TI-2200 Series

Digital Indicator

Setup / Operation Manual

Revision 1.3
October 13, 2000

Transcell Technology inc.

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Contents subject to change without notice.

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CHAPTER 1: INTRODUCTION TO THE TI-2200 SERIES DIGITAL INDICATORS

The TI-2200 Series Digital Indicator is a general purpose, industrial grade weight indicator featuring keyboard tare and batching operation. One model is currently available, distinguishable by display type and enclosure type. Table 1-1 shows the TI-2200 series product matrix. All models operate identically, can readout up to 60,000 display divisions and can supply enough current for up to 8-350Ω load cells. All setup parameters may be entered via the front panel keys, including calibration.

If your Model TI-2200 Series Digital Indicator is part of a complete floor scale or has been installed for you, you may skip to Chapter 8 for operating instructions. Prior to using the indicator, please read this chapter carefully and completely. Store the manual in a safe and convenient place so it will be available if you have questions concerning the operation of the scale.

If you are an installer, the indicator's installation and wiring instructions are found in Chapter 2. The indicator contains three main setup menus. The Setup (“F”) menu configures the indicator to your weigh platform. The User (“A”) menu configures the serial communication port and enables some user options. The Batch (“B”) menu configures the batching operation. Chapter 3 gives an overview and explains how to use the five front panel keys to maneuver and save settings in all three menus. Chapters 4, 5 and 6 explain the Setup, User and Batch Menu options, respectively. Chapter 7 covers system calibration. Prior to installing the indicator, please read this manual carefully and completely. Store the manual in a safe and convenient place so it will be available if you have questions concerning the setup and operation of the scale.

MODEL	DISPLAY TYPE	ENCLOSURE TYPE
TI-2200	LED (light emitting diode), 0.6" tall	Stainless Steel, NEMA 4X rated

TABLE 1-1: TI-2200 Series Product Matrix

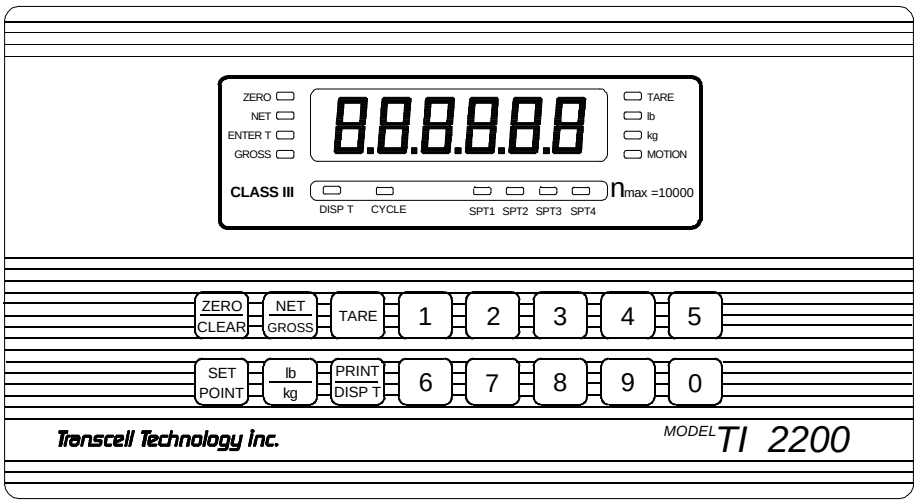

FIGURE 1-1: TI-2200 Front Panel

CHAPTER 2: INSTALLATION

2.1 STAINLESS STEEL ENCLOSURE – NEWER STYLE BOARDS

For indicators contained in a stainless steel enclosure, the rear cover must first be removed to make the appropriate connections to the weigh platform, printer, remote display and batching equipment. To remove the rear cover, simply remove the screws that secure it to the enclosure and set aside.

NOTE: The rear cover must remain off to access the Setup Menu and calibration procedures.

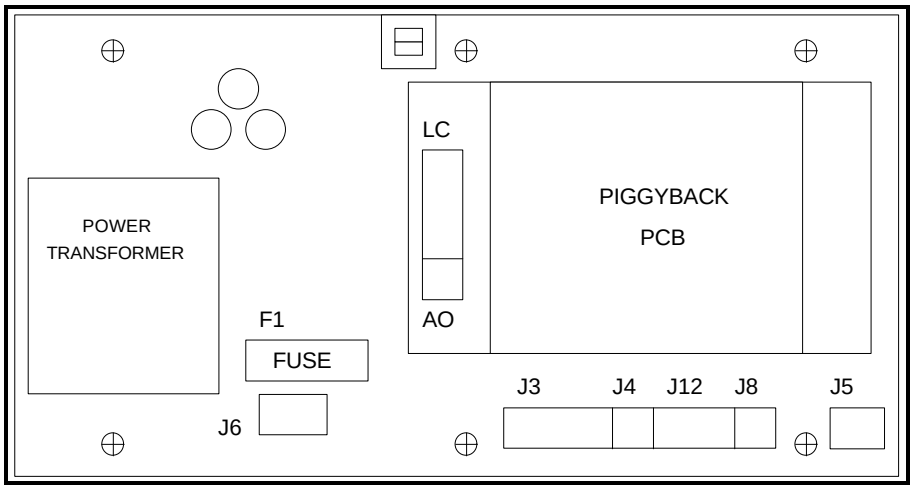

Figure 2-1: TI-2200 Newer Style Main Board Overview

2.1.1 CONNECTING THE WEIGH PLATFORM

1. Connect your shielded load cell cable (not included) to terminal LC on the piggyback board. Connection assignments for the Load Cell Terminal are shown in Figure 2-2.

