Model PC200

Digital Portion Control Scale

Instruction Manual

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Section 1. Unpacking and Installation

Unpacking:

Before unpacking your Doran scale, please read the instructions in this section. Your new scale is a durable industrial product, but it is also a sensitive weighing instrument. Normal care should be taken when handling and using this product. Improper handling or abuse can damage the scale and result in costly repairs that may not be covered by the warranty. If you notice any shipping damage, notify the shipper immediately. Please observe the following precautions to insure years of trouble free service from you new scale.

! DO NOT drop the scale.

! DO NOT immerse the scale.

! DO NOT drop objects on the scale.

Carefully remove the scale from the shipping carton. Be sure to retain all shipping materials in case the scale must be shipped elsewhere.

Installation:

Place the scale on a stable flat surface. Verify that the bubble level located under the platter shows that the scale is level.

Electrical Connections:

The PC200 uses a wall mounted transformer to provide power to the scale. This transformer requires 115 Vac, 50/60 Hz power (230 Vac, 50/60 Hz power optional). Be sure the AC power is not excessively noisy - this can occur if large inductive loads, such as solenoids or motors, are on the same power line. Also be sure that the power outlet and transformer are not exposed to water while the scale is plugged in.

Section 2. Scale Operations Guide

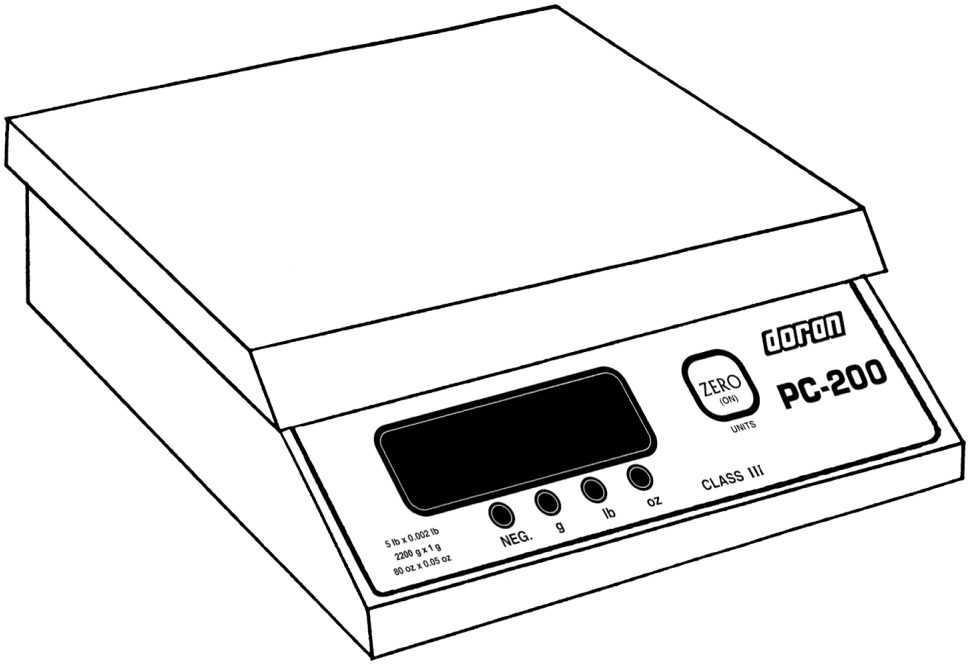

Fig. 1 PC200

Display Functions:

The Model PC200 controls consist of a single ZERO button located under the main display. A 5 digit LED display is used to provide weight indications and operator messages describing scale operation. A single status annunciator, “NEG”, is used to display negative polarity. This LED is located in the lower left corner of the display area. Three LED’s located at the bottom of the display indicate the current weighing units. Motion is indicated when the units LED’s are off. The LED for current units is on when stable.

Basic Weighing Operations:

1) Remove all items from the scale platter.
2) Press ZERO to zero the scale. The weight display should now be zero.
3) Place an item on the scale platter and wait for the scale to stabilize (g, lb or oz indicator will light up.)
4) Read the weight on the scale display.

