Model 300

Digital Bench Scale

INSTRUCTION MANUAL

DORAN SCALES, INC.
1315 PARAMOUNT PKWY.
1-800-262-6844
FAX: (630) 879-0073
http://www.doranscales.com
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Made in USA

Table of Contents

Introduction

Introducing the Doran Scales, Inc. Model 300 Digital Bench Scale. This scale uses state of the art technology to provide you with a low cost solution to the most demanding weighing applications. With ease of use and setup in mind, the scale is simple to set up and ready to use. The Model 300 offers many features. A few of these features are listed below:

- NTEP certification for Class III installations to 5,000d.
- A six digit, 0.56" red LED display for easy reading.
- lb, kg, oz, g, lb-oz display units supported.
- Fully configurable duplex printer port with RS232 support.
- EEPROM nonvolatile data storage of all calibration and setup information.
- Microprocessor monitoring system to prevent scale failure under severe fault conditions.
- 115/230 VAC 50/60 Hz (jumper selectable) operation.
- Field selectable digital filtering.
- Software configurable remote push-button support (Optional).
- 60 hour of battery operation, with built in charger. (Optional).
- Six digit, 0.56" red LED remote display (Optional).

Please be sure to read the entire manual to ensure obtaining all the benefits that the Model 300 can provide. If any questions arise, please feel free to contact the Doran Scales Technical Support Department at 1-800-262-6844.

Unpacking Your Scale

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 will 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 your new scale.

- DO NOT drop the scale.
- DO NOT immerse the scale.
- DO NOT drop objects on the platform.
- DO NOT pick up the scale by the "spider."
- Carefully remove the scale from the shipping carton.

Quick Start User's Guide

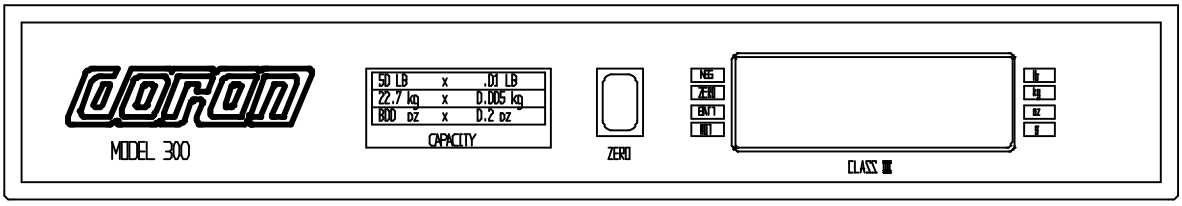


Fig. 1: Model 300 Front Panel Layout

Power Up:

Connect the Model 300 to a compatible power source. Or, press and release ZERO to turn on, for scale with battery option.

Basic Weighing Operation:

1) Remove all items from the scale platter.
2) Press ZERO to zero the scale. The weight display should now read zero.
3) Place an item on scale platter and wait for the motion (MOT) indicator to go out, indicating a stable weight.
4) Read the weight on the scale display.

Turn Off: (Battery option only)

1) To turn off manually, press and hold the ZERO push button until the display shows "**rel Pb**." Then release, the ZERO button and, the indicator will turn off, or…
2) Indicator will turn off automatically at the end of the programmed power on time delay when that mode is selected.

Controls and Display Operation:

The operational controls for the Model 300 consist of the ZERO (on/off on battery option), and an optional PRINT or UNITS button. A six digit LED display is used to provide weight indications and operator messages describing scale operation. Scale status such as motion (MOT), polarity (NEG), center of zero (ZERO), and optional low battery (BATT) are displayed on annunciators located to the left of the display area. Scale units are indicated on four annunciators located to the right of the main weight display.

Zero:

The ZERO button is used to zero the scale prior to making a reading. The ZERO button can function over the full range of the scale or it can be limited to a zero band equal to ±1.9% of scale capacity for Canadian applications. To zero the scale, wait until the scale is stable and press the ZERO button. The scale will zero immediately. The scale will not "zero" if the scale is in motion.

Units: (Optional)

The UNITS button permits the operator to change the Model 300 display weight units easily. Simply press the UNITS button and the scale will indicate the correct weight in the new units, lb, kg, g, oz, lb-oz.

Print: (Optional)

The PRINT button permits the operator to print the current weight or send a data stream to an external device. Like the ZERO button, the user must wait for motion to stop before pressing the PRINT button. The current weight will then be transmitted to the printer or external device.

Battery Operation: (Optional)

The Model 300 is equipped with a self-contained rechargeable, sealed, gelled-electrolyte battery and charging circuit. The scale is designed to run continuously for 60 hours on a fully charged battery.

The built-in charging circuit will fully charge the battery in approximately four hours. To charge the battery, simply plug the line cord into a standard 115V (230V optional) wall outlet.

The Model 300 can be used while recharging the battery. A full recharge takes place in four hours, whether the scale is on or off, in fact the Model 300 can be used with the AC charger cord plugged in on a continuous basis.

If an AC power failure occurs, the Model 300 battery takes over immediately to provide uninterrupted scale operation for up to 60 hours.

Low Battery Indication: (Optional)

The "BATT" indicator indicates that the battery is in need of recharging. Once the "BATT" indicator turns on, there will be approximately one more hour of battery life before the scale shuts down. When the battery is too low to run the scale, the Model 300 simply turns off and will not operate again until the battery is recharged. The Model 300 remains accurate and useable even with the "BATT" on.

Note: Battery life can vary depending on the following:

- The operating temperature.
- If optional remote display is installed.
- Whether or not the battery is fully charged after each low battery event.

Installation:

The desired scale location should be flat, level and free of any obstructions which might interfere with the operation of the scale platter. Remove the platter and locate the bubble level inside the base. Adjust the four scale feet so the bubble is centered with the base stable so it does not rock.

When installing your scale, make sure that the power connection is close to the scale and easily accessible.

Electrical Connections:

Prior to connecting your Model 300 to power, check the serial number tag on the scale for the correct operating voltage. Verify that the power matches the rated voltage.

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. The Model 300 has a filtered power supply to reduce the effects of normal line noise, but they cannot limit severe fluctuations. If problems occur, noise producing devices may have to be suppressed to minimize their effect.

Quick Setup Guide

Load Cell and Power Connections:

Load cell connections are made through a terminal block located at the bottom center of the main PC. Board (Fig. 2). The power cord connects to a connector adjacent to the transformer. These connections are accessible by removing the scale platter and access cover.

