Model 7000

Model 7000XL

Digital Scale

INSTRUCTION MANUAL

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MANUAL REVISION : 1.1
SOFTWARE REVISION : 5.0
MAN123-11 4/8/96

Made in U.S.A.

INTRODUCTION

This manual applies to the Doran Models 7000 and 7000XL Digital Scales. Operation of both scales is very similar, with the 7000 providing the ultimate in simplicity. The 7000 has a single push button; ZERO which is used to clear (tare) the scale display. The 7000XL is an upgraded version of the 7000 providing additional operator control with a three button touch panel. This touch panel offers ZERO, which clears (tares) the scale display, UNITS to change the weight display units and PRINT to send weight data to an external device. Both scales incorporate state of the art microprocessor technology with software to give you the user a low cost solution to your everyday weighing needs. Designed for ease of use, the 7000 and 7000XL can be quickly setup and ready for use.

Because both scales use the same electronic design, and share common features, Doran Scales Inc. has combined the operating manual for the 7000 and the 7000XL. Where there are differences between the operation of the two scales, this manual will describe the differences for your convenience. Please read the manual carefully noting that information which applies to your scale.

Common Features of the Doran 7000 and 7000XL

- NTEP certification for the base and indicator - ClassIII, 3000d
- NTEP certification to 5000d for the 7000M and 7000XLM. (C. of C. 91-106A1)
- A 6 digit, 0.56" red LED display for easy reading
- lb / kg / oz / g / lb-oz display units supported
- Fully configurable bi-directional RS232 printer port.
- EEPROM nonvolatile data storage of all calibration and setup information
- Microprocessor monitoring system to prevent indicator failure under severe fault conditions
- Support for up to 4 350 ohm load cells
- 115/230 Vac 50/60 Hz selectable operation
- Field selectable digital filtering.
- Software configurable remote push-button support (Optional)
- Rugged Stainless Steel construction.
- Dual Print permits dual unit print out.

Additional Features of the Doran 7000XL Scale

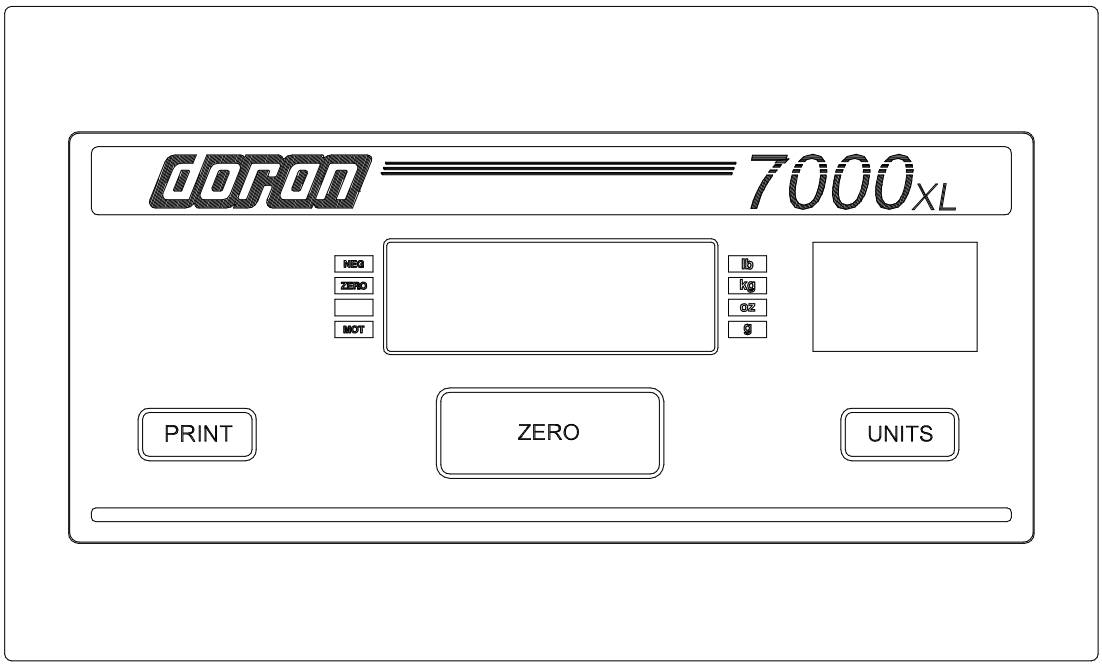
- Polycarbonate touch panel with three push buttons, ZERO, UNITS, PRINT
- Dedicated display indicators for MOTION, Center of ZERO and polarity.

Enjoy your Doran Scale, with proper care, you will get many years of reliable performance. Please be sure to read the entire manual to ensure obtaining all the benefits that we have designed into your Doran 7000 or 7000XL. If questions arise, please feel free to contact the Doran Scales Technical Service Department at 1-800-262-6844.

NOTE: The National Conference on Weights and Measures has adopted an NTEP administrative procedure entitled "Policy on Remanufactured and Repaired Devices." This policy states that a scale must be repaired consistent with the original manufacturer's design. Failure to do so, will negate the NTEP Certificate of Conformance.

All scales produced by Doran Scales Inc. use only the highest quality components. Many of these components are manufactured to Doran Scales specifications and are not available from other sources. In the unlikely event that your Doran scale requires service, protect your Certificate of Conformance by insisting that your dealer service your scale with only Doran factory parts.

Quick Start User's Guide Model 7000XL



Model 7000XL Digital Weight Indicator front panel layout.

Basic Weighing Operations:

1) Remove all items from the scale platter.
2) When the motion (MOT) light goes out, press ZERO to zero the scale. The center of zero (ZERO) light should now be lit.
3) Place an item on scale platter and wait for the motion (MOT) light to go out.
4) Read the weight on the scale display.

Changing Weight Display:

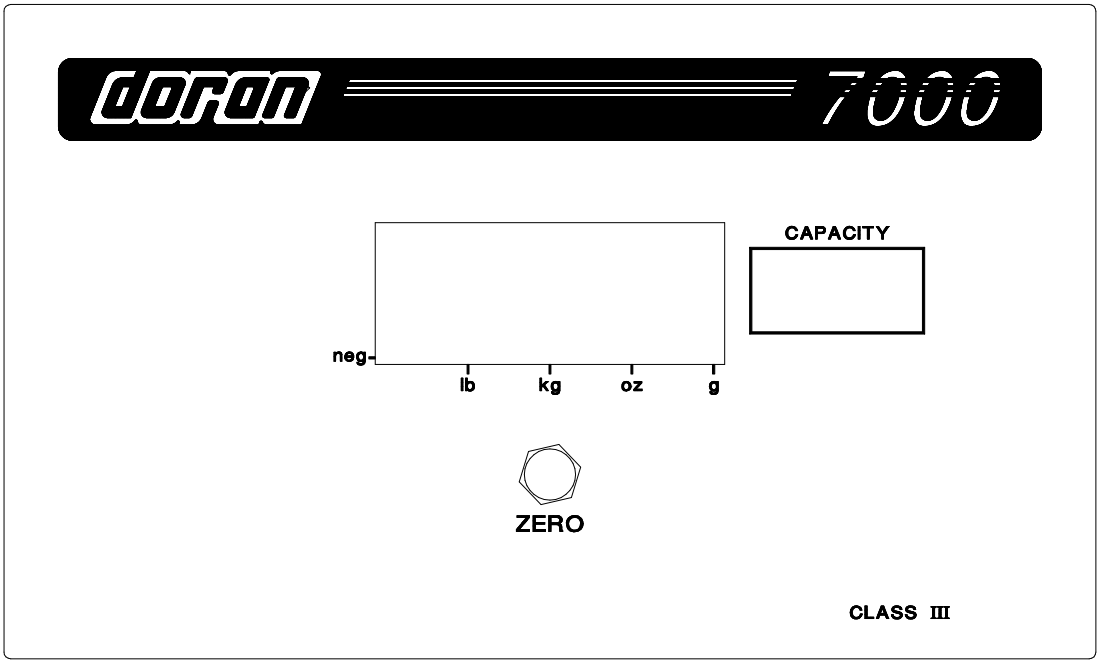
1) Press the UNITS button. The scale will display the new units (lb, kg, oz, g, or lb-oz) to the right of the display.
2) Press the UNITS button until the desired units are selected.

Printing:

1) Zero the scale.
2) Place item to be weighed on the scale platter.
3) Wait until the motion (MOT) light goes out.
4) Press the PRINT button on the indicator front panel. The scale will now send the current weight to the printer or other external device.

NOTE: Read manual before use. Some functions may behave differently depending on scale setup. Consult your instruction manual for details.

Quick Start User's Guide Model 7000



Model 7000 Digital Weight Indicator front panel layout.

Basic Weighing Operations:

1) Remove all items from the scale platter.
2) When the units indicator light, press ZERO to zero the scale. The weight should now be zero[1].
3) Place an item on scale platter and wait for the units indicator to light [1].
4) Read the weight on the scale display.

Changing Weight Display: (optional feature)

1) Press and release the UNITS button. The scale will display the new units below the display.
2) Press the UNITS button until the desired units are selected.

