUTPUT OPTION BOARD

This section describes the installation, setup and calibration of the optional Analog Output option board. This option consists of both a 0 to 10 volt and 4 to 20 mA analog output.

The Analog Output option board (Cardinal p/n 8200-C210-0A) is a 14-bit (16,383 states) analog representation of the displayed weight. The maximum load resistance for the current output is 500 ohms. The minimum load resistance for the voltage output is 2K ohms. Connections are made via a terminal block on the back of the option board. Refer to Figure No. 15 for the connector pin layout.

The 220 indicator features complete "ranging" for analog output. Users may select a weight range to be used for a selectable voltage range. This covers all current indicators/users and expands the capabilities for new applications. The 220 indicator also have auto-detect for option board installation. When the analog output board is found, additional prompts will be added to Setup. The main menu adds ANALOG OUT after KEY LOCK OUT. In addition, the calibration sequence includes the steps necessary to calibrate the analog output.

Mounting The Analog Output Board

NOTE! Should your indicator come with the Analog Output board already installed, the following information describing the mounting of the board does not apply. Proceed to the Cable Installation section.

1. Make sure the power to the indicator is OFF. Unplug the AC adapter and/or remove the battery.
2. Remove the 14 acorn nuts securing the back panel to the main housing.
3. Lift the back panel from the main housing, taking care not to stretch the cable and wires between the panel and main housing.
4. Locate the threaded mounting stud (below J2) and connector P5 on the main board.
5. To install the option board, carefully align the option board P1 (pins on trace side of option board) with connector P5 on the main board.
6. Align the hole in the option board with the threaded mounting stud (below J2) on the main board.
7. Apply even downward pressure to the end of the option board with P1.
8. Using the lock washer and hex nut supplied with the option board, secure the option board to the main board.

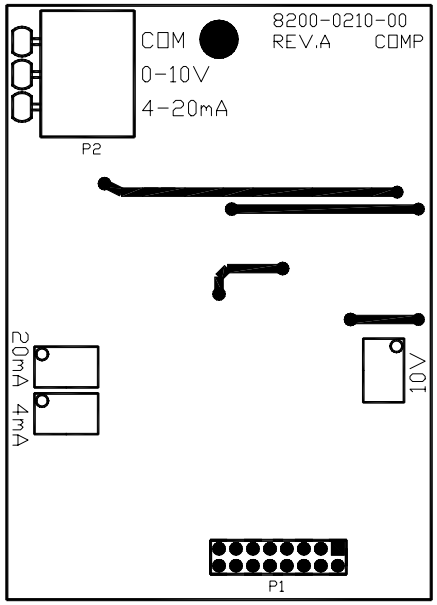


Figure No. 15

Cable Installation

1. Loosen a cable gland connector for the Analog Output cable. The gland connector(s) are located on the rear panel of the enclosure.
2. Slip a two-wire cable through the gland connector and into the enclosure.
3. Remove 2" of the outer insulation jacket then remove 1/4" of insulation from each of the wires.
4. Connect each of the wires to the terminal block (P2).
5. To terminate, first press down on the release bar for the terminal, insert the wire into the opening then allow the release bar to return to its original position, locking the wire in place. Repeat the procedure until all of the wires are in place.

ANALOG OUTPUT OPTION BOARD, Cont.

P2 TERMINAL BLOCK

PIN NO.	Function
COM	Common
0-10V	0 to 10 volt output (2K Ω Min. Load)
4-20 mA	4 to 20 mA current output (500 Ω Max. Load)

Re-Installing The Rear Panel

After all terminations have been made, remove the excess cable from the instrument enclosure and securely tighten each of the cable gland connectors. Do not over-tighten these connectors but make certain they are snug. **DO NOT USE TOOLS!** Finger tighten only! Ensure any unused gland connectors are plugged.

Insure that no cables or wires are exposed between the main housing and rear panel then place the rear panel onto the main housing. Secure the rear panel with the 14 acorn nuts removed earlier. **IMPORTANT!** Follow a diagonal pattern when tightening the acorn nuts.

Calibration Of The Analog Output

The analog output has been calibrated at the factory and should require no other adjustment. If, for some reason, it is found necessary or desirable to readjust this output, the procedure listed below may be used.

In order to calibrate the analog output, it is first necessary to enter the Calibration mode by gaining access to the calibration switch. Refer to the Setup and Calibration section of this manual for additional information.

The following questions in the ANALOG OUTPUT section apply only if the board is installed.

ANALOG OUTPUT - Analog Output Option

With the ANALOG OUTPUT prompt displayed, press the **ENTER** key. The display will change to show LOW WT=.

LOW WT=

Press the **ENTER** key to show the stored value. This is the value, in weight, which outputs zero volts (or 4 mA) from the analog output board. All weight below this target will output zero volts (or 4 mA). If the setting is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the desired weight value, then press the **ENTER** key to save it. Allowable values are: -99999 to 999999.

NOTE! The **NET/GROSS** key will change the weight sign. i.e. –1000 press 1 0 0 0 **NET**.

HIGH WT=

Press the **ENTER** key to show the stored value. This is the value, in weight, which outputs the maximum selected voltage and current (see VOLTS OUT=). All weights above this value will output maximum volts from the analog output board. If the setting is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the desired weight value, then press the **ENTER** key to save it. Allowable values are: 1 to 999999.