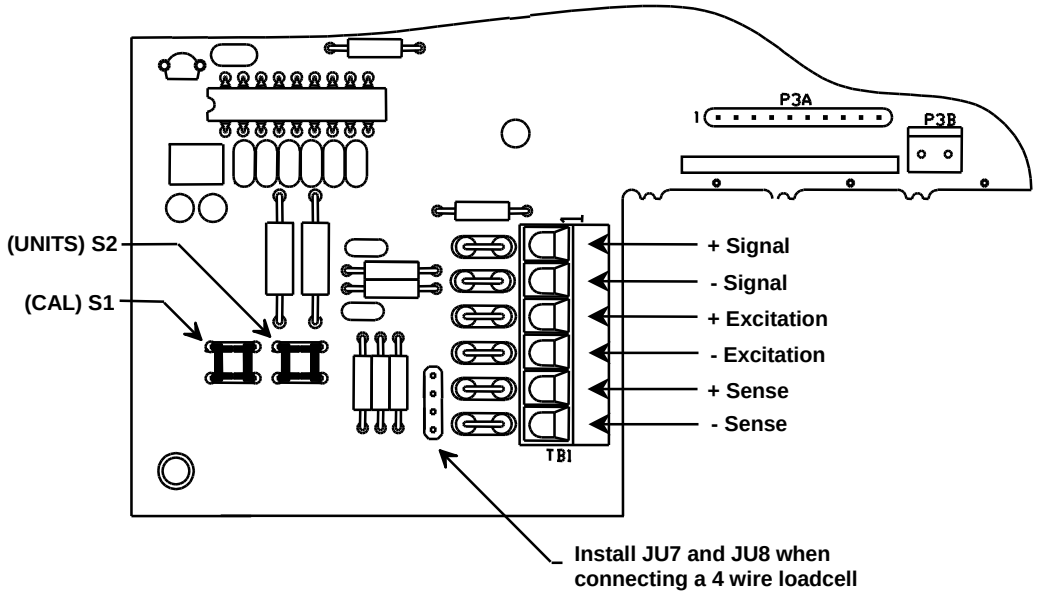


Fig. 2: Load Cell connections

The Calibration button (S5), located on main PC. Board (Fig. 4), can be accessed by removing the scale platter and access cover. There are no zero jumpers, span jumpers, buttons or pots to adjust scale calibration.

Option Connections:

The Remote Button connector is found on the topside of the main PC. board (see Fig. 3). This connection is accessed by removing the access cover. Connections are made by either crimping (or soldering) a connector contact onto each lead of the option cable. After crimping (or soldering), the contact is pressed into a connector housing. The completed option connector is then snapped onto the option connector P2 found on the main board. Like the load cell cable and power cord, the option cables are passed through fittings mounted on the back of the indicator.

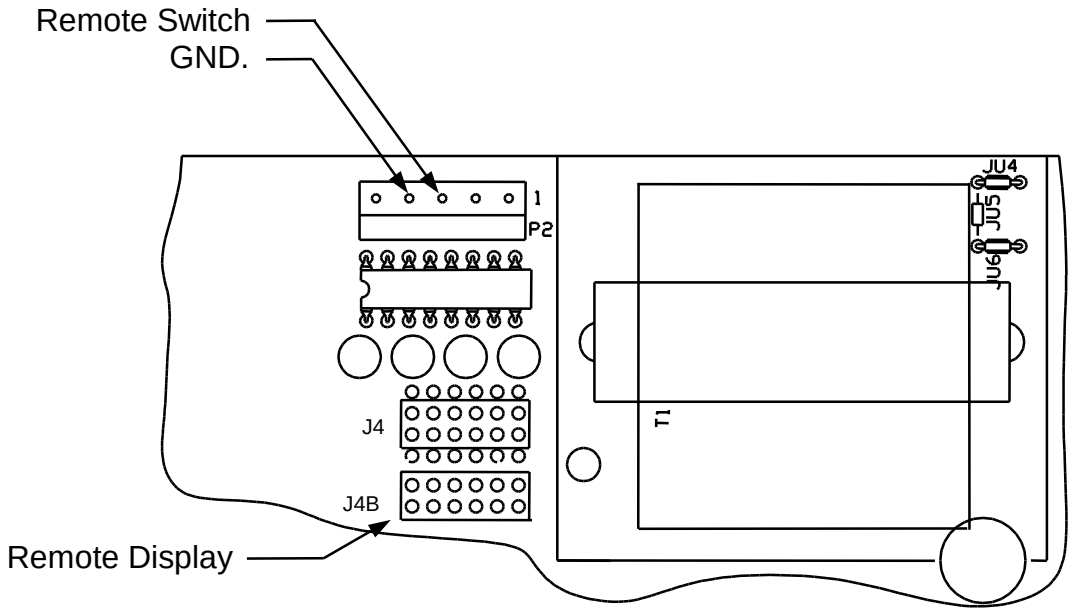


Fig. 3: Remote Push Button Connections

Calibration:

1) Enter Calibration mode by pressing the CAL button (S1 or S5) (see Fig. 4). Press and release the UNITS button (S2 or S6) until **"CAL 0"** appears on the display. Place scale platter back on top of platform.
2) Remove all weight from the scale platter and wait for about 10 seconds. Press **ZERO** and wait for the display to count down to 0. If the calibration zero was in range, the display will return with "**CAL FS"**. If the display returns with a "**CAL 0**". Repeat the process.

NOTE: If "**rg Err**" appears on the display, the calibration zero is out of range. Press **ZERO** to clear error. Refer to the analog setup section for additional information.

3) The scale can be calibrated using (a) full capacity weight, (b) half capacity, (c) quarter capacity, or (d) one tenth capacity. To select the weight to calibrate the scale, press the UNITS (S6) button and select one of four following capacities.

CAL FS: Full load calibration.

CAL .50: Half load calibration. (50% of full load)

CAL .25: Quarter load calibration. (25% of full load)

CAL .10: 1/10th load calibration. (10% of full load)

4) To complete the calibration process, place the correct weight on the platter and press **ZERO**, wait for the display to count down to 0. If the span calibration was in range, the display will return with "**donE"**. If the display returns with a "**CAL 0**", repeat steps 2 and 3.

NOTE: If **"SPAn E"** appears on the display, the calibration span is out of range. Press **ZERO** to clear error. Refer to the analog setup section for additional information.

NOTE: Scales calibrated at 10% of capacity are more likely to have significant errors at full capacity than are scales calibrated at 25% or 50%. Doran Scales recommends that all scales be calibrated at full capacity whenever possible. 10% calibration should not be used when calibrating scales for legal for trade applications.

