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Pennsylvania Scale Company

Model 71/72/7300 Series Scales

Operation & Calibration Manual

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71/72/7300 SERIES SCALES

OPERATIONS MANUAL - SECTION 1

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71/72/7300 SERIES SCALES

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INTRODUCTION

This operating manual covers the following Pennsylvania Scale products.

Model	Description
7100	Smartbase with no internal display or push-buttons.
7200	Smartbase with internal display and no push-buttons.
7300	Scale with internal display and zero, unit, and print push-buttons.

The Pennsylvania Scale Company **7X00 Series** products have been designed to be simple and easy to operate. But they also have many features that make them extremely versatile to use such as:

- Standard RS-232 Interface with a selectable output for communications with a computer or printer
- Adjustable response time
- Optional push-buttons
- Optional remote displays
- Single board electronics for ease of servicing.
- Single button selection of two weighing units.

In addition, the scale can be calibrated with existing keypads or through the RS-232 Interface to match the requirements of the application on hand, as it employs a digital calibration technique that eliminates dip switches and potentiometers.

INSTALLATION AND SET-UP INSTRUCTIONS

The 7X00 Series Scale has been packaged to ensure safe, damage-free arrival. Please use reasonable care when removing the unit from the shipping carton, and retain the original packaging materials in case reshipment is required.

NOTE: **TO PROTECT THE WARRANTY, FILL OUT AND RETURN THE WARRANTY CARD AND THE SCALE CONDITION REPORT.**

To prepare the 7100, 7200 and 7300 system for operation, follow the procedure outlined below.

1. After opening the shipping carton, remove the molded foam top from the carton. *(On 2 lb. and 5 lb. capacity scales the platform is packaged on top of this foam, remove it first and lay it aside.)*

2. Gently lift and remove the stainless steel platform cover only. *(On 2 lb. and 5 lb. capacity scales the platform is packaged separately and does not need to be removed.)*

3. Remove any options which may be packed with the scale.

4. Carefully remove scale from the packaging by grasping both sides of the base. **DO NOT LIFT SCALE BY THE TOP SPIDER ASSEMBLY**.

5. Place the scale on a stable, level surface for operation.

6. Adjust the corner leveling feet until the level bubble indicates the unit is level. Firmly tighten the hex jam nuts on the leveling feet. *(Any time the scale is relocated, it should be leveled*.)

7. Remove the protective plastic wrap from the platform and place the platform on the spider.

8. To activate the scale, plug the line cord into any grounded 50/60 hertz 120 volt outlet. The version number of the software installed is displayed first, followed by the scale's diagnostic countdown process. During this countdown the display *(on 7200, 7300, or a 7100 with a remote display option)* will first show the version number of the software, followed by 9.9.9.9.9.9. through 0.0.0.0.0.0. Each number representing a self-diagnostic test to verify the operation of important unit functions. If the scale should fail any of these tests the display will freeze on that number. *(A diagnostic failure may be bypassed by pressing the ZERO button.)* The serial interface on all models will also transmit the test numbers. On page 4 is the table which lists each test and its corresponding display.

DISPLAY	**DIAGNOSTIC FUNCTION**
9.9.9.9.9.9.	EPROM Checksum, light all LEDS
8.8.8.8.8.8.	RAM check
7.7.7.7.7.7.	No test
6.6.6.6.6.6.	Check switches not shorted
5.5.5.5.5.5.	No Test
4.4.4.4.4.4.	Check load cell excitation voltage
3.3.3.3.3.3.	Analog verify *(checks output from analog -digital)*
2.2.2.2.2.2.	Load CFG EEPROM, test virgin, checksum, initialize on error
1.1.1.1.1.1.	Load CAL EEPROM, test virgin, checksum, initialize on error
0.0.0.0.0.0.	No test
----------	Initializing system *(may take several seconds)*

After the countdown is completed, the scale performs an initial zeroing of the system. No weight should be on the platform at this time.

NOTE: **Allow at least 20 minutes for initial warm-up and load cell stabilization**.

9. The system should now be ready for operation.

OPERATION

OPERATIONAL FEATURES

The following features are available on all 7X00 Series Scales.

Overload - If the weight exceeds 105% of full capacity, the scale will read out "OLOLOL", meaning overload.

Underload - If the weight is below -3% of full capacity, the scale will read out "ULULUL", meaning system underload.

Automatic Zero-Tracking (AZT) - Maintains the system zero to within +/- 1/4 of the display resolution *(The resolution being the smallest increment the scale is programmed to read).* AZT increases the overall accuracy of the system by removing errors at zero caused by accumulation of debris on the base/container or minor drifts in the electronics or load cell.

EXTERNAL CONNECTORS

Available on 7100, 7200 and 7300 scales and may be accessed through the opening on the bottom of the scale.

D-Subminiature Connector (9-pin) - Used with RS-232 Interface.

Remote Display Connector - Used to connect the remote display option to the scale.

DISPLAYS AND INDICATORS *(Refer to Fig. 1 on Page 6)*

Available on the Models 7200 and 7300 with or without a remote display option, or a 7100 with a remote display option.

Weight Display - Indicates weight when the meter is weighing.

Zero Indicator - Illuminates when the weight is within +/-1/4 of the display resolution of system zero.

Weighing Unit Indicators - Two weighing unit indicators are provided to indicate the unit of measure being displayed *(lb, kg, g, oz, etc.).*

PUSH-BUTTON FUNCTIONS *(Refer to Fig. 1 below.)*

A standard feature on the Model 7300, buttons are also available on the 7100 and 7200 with the optional remote display with push-buttons.