NOTE! This weight must be a positive value, up to the capacity of the scale, and above the LOW WT= value.

ANALOG OUTPUT OPTION BOARD, Cont.

Calibration Of The Analog Output, Cont.

VOLTS OUT=

Press the **ENTER** key to show the stored value. This is the maximum output value in volts (00.01 to 10.00). All weight values equal to or greater than HIGH WT= will output this value. Note, that if the scale displays CAPACITY (over capacity), this value is used also. If the setting is acceptable, press the **ENTER** key again to save it. Otherwise, using the numeric keys enter the desired, then press the **ENTER** key to save it. Allowable values are: 00.01 to 10.00.

NOTE! If the 4 to 20 mA current output is to be used, set VOLTS OUT= to: $10x \frac{(\text{max current} - 4)}{16}$

$$\text{Current} = \frac{\text{VOLTS OUT=}}{10} \times 16 + 4 \text{ (mA)} \qquad (\textit{Cannot be greater than 20 mA})$$

ADJ HIIGH

This sets the analog output to VOLTS OUT= level for adjusting the level. Adjustment potentiometers "pots" (10V and 20 mA) on the option board are used.

- Adjust the 10V pot for the maximum voltage output entered for VOLTS OUT=.
- If the 4 to 20 mA current output is to be used, adjust the 20mA pot for the calculated maximum current.

Press the **ENTER** key to proceed to ADJ LOW, or the **ASTERISK** key to return to the previous prompt.

ADJ LOW

This sets the analog output to zero for adjusting the level. Adjustment "pots" (10V and 4 mA) on the option board are used.

- There is no adjustment for zero volts out.
- If the 4 to 20 mA current output is to be used, adjust the 4mA pot for the low (4 mA) current output.

Press the **ASTERISK** key to return to ADJ HIGH, or the **ENTER** key to return to the SETUP prompt

NOTE! Cycling between ADJ HIGH and ADJ LOW is necessary when adjusting the current out. This must be repeated until no adjustment is necessary.

TROUBLESHOOTING

Error Codes

The 220 Indicator is equipped with software that indicates when an error in the operation takes place. The following lists the error codes displayed by the 220 along with their meaning. Should you encounter an error code, please refer to this list for the cause.

ANALOG HIGH

1. The load cell input is above the allowed range of the indicator.

   CORRECTIVE ACTION: Check for improper load cell wiring, excessive load, and for output of 1 to 40mV.

2. Load cell or circuit failure.

   CORRECTIVE ACTION: Consult your scale service provider.

ANALOG LOW

1. The load cell input is below the allowed range of the indicator.

   CORRECTIVE ACTION: Check for improper load cell wiring and for output of 1 to 40mV.

2. Load cell or circuit failure.

   CORRECTIVE ACTION: Consult your scale service provider.

CAL Button

Cal BUTTON will be displayed (until the condition changes), on power-up if the calibration switch is pressed in by the operator, the calibration access screw is the wrong length and is depressing the switch, the switch is disconnected from the PC board, or the switch is defective.

CORRECTIVE ACTION: Release the switch. Insure correct screw (#10 x ½ Stainless Steel fillister head) was installed for the calibration access screw. Referring to Figure No. 6, make sure calibration switch cable is plugged into P3 on the PC board. Replace calibration switch assembly. Consult your scale service provider.

CAPACITY

The load on the scale exceeds the scale capacity (105% of capacity if USA=YES or plus 9 divisions if USA=NO). May indicate miscalibration.

CORRECTIVE ACTION: Remove the over capacity load from the scale platform. Consult your scale service provider regarding recalibration.

-CHECK MATL-

In a Digital Fill Control or Batcher operation configured for decumulative operation (DCUMLATE=YES) there is not enough material to start the operation.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

-CHECK ZERO-

In a Digital Fill Control or Batcher operation with DUMP GATE=YES and AUTO TARE=NO the weight is above the zero tolerance value.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

Cold Ram

The eXternal ram has failed to retain memory.

CORRECTIVE ACTION: Consult your scale service provider.

TROUBLESHOOTING, Cont.

Error Codes, Cont.

CONFIG RQD

E^2PROM checksum failure. Indicates improper stored calibration data, calibration is necessary.

CORRECTIVE ACTION: Recalibrate with calibrated test weight.

-ERROR-

An invalid keypad entry was attempted:

A. **PRINT** key pressed with a negative weight.
B. **TARE** key pressed to enter a push button tare value of a negative value.
C. **ENTER** key pressed to enter a tare weight value that exceeds the scale capacity.
D. **ENTER** key pressed to enter a tare weight value that is inconsistent with the scale division value (i.e. attempt to enter a tare of 123 with scale divisions of 5).
E. **ZERO** key pressed when the gross weight is outside the scale zero weight range.
F. **lb/kg** key pressed to change to kilograms when the kilogram tare weight value exceeds 4 digits in length.

CORRECTIVE ACTION: Determine which of the reasons for the error display is applicable and take the appropriate corrective action.

ERROR A-D

The Analog to Digital converter chip has stopped producing weight.

CORRECTIVE ACTION: Consult your scale service provider.

ERROR DRDY

The Analog to Digital converter chip is not responding.

CORRECTIVE ACTION: Consult your scale service provider.