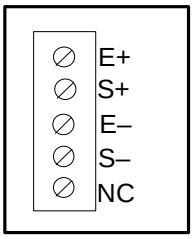

Figure 2-2: Connection assignments for the Load Cell Terminal

2.1.2 CONNECTING THE SERIAL PRINTER, REMOTE DISPLAY OR COMPUTER

The TI-2200 series indicator comes standard with a full duplex, RS-232 port designed for connection to a PC, serial printer or remote display.

For indicators housed in a Stainless Steel enclosure, this port is realized in J12 located on the main board. Connection assignments for the serial communication terminal are shown in Figure 2-3.

1. Connect your serial device communication cable (not included) to terminal J12 on the main board.

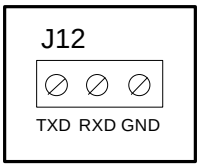

Figure 2-3: Connection assignments for the serial communication terminal

2.1.3 CONNECTING THE ANALOG EQUIPMENT (OPTIONAL)

The TI-2200 series indicator features an optional 4-20 mA analog output designed for connection to a PLC or strip printer.

For indicators housed in a Stainless Steel enclosure, this port is realized in AO located on the piggyback board. Connection assignments for the analog output terminal are shown in Figure 2-4.

1. Connect your analog equipment device cable (not included) to terminal AO on the piggyback board. IO is the current loop output and IG is the current loop return.

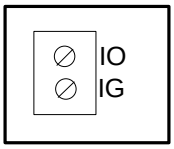

Figure 2-4: Connection assignments for the analog output terminal

2.1.4 CONNECTING THE BATCHING EQUIPMENT

The TI-2200 series indicator features one remote input and four output terminals for connection to batching equipment. A +5VDC terminal is also included for connection to an optional I/O module rack.

The outputs are TTL compatible and are labeled R1-R4. The single remote input is also TTL compatible. For suggested wiring diagrams, see Appendix E.

For indicators housed in a Stainless Steel enclosure, this port is realized in J3 located on the main board. Connection assignments for the batching terminal are shown in Figure 2-5.

1. Connect your output device cabling (not included) to terminals R1-R4 on J3 located on the main board.
2. Connect your remote input switch to the terminal marked IN on J3.

3. If you are using an optional I/O module rack, connect the VCC and Ground wires to J5 located on the main board.

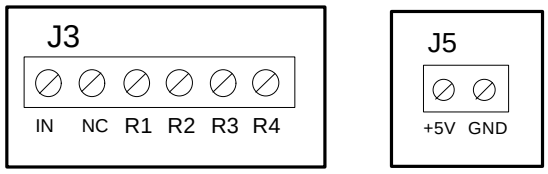

Figure 2-5: Connection assignments for the batching terminals

2.1.5 CONNECTING THE POWER SUPPLY

1. The indicator ships standard with an internal power supply. Simply plug the AC line cord into a standard 110 VAC wall outlet. For international customers, you may connect up to 230 VAC but you must first toggle the switch located next to the power transformer on the main board.

2.2 STAINLESS STEEL ENCLOSURE – OLDER STYLE BOARDS

For indicators contained in a stainless steel enclosure, the rear cover must first be removed to make the appropriate connections to the weigh platform, printer, remote display and batching equipment. To remove the rear cover, simply remove the screws that secure it to the enclosure and set aside.

NOTE: The rear cover must remain off to access the Setup Menu and calibration procedures.

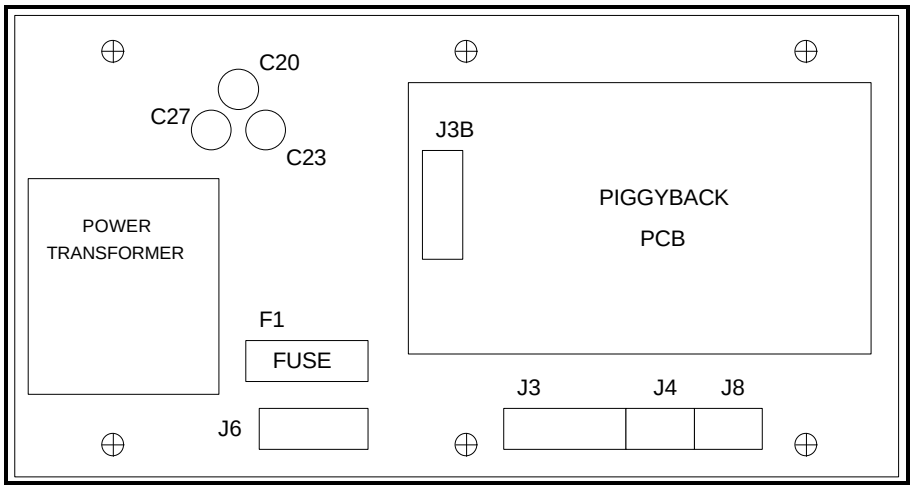

Figure 2-6: TI-2200 Older Style Main Board Overview

2.2.1 CONNECTING THE WEIGH PLATFORM

1. Connect your shielded load cell cable (not included) to terminal J3B on the piggyback board. Connection assignments for the Load Cell Terminal are shown in Figure 2-7.

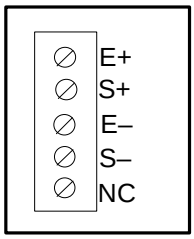

Figure 2-7: Connection assignments for the Load Cell Terminal

2.2.2 CONNECTING THE SERIAL PRINTER, REMOTE DISPLAY OR COMPUTER

The TI-2200 series indicator comes standard with a full duplex, RS-232 port designed for connection to a PC, serial printer or remote display.

For indicators housed in a Stainless Steel enclosure, this port is realized in J4 located on the main board. Connection assignments for the serial communication terminal are shown in Figure 2-8.

2. Connect your serial device communication cable (not included) to terminal J4 on the main board.

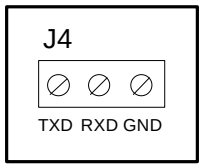

Figure 2-8: Connection assignments for the serial communication terminal

2.2.3 CONNECTING THE ANALOG EQUIPMENT (OPTIONAL)

The TI-2200 series indicator features an optional 4-20 mA analog output designed for connection to a PLC or strip printer.