Analog Setup:

(Refer to this section only if you encounter a calibration problem)

1) Enter Calibration Setup mode by pressing the CAL button (S1 or S5).
2) Press and release UNITS button (S2 or S6) until in the raw counts mode.
3) Return the scale platform to "No Load" by removing all items except platter from the platform.
4) Record the "No Load" counts. The "No Load" or dead load raw counts must be between 130,000 and 393,000 counts. If the readings are outside of the limits specified, the scale's loadcell maybe defective.
5) Place "Full Load" on the platform and record the "Full Load" counts. Subtract the "No Load" counts from the "Full Load" counts to calculate "span". Refer to Table 1 and verify that the span falls within the limits specified range. The "Full Load" raw counts (span + dead load) should not exceed 900,000 counts.
6) When using 50%, 25% or 10% of full load to calibrate, refer to Table 1 50%, 25%, 10% span ranges.

Platform load	Minimum span	Maximum span
Full	50,000	600,000
50%	25,000	300,000
25%	12,500	150,000
10%	5,000	60,000

Table 1: Calibration requirements in raw counts

Detailed Parameter Setup

The Model 300 has 20 setup and calibration parameters, which can be accessed through the scale's Calibration Setup Menu.

Entering and Exiting the Calibration Setup Menu:

To enter the Calibration Setup Menu. Remove the two screws mounting access cover. Once opened, press the CAL button (S5) location on main PC board (see Fig. 4). The indicator will display the first menu parameter, **"CAL 50"** (Where 50 can be any valid capacity).

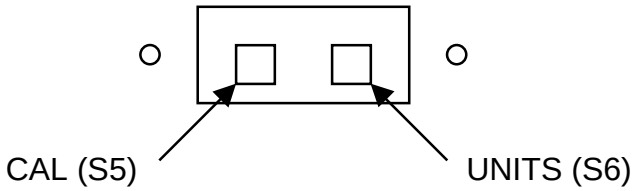


Fig. 4: Quick Access Panel

To exit the Calibration Setup Menu, simply press the CAL button (S5) again, or scroll through the menu, by pressing the UNITS button, until **"donE n"** appears. Press **ZERO** until **"donE y"** appears and then press the UNITS button. The indicator will display **"SAVEd"** and returns to the normal weighing mode. All parameter selections, will be saved, including any just changed.

NOTE: No setup information is saved until scale displays **"SAVEd"** and returns to the RUN mode. In the event of a power failure while in the Calibration Setup Menu, any changes that have been made will be lost.

After all setup changes are finished, and the indicator is in the normal weighing mode, re-install the access cover. Make sure the access cover and all the screws are re-installed in their original locations. Tighten the screws as needed.

Stepping through the menu parameters:

Once the Calibration Setup Menu has been entered, you may step through the menu by pressing and releasing UNITS. A different display prompt will appear for each parameter in the menu.

The parameter list on the following pages corresponds to the parameters available in the Calibration Setup Menu.

Some of the menu parameters, when changed affect settings of other parameters. The scale will limit these parameters or automatically set the parameters to meet the new limits.

Changing a Parameter:

After finding the desired menu item, the parameters for that item may be changed. Press and release **ZERO** to step through the parameter list for that item. The list of choices will repeat if you keep pressing and releasing **ZERO**. When you have found the desired setting, press UNITS to go to the next menu item.

Quick Review of Setup Parameters:

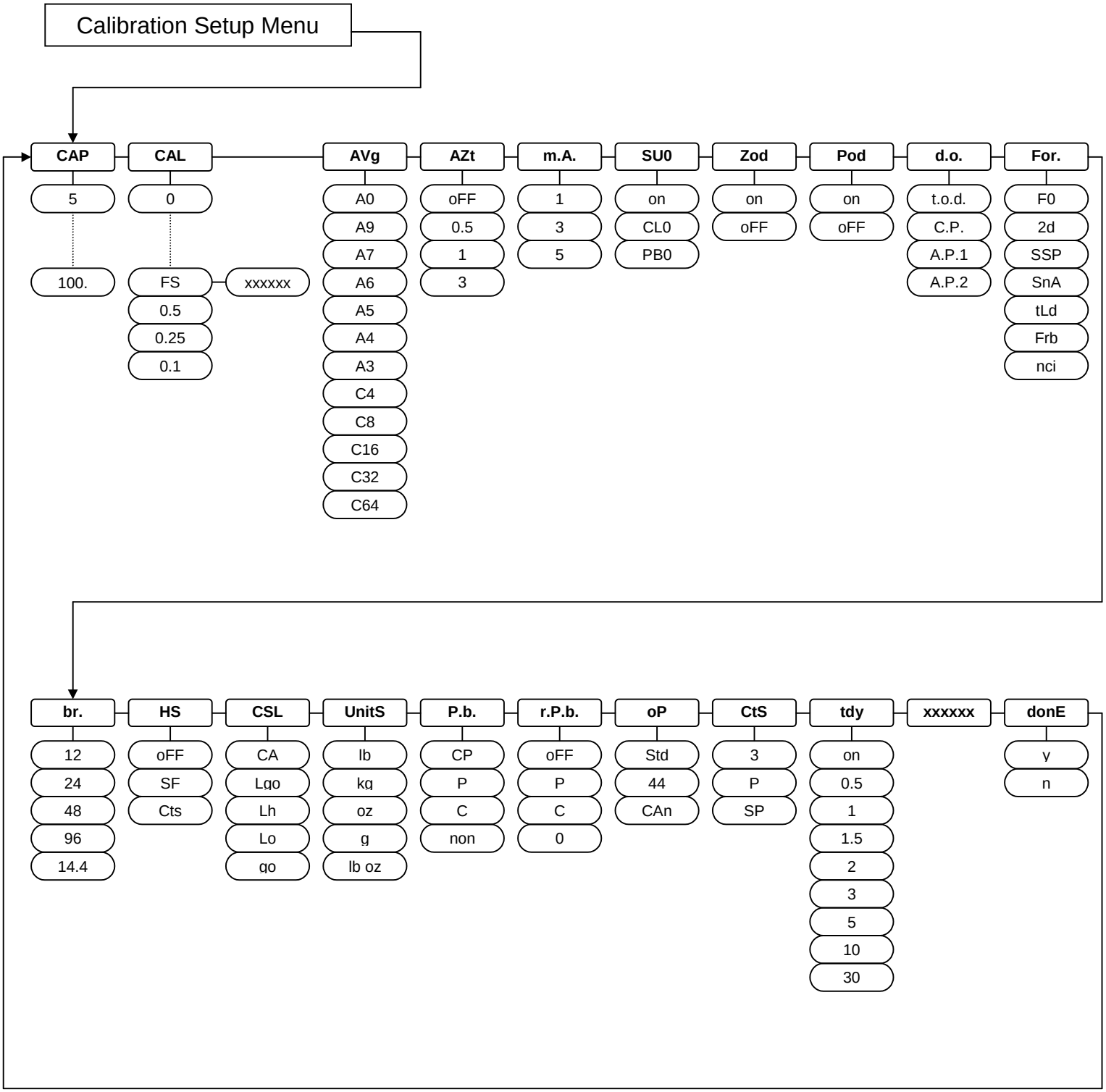
Setup parameters for the Model 300 may be quickly reviewed without opening the scale. Remove power and press and hold the **ZERO** button while you apply power. Hold the button until the scale begins to scroll through the setup parameters. The button may be released anytime after the review has begun. After parameters are displayed, scale will then go to the normal weighing mode automatically.