FILE FULL

The operator is attempting to add an ID when the ID file is full.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

HUH?

UNITS key pressed in an attempt to perform a “unit” conversion that is not allowed.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

ID IN USE

The operator is attempting to add an ID that already exists.

CORRECTIVE ACTION: Chose another number for the ID.

ID NOT FOUND

The operator is attempting to use an ID that does not exist.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

TROUBLESHOOTING, Cont.

Error Codes, Cont.

-LOCKED-

The key pressed has been locked out.

CORRECTIVE ACTION: Refer to SETUP AND CALIBRATION, *KEY LOCK OUT* section of this manual to unlock the key.

-NO TARE-

NET key pressed with no stored tare weight value.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

OVERFLOW

The indicator is attempting to display a positive number greater than seven (7) digits in length or a negative number of more than six (6) digits.

CORRECTIVE ACTION: Return to Gross Weight mode and review Tare value. May indicate miscalibration.

TOO BIG

UNITS key pressed in an attempt to perform a “unit” conversion where the interval would have been greater than 50.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

TOO SMALL

UNITS key pressed in an attempt to perform a “unit” conversion where the interval would have been less than .0001.

CORRECTIVE ACTION: Determine the reason for the error display and take the appropriate corrective action.

-UNLOCKED-

This is not an error message. It is shown on the display when a previously locked out key is unlocked.

CORRECTIVE ACTION: None required. Refer to SETUP AND CALIBRATION, *KEY LOCK OUT* section of this manual for more details.

-UNSTABLE-

Motion is present when trying to power up, print, zero or perform a push button tare function.

CORRECTIVE ACTION: Wait for a stable weight display (*STABLE* annunciator on) before performing any of these operations.

WRONG RAM

During memory access to the eXternal ram, an error has occurred.

CORRECTIVE ACTION: Consult your scale service provider.

Xram FAILURE

The power up test of eXternal ram (the big chip in a socket) has failed.

CORRECTIVE ACTION: Consult your scale service provider.

TROUBLESHOOTING, Cont.

Before You Call Service

The 220 Indicator has been designed to provide you with years of trouble-free operation. In spite of this, troubles sometimes happen. Before calling for service assistance you should make some initial checks to verify that a problem does exist. The following describes several types of symptoms along with suggested remedies.

PROBLEM	POSSIBLE SOLUTIONS
Display does not turn on	Is the AC power cord fully inserted into the wall receptacle? Check wall receptacle for proper AC power. Try another electrical appliance in the same receptacle. Does it work? Check the circuit breaker. Has there been power failure?
Incorrect weight displayed	Has the instrument been calibrated? Insure that the scale platform isn't touching an adjacent object. Check the load cell connector wiring. If using four (4) wire load cells, insure the sense lead jumpers (J4 & J5) are installed. Have proper operation procedures been followed?
Indicator will not display weight	Refer to Error Codes section and make certain that the OVER CAP message is not displayed. If so, and scale is not loaded, perform the calibration sequence.

CALIBRATION SEAL INSTALLATION

If your 220 Weight Indicating Instrument is used in a commercial application it must be tested and sealed by your local weights and measurements official. The 220 is designed to accept a lead and wire security seal to prevent unauthorized access to the calibration adjustments. Refer to the Figure No. 13 for details on the installation of these seals.

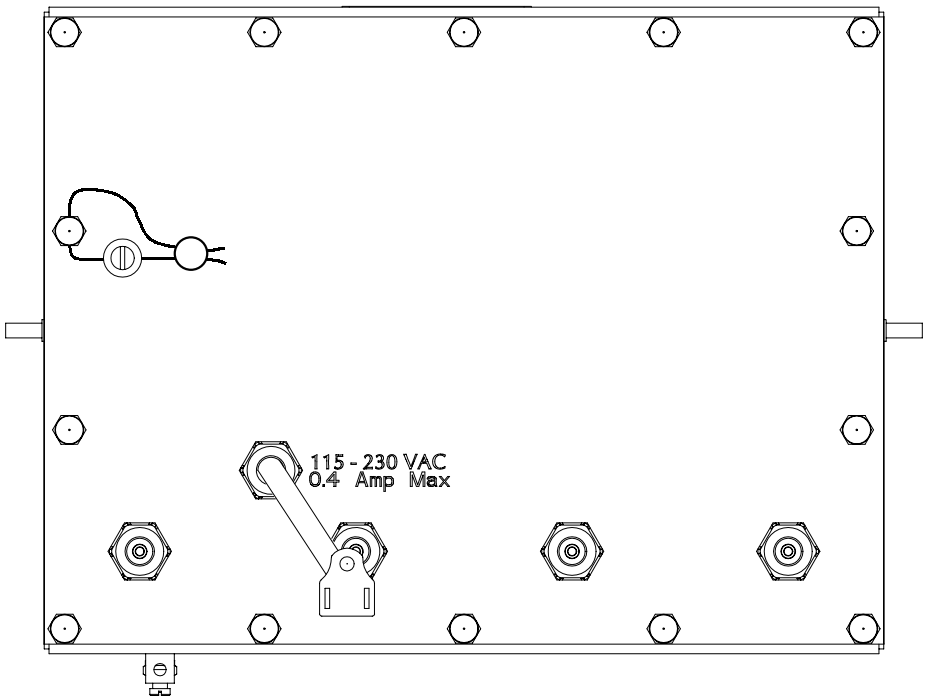


Figure No. 13

EUROPEAN DECLARATION OF CONFORMITY

Manufacturer: Cardinal Scale Manufacturing Company
PO Box 151
203 East Daugherty
Webb City, Missouri 64870 USA