ZERO ON/OFF Push-button - Sets meter to zero. It also functions as a CONTINUE switch during the self-diagnostic check (i.e., if the meter stops at a diagnostic check number, the switch may be pressed to resume the countdown). If held in for five seconds, the unit turns off. Press again to turn on.

UNITS Push-button - Use this button to select between the primary *(upper UNIT indicator)* and secondary *(lower UNIT indicator)* weighing unit.

PRINT Push-button - Transmits formatted print to any device connected to the RS-232 port. Holding this push-button for four seconds will access the RS-232 configuration mode.

WEIGHING

The following instructions are for the **Model 7300** with or without a remote display option or 7100/7200 Scales with a remote display option with push-buttons. *(The 7100 and 7200 scales without the remote display with push buttons require RS-232 communications to operate. Refer to the RS-232 command section for operating these scales.)*

WEIGHING WITHOUT TARE

Establish a base zero by pressing ZERO with nothing on the scale platform to clear any existing weights.

Use the UNITS button to select either the Primary or Secondary weighing unit.

Place the item(s) to be weighed on the platform and read the weight on the display.

NOTE: If very light items *(less then 1/4 of the display resolution)* are placed on the platform individually, the weight may be zeroed off by the AZT feature. Add light items to the platform simultaneously.

WEIGHING WITH TARE

Establish the tare weight by placing the container or object to be tared-off on the platform and press ZERO.

Place the objects to be weighed in the container and read the net weight on the display. To clear a tare value, remove all weight from the scale, press ZERO.

BI-DIRECTIONAL SERIAL ASCII INTERFACE

INTRODUCTION

The 7X00 Scale Series Serial ASCII Interface is an RS-232C, TTL-compatible, asynchronous serial interface capable of bi-directional transmission of scale data.

This interface features programmable baud rates, word lengths, stop bits, parity, address number and a formatted print.

COMMUNICATION CAPABILITIES

The interface provides three basic types of communication with the Model 7X00 Series:

1. Transmission of a predetermined *(at set-up time)* array of information for formatted printing. This may be initiated by pressing the PRINT push-button on a 7300 front panel or remote display with push buttons or by sending "SRP"<CR> *("Send Requested Print")* command to the unit. The scale is shipped from the factory set-up to send the Gross weight when the PRINT button is pressed.

2. Transmission and alteration of specific data upon request from an external device.

3. Alteration of the unit's operating mode upon request from an external device.

4. Alteration of scale Calibration and RS-232 communications parameters and print formatting information. *(Refer to Programming and Calibration section of this manual for more information.)*

RS-232 PIN ASSIGNMENTS and IMPLEMENTED FUNCTIONS

Connection to the Serial Port is made via a DB-9 female connector found in the access area on the bottom of the scale.

PIN	EIA CODE	FUNCTION	DIRECTION
2	BB	Transmit Data	Output
3	BA	Receive Data	Input
5	AB	Signal Ground	-
6	CC	Data-Set Ready (DSR)	Output
7	CB	Clear to Send (CTS)	Input
8	CA	Request to Send (RTS)	Output

NOTE: All remaining pins are currently unused and unconnected. For simple terminal usage where the data rate does not exceed either machine's capacity to process it, only pins 2, 3, and 5 need to be connected.

TYPICAL CABLE WIRING

To connect to a IBM AT or compatible use a cable with one male and one female DB-9 connector with all nine pins connected straight through.

The unit leaves the factory with the following default communication settings :

BAUD	300
WORD LENGTH	7 bits
STOP BITS	1
PARITY	ODD

These settings may be changed using the local or remote display keyboard, or RS-232 Interface commands. If the RS-232 Interface is used, initial communication with the users computer or terminal must be established using the above settings. To return the RS-232 settings to the above default values:

1. Unplug the unit power cord or otherwise remove power.
2. Depress the internal Calibrate button.
3. Plug in *(or energize)* the unit and continue to hold the calibrate button for 5 seconds.

For information on how to reconfigure the RS-232 parameters, refer to the Calibration and Programming section of this manual.

COMMAND FORMATS

The Model 7X00 Series can be controlled from an external device *(such as a computer or terminal)* by various commands, each three letters long, which represent related English phrases or words. For example, to tell the scale to zero, type ZRO followed by a carriage return.

When the scale receives command strings, they are first placed in a 125-character buffer. If many commands are sent to the scale at high baud rates, it is possible to completely fill this buffer and data will be lost. Be sure to send commands to the scale at a rate which does not exceed 125 characters every 500 ms.

The basic command formats are:

1. [<add>]<cmd><cr>
2. <cmd> [<flt>]<cr>

Where <cmd> is a three letter command, <add> is a scale address number (0-255), <cr> represents a carriage return, and <flt> is a mixed number, the brackets [ ] are used to indicate an optional part of the command.

The following are some examples of command formats:

Command format 1:

SRP<cr>	Send a formatted print

Command format 2:

ITW 13.43<cr>	Instructs scale to set tare weight to 13.43 in the current unit

Command format 3:

5 SGW<cr>	Instructs the scale with address #5 to send the gross weight.

MODEL 7X00 SERIES RS-232 SCALE COMMANDS

General Commands

ATW	Acquire Tare Weight
CHK	Initiate self-diagnostics CHecK
LCK	LoCK out keypad
PON	Power ON
POF	Power OFf
RES	RESet, clears tare weight
UCK	UnloCK keypad
UNP	UNits Primary
UNS	UNits Secondary
ZRO	ZeRO scale -

Commands Which Enter Information into the Unit

ITW [FLOATING POINT NUMBER]	Input Tare Weight

Commands Which Request Information

SAI	Send All Information
SAO	Send Abbreviated Output (same as SRP)
SCI	Send Configuration Information
SDT	Send DaTe (with time and date option only)
SGW	Send Gross Weight
SMI	Send Metrological Information
SNW	Send Net Weight
SPC	Send Print Codes
SRP	Send Requested Print
STM	Send TiMe (with time and date option only)
STW	Send Tare Weight
SVN	Send Software Version Number

Calibrate and Configure Commands

CAL	CALibrate - Same as pressing SW4 button.
CFC	ConFigure Communication - To set baud rate etc.
CFP	ConFigure Print codes - To enter print codes.
CLE	CaLibration End - To save calibration data.
CLP	CaLibrate Primary - To set-up primary calibration data.
CLU	CaLibration Unstable - To set-up print stable/unstable.
CLW	CaLibration Weight - To calibrate with weights.