Printing: (optional feature)

1) Zero the scale.
2) Place item to be weighed on the scale platter.
3) Wait until the units indicator light turns on [1].
4) Press the PRINT button. The scale will now send the current weight to the attached printer.

[1] Motion is indicated by the units indicators, The indicators are on when the scale is stable, off when in motion.

NOTE: Read manual before use. Some functions may behave differently depending on scale setup. Consult your instruction manual for details.

NOTE: > To change units without the optional External Units push button, refer to the user 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 your new scale.

- ! DO NOT drop the scale indicator or scale platform.
- ! DO NOT immerse the scale indicator or platform.
- ! DO NOT drop objects on the platform.
- ! DO NOT pick up the scale platform by the "spider."

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

INSTALLATION:

Locate the desired position for the scale indicator. If the indicator is to be permanently mounted to a wall, shelf, or counter, remove the mounting bracket from the indicator. Use the two holes provided in the bracket to affix it to the desired surface. Before mounting the indicator into the bracket, connect the scale platform and any data cables to the indicator. Insert one of the threaded case studs into one of the mounting holes on the bracket. Now gently spread the sides of the bracket apart and insert the other case stud into the hole on the opposite side. Loosely thread the two knobs back onto the studs. Adjust the indicator to the desired viewing angle and tighten down the knobs.

ELECTRICAL CONNECTIONS:

Your Doran scale requires 115 Vac, 50/60 Hz power (230 Vac 50/60Hz. 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. The Model 7000 and Model 7000XL have filtered power supplies 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.

Section 2. Scale Operations Guide

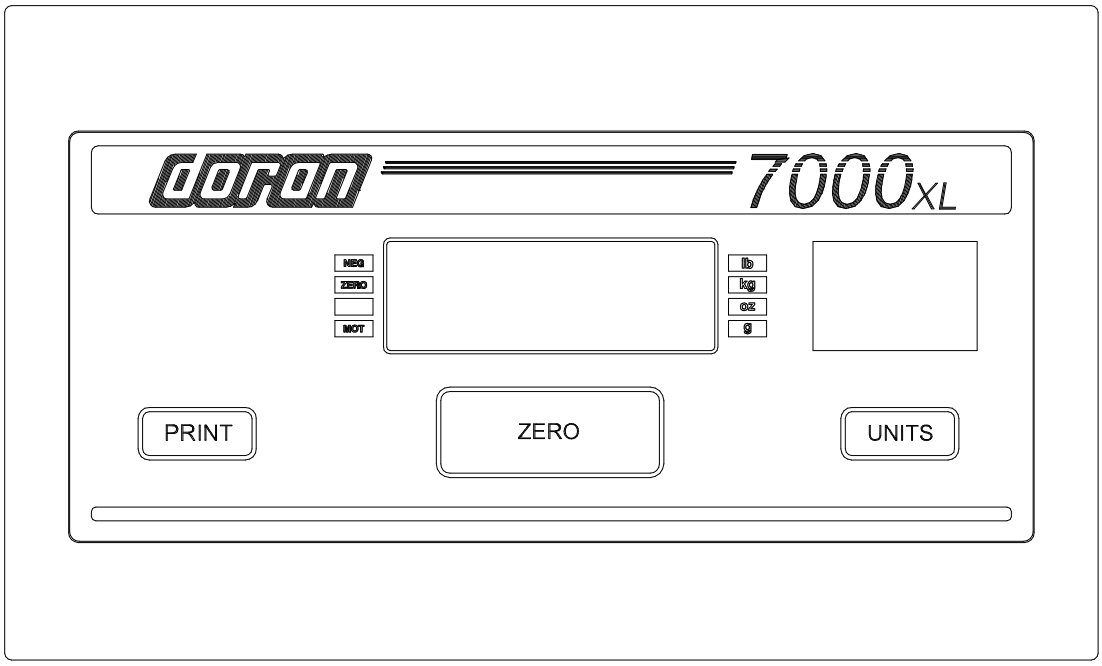


Figure 1: 7000XL Front panel layout and button locations.

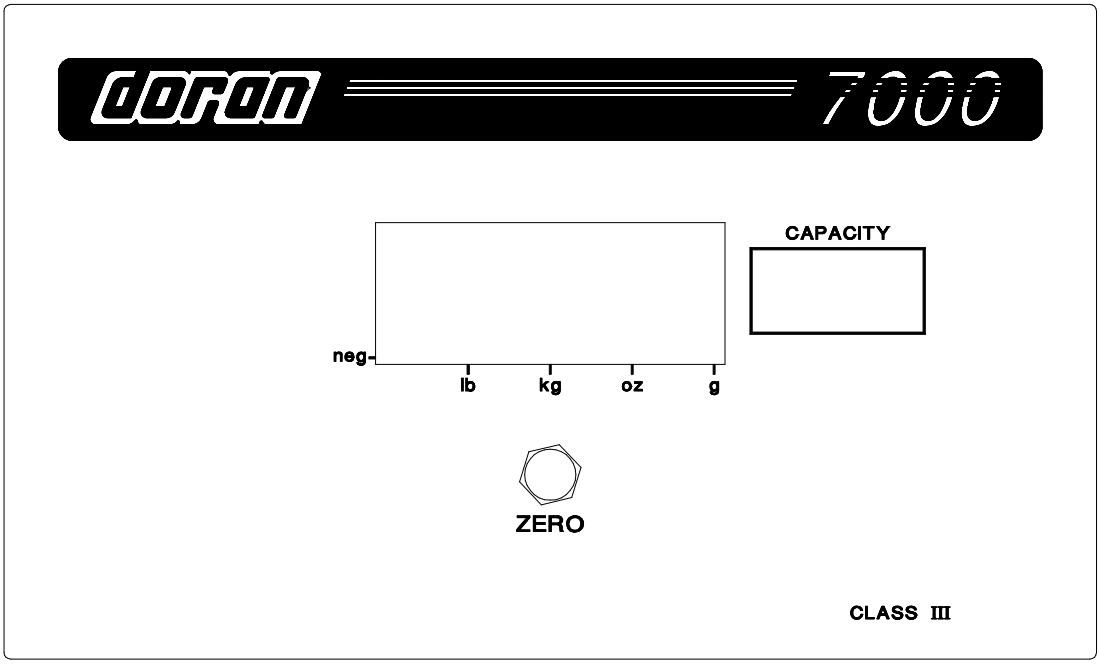


Figure 2: 7000 Front panel layout and button locations.

Model 7000XL:

The operational controls for the Model 7000XL consist of the ZERO, PRINT and UNITS buttons. A 6 digit LED display is used to provide weight indications and operator messages describing scale operation. Scale status such as motion (MOT), polarity (NEG) and center of zero (ZERO) are displayed on annunciators located to the left of the display area. Scale units are displayed on four annunciators located to the right of the main display.

Model 7000:

The Model 7000 controls consist of a single ZERO button located under the main display. A single status annunciator, "NEG, " is used to display negative polarity. This LED is located in the lower left corner of the display area. Four 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's are on when stable.

ZERO:

The ZERO push 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 Legal for Trade applications.

To zero the scale, wait until the scale is stable and press the ZERO button. The scale will zero immediately. Neither the 7000XL or the 7000 will "zero" if the scale is in motion or if it is outside of the 1.9% Legal for Trade zero band (when activated). Refer to Section 4 of this manual for more details.

The 7000XL and the 7000 are equipped with an optional "Zero on Demand" feature which holds "zero" requests until motion stops and capacity limitations have been corrected. These options are activated during the scale setup procedure. Refer to Section 4 of this manual for more details.

UNITS :

(Standard on the 7000XL, optional on the 7000)
The UNITS button provides the operator with the ability of changing the scale units by pressing a button. The units indicator will immediately display the new units. The next display update will indicate the correct weight in the new units.

The UNITS button has several configuration parameters which can disable the UNITS button or limit the display units available. Refer to Section 4 of this manual for more details.

PRINT:

(Standard on the 7000XL, optional on the 7000)
The PRINT button allows the operator to print the current weight by pressing a button. Like the ZERO button, the user waits until motion stops before pressing the PRINT button. The current weight will then be transmitted to the printer.

The PRINT button has a "Print on Demand" feature which stores PRINT requests until the scale is stable. Once stable, the scale will transmits the current weight to the printer. Several automatic print options are also available to simplify printer operation. Refer to Section 4 of this manual for more details.

Section 3. Quick Setup Guide

Load Cell:

Load cell connections are made through a terminal block located on the main PC. board. This block can be accessed by removing the rear cover. The Calibration switch S1, the auxiliary UNITS switch S2 and the zero offset adjustment are located behind the Calibration Access Cover. Calibration and setup can be performed by removing the Calibration access cover. Access to the Load Cell connections require the removal of the rear cover. Switch S2 performs the same function as the UNITS switch on the front of the 7000XL.