Telephone No. 417 673 4631
Fax No. 417 673 5001

Product: Non-automatic Weight Indicating Instrument
Model Numbers 200, 205, 210 and 220
Serial Number EXXXYY-ZZZ
where XXX = day of year
YY = last two digits of year
ZZZ = sequential number

The undersigned hereby declares, on behalf of Cardinal Scale Manufacturing Company of Webb City, Missouri, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of:

European Standard EN 45501: 1992 and equivalent International Recommendation OIML R76, edition 1992
EU Type Approval Certificate Number DK 0199.47
Report No. DANAK-195612

Council Directive 73/23/EEC (19 February, 1993) Low Voltage Directive as amended by Council Directive 93/68/EEC (22 July, 1993)

Council Directive 90/384/EEC (20 June, 1990) on the Harmonization Of the Laws of Member States relating to non-automatic weighing Systems as amended by:
Council Directive 93/68/EEC (22 July, 1993)
Report No. DANAK-195728

European Standard EN50082: 1995 for radiated emissions and European Standard EN50082-2: 1995 Class B for EMC immunity.

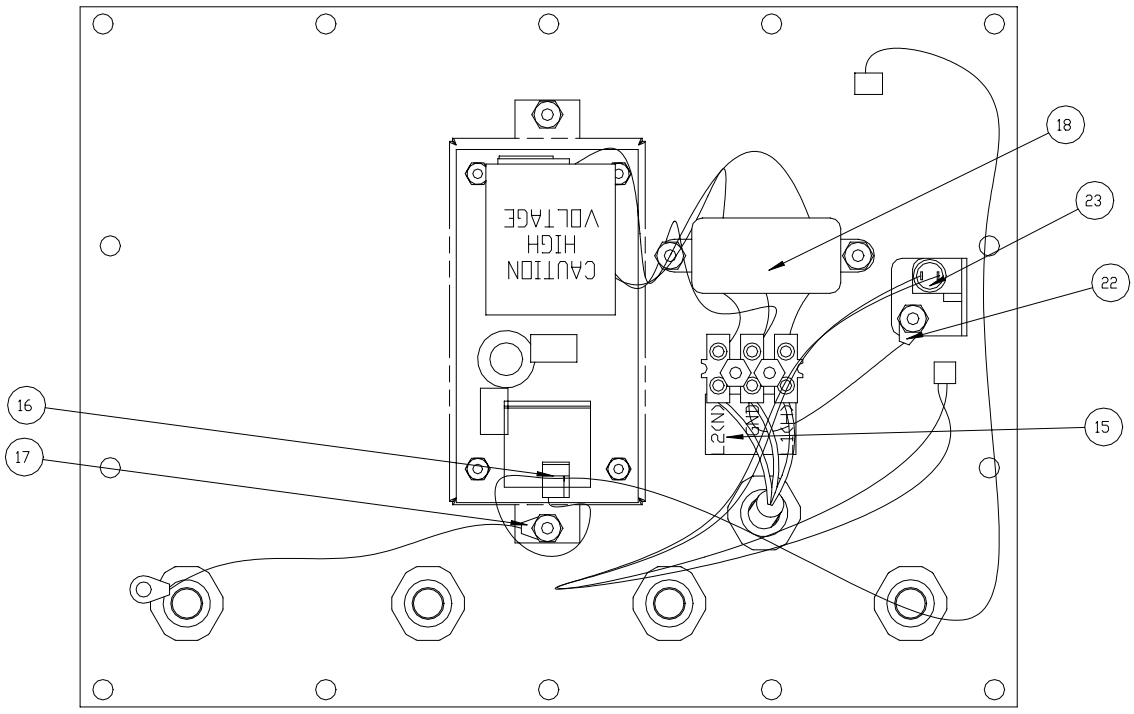
The Technical Construction File required by this Directive is maintained at the corporate headquarters of Cardinal Scale Manufacturing Company, 203 East Daugherty, Webb City, Missouri.