For indicators housed in a Stainless Steel enclosure, this port is realized in J3B located on the piggyback board. Connection assignments for the analog output terminal are shown in Figure 2-9.

2. Connect your analog equipment device cable (not included) to terminal AO on the piggyback board. IO is the current loop output and IG is the current loop return.

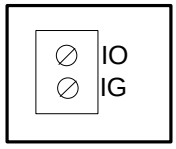

Figure 2-9: Connection assignments for the analog output terminal

2.2.4 CONNECTING THE BATCHING EQUIPMENT

The TI-2200 series indicator features one remote input and four output terminals for connection to batching equipment. A +5VDC terminal is also included for connection to an optional I/O module rack.

The outputs are TTL compatible and are labeled R1-R4. The single remote input is also TTL compatible. For suggested wiring diagrams, see Appendix E.

For indicators housed in a Stainless Steel enclosure, this port is realized in J3 located on the main board. Connection assignments for the batching terminal are shown in Figure 2-10.

1. Connect your output device cabling (not included) to terminals R1-R4 on J3 located on the main board.
2. Connect your remote input switch to the terminal marked IN on J3.
3. If you are using an optional I/O module rack, connect the VCC and Ground wires to J3.

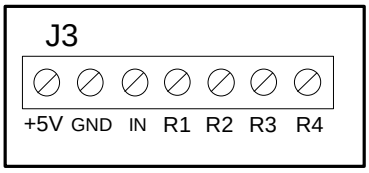

Figure 2-10: Connection assignments for the batching terminal

2.2.5 CONNECTING THE POWER SUPPLY

1. The indicator ships standard with an internal power supply. Simply plug the AC line cord into a standard 110 VAC wall outlet. For international customers, you may connect up to 230 VAC but you must first toggle the switch located next to the power transformer on the main board.

CHAPTER 3: CONFIGURATION

3.1 CONFIGURATION OVERVIEW

The indicator contains three main setup menus. The Setup (“F”) menu configures the indicator to your weigh platform. The User (“A”) menu configures the serial communication port and enables some user options. The Batch (“B”) menu configures the batching operation. The Setup, User and Batch menus consist of several menu selections, each with its own sub-menu of choices.

To set up the indicator, you must first enter the appropriate menu mode. Once there, four of the front panel keys become directional navigators to move around in the menus, and one key is used to save or SET the selections.

3.2 SETUP (“F”) MENU

3.2.1 ENTERING THE SETUP MENU

1. Power off the indicator by unplugging the power source.
2. Remove the back cover and locate the two-position DIP switch located near the top of the board.
3. Set switch #1 to the OFF position. **NOTE:** On the older style boards, set switch #1 to the ON position.
4. Power on the indicator by plugging in the power source. The indicator shows ” F 1” to indicate that you are in Setup Menu mode.

Note: Access to the back cover is inhibited if the indicator has been sealed for commercial use. For more information, please refer to Chapter 9.

3.2.2 NAVIGATING IN THE SETUP MENU

Use the directional keys shown in Figure 3-1 to move around in the Setup Menu Chart shown in Figure 3-2 on the following page.

1. To move to a new “F” heading, use the 9 (left) or 0 (right) key to move right or left in the Setup Menu Chart.
2. To move to the selection level, press the 7 (down) key once. The current saved selection is shown.
3. To view the available selections for the current “F” heading, use the 9 (left) or 0 (right) key to move through the selection field.
4. To save a new selection, press the Set Point (Set) key .To exit without saving, press the 6 (up) key to return to the current “F” heading.
5. Repeat Steps 1 through 4 until the Setup Menu is programmed.