Section 3. Setup and Calibration Guide

Power connections:

The PC200 is operated from a wall mounted transformer. This transformer has a power cord which plugs into the power jack located on the back of the scale.

RS-232 Connections:

The PC200 has a standard RS-232 output. To use this feature, the optional RS-232 cable is needed. Plug one end of the RS-232 connector into the RJ-12 connector located on the bottom of the scale. Plug the other end of the cable into the RJ-12 to DB-9 (or RJ-12 to DB-25) connector and attach the connector to your computer or printer.

Calibration and Parameter Setup:

1) After applying power to the PC200, turn the scale over and remove the screw located next to the RS-232 connector. Place a thin blunt object through the hole and press straight down. The scale should enter the Setup/Calibration mode, and the scale should display “CAP 5” (or “CAP 10”, depending on capacity).

2) Turn the scale upright and press the hidden button located 3/4” to the right of the “ZERO” button. The scale should now display “CAL 0”.

3) Remove any unnecessary weight from the scale platter and wait 10 seconds. Press zero. Wait for the scale to count from “7” to “0”, about 30 seconds. If the scale detects motion, the display will restart the count. When finished, the display will return “CAL F5”.

NOTE: If “r9 Err” appears on the display, the calibration zero is out of range. Press zero to clear this error. Refer to the analog setup section for additional information.

4) Place the correct weight on the platter and wait 10 seconds. Press “ZERO”. Wait for the scale to count from “7” to “0”, about 30 seconds. If the scale detects motion, the count will reset. The display will return “donE.n” when finished.

NOTE: If “CAL 0” or “r9 Err” appears on the display, the calibration span is out of range. Verify that the calibration weight is correct and repeat the calibration.

5) If no other parameter changes are needed, press the “ZERO” button to select “donE Y”. Then press the hidden button to exit setup. Replace and seal the screw by the RS-232 connector.

6) If addition parameter changes are needed, refer to Chapter 4.

Analog Setup:

The following table shows the acceptable “Raw Counts” for no load and full load. “Raw Counts” can be viewed through the last setup parameter. Refer to Section 4, Parameter Setup, for more information regarding parameter viewing.

Scale Capacity	Acceptable “Raw Counts” for no load	Acceptable CHANGE in “Raw Counts” for full load
5 lb	1000 - 18000	21000 - 50000
10 lb	1000 - 18000	21000 - 50000

Section 4. Parameter Setup

The PC200 has eighteen setup and calibration parameters which can be changed (sixteen in the Legal for Trade mode). This flexibility makes these scales versatile weighing instruments capable of meeting almost all common weighing needs.

Entering and Exiting Setup Mode:

To enter the setup menu, apply power to the PC200, turn the scale over and remove the screw located next to the RS-232 connector. Place a thin blunt object through the hole and press straight down. The scale should enter the Setup/Calibration mode, and the scale should display “CAP 5”, “CAP 2” (1000g), or “CAP 10”, (depending on capacity).

The parameters are accessed by pressing a hidden button located 3/4” to the right of the “ZERO” button. Pressing this button will cause the scale to step to the next parameter on the list.

To exit the setup mode, press and release the hidden button until the menu prompt “donE n” appears on the display. Then press the “ZERO” button so that “donE Y” is displayed. Press the hidden button once more and the scale will leave the setup mode.

NOTE: No setup information is saved until the PC200 exits the setup mode. In the event of a power failure while in the Setup Mode, any changes that have been made will be lost. This includes calibration parameters generated during calibration.

After all setup changes have been completed and the scale is in it’s normal operating mode, replace the screw on the bottom of the scale. If it is necessary to seal the scale, run a lead and wire seal through the screw on the bottom and a cross drilled screw on the side of the scale.

Changing a Parameter:

Once the desired parameter has been found, it may be necessary to change the option associated with that parameter. Press and release “ZERO” to step through the individual options. When you have stepped through all of the choices, the scale will return to the top of the list and start over.

Changing Start up Units:

The PC200 has been designed to allow the user the opportunity to make weighments in Pounds, Ounces or Grams. If there is desire to change the operating units, this change is possible without breaking the scale's Weights and Measures seal.