Link Yeager
Director, Quality Assurance

PART IDENTIFICATION

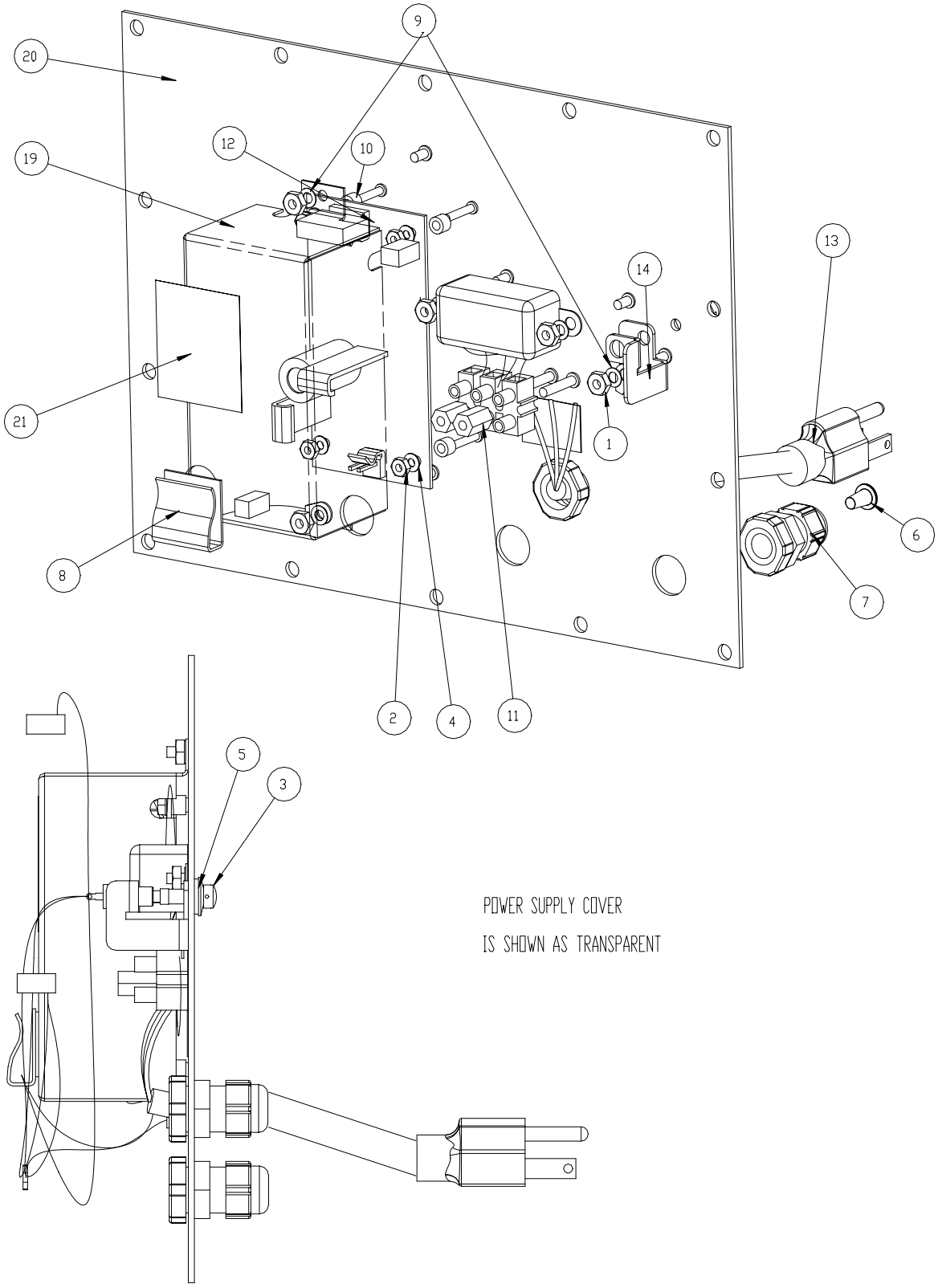
(Rear Enclosure Sub Assembly)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	5	6013-0039	NUT HEX #6-32
2	4	6013-0245	HEX NUT #4-40
3	1	6021-1108	SCW FILLISTER MACHINE-SWC #10-32 X.375 SS
4	4	6024-0108	WASHER LOCK INT TOOTH #4 SS
5	1	6024-1081	WASHER FLAT #10 NEOPRENE BACKING SS
6	4	6540-1104	PLUG, HOLE 0.173-.240 RED POLYETH
7	5	6610-2248	GLAND CONNECTOR
8	1	6610-5007	CABLE CLIP
9	5	6680-0004	WASHER LOCK INT. TOOTH #6 Z/P
10	4	6680-0138	SPACER #6 X .187 NYLON
11	2	6680-0203	SPACER (PCB) #6-32 X .500
12	1	6800-1033	POWER SUPPLY BOARD
13	1	6980-1030	POWER CORD 18/3 SVT CEE 6.3 FT
14	1	8200-B019-08	BRACKET: CALIBRATION SWITCH
15	1	8200-B104-08	LABEL: 205/210 TERM. BLOCK
16	1	8200-B204-0A	CABLE: 205/210 POWER SUPPLY OUTPUT
17	1	8200-B212-0A	CABLE: GND
18	1	8200-B215-0A	CABLE: AC POWER W/FILTER 205/210 DWI
19	1	8200-C018-08	POWER SUPPLY COVER
20	1	8200-C311-0A	WELDMENT: ENCLOSURE, REAR
21	1	8510-C346-0I	LABEL – HIGH VOLTAGE
22	1	8526-B166-0A	WIRE: 18GA, GRN 5.0 #8 RT/TINNED
23	1	8539-B254-0A	ASSEMBLY: CABLE, CALIBRATION SWITCH