Legal for Trade Restrictions:

When the Legal for Trade mode is enabled, it automatically disables some menus and parameter options. This is done to comply with NTEP requirements. The menus and parameter sections are shown on the following pages. Those menus and/or parameters not available when in the Legal for Trade mode are marked by an asterisk.

Setup Menus Explained

(In order of occurrence)



Capacity Setup Menu

CAP	Capacity Select Menu Allows the selection of scale capacity.
50	**50 pounds**
100	100 pounds
150	150 pounds [1,2]

1) No lb-oz display for this capacity in precision resolution.

2) No lb-oz display for this capacity in super precision resolution.

Calibration Menu

CAL	Zero Calibration Mode.
0	**Calibration Zero** Press ZERO to perform calibration of the scale zero. Successful calibration is indicated by **"donE"**

NOTE: The scale will automatically adjust the offset and gain to compensate for dead load and span. When making these adjustments, the scale may ask you to repeat zero calibration immediately after performing a zero calibration or after a span calibration. Successful calibration is indicated by **"donE"**

CAL	Span Calibration Mode. (Does not appear if CAL 0 is not activated.)
FS	**Full load calibration.**
0.5	Half capacity calibration.
0.25	Quarter capacity calibration.
0.1	1/10th of capacity calibration.
XXXXXX	By pressing the optional print push button weight value can be entered in. (note: XXXXXX will be the dialed in weight value.

*** 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 10% of capacity is possible.

Digital Filter Setup Menu

Avg	Averaging mode Determines the number of samples to average
A0	Stabil-izer © auto averaging. All readings are averaged. Display updates 10 times a second.
A9	Stabil-izer © auto averaging. All readings are averaged. Display updates 9 times a second.
A7	Stabil-izer © auto averaging. All readings are averaged. Display updates 7 times a second.
A6	Stabil-izer © auto averaging. All readings are averaged. Display updates 6 times a second.
A5	Stabil-izer © auto averaging. All readings are averaged. Display updates 5 times a second.
A4	Stabil-izer © auto averaging. All readings are averaged. Display updates 4 times a second.
A3	Stabil-izer © auto averaging. All readings are averaged. Display updates 3 times a second.
C4	Fixed averaging 4 readings are averaged. Display updates 10 times a second.
C8	Fixed averaging 8 readings are averaged. Display updates 5 times a second.
C16	**Fixed averaging 16 readings are averaged. Display updates 3 times a second.**
C32	Fixed averaging 32 readings are averaged. Display updates 1½ times a second.
C64	Fixed averaging 64 readings are averaged. Display updates 1 time every 1.4 seconds.

Automatic Zero Tracking Setup Menu

AZt	Automatic Zero Tracking Range Small weights within the specified number of divisions are automatically zeroed.
oFF	Zero tracking is off. No automatic zeroing.
0.5	**Zero tracking to within 0.5 division.**
1 *	Zero tracking to within 1.0 division.
3 *	Zero tracking to within 3.0 divisions.

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

Motion Aperture Setup Menu

m.A. *	**Motion aperture** * **Determines how many divisions consecutive readings must change before the scale is considered in motion.**
1	**1 division change must be seen to enter motion.**
3	3 division change must be seen to enter motion.
5	5 division change must be seen to enter motion.

Start Up Zero Setup Menu

SU0 *	**Start Up Zero** **Controls the start up zero status.**
on	**Zeros on the first stable reading on power up.**
CL0	Loads the calibration zero for zero reference
PB0 *	Loads the last pushbutton zero. (battery option only)

Latching Zero Request Setup Menu

Zod	**Zero on Demand** **Enables or disable zero latching.**
on	If ZERO is pressed, it is saved until the scale becomes stable.
oFF	**If the scale is in motion, the zero request is discarded.**

Latching Print Request Setup Menu

Pod	**Print on Demand** **Enables or disables print latching.**
on	If PRINT is pressed, the print request is saved until the scale becomes stable.
oFF	**If the scale is in motion, the print request is discarded.**

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

Printer Data Output Setup Menu

d.o.	**Data Output Mode** **Determines when serial data will be sent.**
t.o.d.	**Transmit on demand. Print when the PRINT button is pressed.**
C.P.	Continuous Print. Print when display is updated.
A.P.1	Auto Print 1. Print once only when scale goes stable.
A.P.2	Auto Print 2. Print once only when scale goes stable. Scale must return to zero to before it can print again.

Output Formats

For.	**Data Input / Output Format** **Defines the appearance of the serial data sent.**
F0	**Basic output format.** **(See the Data Communication section for details)**
2d	Basic Dual Print Format. Includes Kilogram weight.
SSP	Basic Output for Eltron printer.
SnA	SMA standard #1
tLd	Toledo serial protocol
Frb	Fairbanks Ship-it- UPS Systems
nci	NCI 3800 - Fed Ex Systems

Baud Rate Setup Menu

br.	**Baud Rate Setup** **Determines baud rate for serial data.**
12	1200 baud (bits per second)
24	2400 baud (bits per second)
48	4800 baud (bits per second)
96	**9600 baud (bits per second)**
14.4	14,400 baud (bits per second)

Serial Data Handshaking Setup Menu

HS	**Serial Data Output Handshaking Selects the type of serial data handshaking used. (See the Data Communication section for details)**
oFF	No handshaking is used. Data is sent when ready, receiving device (printer) must be fast enough to keep up with the data.
SF	**Software handshaking. Data is sent when ready. Transmission can be controlled by the receiving device. The software handshaking option activates Bi-directional RS232 communications. Refer to the communications section for details.**
CtS	CTS Handshaking. Data is sent only when CTS is active.

Units Conversion Setup Menu

CSL	**Convert Select Modes Determines which units selections will be active.**
CA *	**Convert All. lb, kg, g, oz and lb-oz are active.**
Lgo	lb, kg, g and oz are active.
Lh	lb and kg are active.
Lo	lb and oz are active.
go	g and oz are active.

Start Up Units Selection Menu

Unlts	**Start Up Units Select Mode Configures selection of start up units.**
	Press ZERO to scroll through the units activated in the CSL parameter. The selected units will be displayed on the units indicators to the right of the display.

NOTE: If an invalid start up unit is selected for a given capacity, the scale will automatically change the unit setting to a valid unit when exiting the setup menu.