NOTES: **All commands and parameters must be separated by spaces. The entire command string must be terminated with a carriage return.**

All calibrate and configure commands are further explained in the Calibration and Programming section of this manual.

All tare functions are available only through the RS 232 interface. The display on the scale will only show the gross weight.

SAMPLE COMPUTER PROGRAM

The 7600 series RS-232 Interface may be tested by connecting it to a terminal with an RS-232 port, or a computer with an RS-232 and a terminal program. If a terminal program is not available the following program is provided for an IBM PC or compatible using BASICA, MBASIC or QuickBASIC.

```
10 '  Terminal Program written for BASIC Programming Language
20 '  Provided by Pennsylvania Scale Company
30 '
40    DEFINT A-Z
50    FALSE = 0: TRUE = NOT (FALSE)
60    KEY OFF: CLS : LOCATE 25, 1
70    PRINT SPACE$(20); "Press Alt-X to Exit Terminal Program"
80    LOCATE 1, 1
90    OPEN "Com1:300,o,7,1" FOR RANDOM AS #1 'Handshaking Enabled
100   OPEN "test.dta" FOR OUTPUT AS #2
110   WHILE NOT (QUIT)
120   KEYBOARDINPUT$ = INKEY$
130   IF KEYBOARDINPUT$ = CHR$(0) + CHR$(45) THEN QUIT = TRUE
140   IF KEYBOARDINPUT$ <> " " THEN PRINT #1, KEYBOARDINPUT$;
150   IF LOC(1) > 0 THEN
160   SCALEINPUT$ = INPUT$ (LOC(1), #1)
170   PRINT SCALEINPUT$;'Writes data from scale to screen
180   LPRINT SCALEINPUT$;         'Writes data from scale to printer
190   PRINT #2, SCALEINPUT$;      'Writes data from scale to file
200   END IF
210   WEND
220   END
```

NOTES:

- **Omit line 180 if data is not to be sent to the printer.**
- **Omit lines 100 and 190 if data is not to be written to a file.**
- **In line 100, the word "OUTPUT" opens the file "test.dta", deleting any data that was in the file before this program was started. If you want to preserve the contents on the file "test.dta" from one session to another, replace the word OUTPUT with APPEND on line 100.**

SAMPLE COMPUTER PROGRAM (cont'd.)

NOTES:

- **Line 90 opens the serial communications port, using 300 baud, Odd parity, 7 data bits, and 1 stop bit. These represent the default settings for the scale, other entries may be used if the scale settings have been changed. Valid entries for baud rate are 300, 600, 2400, 4800, 9600, or 19200. Valid entries for parity are N *(none)*, E *(even)*, or O *(odd)*. Valid entries for data bits are 7 or 8. Valid entries for stop bits are 1 or 2. Com2 may be used if the scale is attached to serial communications port #2.**

- **To eliminate the need for attaching the handshaking lines in the cable between the scale and the computer, change line 90 to read:**

```
90   OPEN "Com1:300,o,7,1,RS,DS0" FOR RANDOM AS #1
            'Handshaking Disabled
```

ERROR MESSAGE LIST

During Diagnostics:

Err1.CA	Scale Calibration
Err2.00 to Err2.63	EEPROM Write Failure
Err2.rS	Serial Interface Setup
Err3.Hd	Deadload too High
Err3.nS	No Sense Line Connected
Err3.-d	Negative Deadload
Err4.Sh	Load Cell Excitation Shorted
Err6.-1 to Err6.-4	Switch SW1-SW4 Shorted
Err8.00 to Err8.FF	RAM Test Error
Err9.CS	Eprom Checksum Error

All Other Times:

Message on Display	Explanation	Message From ASCII Port
Err2.00 to Err2.FF	EEPROM read error	"Err2.? EEPROM"
Err 10	Count too large	none
Err 11	Keyboard Entry Error	none
Err 13	Negative number less than -99,999 will not fit on the display.	none
Err 30	Illegal Zero	none
Err 31	Illegal Tare	none
Err 40	Load Cell error	none
Err 80	RS - 232 Input Error	none
Err 81	RS - 232 Input Error	none
Err 82	RS - 232 Overflow	none
Err Cnf	Config load error on startup	"Err 85 Reset to 300 baud"
Err xx*	Undefined *(Consult Factory)*	none
ULULUL	Load Cell Underload	"Err 41"
OLOLOL	Load Cell Overload	"Err 42"
CalErr	RS - 232 Cal Error	"Calibration Command Error"
none	Bad Print Code	"Err 83 Print Code"
none	No End Code	"Err 84 No Code 99"

* Where "xx" equals any number or character not shown on the above list.

71/72/7300 SERIES SCALES PROGRAMMING/CALIBRATION

SECTION 2

INTRODUCTION

This manual covers the **Programming and Calibration** of the **Pennsylvania Scales Model 7100, 7200 and 7300.**

The 7100, 7200 and 7300 series scales can be calibrated using the standard or optional function buttons, or through the RS-232 Interface. The scale employs a digital calibration technique that makes it very versatile when matching the Scale to the requirements of the application at hand.