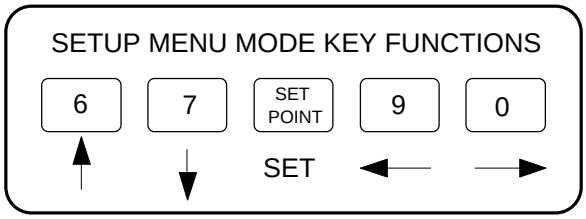

Figure 3-1: Setup Menu Key Assignments

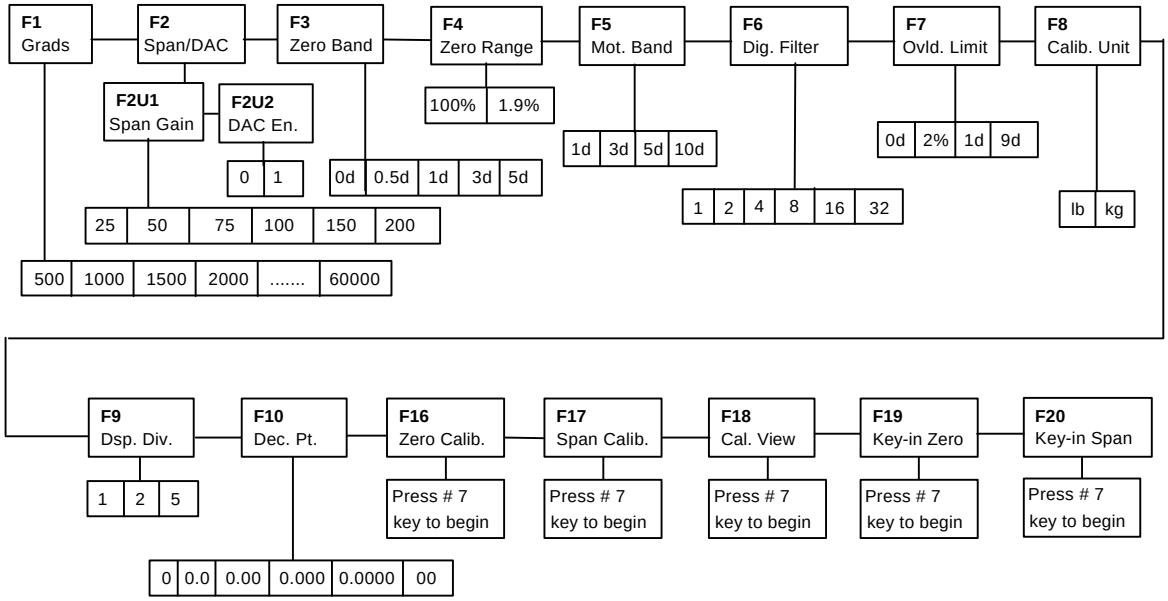

Figure 3-2: Setup Menu Chart

3.2.3 NOTES ON THE SETUP MENU

1. There is an **F21** sub-menu present that is for FACTORY USE ONLY!
2. Detailed descriptions of the setup menu parameters can be found in Chapter 4 of this manual.
3. On certain older units, you will find only F2. In this case, it is for Span Gain. On other certain older units, you will find only two selections available for F2U1. In this case, it is still for span gain - low resolution (0) or high resolution (1).

3.2.4 EXITING THE SETUP MENU

1. Power off the indicator by unplugging the power source.
2. Set switch #1 to the ON position. **NOTE:** On the older style boards, set switch #1 to the OFF position.
3. Power on the indicator by plugging in the power source. The display will go through a digit check, then settle into Normal Operating mode. All front panel keys will now return to their normal mode of operation.

3.3 USER (“A”) MENU

3.3.1 ENTERING THE USER MENU

1. Power off the indicator by unplugging the power source.
2. While pressing and holding down the lb/kg key, re-apply the power source. When the indicator shows ” A 1”, you are in User Menu mode and you may release the lb/kg key.

3.3.2 NAVIGATING IN THE USER MENU

Use the directional keys shown in Figure 3-3 to move around in the User Menu Chart shown in Figure 3-4 on the following page.

1. To move to a new “A” heading, use the 9 (left) or 0 (right) key to move right or left in the User Menu Chart.
2. To move to the selection level, press the 7 (down) key once. The current saved selection is shown.
3. To view the available selections for the current “A” heading, use the 9 (left) or 0 (right) key to move through the selection field.
4. To save a new selection, press the Set Point (Set) key .To exit without saving, press the 6 (up) key to return to the current “A” heading.
5. Repeat Steps 2 through 5 until the User Menu is programmed.

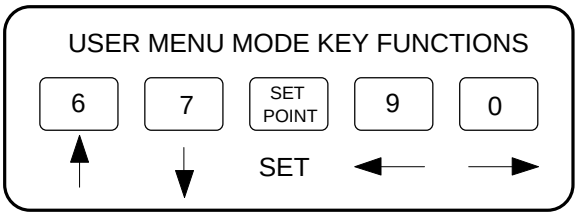

Figure 3-3: User Menu Key Assignments

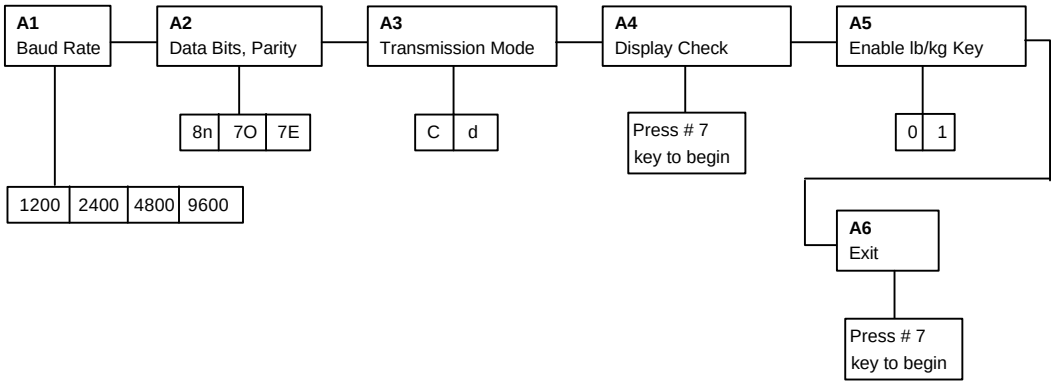

Figure 3-4: User Menu Chart

3.3.3 NOTES ON THE USER MENU

1. Detailed descriptions of the user menu parameters can be found in Chapter 5 of this manual.

3.3.4 EXITING THE USER MENU

1. Use the directional arrow keys to toggle to A6.
2. Press the #7 key to exit the User Menu mode. The display will go through a digit check, then settle into Normal Operating mode. All front panel keys will now return to their normal mode of operation.

3.4 BATCH (“B”) MENU

3.4.1 ENTERING THE BATCH MENU

1. Power off the indicator by unplugging the power source.
2. While pressing and holding down the Set Point key, re-apply the power source. When the indicator shows ” B 1”, you are in Batch Menu mode and you may release the Set Point key .

3.4.2 NAVIGATING IN THE BATCH MENU

Use the directional keys shown in Figure 3-5 to move around in the Batch Menu Chart shown in Figure 3-6 on the following page.

1. To move to a new “B” heading, use the 9 (left) or 0 (right) key to move right or left in the User Menu Chart.
2. To move to the selection level, press the 7 (down) key once. The current saved selection is shown.
3. To view the available selections for the current “B” heading, use the 9 (left) or 0 (right) key to move through the selection field.
4. To save a new selection, press the Set Point (Set) key .To exit without saving, press the 6 (up) key to return to the current “B” heading.
5. Repeat Steps 2 through 5 until the Batch Menu is programmed.