Unplug the scale and press and hold the "ZERO" button. Restore power to the scale. Hold the "ZERO" button until the scale displays "UnItS". The units annunciator will continually sequence through each operating unit until the "ZERO" button is released. Which ever unit light is on when the button is released, will indicate the new operating units.

Reviewing Setup Parameters:

Setup parameters for the PC200 may be reviewed without opening the scale. Remove power and press the hidden button (located 3/4" to the right of the "ZERO" button). Apply power. Hold the button until the scale begins to scroll through the setup parameters. The button may be released anytime after the review has begun.

Legal for Trade Restrictions:

The Legal for Trade mode disables certain setup parameter menus and options. The following pages list and describe the setup parameters and option menus. Any item marked by an asterisk will not be available in the Legal for Trade operating mode.

Section 5. Setup Menus Explained

Capacity Setup Menu

CAP	Select Scale Capacity (lbs)
2	Scale capacity set to 2 pounds
5	Scale capacity set to 5 pounds
6	Scale capacity set to 6 pounds (not used)
10	Scale capacity set to 10 pounds
15	Scale capacity set to 15 pounds (not used)

Calibration Menu(s)

CAL	Zero Calibration Point
0	Press ZERO to calibrate zero point

CAL	Span Calibration Point
FS	Full scale calibration
hS	Half scale calibration
4S	1/4 scale calibration
.1S	10% scale calibration

NOTE: For maximum accuracy, Doran Scales recommends that all scales be calibrated at full capacity. When location or installation make it difficult to bring full capacity weights to the scale, calibration with as little as 10% of capacity is possible.

Exit Setup Mode?

donE.	Done? Allows the scale to return to normal weighing mode.
n	No. Continue to next parameter.
y	Yes. Exit Setup Mode

Reset Default Parameters

rSt	Reset Parameters Resets the scale parameters to default.
n	No. Continue to next parameter.
y	Yes. Reset Parameters. Verifies by asking "SUre."

Auto Off Mode

Ao	Auto Off Mode Determines how long the scale will wait before turning off.
oF	Off. Scale will run continually
60	60 minutes
30	30 minutes
20	20 minutes
10	10 minutes
5	5 minutes
4	4 minutes
3	3 minutes
2	2 minutes
1	1 minute

Auto Zero Tracking

Zt	# of displayed divisions that are automatically zeroed from displayed zero
0.5	1/2 division
3.0 *	3 divisions
1.0 *	1 division

Motion Aperture

nnA *	# of displayed divisions that must change before motion is detected
1	1 division
3	2 divisions
5	3 divisions

Start Up Zero

SUO *	Controls the start-up zero point
no	Scale will NOT zero on power up. Calibrated zero point is returned.
on	Scale will zero on powerup.

NOTE: The Legal for Trade mode disables certain options and selections listed above. These items have been indicated by an asterisk (*).

Data Output

d.o.	Controls when information is transmitted from the scale though the serial port
C.P.	Continuous data transmission. Transmits data each time the display is updated.
A.1	Prints every stable weight.
A.2	Prints weights above zero. Must return to zero before next print.
t.d.	Transmits data when PRINT button is pressed.

Data Format

For.	Format of transmitted data from the serial port
FO	Basic data format.
2P	Basic dual print format. Includes metric weight.
F1	Enhanced data format. **Output NOT Legal for Trade.**
SP	Basic format for an Eltron SSP printer. Call Doran for details.

Baud Rate

b.r.	Serial port transmission rate
12	1200 Baud (bits per second)
24	2400 Baud (bits per second)
48	4800 Baud (bits per second)
96	9600 Baud (bits per second)

Data Bits & Parity

d.b.P.	Character transmission format. Data bits and parity
8n	8 data bits, no parity.
7o	7 data bits, odd parity.
7E	7 data bits, even parity.
7n	7 data bits, no parity.

Handshaking

HS	Communication Handshaking
SF	Software handshaking. Data is sent when ready. Transmission can be stopped by sending the scale an “xoff” (ASCII 19 or Ctrl-S). Transmission resumes by sending the scale an “xon” (ASCII 17 or Ctrl-Q). When “xon” is received, the scale will finish sending the data in progress at the time of “xoff.” The software handshaking option activates Bi-directional RS-232 communications.
Ct	Hardware handshaking (CTS)
no	No handshaking.