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

Push-button Function Setup Menu

P.b.	Push Buttons Configures the active push button functions.
CP	**UNITS, PRINT enabled**
P	PRINT enabled only.
C	UNITS enabled only.
non	UNITS, PRINT disabled.

Remote Push-button Configuration Menu

r.P.b.	Remote Push Button Configures the remote switch to perform one of the three front panel functions.
off	**The remote switch is disabled.**
P	The remote switch functions as a PRINT button.
C	The remote switch functions as a UNITS button.
0	The remote switch functions as a ZERO button.

Legal For Trade Setup Menu

oP *	Operating mode Activates the Legal for Trade mode.
Std	**Standard operation**
44	Legal for Trade, Handbook 44 compliant.
Can	Legal for Trade, Canadian W&M compliant.

Scale Resolution Setup Menu

CtS	Counts select
3	Standard precision mode (3000d typ.)
P	**Precision mode (5000d typ.)**
SP	Super precision mode (10,000d typ.)

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

Unit On Timer (Battery only)

tdy	Selects the time value that the unit will remain on
on	Unit will remain on, On timer is off
0.5	**30 second "On timer"**
1	1 minute "On timer"
1.5	1 minutes
2	2 minutes
3	3 minutes
5	5 minutes
10	10 minutes
30	30 minutes

NOTE: The "On Timer" governs the amount of time the unit stays on after ON/ZERO is pressed. The electronics in the scale sense activity on the scale platform - when there is no activity on the platform within the time programmed for the "On Timer", the unit will turn itself off. Each time there is activity (motion) on the scale's platform or any pushbutton activity before the scale turns off, the "On Timer" is reset to its full time period.

Raw Counts Display Mode

Raw Counts	Displays the raw Analog to Digital converter data.
	Press UNITS to exit Raw Counts.

Configuration Menu Exit

donE	Exit Configuration Menu.
n	**Do not exit menu. Start over at the top of the parameter list.**
Y	Exit Configuration menu. Save all parameter changes. The scale will return to normal weighing when UNITS is pressed.

Data Communications

Introduction to data communications:

In the Model 300 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 scale.

The scale transmits letters and numbers to a printer or computer by replacing the letter (or number) with an eight bit ASCII code. This code is then transmitted, one bit at a time, to a printer or a computer. 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 scale 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 to the printer (or computer) and is measured in Baud or bits per second. (For applications such as the Model 300, 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 scale 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 scale is controlled by the data bits, parity and stop bit configuration. The scale 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.

The scale offers hardware and software handshaking. Hardware handshaking makes use of the CTS (clear to send) input on the unit. When this signal is active, the scale is permitted to send data. When the receiving unit is busy, the CTS line is deactivated and the scale stops sending data. When the receiving unit is ready for more data, the CTS is reactivated and the scale will finish sending the data string it was sending when transmission was interrupted. All readings created while transmission is halted are discarded.

Software handshaking relies on bi-directional communications to send the XON (Ctrl-Q) and XOFF (Ctrl-S) flow control characters. The scale 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 scale is tied to the TXD line of the receiving unit.

Printer Modes:

The Model 300 offers four different print control modes. These modes dictate when printer data is sent.

Transmit on demand (tod):
In this mode, scale data is transmitted whenever the print button is pressed, the remote print button is pressed, or a print request is received from the serial port. The scale must be stable and the scale value must be valid before the data is printed.

Continuous print (CP):
In continuous print, data is transmitted each time the scale has a reading ready. 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 scale to be useful, the data must be organized so that it is easy to read. To accomplish this, the scale arranges the displayed data with additional text to indicate the active units and to indicate the presence of motion during the reading.

"F0" Format:

The basic data format sent by the scale is illustrated in Table 4. Each line of data begins with an STX character (start of text) followed by a polarity sign, 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.

In the case of lb-oz data, the pounds value is placed after the polarity sign. A space followed by "lb" and another space follows the pounds data. Ounce data is then sent with a decimal point inserted where needed. Once again a space is inserted after the weight data followed by "oz." Only six digits are sent in the lb-oz mode so the allocation of these digits depends on the ounces resolution. Refer to Table 4 for details.

"2d" Format:

In the "DUAL PRINT" format, the current 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 Table 4 for details.

"SSP" format:

The data string produced by the SSP format allows the scale to communicate with an Eltron Label Printer. This printer allows the creation of custom labels containing weight information, bar codes and graphics. Refer to Table 4 for details.

Command	Scale output Response	Description
W	<STX><p><xxxx.xx><SP><uu><SP><MOT><CR><LF> or <STX><p><xxxx.xx><SP><uu><SP><MOT><CR><LF> <(><p><xxxx.xx><SP><kg><SP><)><MOT><CR><LF> or <FR"L1"><LF><?><LF><p><xxxx.xx><LF><uu><LF> <GS><LF><MOT><LF><p><xxxx.xx><LF><kg><LF> <P1,1><LF>	**"_F0"** standard format, Prints current weight and units. **"_2d"** dual print format, Prints current and kg weight resolution. **"SSP"** Label printer format, for Eltron printers <**xxxx.xx>** weight data (fixed field of 6 digits plus decimal or "-------" for overload, underload, gross underload, or gross overload) **<p>** polarity "-" or " " <**GS>** gross or net status (always "GS") <**uu>** current units **<SP>** line space (hex 20) <**MOT>** motion status ("MOT." or " ") <**CR>** carriage return (hex 0D) (control-M) **<LF>** line feed (hex 0A) (control-J)
U		**Scale changes units**
Z		**Zeros scale**
XON (hex 11, ctrl-Q)		**Turns on serial handshaking** scale output disabled
XOFF (hex 13, ctrl-S)		**Turns off serial handshaking** scale output enabled