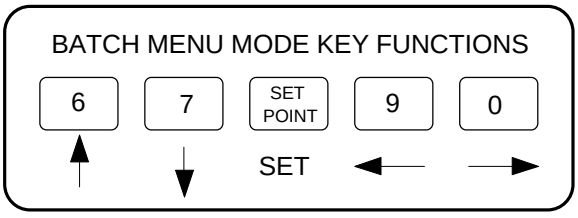

Figure 3-5: Batch Menu Key Assignments

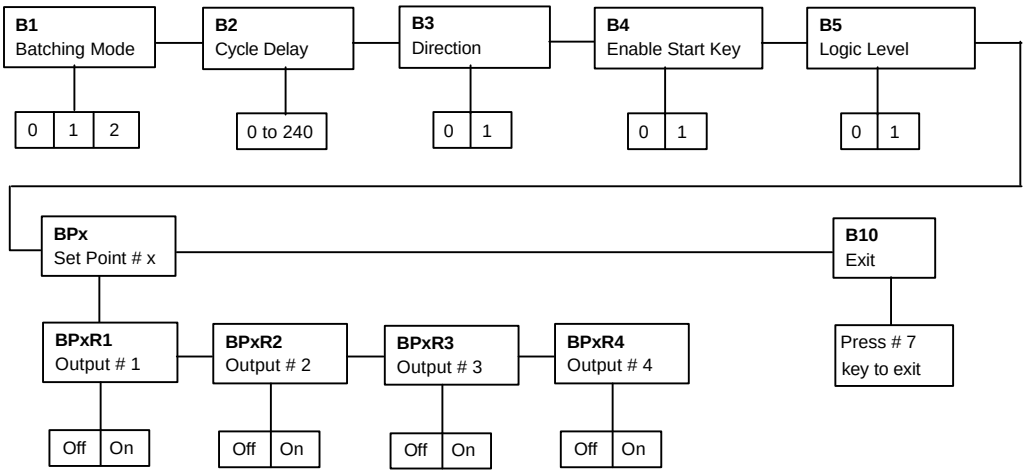

Figure 3-6: Batch Menu Chart

3.4.3 NOTES ON THE BATCH MENU

1. Detailed descriptions of the batch menu parameters can be found in Chapter 6 of this manual.

3.4.4 EXITING THE BATCH MENU

1. Use the directional arrow keys to toggle to B10.
2. Press the #7 key to exit the Batch Menu mode. The display will go through a digit check, then settle into Normal Operating mode. All front panel keys will now return to their normal mode of operation.

CHAPTER 4: SETUP MENU DESCRIPTIONS AND PROCEDURES

4.1 SETUP MENU DESCRIPTIONS

This section provides more detailed descriptions of the selections found in the Setup Menu Chart. Factory-set defaults are shown in bold with a checkmark (√).

Table 4-1 shows the selections that are <u>not</u> allowed for "Legal-for-Trade" applications:

NAME/CODE	DESCRIPTION	CODE/VALUE
F1 Graduations	Specifies number of full-scale graduations. Value should be consistent with legal requirements and environmental limits on the useful system resolution.	500 1,000 1,500 2,000 2,500 3,000 4,000 5,000 6,000 8,000 **10,000**√ 12,000 20,000 30,000 40,000 50,000 60,000
F2 Span Gain / DAC Enable	Sets the indicator's internal resolution and enables or disables the optional 4-20 mA output. This menu selection has two sub-menus; "F2U1" (Span Gain) and "F2U2" (DAC enable). F2U1: **"25"** lowest resolution / fastest update rate **"200"** indicates highest resolution / slowest update rate F2U2: **"0"** indicates disabled **"1"** indicates enabled	**F2U1**: 25, 50, 75, **100**√**,** 150, 200 **F2U2:** **0**√ 1
F3 Zero Track Band	Selects the range within which the scale will automatically zero. Note that the scale must be in standstill to automatically zero. Selections are in Display Divisions.	0d **0.5d**√ 1d 3d 5d
F4 Zero Range	Selects the range within which the scale may be zeroed. Note that the indicator must be in standstill to zero the scale.	**100%**√ 1.9%
F5 Motion Band	Sets the level at which motion is detected by comparing the present display update with the previous one. If motion is not detected for two seconds or more, scale is in standstill and can process a Print or Zero command. Maximum value varies depending on local regulations.	**1d**√ 3d 5d 10d
F6 Digital Filter	Averages weight readings to produce higher stability. The higher the filter number, the greater the stability but the slower the response time. Choose 8 unless a very fast response is needed.	1 2 4 **8**√ 16 32
F7 Overload Limit	Selects the desired formula which determines the point at which the indicator shows overload. All selections are based on the primary unit selected in F8. "FS" = Full scale in primary units.	FS **FS + 2%**√ FS + 1d FS + 9d
F8 Calib. Unit	Selects the primary base unit to be used in the calibration process. Also the default unit for normal operation. "1" = primary unit is lb. "2" = primary unit is in kg.	**1**√ 2

NAME/CODE	DESCRIPTION	CODE/VALUE
F9 Display Divisions	Determines the desired weight increments. Value should be consistent with legal requirements.	**1**√ 2 5
F10 Decimal Pt.	Determines location of the decimal point.	**0**√ 0.0 0.00 0.000 0.0000 00
F16 Zero Calibration	Places indicator into the zero calibration routine. Scrolling down with the **#7** key one level begins the procedure.	Press **#7** key to begin sequence
F17 Span Calibration	Places indicator into the span calibration routine. Scrolling down with the **#7** key one level begins the procedure.	Press **#7** key to begin sequence
F18 View Calibration	Actuates the function that allows you to view both the zero and span calibration value. The values displayed in this function are valid only after Calibration (F16 & F17) has been successfully completed. Scrolling down with the **#7** key one level begins the procedure.	Press **#7** key to begin sequence
F19 Key-in Zero	Allows you to key-in known zero calibration value in case of memory loss in the field. Scrolling down with the **#7** key one level begins the procedure.	Press **#7** key to begin sequence
F20 Key-in Span	Allows you to key-in a known span calibration value in case of memory loss in the field. Scrolling down with the **#7** key one level begins the procedure.	Press **#7** key to begin sequence
F21 Factory Reset	This sub-menu will reset all parameters in the "F", "A" and "B" menus to the default settings. USE WITH CAUTION!	Press the **#7** key twice to execute.