Startup Units

UNITS	Unit of measure that the scale displays upon power-up
	Press ZERO to scroll through the units activated in the CSL mode. The selected units will be displayed on the units indicators below the display. Pounds is default.

Convert Select

CSL	Controls which units are available for use
L9	Pounds, grams and ounces
9o	Grams and ounces
Lo	Pounds and ounces
Lh	Pounds and grams.

Operation Mode

oP	Sets the scale for Legal for Trade mode
St	Standard mode. NOT legal for trade.
44	Handbook 44. Legal for trade.

Exit Setup Mode

done	Exit Setup Mode?
n	No. Continue to next parameter.
y	Yes. Exit Setup Mode

Raw Counts Counts from A/D converter. Changes when weight is applied.

######	Raw counts from A/D converter
	View these numbers if calibration is unsuccessful. Refer to Section 3 for interpretation of these numbers. Press ZERO to exit.

Section 6. Data Communications

Introduction to data communications:

In the PC200, data is sent to a printer or computer by using “asynchronous serial data communications.” Data is broken up and sent one piece at a time to the printer or computer. In spite of this apparent simplicity, a basic understanding of serial data communications is needed when setting up the PC200.

The PC200 transmits letters and numbers by replacing the letter or number with an eight bit ASCII code. This code is then transmitted one bit at a time. A bit is the smallest unit of data and can have a value of “1” or “0”. By combining eight bits into a byte, it is possible to get 256 unique bit patterns. These patterns are used to create the ASCII codes used by the PC200 to represent letters and numbers.

When setting up a serial communications system, there are several concerns which affect the configuration of that system. These are:

- transmission rate
- knowing when data starts and stops
- the ability of the receiving equipment to digest the data sent

The transmission rate determines how fast the data is sent from the scale and is measured in Baud or bits per second. (For applications such as the PC200, Baud and bits per second are interchangeable.) The transmission rate controls how many bits can be sent in a given time. It is important that the sending and receiving units are set to the same Baud settings. Typical values are 1200, 2400, 4800 and 9600 baud.

The term “Asynchronous serial data communications” implies that the sending unit has no way of telling the receiving unit when a data bit has been sent or when to expect the next bit. To correct this problem, both the sending and receiving units use the baud rate setting to determine how fast data should be sent. If the baud rates at the sending and receiving units differ, the receiving unit will expect data to arrive at a different time than when the transmitting unit sent it. When this happens, data will be lost. When the baud rates match, the receiving unit has no problem with the data arriving early or late. The only problem is knowing when the data transmission started.

The PC200 and the equipment connected to it resolve this dilemma by sending a “start bit” at the beginning of each data byte. This bit tells the printer or computer that a new data byte is on the way. When the start bit is received, the bit timer starts running and runs until it has received the correct number of bits.

The number of bits sent by the PC200 is controlled by the data bits, parity and stop bit configuration. The PC200 is factory set for eight bits, no parity and one stop bit. This means that the eight bits following the start bit will be data, followed by a stop bit. The stop bit signals the end of the data and permits the bit timer a chance to reset itself before the next data byte is sent. No parity bits are sent.

In many cases, the receiving unit is a slow printer with limited memory. In these cases, more data may be sent than the printer can use. Again, data may become lost or "scrambled." To prevent this from happening, "Handshaking" is used. When the receiving unit is busy or incapable of receiving further data, it activates the handshaking, telling the sending unit to stop transmission. Then, whenever the receiving unit is ready for more data, it deactivates the handshaking and data transmission continues.

Software handshaking relies on bi-directional communications to send the XON (Ctrl-Q) and XOFF (Ctrl-S) flow control characters. The PC200 has limited bi-directional serial communications to support software handshaking. When a "Ctrl-S" is received, the transmission of data is halted until a "Ctrl-Q" is received. To use this mode, the RTX line of the PC200 is tied to the TXD line of the receiving unit.