Table 4: Standard Doran serial protocol

Command	Scale Response	Description
<LF>W<CR>	<LF><s><r><n><m><f><p><xxxxx.xxx><uuu><CR>	**Standard Scale Response Message** **<LF>** line feed (hex 0A) (control-J) **<s>** scale status **"Z"** Center of Zero **"O"** Over Capacity (ovr_Ld or grs_oL) **"U"** Under Capacity (udr_Ld or grs_uL) **"E"** Zero Error (pb zero error) **"I"** Initial-Zero Error (pwr-up zero error) **" "** no errors **<r>** scale range (always "1") **<n>** gross / net status (always "G") <**m>** motion status ("M" or " ") <**f>** future (not used, always " ") **<p>** polarity "-" or " " <**xxxx.xxx>** weight data (fixed field of 8 digits plus decimal or "----------" for error status E, I) <**uuu>** current units ("lb ", "kg ", "oz ", "g ") <**CR>** carriage return (hex 0D) (control-M)
<LF>Z<CR>	<LF><s><r><n><m><f><p><xxxxx.xxx><uuu><CR>	**Standard Scale Response Message** (See previous description)
<LF>D<CR>	<LF><r><e><c><m><CR>	Invoke Scale Diagnostics **<r>** ROM error = "R" or No error = " " **<e>** EEPROM error = "E" or No error = " " **<c>** Calibration error = "C" or No error = " " **<m>** not used (always " ")
<LF>A<CR>	<LF><SMA:1/1.0><CR>	**About Command Response "A"** <SMA:1/1.0> compliance level/revision (will reset B about command to response #1)
<LF>B<CR>	<LF><xxx>:<yyyyyy><CR>	**About Command Response "B"** **<xxx>** 1st response "MFG" manufacturer **<yyyyyy>** "Doran Scales, Inc." **<xxx>** 2nd response "MOD" model number **<yyyyyy>** 300 **<xxx>** 3rd response "REV" software revision **<yyyyyy>** SW005900 **<xxx>** 4th response "SN " serial number **<yyyyyy>** " " not used **<xxx>** 5th response "END" last command **<yyyyyy>** not printed **<xxx>** 6th response "?" no more commands **<yyyyyy>** not printed **Note:** "A" command will reset B command back to 1st response)
<ESC>		**Scale Communication Reset Command Response** Scale will perform a power-up reset.
<LF>X<CR> X = bad char.	<LF>?<CR>	**Command Error Response** Scale does not recognize command

Table 5: SMA serial protocol

Command	Scale Response	Description
W	<STX><xxx.xx><CR> or <STX>?<status byte><CR>	**Standard Scale Response Message** **<STX>** start of text (hex 02) (control-B) Prints current weight and resolution <**xxx.xx>** weight data (fixed field of 5 digits plus decimal. If in Legal for Trade mode, 5 digits plus decimal & polarity) **?<status byte>** is printed if in overload, underload, gross underload, or gross overload condition. Bit 7 = always 0 (no parity) Bit 6 = always 1 Bit 5 = always 1 Bit 4 = center of zero Bit 3 = outside zero capture (overload, underload, gross underload, or gross overload) Bit 2 = under zero (underload or gross underload) Bit 1 = over capacity (overload or gross overload) Bit 0 = motion <**CR>** carriage return (hex 0D) (control-M)
H	<STX><xxx.xx><CR> or <STX>?<status byte><CR>	**High Resolution Scale Response Message** Prints current weight and resolution (same as W command) <**xxx.xx>** weight data (see previous description) **?<status byte>** status byte (see previous description)
Z	<STX>?<status byte><CR>	Zero Command Response Message Zeros scale and response with status byte **?<status byte>** status byte (see previous description)
A	<STX><CR>	Initiate a confidence test
B	<STX><confidence byte><CR>	Prints confidence test results **<confidence byte>** Bit 7 = always 0 (no parity) Bit 6 = confidence test completed Bit 5 = always 0 Bit 4 = ROM error. Bit 3 = always 0 (RAM error not available) Bit 2 = always 0 Bit 1 = EEPROM error. Bit 0 = always 0 (STATIC RAM error not available)
E	<STX>"E"<CR>	**Enter echo mode command** **"E"** The scale echoes back, to indicate that the command was received.
F	<STX>"F"<CR>	**Exit echo mode command** **"F"** The scale echoes back, to indicate that the command was received.
L (disabled in LFT mode)	<STX><xxx.xx><CR> or <STX>?<status byte><CR>	**Switch scale to lb and prints** Prints lb weight and resolution (same as W command) <**xxx.xx>** weight data (fixed field of 6 digits) or **?<status byte>** status byte (see previous description)
K (disabled in LFT mode)	<STX><xxx.xx><CR> or <STX>?<status byte><CR>	**Switch scale to kg and prints** Prints kg weight and resolution (same as W command) <**xxx.xx>** weight data (fixed field of 6 digits) or **?<status byte>** status byte (see previous description)
C	No response	**Initiate host interface scale configuration (not available)**

Note: UNITS push button is disabled when in Legal for Trade Mode.

Table 6: Toledo serial protocol

Command	Scale Response	Description
<CR>	<p><xxx.xx><SP><uu><SP><mm> <SP><SP><CR><LF><EOT> or <CR><ETX>	**Standard Scale Response Message** **<p>** polarity "-" or " " <**xxx.xx>** weight data (fixed field of 5 digits with decimal point) **<SP>** space " " (hex 20) <**uu>** current units ("lb", "kg", "oz", "g ") <**mm>** motion status ("GR" = stable or "gr" = motion) <**CR>** carriage return (hex 0D) (control-M) **<LF>** line feed (hex 0A) (control-J) **<EOT>** end of transmit (hex 04) (control-D) **<ETX>** end of transmit (hex 03) (control-C) **Note:** if scale is in overload, underload, gross underload, or gross overload condition. Scale will respond with a <CR><ETX>

Table 7: Fairbanks serial protocol

Command	Scale Response	Description
W<CR>	<LF><xxx.xx><status byte><CR><ETX>	**Standard Scale Response Message** **<LF>** line feed (hex 0A) (control-J) <**xxx.xx>** weight data (fixed field of 5 digits plus decimal. If in Legal for Trade mode, 5 digits plus decimal & polarity) **<status byte>** Bit 7 = always 0 (not used) Bit 6 = always 0 (not used) Bit 5 = always 0 (not used) Bit 4 = motion Bit 3 = always 0 (not used) Bit 2 = always 0 (not used) Bit 1 = over capacity (overload or gross overload) Bit 0 = under capacity (underload or gross underload) <**CR>** carriage return (hex 0D) (control-M) **<ETX>** end of transmit (hex 03) (control-C) **Note:** if scale is in motion, overload, underload, gross underload, or gross overload condition. Scale will respond with a "------" for weight value.
Z<CR>		**Zero Command** Scale will zero **Note:** if scale is in motion, overload, underload, gross underload, or gross overload condition. Scale will not zero.
S<CR>	<LF><status byte><CR><ETX>	**Transmit Status byte** **<status byte>** (see previous description)
X<CR> X = bad char.	<LF>?<CR>	**Command Error Response** Scale does not recognize command

Note: UNITS push button is disabled when in Legal for Trade Mode.