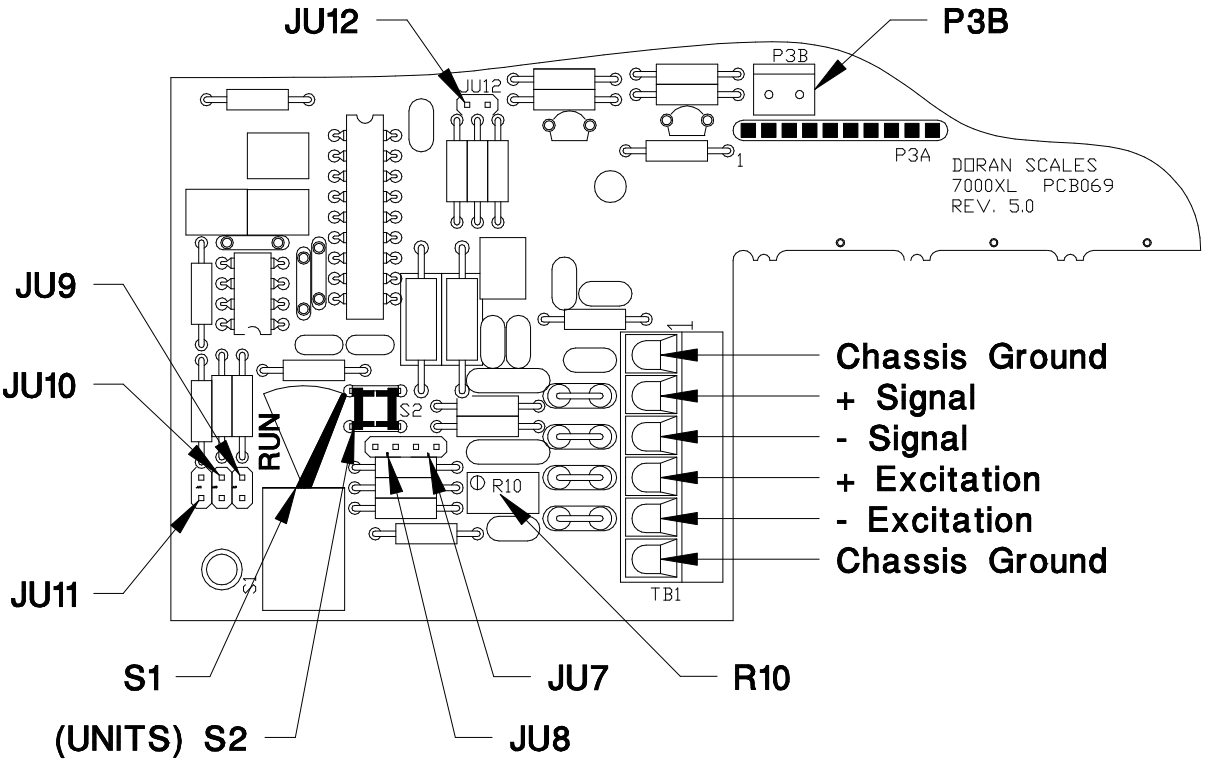


Fig. 1: Load Cell Connection and Calibration Jumpers

Option Connections:

The Remote Switch and Serial Communications connector is found on the on the main PC. board. This connection is accessed by removing the rear 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 found on the main board. Like the load cell cable and power cord, the option cables are passed through watertight fittings mounted on the rear cover.

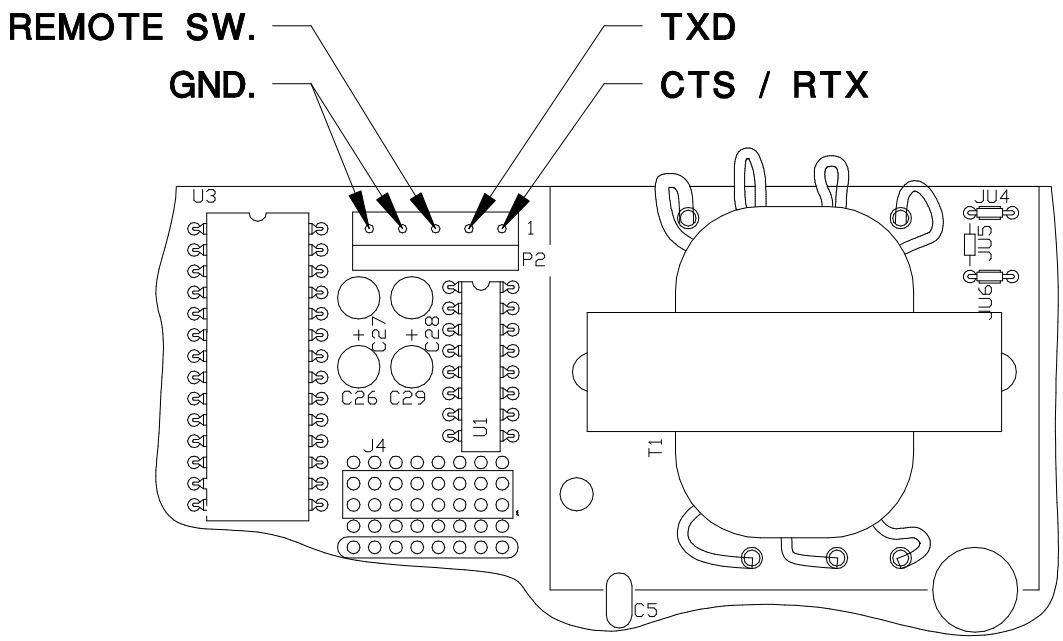


Fig. 2. Serial Communications and Remote Switch Connections

Capacity:

Capacity selection is performed by placing the Calibration switch S1 in the calibration mode (Refer to Figure 1. The switch is shown in the CALIBRATE position). Press and release UNITS or S2 (located next to the Calibration switch) until CAP 30 appears on the display (where "30" can be any valid capacity). Once the CAP prompt appears, press and release ZERO until the desired capacity is displayed. When finished, return the Calibration switch S1 to the RUN position.

Once the desired capacity has been selected, Install the correct capacity label on the front surface of the Model 7000 or in the label pocket located on the inside surface of Model 7000XL touch panel.

NOTE: On scales with factory installed platforms, the capacity is set at the factory, It will not be necessary to set the scale capacity.

Calibration:

1) Place the RUN / CALIBRATE switch in the CALIBRATE position. Press and release UNITS or S2 until CAL 0 appears on the display.

2) 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 15 seconds. The display will return CAL FS

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.

3) Press and release UNITS or S2 to scroll through the calibration capacities. Select one of the following:

CAL FS : Full load calibration.
CAL HS : Half load calibration. (50% of capacity)
CAL 4S : Quarter load calibration. (25% capacity)
CAL .1S : 1/10th load calibration. (10% capacity)

Place the correct weight on the platter and wait 10 seconds. Press ZERO. Wait for the scale to count from "7" to "0," about 15 seconds. The display will return Aug A1. Return the RUN / CALIBRATE switch to the RUN position.

NOTE: If r9. Err 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: Calibration at 10% of capacity has been provided as a convenience to customers with high capacity scales in remote or inaccessible locations. 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.

Analog Setup:

1) Place the Calibration switch S1 in the CALIBRATE position. Press and release UNITS or S2 until CAP 30 (where 30 can be any valid capacity) appears on the display. Follow the procedure to select the desired scale capacity. Then press UNITS or S2 until Aug A1 appears on the display (where A1 can be any valid filter mode). If the A1 mode appears, press and release ZERO at least once to disable automatic filtering.

NOTE: On scales with factory installed platforms, the zero and span are set at the factory, It should not be necessary to set the zero and span.

2) Once the correct capacity and filter have been selected, press and release UNITS or S2 until the scale is in the raw counts mode. If the capacity menu CAP 30 appears, scroll through the menu and try again.

3) Remove any unneeded items from the platform.

4) Check the raw "zero" point. The raw "zero" should be between -19,000 counts and -10,000 counts. If not, adjust R10 until the raw counts lie within this range. If the zero does not fall within this range, refer to Section 5 for details on adjusting the zero and span range.

5) Check the raw "span." Place "Full Load" on the platform and verify that the raw counts change by at least 21,000 counts. "Half Capacity" and "Quarter Capacity" can be used in place of "Full Load". Use 10,500 counts and 5,250 counts change respectively.

If the span is not sufficient, refer to Section 5 for details on adjusting the zero and span range.

Section 4. Parameter Setup

The Model 7000XL and Model 7000 have twenty two setup and calibration parameters which can be changed (nineteen 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 the Setup Mode:

To enter the setup menu, locate the Quick Access Cover on the back side of the indicator. Remove the two hex screws to open the cover. Once opened, locate the Calibration switch S1 just inside the opening. Place the switch in the CALIBRATE mode by moving the switch lever. The indicator will display the first menu item, CAP 30 (Where 30 can be any valid capacity).