NOTES on Setup Menu Descriptions

1. On certain older units, you will find F2 as follows:

F2 Span Gain / DAC Enable	Sets the indicator's internal resolution and enables or disables the optional 4-20 mA output. This menu selection has two sub-menus; "F2U1" (Span Gain) and "F2U2" (DAC enable). F2U1: **"0"** low resolution / fastest update rate **"1"** high resolution / slowest update rate F2U2: **"0"** indicates disabled **"1"** indicates enabled	**F2U1**: 0 **1**√ **F2U2:** **0**√ 1

2. On other certain older units, you will find F2 as follows:

F2 Span Gain	Sets the indicator's internal resolution: **"25"** lowest resolution / fastest update rate **"200"** indicates highest resolution / slowest update rate	25, 50, 75, **100**√**,** 150, 200

SUB-MENU	TITLE	SELECTIONS
F1	Graduations	12,000 15,000 20,000 30,000 40,000 50,000 60,000
F3	Zero Tracking Band (SAZSM)	0d 5d
F4	Zero Reset Range	100% (Canada Only)
F5	Motion Band	3d 5d 10d
F6	Digital Filter	1 2 4

Table 4-1: Invalid Setup Menu selections for commercial applications

CHAPTER 5: USER MENU DESCRIPTIONS AND PROCEDURES

5.1 USER MENU DESCRIPTIONS

This section provides more detailed descriptions of the selections found in the User Menu Chart. Factory-set defaults are shown in bold with a checkmark (√).

NAME/CODE	DESCRIPTION	CODE/VALUE
A1 Baud Rate	Selects the baud rate for data transmission through the serial port.	1200 **2400**√ 4800 9600
A2 Data Bits and Parity	Selects the number of data bits and parity of serial transmission. "8n" = 8 data bits with no parity bit and one stop bit "7O" = 7 data bits with odd parity bit and one stop bit "7E" = 7 data bits with even parity bit and one stop bit	**8n**√ 7O 7E
A3 Mode of Serial Transmission	Selects when data will be sent out of the serial port to a printer or computer: "C" = Continuous mode; send data continuously "d" = Demand mode; send data when a PRINT command is issued from the printer, computer, or indicator.	C **d**√
A4 Display Check	Actuates the function that illuminates all digit segments, decimal points, and LCD annunciators in a test sequence. Pressing the **#7** key to scroll down one level begins the test sequence.	Press **#7** key to begin sequence
A5 Disable the lb/kg Key	Allows the lb/kg key to be disabled so that an operator does not accidentally press the key and change the displayed units. "0" = Disable the lb/kg key "1" = Enable the lb/kg key	0 **1**√
A6 Exit User Menu	Actuates the function that exits the User Menu Mode and returns to Normal Operating Mode.	Press **# 7** key to begin sequence

CHAPTER 6: BATCH MENU DESCRIPTIONS AND EXPLANATIONS

6.1 BATCH MENU DESCRIPTIONS

This section provides more detailed descriptions of the selections found in the Batch Menu Chart. Factory-set defaults are shown in bold with a checkmark (√).

NAME/CODE	DESCRIPTION	CODE/VALUE
B1 Batching Mode	Selects the batching mode through the set point outputs. "0" = Off "1" = Manual Batch Mode "2" = Automatic Batch Mode	**0**√ 1 2
B2 Cycle Delay	Selects the delay period (pause) in seconds between cycles for Automatic Batch Mode. "0" = free running	**0**√ 1, 2, 5, 10, 30, 60, 120, 240
B3 Direction	Determines the direction in which the outputs will activate: "0" = One direction (Latched) "1" = Both directions (Unlatched)	**0**√ 1
B4 Start/Stop Control Enable	Determines whether or not the batching cycle is controlled by the front panel lb/kg key / remote input. "0" = Disable Start/Stop control "1" = Enable Start/Stop control	0 **1**√
B5 Output Enable Level	Determines the logic level that denotes an "ON" condition for the output device. "0" = 0 VDC "1" = 5 VDC	**0**√ 1
BP1-BP4 Set Point Truth Table	Determines the state ("On" or "Off") of each set point output (R1-R4) for each set point range (SPT1-SPT4).	On **Off**√
B10 Exit Batch Menu	Actuates the function that exits the Batch Menu Mode and returns to Normal Operating Mode.	Press **# 7** key to begin sequence

6.2 BATCH MENU EXPLANATIONS

This section provides more information for all of the Batch Menu items. For even more information, be sure to see Appendix E.

6.2.1 Batch Mode (B1) and Cycle Delay (B2)

To understand the batch modes, you must first understand what is meant by a "cycle". A cycle is defined as the period of time that transpires between two events: batch start and batch end. Batch start is usually (but not always) zero weight. Batch end occurs when the displayed weight exceeds the highest programmed set point value.

Depending on the batch mode setup, cycles can be free running without end - or they can be one-time events that must be reset.

Manual Batch Mode- In this mode the batching cycle must be manually restarted once it is finished. This can be done by means of the Start/Stop key (see Chapter 8) and/or Remote Input (see Chapter 2).

Automatic Batch Mode- In this mode the batching cycle is automatically restarted once it is finished. However, the indicator must first pause. The length of time that the indicator pauses is programmed in B2 (Cycle Delay).

NOTE: B2 is disregarded if B1 is set to manual batch mode.