PART IDENTIFICATION

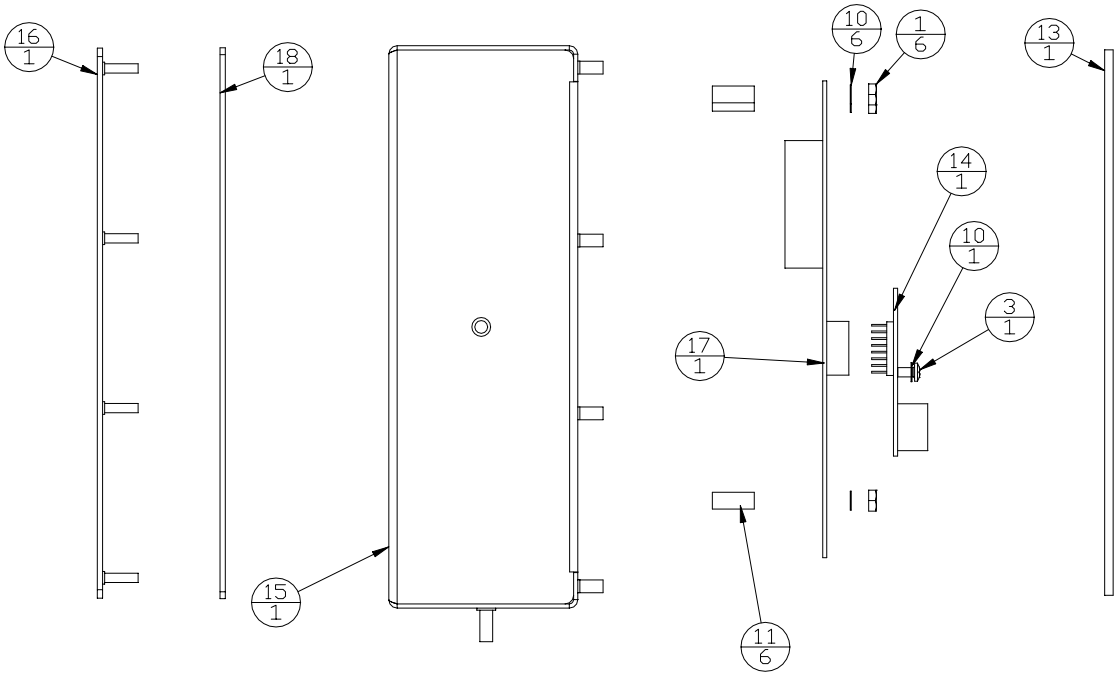
(Rear Enclosure Sub Assembly)



PART IDENTIFICATION

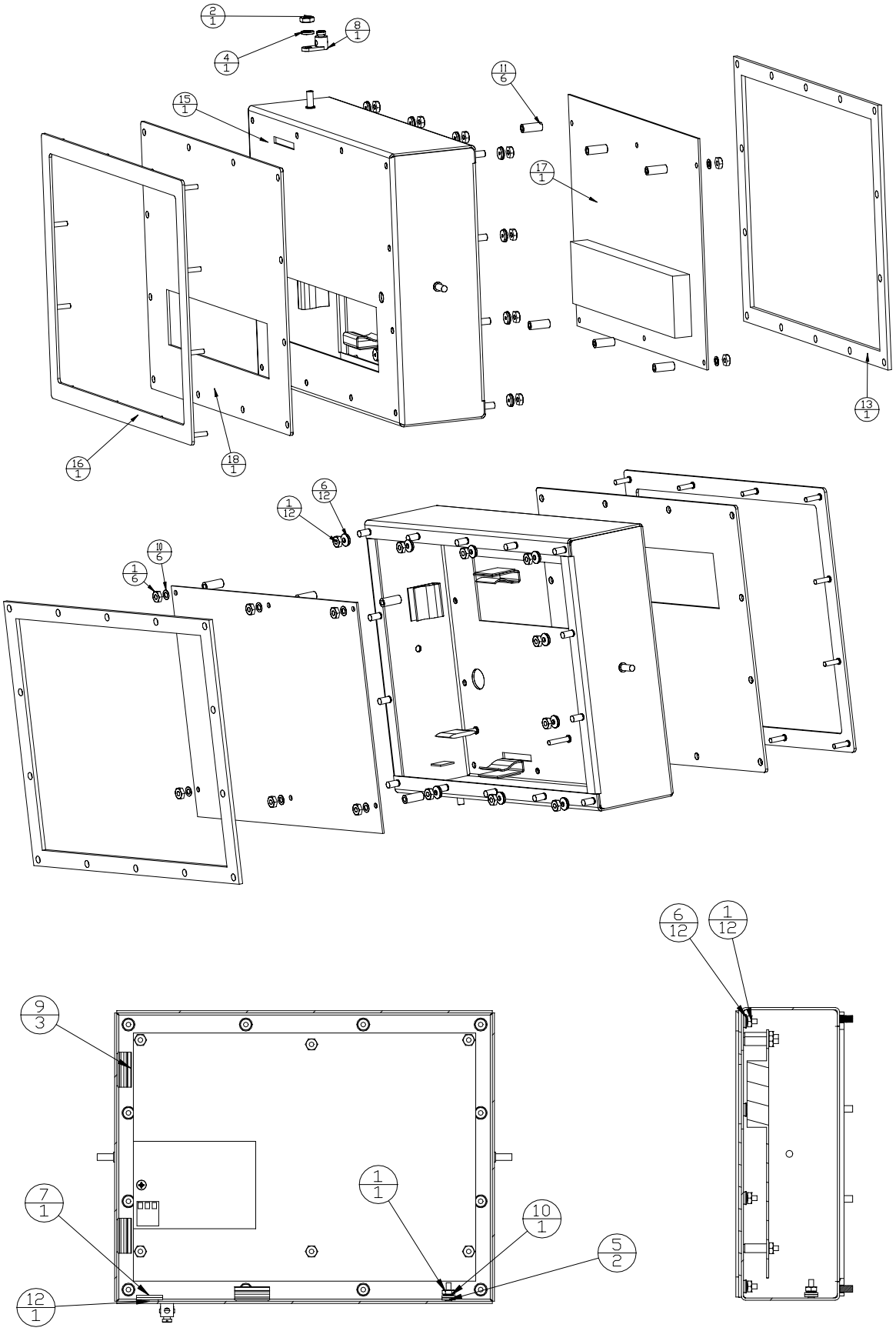
(Front Enclosure Sub Assembly)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	19	6013-0039	NUT HEX #6-32
2	1	6013-0297	NUT 10-32 HEX
3	1	6021-0654	SCW PAN HEAD #6-32 X .250 PDMS (OPTIONAL)
4	1	6024-0037	WASHER – LOCK #10 HEL SPLIT
5	2	6024-1022	WASHER #8 FLAT SS
6	12	6024-1078	WASHER FLAT #6 NEOPRENE BACKING SS
7	1	6560-0064	DESSICCANT 1 X 1 BAG
8	1	6610-5002	GROUND LUG
9	3	6610-5007	CABLE CLIP
10	7	6680-0004	WASHER LOCK INT. TOOTH #6 Z/P (OPTIONAL)
11	6	6680-0080	SPACER #6 X .625 NYLON
12	1	6710-1017	TAPE DBL SIDED 1.0 WIDE 45 MIL THK.
13	1	8200-B309-08	GASKET FOR 220 ENCLOSURE
14	1	8200-C210-0A	DAC PCB (OPTIONAL)
15	1	8200-C310-0A	WELDMENT: ENCLOSURE, FRONT
16	1	8200-C312-0A	WELDMENT: BEZEL FOR 220
17	1	8200-D300-0A	PC BD ASSY. 220 MAIN
18	1	8200-D302-08	KEYPAD: 220 DWI