Printer Modes:

The PC200 offers four different print control modes. These modes dictate when data is transmitted though the serial port.

Transmit on demand (tod): In this mode, scale data is transmitted whenever the print button is pressed or a print request is received from the serial port. The scale must be stable and the weight must be valid (no error codes displayed) before data is printed.

Continuous print (CP): In continuous print, data is transmitted each time the scale has a reading ready (each time the display is updated with new data). Readings which occur when the scale is in motion are called out by the abbreviation "MOT." following the data.

Auto Print 1 (AP1): Auto Print 1 transmits the first scale reading after the scale leaves motion. The reading must be stable and must be a valid reading before it can be sent.

Auto Print 2 (AP2): Like Auto Print 1, Auto Print 2 transmits the first scale reading following the scale leaving motion. In Auto Print 2, no further readings will be sent until the scale returns to displayed zero. The reading must be stable and must be a valid reading before it can be sent.

Data Output Format:

In order for the serial data sent from the PC200 to be useful, the data must me organized so that it is easy to read. To accomplish this, the PC200 arranges the displayed data with additional text to indicate the active units and to indicate the presence of motion during the reading.

"FO" Format: The basic data format sent by the PC200 is illustrated in Fig. 2 through Fig. 4. Each line of data begins with an STX character (02 hex, start of text) followed by a polarity sign (space for positive and "-" for negative) which indicates the reading polarity. Next the displayed data is sent. Six digits are used with a decimal point inserted in the correct position. After the weight data is sent, a space followed by the units are added to the string. When motion is present, another space is inserted followed by "MOT." The string is then finished by adding a carriage return and a line feed.

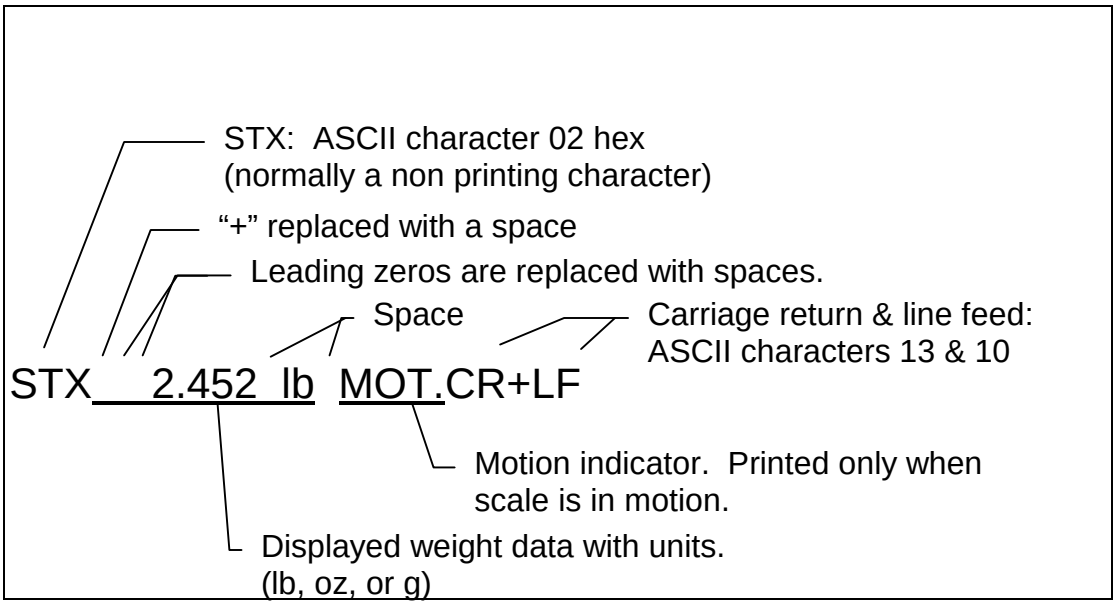

Fig. 2 Format "F0" standard form.

"F1" Format: The "F1" format is similar to "F0", but utilizes single characters for scale status. It is not legal for trade.

Dual print format (2P): The dual print mode provides the PC200 with the ability to print the current scale reading followed by the equivalent value in Kilograms.