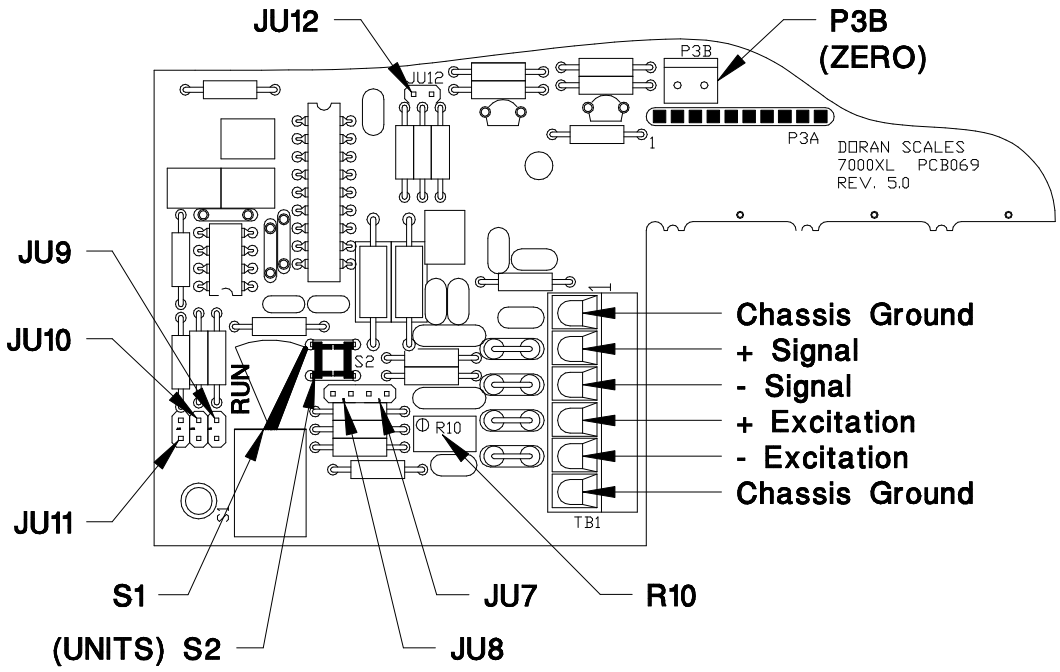


Figure 1. Load Cell Connection and Calibration Jumpers.
Switch S1 is shown in the CALIBRATION mode.

To exit the setup mode, simply return the Calibration switch S1 to the RUN position. The indicator will return to the normal weighing mode. All menu selections will be saved at that time.

NOTE: No setup information is saved until S1 is returned to the RUN position. In the event of a power failure while in the Setup Mode, any changes that have been made will be lost.

After all setup changes are finished, return to the RUN mode. Reinstall the cover by reversing the removal procedure. Make sure all the screws are reinstalled in their original positions and the gasket is properly installed. Tighten the screws as required.

Stepping through the menu functions:

Once the setup mode has been entered, it is possible to step through the setup menu by pressing and releasing UNITS or S2. A different display prompt is generated for each item in the setup menu.

Changing a Parameter:

Once the desired menu item has been found, it may be necessary to change the parameter associated with that item. Press and release ZERO to step through the individual parameters. When the bottom of a parameter list is reached, the scale will restart the list at the top.

Reviewing Setup Parameters:

Setup parameters for the 7000XL may be reviewed without opening the scale. Remove power and press the hidden button (located ½" above the PRINT 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.

To access the parameters on the 7000, follow the same procedures, but press the ZERO button.

Legal for Trade Restrictions:

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

SETUP MENUS EXPLAINED (in order of occurrence)

Capacity Setup Menu

CAP	Capacity Select Menu Allows the selection of scale capacity.
5	5 pounds
6	6 pounds [5]
10	10 pounds
15	15 pounds [2, 5]
20	20 pounds
30	30 pounds [5]
50	50 pounds
60	60 pounds [5]
100	100 pounds
150	150 pounds [2, 5]
200	200 pounds
300	300 pounds [3, 5]
500	500 pounds [1, 2, 3]
600	600 pounds [1, 2, 3, 5]
1.	1000 pounds [1, 2, 3]
1.5	1500 pounds [1, 2, 3, 5]
2.	2000 pounds [1, 2, 3]
3.	3000 pounds [1, 2, 3, 5]
5.	5000 pounds [1, 2, 3]
6.	6000 pounds [1, 2, 3, 5]
10.	10,000 pounds [4]
15.	15,000 pounds [4, 5]
20.	20,000 pounds [4]
30.	30,000 pounds [4, 5]
50.	50,000 pounds [4]
60.	60,000 pounds [4, 5]
100.	100,000 pounds [4]

1) No lb-oz display for this capacity in standard resolution.
2) No lb-oz display for this capacity in precision resolution.
3) No grams display for this capacity.
4) Pound - kilogram display only at this capacity.
5) This capacity steps down to the previous capacity when precision "Legal for Trade" is used.

Calibration Menu

CAL	Zero Calibration Mode.
0	Calibration Zero Press ZERO to perform calibration of the scale zero. The raw counts should lie between -19,000 counts and -10,000 counts.

CAL	Span Calibration Mode. (Does not appear if CAL 0 is not activated.)
FS	Full load calibration. Span should be greater than 21,000 raw counts
hS	Half load calibration. Span should be greater than 10,500 raw counts
4S	Quarter load calibration. Span should be greater than 5,300 raw counts
.1S	1/10th load calibration. Span should be greater than 2,100 raw counts

NOTE: If the "span" or "zero" requirements are not met during calibration, the scale will display "rg Er." If this occurs, refer to section 5 and repeat the zero and span 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 10% of capacity is possible.

Digital Filter Setup Menu

Avg	Averaging mode Determines the number of samples to average
A1	Auto averaging 1:1 when in motion A weighted average filter displays each reading when stable.
1	No averaging All readings displayed.
2	Fixed averaging 2 readings are averaged.
4	Fixed averaging 4 readings are averaged.
8	Fixed averaging 8 readings are averaged.

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.

Motion Aperture Setup Menu

mA *	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.

Stability Indication Menu (Model 7000 only)

Stt *	Stability Indication * Not available on the 7000XL Controls the display of scale motion.
on	Enables motion indication by blanking the units annunciators when motion is present.
off	Deactivates the motion indicator.

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.
off	Loads the calibration zero for zero reference

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 disable 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.

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.

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

Output Formats

For.	Data Output Format Defines the appearance of the serial data sent.
F0	7000XL output format. (See section 6 for details)
2P	Dual Print mode. (Current units and kg output)
F1	Model 7000 compatibility mode. Output Not Legal for Trade
SSP	Output for Doran Model SSP printer.
dgH	4 - 20 mA output interface. Option type "R." Output Not Legal for Trade

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)

Serial Data Parity and Stop Bit Setup Menu

d.b.P.	Data Bits, Parity and Stop Bits Determines the number of data bits transmitted, the type of parity and the number of stop bits.
8n1	8 bits data, no parity and one stop bit.
7o1	7 bits data, odd parity and one stop bit.
7e1	7 bits data, even parity and one stop bit.
7n2	7 bits data, no parity and two stop bits.

Serial Data Handshaking Setup Menu

HS	Serial Data Output Handshaking Determines the type of serial data handshaking used.
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 stopped by sending the scale an "xoff" (ASCII character 17 or Ctrl-Q). Transmission resumes by sending the scale an "xon" (ASCII character 19 or Ctrl-S). When "xon" is received, the scale will finish sending the data in progress at the time of "xoff." A print request can be generated by sending the scale a "W" (ASCII character 87). This print request is identical to a push-button print request. The software handshaking option activates Bi-directional RS232 communications.
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.

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

Start Up Units Selection Menu

UnIts	Start Up Units Select Mode Configures selection of start up units.
	Press ZERO to scroll through the units activated in the CSL mode. 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: Start up units may be set without using the setup menu. While in the weighing mode, select the desired start up units. Switch the scale into the setup/calibration mode by toggling S1. Switch S1 back to the RUN mode. The scale will now power up in the desired units.

Push-button Function Setup Menu

P.b.	Push Buttons Configures the active push button functions.
CP	UNITS and PRINT enabled.
P	PRINT enabled only.
C	UNITS enabled only.
non	UNITS and 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 When oP mode 44 is used in the 6000d resolution mode, scale capacity is limited to 5000d. The 30, 300, 3000 and 30,000 lb capacities becomes 20, 200, 2000, 20,000 lb. The 6, 60, 600, 6000 and 60,000 lb capacities become 5, 50, 500, 5000, 50,000 lb. The 15, 150, 1500, 15,000 lb capacities become 10, 100, 1000, 10,000 lb.

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

Scale Resolution Setup Menu

CtS	Counts select
3	Standard precision mode (3000d typ.)
6	Precision mode (6000d typ.)

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.

Raw Counts Display Mode

Raw Counts	Displays the raw Analog to Digital converter data.
	Press ZERO or UNITS to exit Raw Counts. The Raw Counts display responds faster if the automatic filtering "A1" mode is off.

Section 5. Calibration

Digital Calibration:

1) Place switch S1 in the CALIBRATE mode if it isn't already. The scale should indicate "CAP **" (where ** is a valid capacity) on the display. Press and release "ZERO" until the desired capacity appears on the display.