This manual covers calibration and programming of the following Pennsylvania products:

Model	**Description**
7100	Smartbase with no internal display or push-buttons.
7200	Smartbase with internal display and no push-buttons.
7300	Scale with internal display and zero, unit, and print push-buttons.

All of these products come standard with a RS-232 Interface and the capability of accepting a remote display with or without push-buttons.

7X00 SERIES CALIBRATION

The following calibration data entry applies to the Model 7300 or a 7200 and 7100 with a remote display with push-buttons interfaced. For calibration of models without push-buttons, please refer to the RS-232 Interface command section.

Before attempting to calibrate the scale, a thorough understanding of the method of data entry is required. Below is an explanation of the switches and their functions.

When the calibration mode is entered, the pushbutton switches will be redefined to allow data entry. The four switches will be redefined as shown by the parentheses.

CAL (D.P. / CLR)

[The CAL switch is located inside of the scale on the main PCB, directly below the access cover plate.]

ZERO (INC.)
ON/OFF

UNITS (ADV.)

PRINT (ENT.)

Following is a description of the function of each switch.

INC (Increment)

This switch is used to key numbers onto the display. The value of the number increases by one each time the switch is pressed. Holding the switch closed will engage automatic incrementing.

NOTE: **This switch will also act as a scroll push-button, used to make calibration selections where noted in the instructions. For all other calibration steps it acts as the increment push-button.**

FUNCTION BUTTONS (cont'd.)

ADV (Advance)

The advance switch multiplies any number keyed into the scale by 10, *(The number is shifted one digit to the left each time the button is pressed)*. If this switch is pressed when the display shows "0", the digit will not shift. If it is pressed when the display is filled, the display will be cleared and the input procedure can be restarted.

D.P. / CLR (Decimal Point / Clear)

Pressing this push-button once causes the decimal point to appear. If an error is made at any time during data entry pressing this push-button twice will clear the display. The correct data can then be entered.

ENT (Enter)

When this push-button is pressed the data currently displayed is committed to system memory and the calibration automatically advances to the next calibration step.

DATA ENTRY EXAMPLE

The following example describes the switch-closure sequence needed to enter the number 320.0.

1. While the display is alternately flashing the calibration step number and the data stored, press the INC button to start the data input sequence. The display will stop flashing and show "0".

2. Press INC three more times or hold INC closed until a 3 appears. The display will show "3".

3. Press ADV; the display will show "30".

4. Press INC two times or hold INC closed until a 2 appears in the right-most position. The display will show "32".

5. Press ADV; the display will show "320".

6. Press D.P./CLR for the decimal point. The display will show "320.0".

7. Press ENT to commit this value to system memory. At this point the next calibration step will appear.

7x00 CALIBRATION PROCEDURE

The calibration of the 7100, 7200 and 7300 scales is divided into six major categories. The entry point for these categories are the calibration steps that are evenly divisible by ten.

STEP DESCRIPTION

Cal 20 **Entry point**

(20) = Manual CAL *(input operational features)*

(30) = Select secondary weighing unit

(40) = Load Cell *(calibrates the scale weights)*
This mode requires the use of approved weights to be completed.

(60) = RS-232 CAL *(Setup RS-232 Interface parameters)*
May also be accessed by pressing and holding the PRINT button for 5 seconds.

(70) = Setting battery saver time. *(Also time and date if option is installed.)* May be accessed by pressing and holding the PRINT button for 5 seconds.

(80) = Print CAL *(setup printer output format)*
May also be accessed by pressing and holding the PRINT button for 5 seconds.)

At any of the above steps:

- Press ENTER to access that category.
- Key in the number of any other category *(using the INC and ADV buttons)* and press ENTER to move to that category.
- Key in a "99" or a "0" *(using the INC and ADV buttons)* and press ENTER to leave calibration.

When the last Calibration step of each category is reached, the calibration automatically advances to the next category.

CALIBRATION PROCEDURE

To begin calibration:

- First remove the weighing platform from the scale. The calibration switch access plate is located at the top, front, center of the scale.

- Set the scale on it's side to reveal the sealing screw on the bottom of the scale that holds the calibration access plate in place. Remove the sealing screw and the access plate and return the scale to an upright position. This will reveal the calibration switch (SW4) on the main PCB.

- Enter calibration by pressing the calibration switch (SW4) and then place the platform back on the scale. *(On 10 lb through 200 lb capacity scales, the platform should be placed upside down on the spider assembly so that the SW4 may still be accessed during calibration.)*

  The display will prompt "CAL 20". At this point, you can either:

  1) Push "ENT" to select this category

  or

  2) Select another category as described above.

CALIBRATION STEPS

NOTE: **During the calibration procedure each calibration step will be printed to any device interfaced to the RS-232 port.** ***(Refer to page 23 for a sample print out.)***

STEP DESCRIPTION *(Press ENTER after each entry)*

CAL 20 **Manual Calibration entry point**

CAP 21 Full capacity - Input full capacity of scale in the primary weighing unit.

rES22 Primary Resolution - Input Scale Resolution. Standard entry is the capacity of the scale divided by 5000 and rounded to the nearest 1, 2 or 5. *(Refer to enclosed chart for standard resolutions.)*

-0- 23 Zero Range - Input the Zero Range. The amount of weight the scale is allowed to zero off. *(99.8% is the maximum value that may be zeroed off, even if full capacity is entered.)*

UnS 24 Units - Select the weighing units number from the following table by pressing the ZERO button to scroll through the choices.