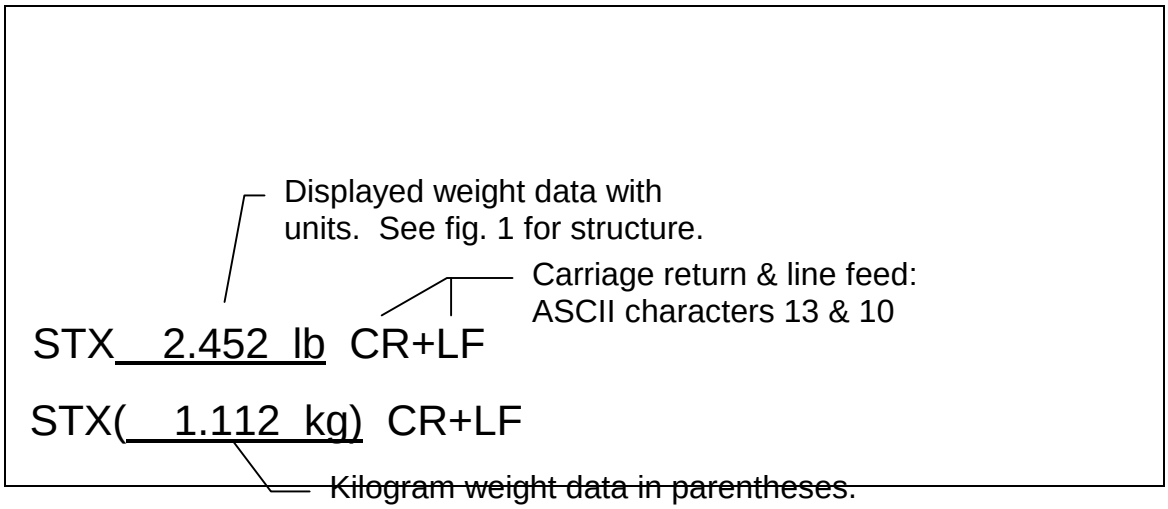

Fig. 3 Format "2P" form

The weight is first printed using the "F0" format. Then the weight is recalculated in kilograms and is sent as a second line of text. The kilogram data follows the "F0" data format except where parentheses are placed after the STX character and before the carriage return & line feed. Refer to Fig. 3.

"SP" Format: The "SP" format is used with the Doran SSP label printer. See Fig. 4 for details.

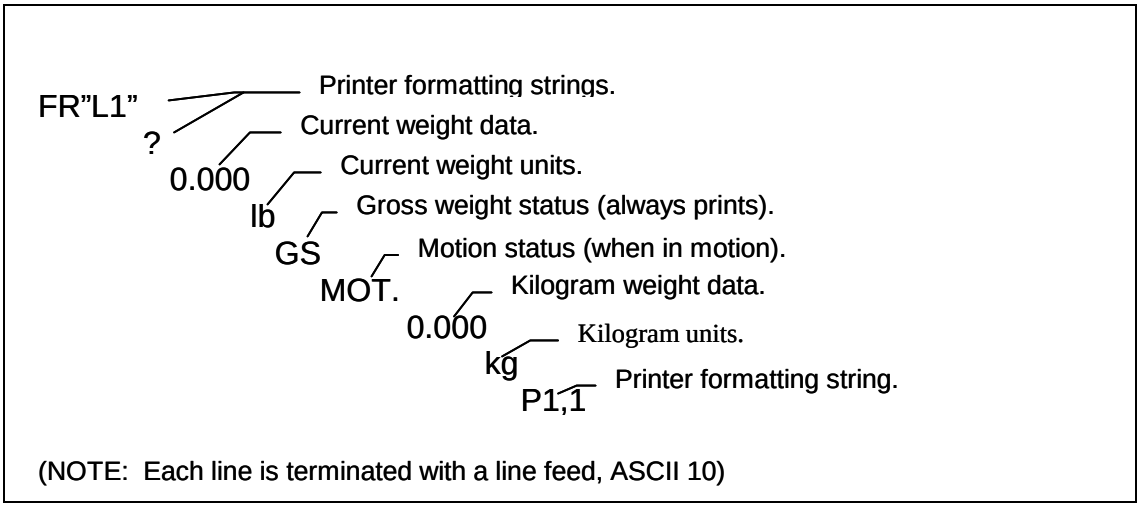

Fig. 4 Sample "SP" Format

Bi-directional Communications:

The scale will respond to the following single letter ASCII commands.