2) Press and release UNITS or S2 until "AVG **" (where ** is a valid filter setting) appears on the display. Once the "AVG **" display appears, press and release the "ZERO" button until the display reads "AVG 1."

3) Press and release UNITS or S2 until the raw counts mode is enabled.

4) Verify that the no load counts read between -19,999 and -10,000 counts. Verify that the full load span is about 24,000 (21,000 min.). Subtract the no load reading from the full load reading to calculate span. When using 1/2, 1/4 and 1/10th capacity calibration, use 12,000, 6000 or 2100 counts respectively. If the scale reads "gr OL," or if the no load or span readings are out of range, refer to "Adjustment of span and zero" in this section.

5) Once the raw zero and span readings are correct, press and release UNITS or S2 twice so that the scale displays "CAL 0." Reduce the scale load (or calibrator) to no load. Press and release "ZERO." The scale will count from "7" to "0." When finished, the scale will display "CAL FS."

NOTE: If the scale platform is disturbed during the count down, the scale will reset the count when the platform becomes stable.

NOTE: If "rg Er" appears on the display, the zero is out of range. Press and release "ZERO" to clear the error and repeat step 4 to correct the problem.

6) If full scale calibration is being used, place full load on the scale (or set the calibrator to full scale). Press and release "ZERO." The scale will count from "7" to "0." When finished, the scale will display "Avg **."

If calibration at 1/2 , 1/4 or 1/10th capacity is desired, press and release UNITS or S2 to scroll through the calibration capacities. These are: "CAL hS" (1/2 capacity), "CAL 4s" (1/4 capacity), "CAL .1s" (1/10th capacity) and "CAL FS" (full capacity). Once the desired calibration

capacity is selected, place the correct weight on the scale (or set the calibrator to the correct value). Press and release "ZERO." The scale will count from "7" to "0." When finished, the scale will display "AVG **."

NOTE: If the scale platform is disturbed during the count down, the scale will reset the count when the platform becomes stable.

NOTE: If "rg Er" appears on the display, the calibration span is out of range. Press and release "ZERO" to clear the error and verify that the correct weight or calibrator setting was used. Repeat step 4 and 5 if the correct weight was present.

7) After successfully completing the scale calibration, reset the remaining scale parameters using UNITS or S2 and "ZERO." Be certain to reset the filter if it was changed during calibration.

8) After the setup and calibration are complete, place the Calibration switch S1 in the "RUN" mode to resume normal weighing operation.

NOTE: If "Er EP" appears, then the scale calibration was not successful. Return to step 1 and repeat the calibration.

NOTE: No calibration or setup data is stored until the Calibration switch S1 is returned to the "RUN" position. If scale power is removed before returning to the run mode, all calibration and setup changes will be lost and the previous values will remain in memory.

Adjustment of span and zero

NOTE: The steps below are intended as a general guideline for determining the best combination of jumpers in the least amount of time. This procedure should yield acceptable results in most instances. This procedure assumes that the load cell is properly connected.

1) To begin the determination of the span and zero adjustment, remove jumpers JU7 through JU11. Then connect a load cell simulator (or an unloaded load cell) to the input (TB1).

2) Apply power and place the scale in the "raw counts" mode of the calibration menu. Set the calibrator to zero.

3) Adjust R10 from full counterclockwise to full clockwise to determine the adjustment range. Readjust R10 so that is set to 1/2 of its range.

4) Remove the simulator and attach the load cell. Remove the load from the cell while leaving the dead load attached. If "gr OL" is displayed, note the "NEG" annunciator.

a) If the "NEG" annunciator is on, the overflow is negative, turn R10 counter clockwise until the overload clears. If the annunciator is off, turn R10 clockwise until the overload is cleared and the raw counts fall between -19,000 counts and -10,000 counts.

b) If it is not possible to clear a positive overflow, begin increasing the negative zero shift by adding JU7 and JU8 (as shown in table 2). After inserting a jumper, adjust R10 across it's full range. Repeat this sequence until the no load raw counts lie between -19,000 counts and -10,000 counts. Remove power to avoid damaging the scale when inserting and removing jumpers. Go to step 6.

5) Adjust R10 until the no load raw counts lie between -19,000 counts and -10,000 counts. If this is not possible, adjust R10 for the most negative reading.

6) Place the calibration weight on the scale. Record the raw counts reading. Calculate the span by subtracting the no load counts from the full load counts. If half capacity, quarter capacity or 10% capacity calibration is being used, multiply the span by factors of two, four or ten respectively. If the scale goes into overload, begin increasing the negative zero shift by adding JU7 and JU8 (as shown in table 2) Repeat steps 4 and 5 after each jumper change. In cases where the span is greater than 30,000 counts, it may be necessary to adjust the no load counts to about -18,700 counts.

7) Using the calculated span from above, refer to table 3. Select and install the correct combination of JU9, JU10 and JU11.

8) Verify that the no load raw counts are between -19,000 counts and -10,000 counts. It may be necessary to readjust the zero point by reducing the "zero shift" percentage or by adjusting R10.

9) Verify that the no load to full load span is greater than 21,000 counts (greater than 24,000 counts is preferred).

10) Once the zero and span are set, calibrate the scale using the normal calibration procedure.

Selection of scale type

Since the 7000 and the 7000XL share common electronics and software, it is necessary to configure the scale to operate as either a Model 7000 or a Model 7000XL.

1) To setup your scale as a 7000, it is necessary to insert JU20, JU21 and JU22. JU21 and JU22 are three pin headers located on the display section. Place the jumper shunt block on the left two pins of JU21 and JU22. Refer to Figures 3 and 4.

2) To setup your scale as a 7000XL, it is necessary to insert JU21 and JU22 only. JU21 and JU22 are three pin headers located on the display section. Place the jumper shunt block on the right two pins of JU21 and JU22. Refer to Figures 3 and 4.

Jumper settings:

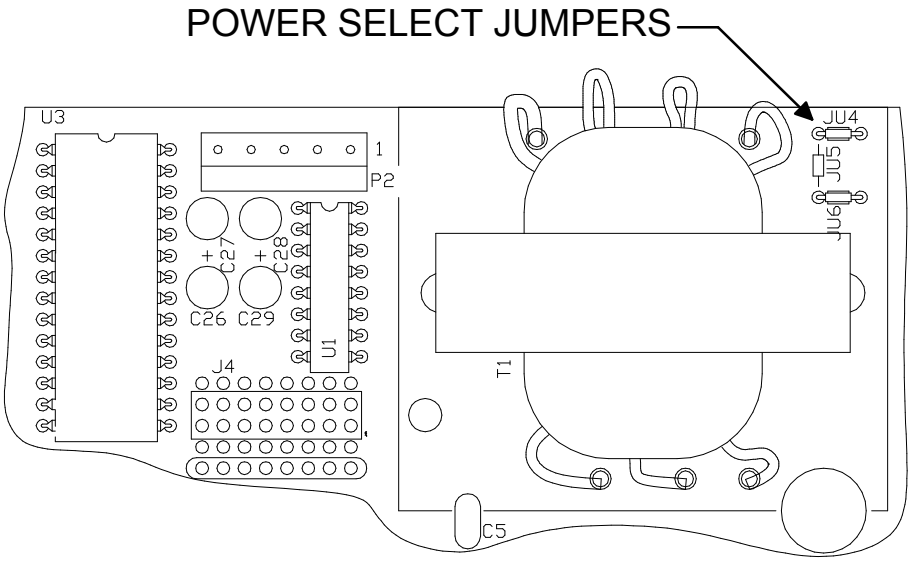


Fig. 1. Power select jumper location.

Table 1 Power select jumper settings.

■	115V	230V
JU4	IN	OUT
JU5	OUT	IN
JU6	IN	OUT

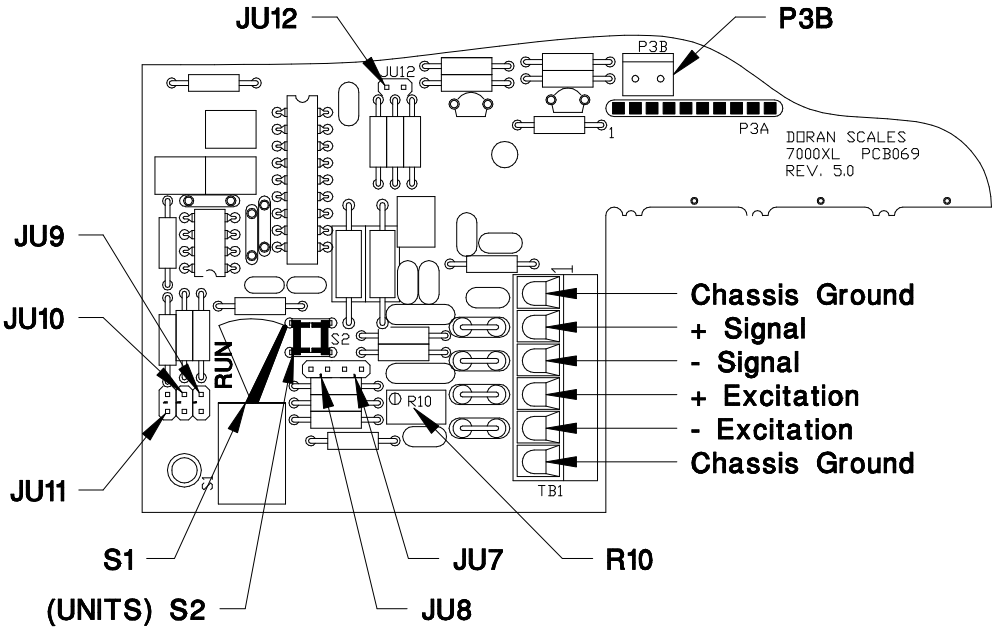


Fig. 2. Setup jumper locations.