6.2.2 Direction (B3)

One Direction (Latched)- When set to "latched", the outputs (R1-R4) work only in one direction. Once a set point is reached, the output is activated (ON or OFF) but it cannot be re-activated until the cycle is restarted (or a subsequent set point re-activates the output). For example, suppose that R1 should turn ON when the weight reaches 300 pounds. Once this event occurs, R1 stays ON even if the weight drops back below 300 pounds for some reason. This is useful for batching applications where you want to mix specific quantities of 2-4 different ingredients together into a single mixer.

Both Directions (Unlatched)- When set to "unlatched", the outputs (R1-R4) will track the weight and toggle ON or OFF accordingly. This is useful for check weighing or self-running processes. For example, R1 could be programmed to ON when the weight is at or below 300 pounds and OFF when the weight exceeds 300 pounds. This would ensure that the material in a container never dropped below 300 pounds for very long.

6.2.3 Set Point Truth Table (BP1-BP4)

There are four weight set points, programmable from the front panel in Normal Operating Mode. These are referred to as SPT1-SPT4. The Batch Menu Mode defines four weight ranges, designated as BP1-BP4, as follows:

BP1 Range: $0 < \text{current weight} \leq SPT1$

BP2 Range: $SPT1 < \text{current weight} \leq SPT2$

BP3 Range: $SPT2 < \text{current weight} \leq SPT3$

BP4 Range: $SPT3 < \text{current weight} \leq SPT4$

There are four outputs on the indicator designated as R1-R4 (see Chapter 2). The BP1-BP4 sub-menus define the state (ON or OFF) for each of the four outputs (R1-R4) within each weight range (BP1-BP4). Refer to Table 6-1 for an example of a mixing application.

	R1 State	R2 State	R3 State	R4 State
BP1 Range	ON	OFF	OFF	OFF
BP2 Range	OFF	ON	OFF	OFF
BP3 Range	OFF	OFF	ON	OFF
BP4 Range	OFF	OFF	OFF	ON

Table 6-1: Batching Chart

CHAPTER 7: CALIBRATION

7.1 CALIBRATION OVERVIEW

The indicator is calibrated by following the procedures embedded in F16 (Zero) and F17 (Span) of the Setup Menu. Each procedure enters a value into the indicator's non-volatile memory - F16 the zero value (deadweight) and F17 the span value (test weight). The minimum test weight that can be used is 1% of full-scale capacity. The indicator allows for multi-point calibration in F17. These three calibration points are denoted C1-C3. You may use C1 only if you like. If you do use all three calibration points, then they must be in ascending order, e.g. 2,000, 5,000 and 10,000 pounds.

After the two calibration procedures are executed successfully, you should record both calibration values in Table 7-1 using the F18 View procedure.

In the unlikely event that either value is lost while in the field, the setup menu makes provisions for re-entering these values via F19 and F20, thus eliminating the need for re-calibration with test weights.

NOTE: This chapter assumes that the indicator is in Setup ("F") Menu mode. If the indicator is not in Setup Menu mode, refer to Chapter 3 for instructions.

7.2 ZERO CALIBRATION (F16)

1. While in the Setup mode, scroll to "**F 16**", then scroll down once using the #7 key to enter zero calibration menu. The display will momentarily show "**C 0**" followed by a value. This value is the internal A/D count and can prove useful when trying to troubleshoot setup problems.
2. After making sure that there are no test weights on the platform, press the ZERO key to zero out the displayed value.
3. Press the SET POINT key to save the zero point value. The display will show "**EndC0**" momentarily, then revert back up to F16. At this time, proceed to the F17 span calibration to complete indicator calibration.

7.3 SPAN CALIBRATION (F17)

1. While in the Setup mode, scroll to "**F 17**", then scroll down once using the #7 key to enter span calibration menu. The display will momentarily show "**C 1**" for the first span calibration point, followed by a value with one flashing digit. This value will be zero with the Decimal Point parameter selected in F10.
2. Place the first test weight on the weighing mechanism.
3. Use the front panel keys to key-in the actual test weight value. There is no need to enter a decimal point, since it is fixed on the display. If you make a mistake, press the ZERO/CLEAR key, which acts as a backspace.
4. After entering the exact value, press the SET POINT key to save the value. If the C1 calibration was successful, the display will show "**EndC1**" momentarily, followed by "**C 2**" for the second calibration point.
5. Repeat steps 2-4 for C2 and C3. At the conclusion of C3, the indicator reverts back up to F17. NOTE: If you wish to use only one calibration point (C1), simply press the ZERO/CLEAR key when prompted for C2 and C3.

6. At this time it is suggested that the calibration values be recorded for future use (see Section 7.4).

If the calibration was *not* successful, one of the error messages below will appear. Take the indicated action to correct the problem, then perform a new calibration.

"**Err0**" - The calibration test weight or the keyed-in weight is larger than the full capacity of the scale. Change the calibration test weight or check the input data.

"**Err1**" - The calibration test weight or the keyed-in weight is smaller than 1% of the full capacity of the scale. Change the calibration test weight or check the input data.

"**Err2**" - The internal resolution of the scale is not high enough to accept the calibration value. Select a larger parameter for the Span Gain (F2). SEE APPENDIX C FOR MORE INFORMATION.

7.4 VIEW CALIBRATION VALUES (F18)

Note: The values displayed in this procedure are valid only after a successful calibration has been performed using F16 and F17.

1. While in the Setup mode, scroll to "**F 18**", then scroll down once using the #7 key to enter View calibration menu.
2. The display will show the information listed in Table 7-1. The code will display briefly followed by the value. It is recommended that you record each value in the table below. Press any key to continue down the list. At the completion of the list, the indicator reverts back up to F18.