"W" initiates transmission of current weight data (if scale is stable).

"U" changes the displayed weight units.

"Z" zeroes the scale (if scale is stable).

Note: In order to use bi-directional communications, the "HS" parameter must be set to "SF".

Section 7. Specifications and Interconnect Data

Specifications:

	Model PC200
Resolution:	2500d
Power Supply:	Wall Transformer output: (scale input) 9VDC, 500mA Pos. (+) center
Display:	5 digit LED. 0.56” high
Displayed units:	lb, oz and g
Indicator Capacities:	2, 5 and 10 lbs
Printer Interface:	Bi-directional RS-232
Calibration:	Unit may be calibrated with 10%, 25%, 50% and 100% of capacity.
Controls:	Rugged Polycarbonate touch panel with built in ZERO switch. Also a second, HIDDEN, switch for parameter selection.
Construction:	Rugged stainless steel construction.
Options:	Security cable and lock

Interconnect Data:

PIN #	TITLE
1	+ Excitation
2	+ Signal
3	- Signal
4	- Excitation

Table 1: TB1 Load Cell Connections

Serial Cable Assembly		
DB25 Female Connector w/ Software Handshaking		
Function	**Pin**	**Note:**
TXD	3	
RXD	2	
Signal GND	7	
RTS	4	4 and 5 are shorted at the pcb
CTS	5	
DTR	20	Open, no connection at pcb
DB9 Female Connector w/ Software Handshaking		
TXD	2	
RXD	3	
Signal GND	5	
RTS	7	7 and 8 are shorted at the pcb
CTS	8	
DTR	4	Open, no connection at pcb

Table 2: Serial Cable Assembly with Software Handshaking

Section 8. Troubleshooting

General problem resolution:

Problem:	What to Do or Check:
Weight reading will not repeat or scale does not return to zero when weight is removed.	Make sure that the scale platter is not rubbing or touching the scale cover. Verify that there is nothing caught in the platform under or around the load cell or spider.
Scale overloads early	Verify scale calibration is correct. If problem persists, recalibrate the scale.
Scale will not come to zero when the ZERO button is pressed.	Make sure that the scale is stable (Units annunciator is on) when ZERO is pressed. If excessive motion is a problem, then it may be necessary to lengthen the filter time (slow down display update rate) AVG. If problem persists, there may be a problem with the touch panel or pcb.
Weight readings don't seem to be correct.	Verify the scale calibration with an accurate test weight. If the readings are not correct, recalibrate.
Scale drifts off zero.	Check for air currents and/or vibration around the scale. If that is the cause, it may be necessary to set the AZT and nnA parameters to wider settings to compensate (see section 4.) Verify that no mechanical restrictions exist, i.e. platter rubbing, something caught under or around the load cell.
Bubble level cannot be centered	Place scale on level surface. If scale must be installed on non-level surface, optional leveling feet are available.

If problems persist and are not listed in the above troubleshooting table, please contact your Doran Scales authorized dealer.

Resetting the scale:

In the event that a power problem has disabled the scale, remove power, wait 15 seconds and restore power. The scale should restart and function properly.

Error Messages:

Error Message:	What to do or check:
“Er EP”	The setup parameters loaded in nonvolatile memory have become corrupted. The scale requires reinitialization by a qualified scale technician.
“rg Er”	The calibration zero is out of range. Press zero to clear this error. Refer to the analog setup section for additional information.
“Ldg 0”	The scale is attempting to load power up zero. This message will remain until the scale is stable.
“ov-Ld”	The scale is in overload. The load on the scale platform exceeds the scale capacity by more than 103%. Remove excess weight from scale platform.
“gS-oL”	The scale is in gross overload. The load exceeds the scale rating and might result in damage to the scale. Remove excess weight immediately.