Table 2 Zero Down jumper positions

PERCENT ZERO SHIFT	MILIVOLT ZERO SHIFT [1]	JU8	JU7
±60%	0mV to -5mV	OUT	OUT
+40% TO -160%	-5mV to -9.6mV	IN	OUT
-115% TO -235%	-8.7mV to -13.7mV	OUT	IN
-215% TO -335%	-14.3mV to -18.7mV	IN	IN

1 When used with a 350W load cell.

Table 3 Span adjustment jumper

LOAD CELL SENSITIVITY	JU11	JU10	JU9	CALCULATED SPAN RANGE [1]
0.5 mV/V	IN	IN	IN	3,500 TO 6,000 COUNTS [2]
1.0 mV/V	OUT	IN	IN	7,000 TO 12,000 COUNTS [2]
1.5 mV/V	IN	IN	OUT	10,500 TO 18,000 COUNTS
2.0 mV/V	OUT	IN	OUT	14,000 TO 24,000 COUNTS
2.5 mV/V	IN	OUT	OUT	17,500 TO 30,000 COUNTS
3.0 mV/V	OUT	OUT	OUT	21,000 TO 36,000 COUNTS[3]

[1] When measured with JU9, JU10 and JU11 removed.

[2] If the span lies between 6000 and 7000 counts, or below 3500 counts, insert JU12.

[3] If span is greater than 30,000 counts, adjust the no load setting to -18,700 counts.

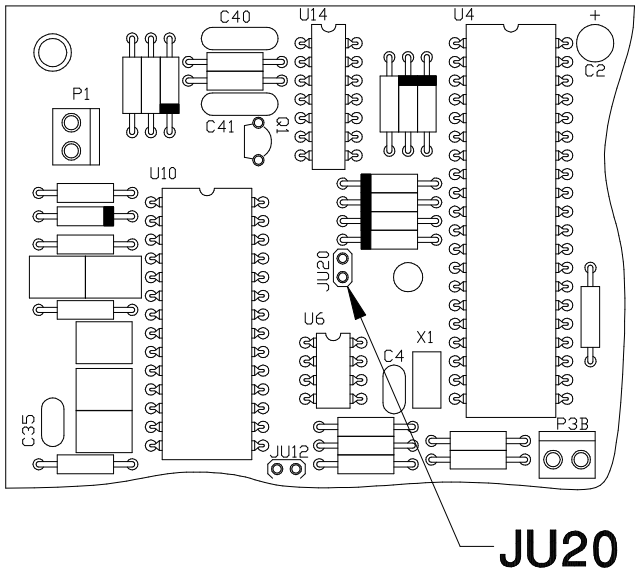
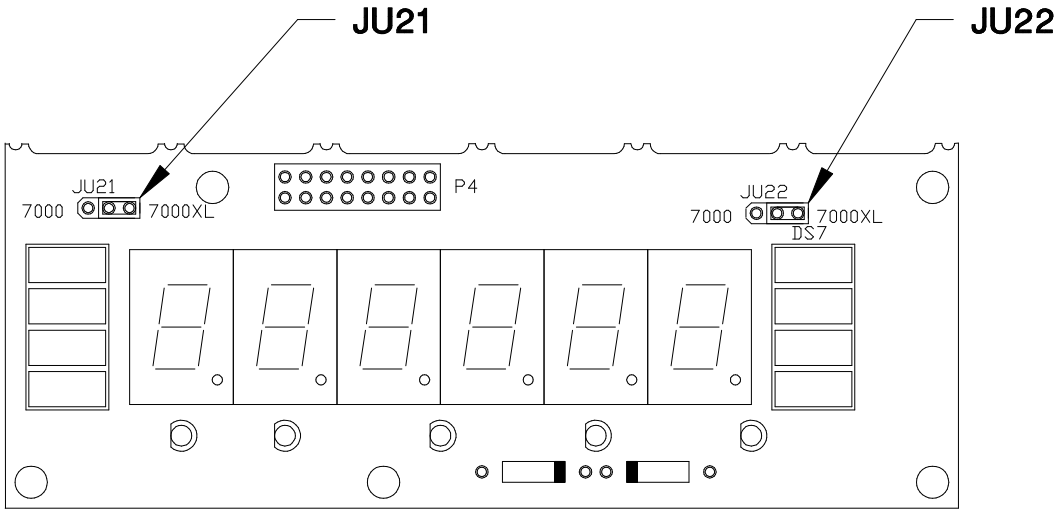


Fig. 3. Scale type selection jumper.



(Shown in 7000XL position.)

Table 4 Scale type selection jumpers.

Jumper	Model 7000	Model 7000XL
JU20	IN	OUT
JU21	LEFT TWO PINS	RIGHT TWO PINS
JU22	LEFT TWO PINS	RIGHT TWO PINS

Section 6. Data Communications

Introduction to data communications:

In both the Model 7000XL and the Model 7000, data is sent to a printer or computer using "asynchronous serial communications." While the name is quite impressive, the actual concept is fairly simple. Data is broken up and sent one piece at a time to a printer or computer. In spite of this simplicity, a basic understanding of serial data communications is helpful when setting up these devices.

The 7000XL and 7000 transmit 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. 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 7000XL and the 7000 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 (Baud Rate);
knowing when data starts and stops;
detecting noise on the data.;
knowing if the receiving equipment is ready for more data.

The transmission rate determines how fast 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 7000XL or 7000, 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 higher the Baud rate the faster the data is sent.

The term "asynchronous serial 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 settings to determine how fast to send data. 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. As a result, the 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 7000XL and the 7000 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 is controlled by the data bit and parity setup. Eight data bits (seven in some cases) usually follow the start bit. After that, a parity bit is sent, followed by the stop bits. Parity bits are sent to help detect errors which may have occurred during transmission. In many cases, parity bits are ignored. The stop bits signal the end of the data and permit the bit timer a chance to reset its self before the next data byte is sent. The number of stop bits sent can be as few as one and as many as two.

Parity bits can take three forms: odd, even or none,. With odd or even parity, the parity bit is set if the sum of the data bits is odd or even respectively. Parity bits are useful for detecting data bytes which have been damaged by noise. When parity is set to none, no parity bit is added to the bit stream.

In many cases, the receiving device will be a slow printer with limited memory. In these cases, data may be sent faster than the printer (or computer) can use. As a result, data may become lost or scrambled. To prevent this from happening, "Handshaking" is used. When the receiving unit is busy or incapable of accepting 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 7000XL and 7000 offer both hardware and software handshaking. Hardware handshaking makes use of the CTS (clear to send) input on the 7000. 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 7000 stops sending data. When the receiving unit is ready for more data, the CTS is reactivated and the 7000 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-S) and XOFF (Ctrl-Q) flow control characters. The 7000 has limited bi-directional serial communications to support software handshaking. When a "Ctrl-Q" is received, the transmission of data is halted until a "Ctrl-S" is received. To use this mode, the RTX line of the 7000 is tied to the TXD line of the receiving unit.

Printer Modes:

The 7000XL and 7000 offer four different print control modes. These modes determine when the printer data is sent.

Transmit on demand (tod): In this mode, scale data is transmitted whenever the print button on the scale (or a remote print) is pressed. The scale must be stable and the scale value must be valid before the data is printed. When software handshaking is on, a print request is created whenever a "W" is received from the bi-directional serial input.

Continuous print (CP): In continuous print, data is transmitted each time the scale has a reading ready. Readings which occur while the scale is in motion are indicated by the abbreviation "MOT." following the data.

Auto Print 1 (AP1): Auto Print 1 automatically transmits the first valid scale reading after the scale becomes stable.

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

Data output format:

In order for the serial data sent from the 7000XL or 7000 to be useful, the data must be organized in such a way as to be easily read. To accomplish this, the 7000XL and the 7000 format the displayed data with additional text to communicate the active units and the scale status during the reading.

Format "F0": The basic data format used by the 7000XL and the 7000 is illustrated in Fig. 1 through Fig. 3. Each line of data begins with an STX character (start of text) followed by a polarity sign which indicates the reading polarity. Next the weight data is sent. Six digits are sent 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 terminated by adding a carriage return and a line feed.