1 = lb	5 = lb t	9 = c
2 = kg	6 = gr	10 = oz f
3 = g	7 = dwt	11 = ml
4 = oz t	8 = oz	12 = l
		13 = tons

Prt 25 Print Stable*/First/Unstable - Use the ZERO button to select whether the scale will respond to a print request only when stable (StABLE) is to print the first stable; non-zero weight (FirSt) or any time a print is requested (UnStbL).

Cnd 26 Configure scale for Canadian specifications (“yes” or * “no”)

0 - t 27 Zero tracking value entered as a percent of one display resolution.

EXAMPLES: Entering a .25 represents a zero tracking value of 25% of one display resolution and entering a 0 will disable the zero tracking feature.

CAUTION: It is not recommended that a value larger than 5.00 be entered in this step as it may cause errors in the weight readings. (* . 25)

CALIBRATION STEPS (cont'd.)

Stt 28 Stable threshold, enter as a percent of one display resolution (1.00*)

CAL 30 **Secondary Weighing Unit**

2Un 31 Select secondary weighing unit using the INC button.

1 = lb	5 = lb t	9 = c
2 = kg	6 = gr	10 = oz f
3 = g	7 = dwt	11 = ml
4 = oz t	8 = oz	12 = l
		13 = tons

2rE 32 Secondary weighing resolution - Standard entry is the capacity of the scale divided by 5000 and rounded to the nearest 1, 2 or 5.

CAL 40 **Load Cell Calibration entry point**

FIL 41 Response time - Enter a number from 0 to 9 to select the response time of the scale. Pressing the INC button will scroll through the numbers. Press ENTER when the desired number is reached. A "0" will give very fast response and less immunity to vibrations. A "9" is the slowest response, but very stable. *("3" is the standard entry.)*

nol 42 No Load - With the platform in place but no weight on the scale, press ENTER

HLF 43 Half Capacity - Apply half load and press ENTER. If a 1/2-capacity weight is unavailable, place a substitute weight on the platform, key in the amount of weight being used and press ENTER.

FUL 44 Full Capacity - Apply full load and press ENTER button. If a full capacity weight is unavailable, place a substitute weight on the platform, key in the amount of weight being used and press ENTER.
(SEE WARNING ON PAGE 26)

WARNING!!! **When using a substitute weight for ½and full capacity, you must use weights which meet the specifications in either 1 or 2 below, or the scale may not calibrate properly.**

1. Two weights (one for 1/2 capacity, one for full capacity) that are greater than 25% of full capacity and differ by at least 50% of full capacity.
EXAMPLE: The weights used for a 100-lb scale could be 30 lb and 80 lb.

2. One weight which is preferably greater than 50%of full capacity.

nol 45 No Load - Remove all weight from the platform and press ENTER.

CFG 60 **RS-232 Configuration**
(This step can also be reached from the front panel by pressing and holding the PRINT button for 2 seconds.) **Press ENTER.** ***(* = default)***

bAU 61 BAUD RATE: Select a baud rate from the table below using the SCROLL (INC) push-button to view the options; press ENTER when you reach the required baud rate.

300 baud*	4800 baud
600 baud	9600 baud
1200 baud	19200 baud
2400 baud	

LEn 62 WORD LENGTH: Select the word length from the table below using the SCROLL (INC) push-button to view the options; press ENTER when you reach the required word length.

7 bits*
8 bits

CALIBRATION STEPS (cont'd.)

SPb 63 STOP BITS: Select the stop bits from the table below using the SCROLL (INC) push-button to view the options; press ENTER when you reach the required stop bits.

1 stop bit*
2 stop bits

PAr 64 PARITY: Select the parity from the table below using the SCROLL (INC) push-button to view the options; press ENTER when you reach the required parity.

None
Even parity
Odd parity*

Ech 65 ECHO: Use the SCROLL (INC) button to select whether the scale is to echo input data back to the sending device.

no Ech (No echo)*
Ech (Echo)

Cdr 66 COMM (Network) ADDRESS: If the scale is used in a networking situation it may be assigned an address number. When the scale is assigned an address number it will ignore any commands not preceded by that number. Key in a number from 0 to 255. *(0 is the normal entry and disables this feature).*

Pd 67 Select whether the power on diagnostics will be sent from the RS-232 port. *("Yes" or * "No")*

CALIBRATION STEPS (cont'd.)

CAL 70 **Setting of time and date**
(Steps 71 -73 will only come up if the Time and Date option is installed.)

StF 71 Select type of clock.

0 = 24 hour clock
1 = 12 hour clock, currently AM
2 = 12 hour clock, currently PM

td1 72 Enter the current time as HHMMSS. Based on the type of clock selected in step 71. Clock will begin with the pressing of the ENTER button.

td2 73 Enter the current date as MMDDYY.

Setting battery saver time:

SLP 74 For AC/DC versions of the scale, enter the amount of time the display is to remain on before going into the battery saver sleep mode. The time is entered in number of minutes, from .5 to 25. Entering a zero will disable the sleep mode for AC only scales.

CAL 80 **Formatted print slot programming. Press ENT to access the first print slot.**
Before continuing, an explanation of formatted printing is necessary.

BUILDING A FORMATTED PRINT

The user defined formatted print is the string of information sent from the RS-232 port when the PRINT button is pressed or the scale receives an SRP command from a computer or terminal. The user selects the format of this string by entering two digit print codes into the 21 available print slots, PSL 81 through PSL 102. The print codes, which represent various types of scale information and RS-232 page and line positioning commands, are divided into several categories i.e. prefix and suffix labels, scale data only, scale data with prefix and suffix labels, page and line formatting characters and repeat codes.