PART IDENTIFICATION

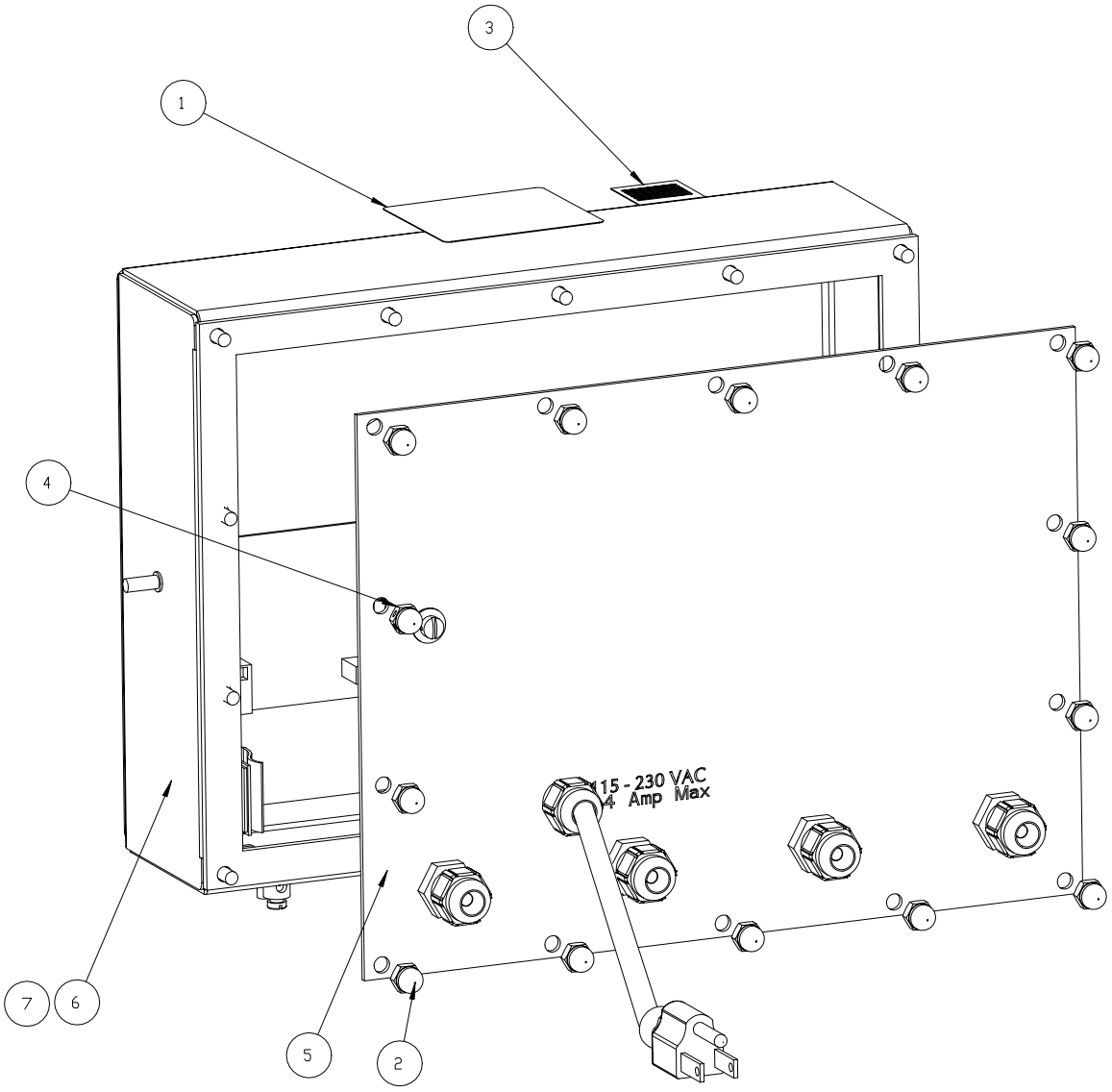
(Front Enclosure Sub Assembly)