In the case of lb-oz measurements, the pounds data is placed after the polarity sign. A space followed by "lb" and another space is added to the pounds data. Ounce data is then sent with a decimal point inserted as 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 depend on the ounces resolution. Refer to Fig. 2 for details.

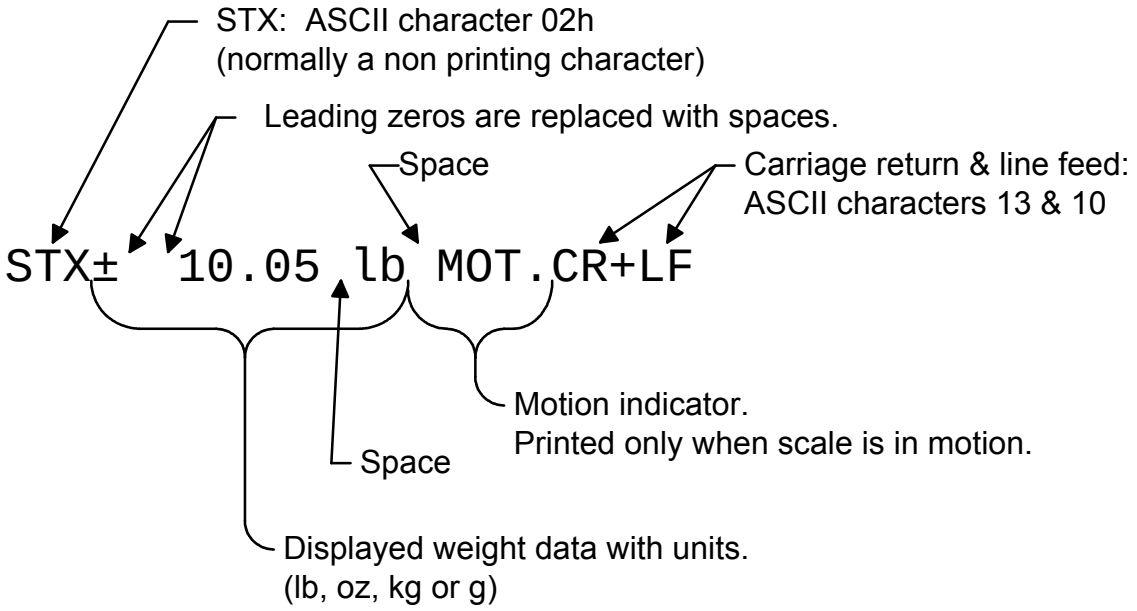


Fig. 1 F0 Data output format for lb, oz, and g.

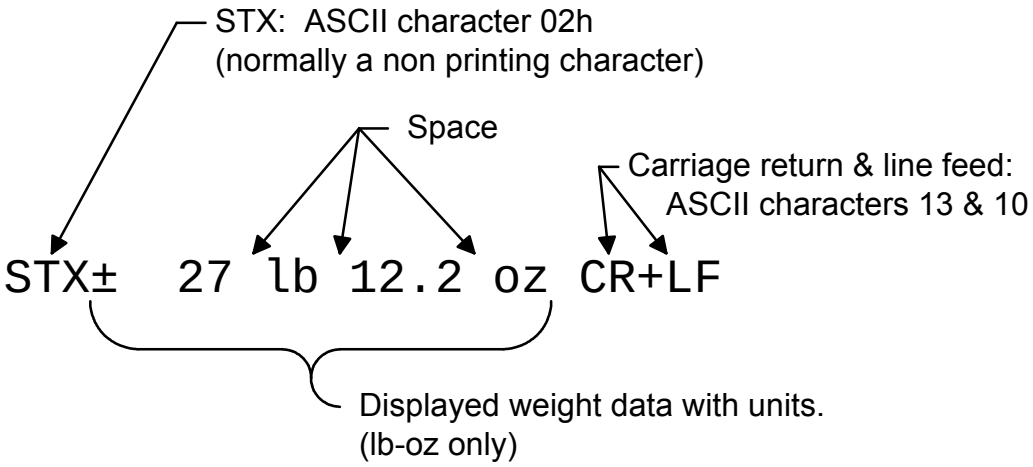


Fig. 2 F0 Data output format for lb-oz display

Dual print format: The dual print modes provide the 7000 with the ability to print the current scale reading followed by the equivalent value in Kilograms.

In the "DUAL PRINT" format, the scale recalculates the weight in Kilograms and sends it in 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. Refer to Fig. 3.

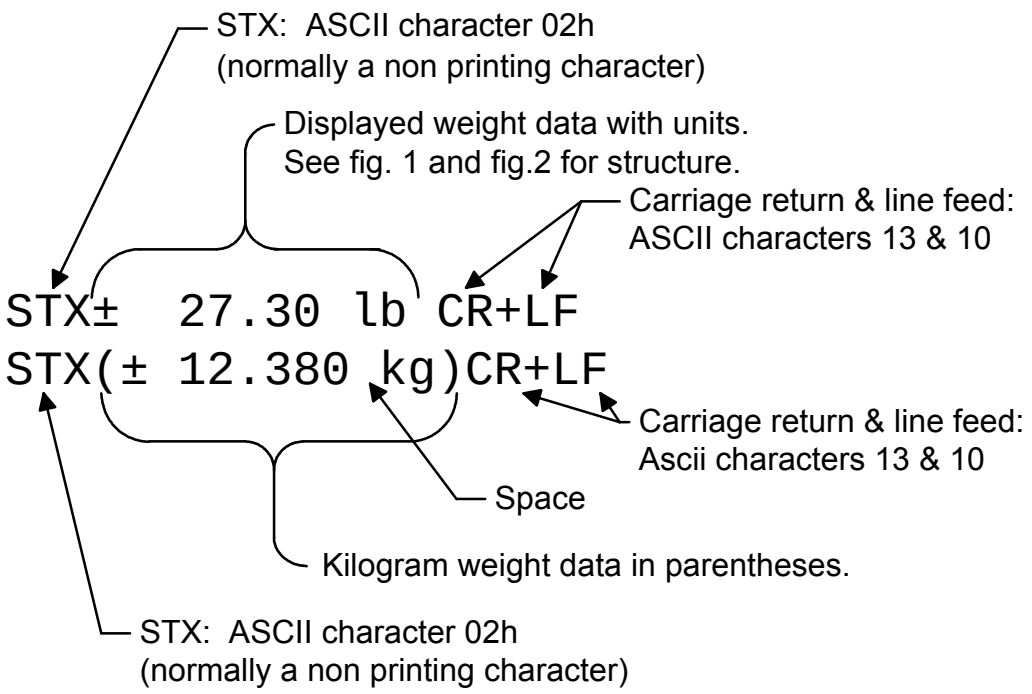


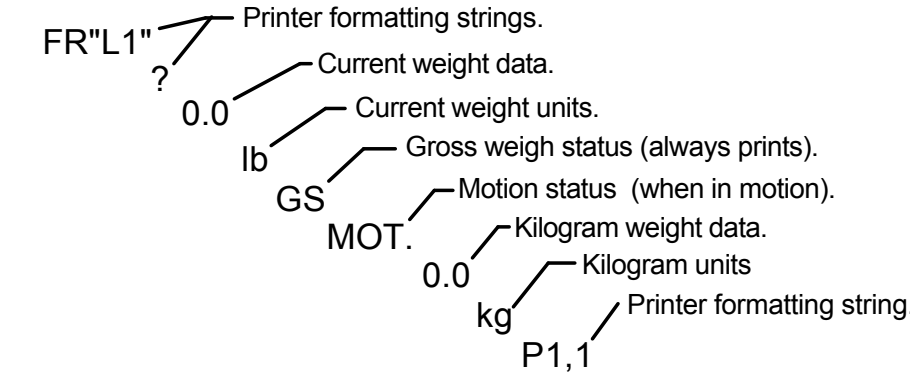
Fig. 3: Data output format for DUAL PRINT

```
 45 lb  0.0 oz
(  20.410 kg )
 45 lb  0.0 oz
(  20.410 kg )
 43 lb  8.4 oz MOT.
(  19.740 kg MOT.)
  0 lb 15.8 oz MOT.
(   0.450 kg MOT.)
- 5 lb  0.0 oz MOT.
(-  2.265 kg MOT.)
- 5 lb  0.0 oz
(-  2.265 kg )
- 5 lb- 0.0 oz
(-  2.265 kg )
- 4 lb 11.0 oz MOT.
(-  2.125 kg MOT.)
- 0 lb  0.2 oz MOT.
(-  0.010 kg MOT.)
  0 lb  0.0 oz MOT.
(   0.000 kg MOT.)
  0 lb  0.0 oz
(   0.000 kg )
  0 lb  0.0 oz
(   0.000 kg )
```

Fig 4. Sample DUAL PRINT printer output.
Continuous print mode.

"F1" format: The "F1 format provides data compatibility with older Doran Model 7000 Scales. The data representations use single characters for scale status. This mode is intended for use in applications where a computer is looking for the specific data format produced by the previous versions of the Model 7000. The older 7000 format is no longer Legal for Trade.