BUILDING A FORMATTED PRINT (cont'd.)

To build a formatted print, refer to "Formatted Print Codes" following this section. Select the desired code for the current slot and key it in using the INC and ADV buttons. Press ENTER to move to the next print slot. *(If a print code is entered that is not legal, the message "Illegal Print Code" will be sent out with the Formatted Print.)*

When you are finished entering data to construct the formatted print, "99" is entered to mark the end of print formatting.

NOTE: The code "0" allows you to exit the building or examining of a formatted print at any time without destroying or altering print codes already entered.

EXAMPLE OF BUILDING A FORMATTED PRINT

To build a simple formatted print that could be sent to a ticket printer the following print codes could be entered:

PSL 81 - 65 (This is a carriage return and line feed.)
PSL 82 - 30 (Prints the gross weight with prefix and suffix.)
PSL 83 - 65 (Sends another carriage return and line feed.)
PSL 84 - 32 (Prints the net weight with prefix and suffix.)
PSL 85 - 65 (Sends a carriage return and line feed.)
PSL 86 - 31 (Prints the tare weight with the prefix and suffix.)
PSL 87 - 65 (Sends a carriage return and line feed.)
PSL 88 - 65 (Sends a carriage return and line feed.)
PSL 89 - 99 (Ends the print format)

The result of the above formatted print is:

GROSS	1.205 lb
NET	0.205 lb
TARE	1.000 lb

FORMATTED PRINT CODES

Print Prefix and Suffix Formatted Print Codes

02 = Current Time *(only with time and date option)*
03 = Current Date *(only with time and date option)*
04 = Current weighing unit suffix label
05 = "GROSS" prefix label
06 = "TARE" prefix label
07 = "NET" prefix label

ELTRON LP 2642 Print Commands

14 = Prologue (File name "L1")
15 = Epilogue (P1, prints one label)

Print Data Only Formatted Print Codes

20 = Print Current gross weight
21 = Print Current tare weight
22 = Print Current net weight

Print Prefix, Data, and Suffix Formatted Print Codes

30 = Print Gross weight prefix, data and suffix
31 = Print Tare weight prefix, data and suffix
32 = Print Net weight prefix, data and suffix

Continuous Output Print Codes

50 = Continuous output (Formatted print will be sent continuously as long as scale is turned on.)
51 = Toggled continuous output *(The formatted print will be sent continuously after the PRINT button is pressed or an SRP command is received by the scale. Pressing the PRINT or sending SRP a second time will turn off the continuous output.)*
52 = Status Character *(May be used by a computer to determine the condition of the scale at any given moment. See Page 13 for a list and definition of the characters sent.)*
53 = ABO Checksum *(May be used in building a continuous output compatible with other Pennsylvania Scales.)*
54 = Select Leading Zeros
59 = No Operation

FORMATTED PRINT CODES (cont'd.)

Print Special ASCII Characters Formatted Print Codes

60 = Print an ASCII space (SP)
61 = Print an ASCII horizontal tab (HT)
62 = Print an ASCII line-feed (LF)
63 = Print an ASCII start of header (SOH)
64 = Print an ASCII carriage return (CR)
65 = Print an ASCII carriage return and line feed (CR LF)
66 = Print an ASCII form-feed (FF)
67 = Turn on large print (PA Scale printer)(SO, HEX 0EH)
68 = Turn off large print (PA Scale printer)(SI, HEX 0FH)
69 = Print an ASCII null (NUL)
78 = Invert print (PA Scale printer)(DC3, HEX 13H)
79 = End inverted print (PA Scale printer)(DC4, HEX 14H)

Formatted Print Codes

0 =	Exits building of formatted print without loss of previously entered print codes
91-98 =	Repeat Codes *(Repeats previous entry 1 to 8 times.)*
99 =	Marks the end of the formatted print

CAL 0 Exit Calibration

COMMAND FORMATS

All Model 7100, 7200 and 7300 scales may be calibrated and programmed through the RS-232 Interface using a terminal or computer. These scales are controlled by various commands, each three letters long, that represent related English phrases or words.

When the scale receives command strings, they are first placed in a 125-character buffer. If many commands are sent to the scale at high baud rates, it is possible to completely fill this buffer and data will be lost. Be sure to send commands to the scale at a rate which does not exceed 125 characters every 500 ms.

The basic command formats are:

1. [<add>]<cmd><cr>
2. [<add>]<cmd> [<flt>]<cr>

Where <cmd> is a three-letter command, <add> is a scale address number (0-255), <cr> represents a carriage return, and <flt> is mixed number, the brackets [ ] are used to indicate an optional part of the command.

The following are some **EXAMPLES** of command formats:

Command format 1:

SRP<cr>	Send a formatted print

Command format 2:

ITW 13.43<cr>	Instructs scale to set tare weight to 13.43 in the current unit

Command format 3:

5 SGW<cr>	Instructs scale with address #5 to send the gross weight.

MODEL 7X00 SERIES RS-232 SCALE COMMANDS

General Commands

ATW	Acquire Tare Weight - Same as ZRO
CHK	Initiate self-diagnostics CHecK
LCK	LoCK out keypad
PON	Power ON
POF	Power OFf
RES	RESet, clears tare weight
UCK	UnloCK keypad
UNP	UNits Primary
UNS	UNits Secondary
ZRO	ZeRO scale - Same as ATW

Commands Which Enter Information into the Unit

ITW [FLOATING POINT NUMBER]	Input Tare Weight

Commands Which Request Information

SAI	Send All Information (All setup information)
SAO	Send Abbreviated Output (Same as SRP)
SCI	Send Configuration Information
SDT	Send DaTe (with time and date option only)
SGW	Send Gross Weight
SMI	Send Metrological Information
SNW	Send Net Weight
SRP	Send Requested Print
SPC	Send Print Codes
STM	Send TiMe (with time and date option only)
STW	Send Tare Weight
SVN	Send Software Version Number

MODEL 7X00 SERIES RS-232 SCALE COMMANDS (cont'd.)