PART IDENTIFICATION

(Final Assembly)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	593GR986	SERIAL TAG ASSEMBLY
2	13	6013-0433	NUT HEX #10-32 ACORN SS
3	1	6650-0087	LABEL: MADE IN THE USA
4	1	8200-B026-08	NUT HEX #10-32 ACORN SS DRILLED
5	1	8200-D313-0A	SUB ASSEMBLY: REAR ENCLOSURE
6	1	8200-D314-0A	SUB ASSEMBLY FRONT
7	1	8200-D314-1A	SUB ASSEMBLY FRONT W/DAC



APPENDIX A - ASCII COMMANDS

The 220 indicator will respond to ASCII coded serial data, in the format below, when input to the RXD1 serial input or the IR port.

- The commands are ASCII strings, without spaces, followed by a carriage return <cr> and can be upper or lower case, or any combination.
- Data inside parenthesis is the parameter item designator (e.g. “PWC(1)<cr>” requests the value of PWC number 1 preset to be transmitted from the indicator).
- A command followed by the equal sign “=” is a set command and must be followed by the data desired to be stored for that parameter.
- Any command without an equal sign requests data to be transmitted from the indicator (a query command).
- Commands that set more than one value use commas between the values.
- To verify data has been stored correctly in the indicator, send the command to request the same data to be transmitted from the indicator.

Commands

Command	**Response**	**Description**
Gross<cr>	1000lb G	Transmit Gross Weight
Tare<cr>	100lb T	Transmit Current Tare
Tare=123<cr>	OK	Set Tare To Value
Net<cr>	900lb N	Transmit Net Weight
PWC (1)<cr>	100lb PWC1	Transmit PWC Value
PWC (1)=123<cr>	OK	Set PWC To Value
Fast<cr>	100lb F	Transmit 2 Speed DFC Fast Value
Fast=123<cr>	OK	Set 2 Speed DFC Fast Value
Slow<cr>	100lb F	Transmit 2 Speed DFC Slow Value
Slow=123<cr>	OK	Set 2 Speed DFC Slow Value
Fill<cr>	100lb F	Transmit 1 Speed DFC Value
Fill=123<cr>	OK	Set 1 Speed DFC Value
Trim<cr>	100lb TRM	Transmit DFC Trim Value
Trim=123<cr>	OK	Set DFC Trim Value
Accum(g)<cr>	1000lb	Transmit Accumulator Valid Selections G/N/C/1-7
Accum(n)=100<cr>	OK	Set Accumulator
Ing(1)<cr>	1 100lb 1200lb	Transmit Ingredient (Bin,Fast,Slow)
Ing(1)=1,100,150<cr>	OK	Set Ing (Bin,Fast,Slow)
Trim(1)<cr>	100lb TRM1	Transmit Batcher Trim For Ing X
Trim(1)=100<cr>	OK	Set Batcher Trim
ID()<cr>	id(x)=r,1,2	List ALL IDs ID(*ID*)=*Ref,Tare,Accum*
ID(1)<cr>	id(1)=r,1,2	List A Single ID
ID(1)=ref,100,0<cr>	OK	Add Or Replace An ID
Key(x)<cr>	Results of (x) function.	Performs the function of (x) as if the key was physically pressed. See list of valid key names.

<cr> = carriage return

APPENDIX A - ASCII COMMANDS, CONT.

Valid Key Names

The following is a list of valid key names for the ASCII COMMAND Key(x).

Key Name	Comments
asterisk or *	Use either the word “asterisk” or the symbol “*”
0 to 9	Numeric characters
A to Z	Uppercase alpha characters
a to z	Lower case alpha characters
enter	
time	
net	Toggles between Gross and Net weight modes
preset	
count	
tare	Stores the current gross weight as the new tare weight. (The same function as the diamond “T” key).
tarewt	Displays the current tare weight for three seconds. (The same function as the weight “T” key).
print	
off	Turns the indicator off. (**NOTE:** The **ON/OFF** key on the keypad must be pressed to turn the indicator back on).
zero	
units	Toggles between the base units and converted units selected during Setup and Calibration.
start	
stop	
mem	
id	
accum	
delete	
dump	
gross	Selects Gross weight only, DOES NOT toggle between Gross and Net weight modes. (See Net, above).

Error Responses

Response	Description
?	Didn't understand the command.
MODE	This command not supported by the mode of operation. i.e. no Ing() if not batcher.


DESIGNED & MANUFACTURED
IN U.S.A.