Table 8: NCI serial protocol

Specifications and Interconnect Data

Specifications:

Model 300			
Resolution:	5,000d in precision mode		
Power Supply:	115/230 VAC 50/60 Hz	115/230 VAC 50/60 Hz 6V Battery	
Display:	6 digit LED. 0.56" high		
Displayed units:	lb, kg, oz, g and lb oz		
Capacities:	50 lb	100 lb	150 lb
Printer Interface:	Bi-directional RS-232		
Calibration	Unit may be calibrated with 10%, 25%, 50%, or 100% of capacity.		
Controls:	ZERO switch, Optional PRINT or UNITS switch.		
Construction:	Rugged steel construction.		
Options:	User configurable remote switch. 6 digit LED remote display Internal battery and charger		

Table 9: Scale Specifications

Interconnect Data:

PIN #	TITLE
1	Chassis Ground (not on connector)
2	+ Load Cell Signal
3	- Load Cell Signal
4	+ Load Cell Excitation
5	- Load Cell Excitation
6	+ Sense Signal
7	- Sense Signal
8	Chassis Ground (not on connector)

Table 10: TB1 Load Cell Connections

PIN #	TITLE
1	CTS for Hardware Handshaking RTX for Software Handshaking
2	TXD
3	Remote Switch High
4	Remote Switch Ground
5	RS232 Signal Ground

Table 11: P2 Options Connections

PIN #	TITLE
1	n/c
2	Neutral
3	Ground
4	Hot

Table 12: J1 Power Connections

P3 PIN #	TITLE
1	Zero Switch Ground
2	Zero Switch High
3	Units Switch
4	Print Switch
5	Hidden Switch
6	Keyboard Scan

Table 13: P3 Keyboard Connections

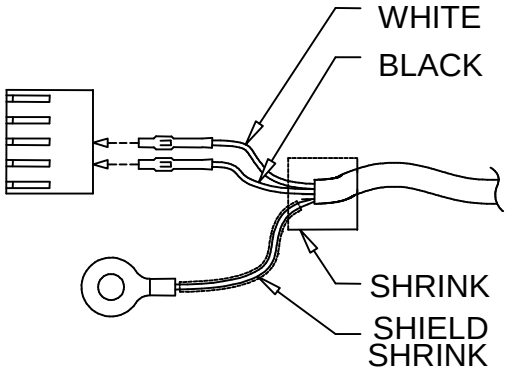


Fig. 5: Connector J2, Remote switch cable assembly

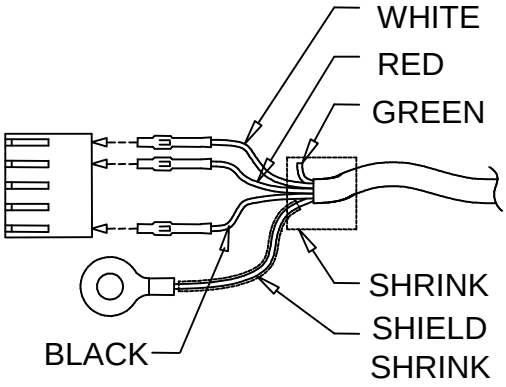


Fig. 6: Connector J2, Serial cable assembly

Serial Cable Assembly		
DB25 Female connector w/ hardware handshaking		
Function	**Pin**	**Wire Color**
RXD	2	White
Signal GND	7	Black
RTS	4	Red
CTS	5	Jumper 4 to 5
DSR	6	Jumper 6 to 8 to 20
DCD	8	
DTR	20	
DB9 Female Connector w/ Hardware Handshaking		
RXD	3	White
Signal GND	5	Black
DCD	1	Jumper 1 to 4 to 6
DTR	4	
DSR	6	
RTS	7	Red
CTS	8	Jumper 7 to 8

Table 14: Serial Cable assembly with Hardware Handshaking

Serial Cable Assembly		
DB25 Female connector w/ Software Handshaking		
Function	**Pin**	**Wire Color**
TXD	3	Red
RXD	2	White
Signal GND	7	Black
RTS	4	Jumper 4 to 5
CTS	5	
DSR	6	Jumper 6 to 8 to 20
DCD	8	
DTR	20	
DB9 Female Connector w/ Software Handshaking		
TXD	2	Red
RXD	3	White
Signal GND	5	Black
DCD	1	Jumper 1 to 4 to 6
DTR	4	
DSR	6	
RTS	7	Jumper 7 to 8
CTS	8	

Table 15: Serial Cable assembly with Software Handshaking

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 there is nothing caught in the platform under or around the load cell or spider interfering with its movement.
Scale overloads early.		Make sure all four corner overload stops are properly set, if present. Take the platter off the scale, invert it and place it back on the spider. With 1/2 of the scale's capacity in test weights concentrated over a corner of the platform, there should be approximately 1/32" of clearance between the stop and the bottom of the spider. Check all four corners then recalibrate the scale. If the problem persists, it is possible that the scale is being shock-loaded causing the load cell to be shifted.
Scale will not indicate full capacity or go into overload.		Make sure that there is nothing caught in the scale under or around the load cell or spider, which would interfere with their movement. If not, check the overload stops using the above procedure.
Scale will not come to zero when the ZERO button is pressed.		Make sure that the scale is stable ("MOT" annunciator is off) when ZERO is pressed. If excessive motion is a problem, then it may be necessary to activate the latching print feature (POd) or lengthen the filter time (Av C32). If the scale is stable, the scale may be set to the Canadian Legal for Trade (4% zero bandwidth). An attempt is being made to zero more than 4% of capacity (see Section 4). There may be a problem with the touch-panel or main board.
Weight readings don't seem to be correct.		Check the scale's accuracy with a test weight. Recalibrate if necessary.
Scale drifts off of zero.		Check for air currents and/or vibration around the scale. If that is the cause it may be necessary to set the AZT aperture to a wider setting to compensate (see Section 4).
Scale drifts off of zero.		Check for air currents and/or vibration around the scale. If that is the cause it may be necessary to set the AZT aperture to a wider setting to compensate (see Section 4).
Scale reading is bouncing or "flighty".		Check for air currents and/or vibration around the scale. If that is the cause it may be necessary to set the Digital Averaging to a higher setting to stabilize the reading (see Section 4).

If you are still experiencing a problem with your scale, or if the problem you are having is not covered in the above list, please contact your Doran Scales authorized dealer.

Resetting the scale parameters:

- If at some point the Model 300, user wishes to return the setup parameters to factory default, follow these steps.
  WARNING: Defaulting the scale will require recalibration.
- Remove power.
- Hold the CAL push button while power is restored.
- The indicator will display "rEL Pb" until the CAL button is released, the scale will then show "InIt" and "SAVEd". After the "SAVEd" message is displayed the scale then perform its normal power up routine and enter the Calibration mode. At this time, all the parameters will have been reset to their factory default settings. See Setup Menus Explained section for details on setting up the individual scale parameters.
- Return to the normal weighing position by scrolling to the end of the menu "donE Y" or press CAL push button again. The scale will save the revised parameters and will enter the normal weighing mode.

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.