Calibrate and Configure Commands *(* requires SW4 to be pressed)*

CAL*	CALibrate - Scale will follow push button cal.
CFC	ConFigure Communication - To set baud rate etc.
CFP	ConFigure Print codes - To enter print formatting.
CLE	CaLibration End - To save calibration data.
CLP*	CaLibration Primary - To set-up primary calibration data.
CLS*	CaLibrate Secondary - Select secondary units and resolution.
CLU*	CaLibration Unstable - To set-up print stable/unstable.
CLW*	CaLibration Weight - To calibrate with weights.

Note: **All commands and parameters must be separated by spaces. The entire command string must be terminated with a carriage return.**

All tare functions are available through the RS 232 only. The display will only show gross weight.

CONFIGURATION OF RS-232 COMMUNICATION PARAMETERS

The unit leaves the factory with the following default communication settings :

BAUD	300
WORD LENGTH	7 bits
STOP BITS	1
PARITY	ODD

These settings may be changed using the local or remote display keyboard as described above, or RS-232 interface commands. If the RS-232 interface is used, initial communication with the users computer or terminal must be established using the above settings. To return the RS-232 settings to the above default values:

1. Unplug the unit power cord or otherwise remove power.
2. Depress the internal Calibrate button.
3. Plug in (or energize) the unit and continue to hold the calibrate button for 5 seconds.

When communication with the scale has been established, the CFC (ConFigure Communication) command may be used as described under the RS-232 command section.

COMMAND	FORMAT	DESCRIPTION
CFC	CFC 9600 8 1 0 0 5 <ENT>	Selects 9600 Baud, 8 bit word length, 1 stop bit no parity, no echo, and address #5. Other baud rates that can be used are: 300, 600, 1200, 2400, 4800 & 19200. Word length, 7 or 8. Stop bits, 1 or 2. Echo, 0 is off and 1 is on. Scale address # (0-255). Parity choices are: 0 is no parity, 1 is odd, 2 is even.

NOTE: Spaces must separate the settings and there must be 6 values.

CONFIGURATION OF RS-232 PRINT CODES

These print code settings may be changed using either the local or remote display push-buttons, or through RS-232 Interface commands. When communication with the unit has been established, the CFP (ConFigure Print code) command may be used as follows:

COMMAND	FORMAT	DESCRIPTION
CFP	CFP 30 65 31 99 <ENT>	Send gross weight, CR\LF, Send the net weight, End.

Up to 21 print codes can be entered. Refer to the Formatted Print Code list for additional print codes.

NOTE: **Spaces must separate the settings and a "99" must be the final print code. Refer to page 9 for further information on formatted print codes.**

CALIBRATION USING RS-232 SERIAL INTERFACE

The calibration feature is designed to prevent unauthorized personnel from changing any of the parameters that would affect the accuracy of the unit. This includes the full capacity, weighing resolution, zero range, units, filter response, weight calibration and whether printing is allowed when unit is stable or not. In order to change these parameters, the internal calibration switch (SW4) must be pressed.

Before starting calibration:

- **For the 10LB thru 100LB capacity** - Remove the stainless steel platform from the scale to expose the calibration access plate on the top, front, center of the scale. Remove the sealing bolt, nut and the access plate. This will expose the calibration switch (SW4) on the main PCB. Then place the stainless steel platform upside down onto the spider so that SW4 may be accessed when needed.

- **For the 2LB and 5LB capacity** - Remove the aluminum platform from the load cell. Remove the two Phillips head screws holding the top plate in place and lift the front of the top plate. This will allow access to the calibration switch (SW4) on the front center of the main PC board when needed

CALIBRATION USING RS-232 SERIAL INTERFACE (cont'd)

To begin calibration, enter any of the calibration commands. The Model 7X00 Series product will prompt to the terminal one of the following messages:

RESPONSE TO TERMINAL *(parenthesis indicate scale display message):*

"Push CALIBRATION SELECT Switch" (CALSEL)	Push the Calibrate Button now. This only has be done once. After this, other commands can be entered.

OR

W? Calibration Command Error" (CALErr)	If illegal values for the settings, incorrect number of settings, spaces not used between the settings, etc.

NOTE: BEFORE EXITING CALIBRATION, THE "CLE" COMMAND (CALIBRATION END) MUST BE SENT TO SAVE THE CALIBRATION DATA (EXCEPT WHEN "CAL" COMMAND IS USED)!

Unless otherwise indicated, the terminal responses and displays for the following serial interface commands are shown here *(parenthesis indicate messages on scale display)*:

CR/LF "Waiting for Calibration Command" (-232-)	If settings are acceptable.

OR

"? Calibration Command Error" (CALErr)	If illegal values for the settings, incorrect number of settings, spaces not used between the settings, etc.

CALIBRATION COMMANDS

NOTE: Spaces must separate the command and settings. And each command string must be terminated with a carriage return.

1. CLP - CaLibration Primary
   COMMAND: CLP 10.0 0.002 5.0 1 Enters the Calibration Factors for the Primary weighing mode.