"SSP" format: The data string produced by the SSP format allows the 7000XL to communicate with the Doran Model SSP Label Printer. This printer allows for the creation of custom labels containing weight information, bar codes and graphics. Contact to your Authorized Doran Scales Dealer for more information.



(NOTE: Each line is terminated with a line feed.)

Fig 5. Sample SSP Format printer output.

"DGH" format: The DGH format allows the Model 7000 to communicate with the Option Type "R" 4 to 20 mA analog output module. Selection of this mode without the Type "R" option installed will result in an "Er Ao" error.

Section 7: Specifications and Interconnect Data

Specifications:

	Model 7000XL	Model 7000
Resolution:	6000d in precision mode (5000d for Legal for Trade)	
Sensitivity:	0.5 µV min.	
Load Cell Capacity:	0.5 mV/V to 3.5 mV/V	
Power Supply:	115/230 Vac 50/60 Hz	
Display:	6 digit LED. 0.56" high	
Displayed units:	lb, kg, oz and g	
Capacities:	5lb to 100,000 lb	
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, PRINT and UNITS switches.	Water tight ZERO switch. Optional PRINT or UNITS switch.
Construction:	Rugged stainless steel NEMA 4/4x construction.	
Options:	Dual Print permits weight printing in current units and Kilograms.	
	User configurable remote switch.	
	4-20mA analog output.	

Interconnect Data:

PIN #	TITLE
1	Chassis Ground
2	+ Load Cell Signal
3	- Load Cell Signal
4	+ Load Cell Excitation
5	- Load Cell Excitation
6	Chassis Ground

Table 1: TB1 Load Cell Connections

NOTE: When connecting the load cell, be sure to install the ESD and EMI protection inductor. Refer to Fig. 3 for details.

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 2: P2 Options Connections

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

Table 3: J1 Power Connections

P3 PIN #	P3B PIN #	TITLE
1	1	Zero Switch High
2	2	Zero Switch Ground
3	n/a	Units Switch
4	n/a	Print Switch
5	n/a	Unused Switch
6	n/a	Keyboard Scan

Table 4: P3 and P3B Keyboard Connections

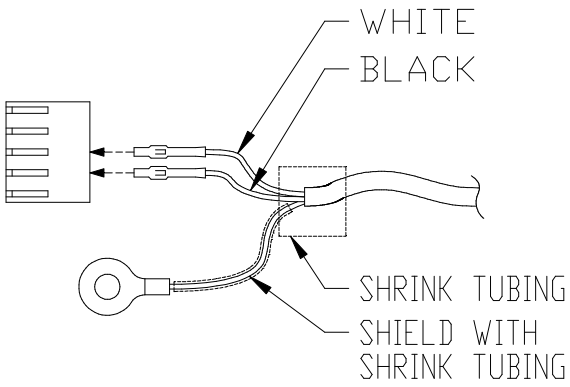


Fig. 1: Connector J2; Remote switch cable assembly

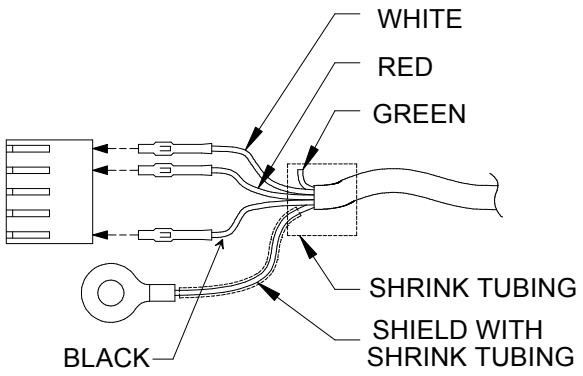


Fig. 2: Connector J2; Serial cable assembly

Serial Cable Assembly		
DB25 Female connector w/ hardware handshaking		
Function	Pin	Wire Color
RXD	2	White
Signal Gnd	7	Black
RTS	4	Red Jumper 4 to 5
CTS	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 Jumper 7 to 8
CTS	8	

Table 5: 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 6: Serial Cable assembly with Software Handshaking

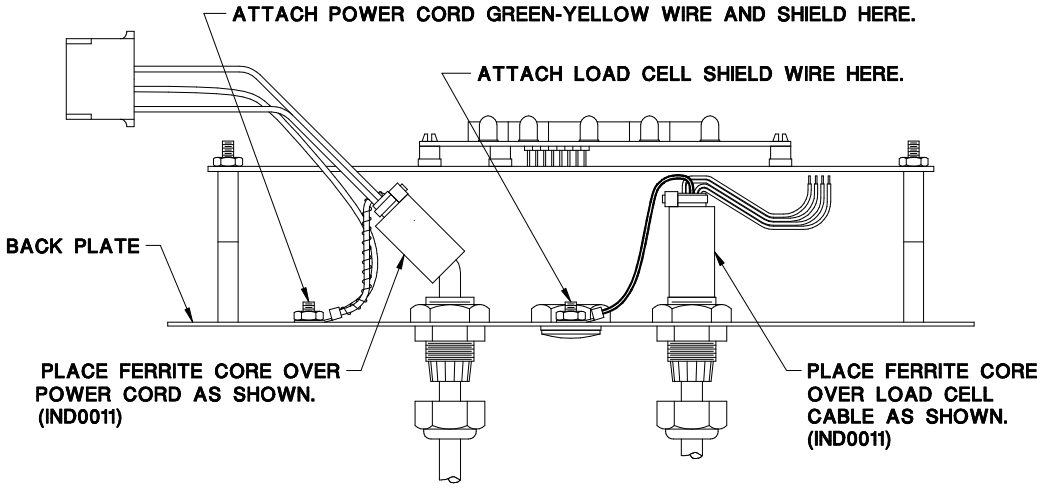


Fig. 3: Installation of EMI / RFI / ESD protection devices.

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 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 overload stops are properly set. Take the platter off the platform, 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. Review the cautions in section 1.
Scale will not indicate full capacity or go into overload.		Make sure that there is nothing caught in the platform 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 A1). 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 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 your7000XL, 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 7000XL or Model 7000, user wishes to return the setup parameters to factory default, follow these steps.

- Remove power.
- Place scale in the calibration mode and hold the ZERO push button while power is restored.
- The indicator will display "InIt" until the ZERO button is released. After ZERO is released, the scale will perform its normal power up routine and then enter the Calibration mode. At this time, all the parameters will have been reset to their factory default settings. See Section 4 for details on setting up the individual scale parameters.
- Return the switch to the normal weighing position. 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.

Error messages:

Error Message		What to Do or Check:
"ovr-Ld" Scale overload		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.
"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.
"SU 0 E" Startup zero error		The scale was not stable, or a weight in excess of 1.9% of full load was present on the platter when the scale started. This error will only occur in Legal for Trade applications. Remove the weight and wait. The scale will zero once it becomes stable.
"Err EP" EEPROM error		The nonvolatile memory has been corrupted by transients or electrostatic discharge. Reenter the scale parameters and recalibrate the scale (see Section 4).
"rg. Err" Calibration range error		During span or zero calibration, the scale input was at an incorrect level. Press ZERO to clear error. Then correct the input levels. See Section 5 for more detail.
"Err 1" Program ROM error		The program memory in the scale has become corrupted. Have scale serviced by a qualified scale repair technician.
"Err AO" Analog output error.		The scale has been set up for the Option "R" 4-20ma analog output module when this option is not present.
"Ldg 0" Loading zero.		The the scale is attempting to load power up zero. This message will remain until scale is stable.

doran

Model 7000XL
Model 7000

Digital Weight Indicator

INSTRUCTION MANUAL ADDENDUM

SOFTWARE REVISION : All

MAN180.10 9/22/97

Page 32 Table 3 of the 7000XL manual (MAN105), and Page 37 Table 3 of the combined 7000/7000XL manual (MAN132 rev. 1.0) have errors.

Please replace these pages with the attached page.

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 2: P2 Options Connections

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

Table 3: J1 Power Connections

P3 PIN #	P3B PIN #	TITLE
1	1	Zero Switch High
2	2	Zero Switch Ground
3	n/a	Units Switch
4	n/a	Print Switch
5	n/a	Unused Switch
6	n/a	Keyboard Scan

Table 4: P3 and P3B Keyboard Connections

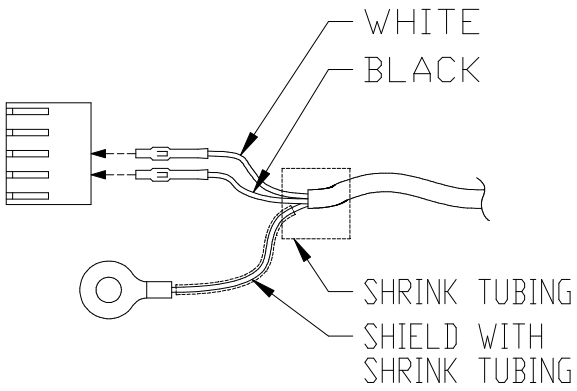


Fig. 1: Connector J2; Remote switch cable assembly