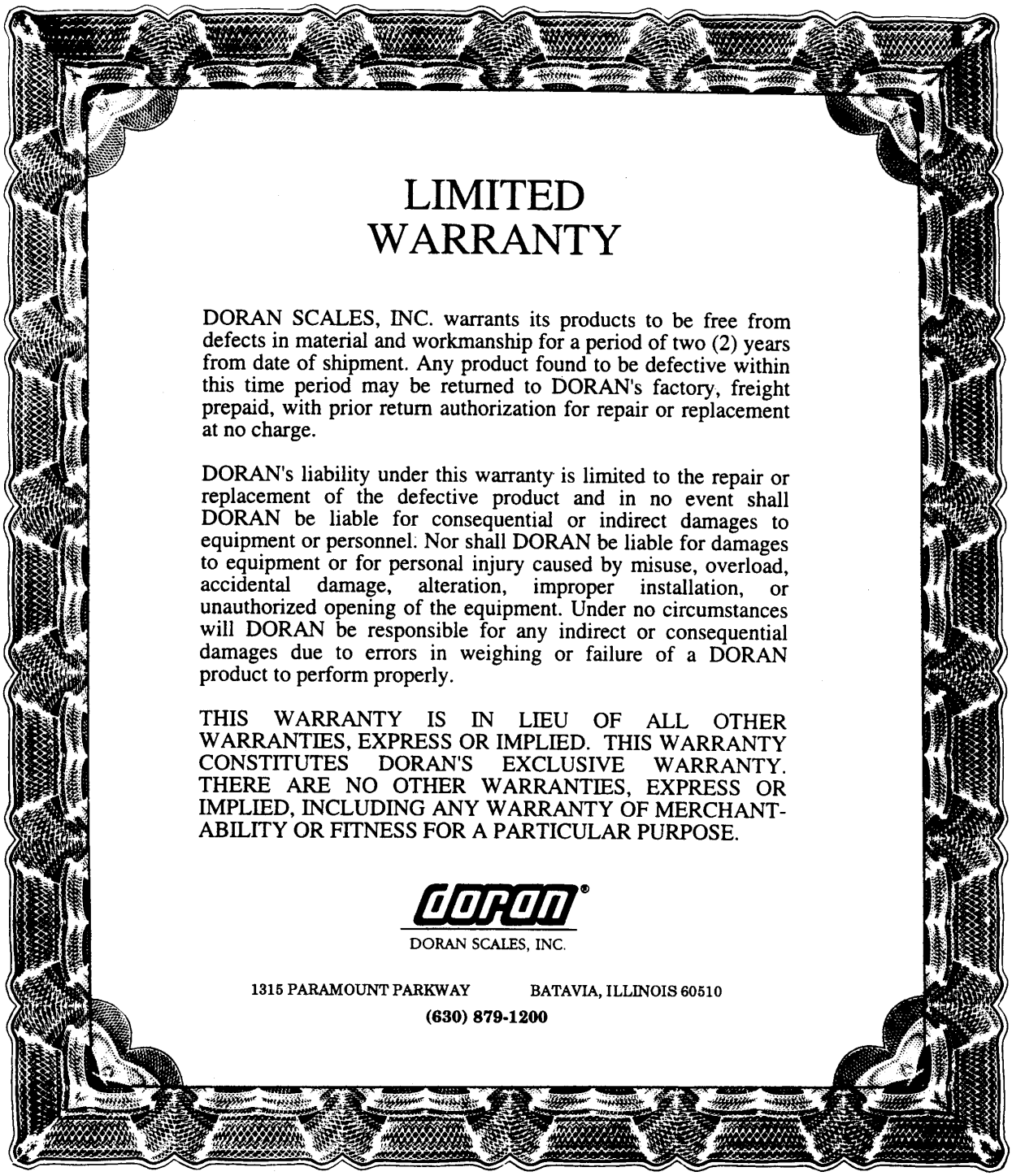
Scale Messages:

Message		Meaning
"donE" Function complete.		The scale has successfully completed the requested action.
"Abort" Aborted Function.		The requested action has been canceled prior to completion.
"SAVEd" Parameter value saved.		The scale has successfully store and verified parameter value in nonvolatile memory.

Error messages:

Error Message		What to Do or Check:
"ovr-Ld" Scale overload		The scale is in overload. The load on the scale exceeds the capacity by more than 103%. Remove excess weight from scale.
"udr-Ld" Scale underload		The scale is in underload. The load on the scale is less then the minimum scale capacity by more than -20%. Recalibrate scale or add additional dead load.
"grs-oL" Gross overload		The scale is in gross overload. The load exceeds the scale ratings and might result in damage to the scale. Remove excess weight immediately. Ignore this message for the first 5 seconds after power up.
"grs-uL" Gross underload		The scale is in gross underload. The load exceeds the minimum scale ratings and might result in damage to the scale. Loadcell connections might be wired in reverse. Ignore this message for the first five seconds after power up.
"SU 0 E" Startup zero error		The scale was not stable. This error will only occur in Legal for Trade applications. The scale will zero once it becomes stable.
"Er Ad" A/D failure		The scale has detected a failure in A/D circuit. Have scale serviced by a qualified scale repair technician.
"Err EP" EEPROM error		The setup parameters loaded in nonvolatile memory have become corrupted. The scale requires reinitialization by a qualified scale technician.
"Err CAL" Calibration error		The calibration values loaded in nonvolatile memory have become corrupted. The scale requires recalibration by a qualified scale technician.
"Err 1" Program ROM error		The program memory in the scale has become corrupted. Have scale serviced by a qualified scale repair technician.
"Ldg 0" Loading zero.		The scale is attempting to load power up zero. This message will remain until scale is stable.
“SPAn_E” Calibration Range Error		Calibration zero is out of range, refer to analog setup section for additional information.
“rA_Err” Calibration Span Error		Calibration Span is out of range, refer to analog setup section for additional information.

Warranty Statement



LIMITED WARRANTY

DORAN SCALES, INC. warrants its products to be free from defects in material and workmanship for a period of two (2) years from date of shipment. Any product found to be defective within this time period may be returned to DORAN's factory, freight prepaid, with prior return authorization for repair or replacement at no charge.

DORAN's liability under this warranty is limited to the repair or replacement of the defective product and in no event shall DORAN be liable for consequential or indirect damages to equipment or personnel. Nor shall DORAN be liable for damages to equipment or for personal injury caused by misuse, overload, accidental damage, alteration, improper installation, or unauthorized opening of the equipment. Under no circumstances will DORAN be responsible for any indirect or consequential damages due to errors in weighing or failure of a DORAN product to perform properly.

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DORAN SCALES, INC.

1315 PARAMOUNT PARKWAY BATAVIA, ILLINOIS 60510

(630) 879-1200