The example shown selects:

10.0 = Full scale Capacity
0.002 = Resolution
5.0 = Zero Range
1 = Units code (LBS)

2. CLS - CaLibration Secondary
   COMMAND: CLS 2 0.002 Sets secondary units to "kg" and resolution to .002 kg.

3. CLU - CaLibration Print when Stable or Unstable
   COMMAND: CLU 0 Selects print when stable or unstable

   Options: 0 = Selects print when NOT stable
   1 = Selects print when Stable (Required for NTEP)

4. CLW - CaLibration Weight
   COMMAND: CLW 3 Enters the Standard Two (2) Point Weight Calibration using a filter response time of 3.

   COMMAND: CLW 3 5.0 Enters the Weight Calibration with a filter response of 3 and a single point calibration using a 5 lb. weight.

   COMMAND: CLW 3 1 10 Enters the Weight Calibration a filter response of 3 and using a 1 lb. and a 10 lb. weight.

NOTE: Unless Calibration points are entered as part of the CLW command,

Calibration points will default to one half, and one, times the full scale primary weighing range.

RESPONSE TO TERMINAL*(parenthesis indicate local display message):*

"Internal A/D Calibration.- Please Wait
(------)

Place the following weights on the platform, press ENTER *(either on terminal or scale)* after each:

0.000 lb*	(LoAd 0.000)	
5.000 lb*	(LoAd 5.000)	*(* = Current weighing unit*
10.000 lb*	(LoAd 10.000)	*selected will be displayed.)*
0.000 lb*	(LoAd 0.000)	

5. CLE - CaLibration End

COMMAND: CLE — Ends the calibration process and stores the results in the unit's internal memory. The unit will then self-test and return to normal operation.

RESPONSE TO TERMINAL:

"Saving CAL Data
CAL Completed" — If data acceptable.

CALIBRATION EXAMPLE

Using the example commands from page 22, a typical sequence of calibration commands might be:

CLP 10.0 0.002 5.0 1	Enters the Primary Calibration Factors
CLU 0	Selects print while Unstable for non-NTEP
CLW 3	Enters the Weight Calibration Mode
CLE	Ends the calibration process, stores results.

See the individual command descriptions for complete command and response information.

USING THE "CAL" COMMAND

The "CAL" command may also be used to calibrate the scale. This command will cause the scale to enter the same calibration routine as the push button calibration process.

After the "CAL" command is sent to the scale it will prompt the operator to press the calibration select key (SW4). After SW4 is pressed the scale will prompt with:(Brackets [] indicate scale display message)

Calibration Step (20)?
[CALSEL]

At this point the operator may: *(These steps may also be performed from the scale keypad if it has one.)*

1. Press return to go to calibration step 21.
2. Key in the number of another calibration category and press return.
3. Key in a "0" and press return to leave calibration.

The following is a list of prompts the terminal or computer would receive after calibration mode has been entered. The parenthesis indicate the current entry in the scale. Words inside of {} will not appear on the screen, but indicate possible entries. The list below uses the standard entries for a 25 LB capacity scale as an example.

Calibration Step (20)? 20*

21 Full Capacity (25.000)? 25.000	{Enter scale capacity}
22 Primary Resolution (0.005)? 0.005	{Enter display resolution}
23 Zero Range (25.000)? 25.000	{Zero to full capacity}
24 Primary Unit (1)? 1	{Refer to chart on p. 6}
25 Print Operation (StAbLE)? 1	{1 = stable, 0 = unstable}
26 Canadian Unit (no) ? 0	{1 = Yes, 0 = no}
27 Zero Tracking (0.25) ? .25	{Key in percent of one display resolution}
28 Stable Threshold (1.00) ? 1.00	{Key in percent of one display resolution)

Calibration (30) ?*

31 Secondary Unit (2) ? 2	{Refer to chart on p. 7 }
32 Secondary Resolution (0.002) ? 0.002	{Enter secondary display resolution}

Calibration Step (40)? 40*

41 Filter Speed (3)? 3	{0 (less filter) to 9}
42 No Load (0.000)? 0.000	{No weight on scale}
43 Half Load (12.500)? 12.500	{Place weight on scale}
44 Full Load (25.000)? 25.000	{Place weight on scale}
45 No Load (0.000)? 0.000	{Remove weight from scale}

USING THE "CAL" COMMAND (cont'd.)

Configuration Step (60)? 60*

61 Baud Rate (300)? 0 {Selections on p. 8 }
62 Parity (nonE)? 0 {0 = none, 1 = odd, 2 = even}
63 Word Length (8 bit)? 1 {0 = 7 bit, 1 = 8 bit}
64 Stop Bit (1)? 1 {1 or 2}
65 Echo (no Ech)? 0 {0 = no echo, 1 = echo}
66 Comm Address (0)? 0 {0 to 255}
67 Prt Diag (yes)? 1 {Yes or No}

Calibration (70) ? 70*

71 Set Time Flag (1) ? 1 {Selections on p. 9 } (T&D Option Only)
72 Set Time (135056) ? 135056 {Enter time HHMMSS} (T&D Option Only)
73 Set Date (110895) ? 110895 {Enter date MMDDYY} (T&D Option Only)
74 Sleep Time (0.0) ? 0 {Sleep time in minutes (.5 to 12)}

Configuration Step (80)? 80*

81 Print Slot (65)? 65 {Print codes on p. 12}
82 Print Slot (30)? 30 {Print codes on p. 12}
83 Print Slot (65)? 65 {Print codes on p. 12}
84 Print Slot (99)? 99 {Print codes on p. 12}

Configuration Step (0)? 0

Diagnostic...
8.7.6.5.4.3.2.1.0.
Wait... Ready for Command

- **At these steps:**
  1. Pressing return will enter that calibration category.
  2. Keying any of the following numbers (20, 40, 30, 60, 70, 80) and pressing return will access that category.
  3. Keying in "0" and pressing return will end calibration.