CODE	NAME	VALUE
C 0	Zero Calibration Value	
T 1	First Test Weight Value	
C 1	First Span Calibration Value	
T 2	Second Test Weight Value	
C 2	Second Span Calibration Value	
T 3	Third Test Weight Value	
C 3	Third Span Calibration Value	

Table 7-1: Calibration Value Table

7.5 KEY-IN ZERO CALIBRATION VALUE (F19)

Note: This procedure is intended for emergency use only in the case of non-volatile memory loss. A valid zero calibration value, obtained from a successful F16 calibration procedure, must be used.

1. While in the Setup mode, scroll to "**F 19**", then scroll down once using the #7 key. The display will momentarily show "**ET C 0**", followed by a value of zero
2. Use the front panel keys to key-in the actual zero calibration value. If you make a mistake, press the ZERO/CLEAR key, which acts as a backspace.
3. After entering the exact value, press the SET POINT key to save the value. The display will show "**E E C 0**" momentarily, then revert back up to F19.

7.6 KEY-IN SPAN CALIBRATION VALUE (F20)

Note: This procedure is intended for emergency use only in the case of non-volatile memory loss. A valid span calibration value, obtained from a successful F17 calibration procedure, must be used.

1. While in the Setup mode, scroll to "**F 20**", then scroll down once using the #7 key. The indicator will prompt you to enter the information in Table 7-2.
2. If the value shown is correct, press the ZERO/CLEAR key to move to the next parameter. Otherwise, use the front panel keys to key-in the actual calibration value If you make a mistake, press the ZERO/CLEAR key, which acts as a backspace.
3. After setting the exact value, press the SET POINT key to save the value.
4. If the entered values are entered successfully, the display will show "**E**" momentarily before continuing to the next parameter. At the completion of the sequence, the indicator will then revert back up to F20.

CODE	NAME
ET T 1	First Test Weight Value
ET C 1	First Span Calibration Value
ET T 2	Second Test Weight Value
ET C 2	Second Span Calibration Value
ET T 3	Third Test Weight Value
ET C 3	Third Span Calibration Value

Table 7-2: Calibration Value Entry Table

CHAPTER 8: OPERATION

8.1 DISPLAY

The Model TI-2200 indicator utilizes a 6-digit LED (Light Emitting Diode) display to display the weight and system information. Table 8-1 summarizes the display annunciators.

8.1.1 LIGHT EMITTING DIODE (LED) DISPLAY

Figure 8-1 shows the display detail of the TI-2200 LED display.

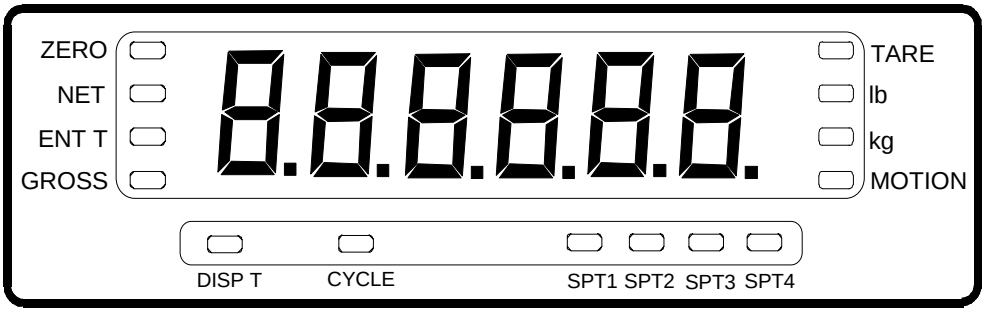

FIGURE 8-1: TI-2200 LED Display Detail

LED Annunciator	MEANING
ZERO	Better known as the “Center of Zero” annunciator, this light is active whenever the displayed weight is within ± 0.25 divisions of true zero.
NET	Denotes that the indicator is displaying net weight.
GROSS	Denotes that the indicator is displaying gross weight.
TARE	Indicates that a push-button tare weight has been established in the system.
ENTER T	Indicates that a keyed-in tare weight has been established in the system.
lb, kg	Indicates the unit of the displayed weight.
MOTION	This light is on whenever the scale is in motion.
DISP T	Denotes that the indicator is currently displaying the current tare weight.
SPT1-SPT4	During an active batch, denotes the state (ON or OFF) of each of the four outputs (R1-R4). When programming new set points, indicates which set point value is being entered.
CYCLE	Denotes that the indicator is currently processing an active batch. During an active batch, the keypad will be locked out.

TABLE 8-1: TI-2200 Series Annunciator Definitions

8.2 KEYBOARD

The keyboard is composed of sixteen function keys. Refer to Figure 8-2 for the overall layout and key locations.

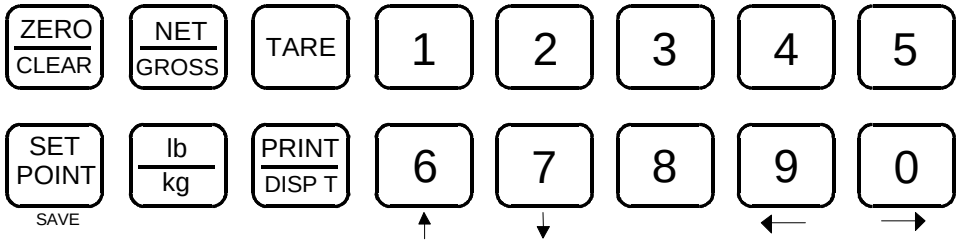

FIGURE 8-2: Function Keys Layout

8.2.1 FUNCTION KEYS

0 - 9 – These keys allow numeric entry where applicable, such as keyboard tare entry. The "6", "7", "9" and "0" keys also function as arrow keys when in the Setup Menu mode, Batch Menu Mode and User Menu mode.

lb/kg – This key toggles the indicator between the primary weight unit and the secondary weight unit if the key is enabled in the User ("A") menu. See Chapter 5 for more information.

This key also acts as the START/STOP key for batching. To start the batch, press and hold the lb/kg key for three seconds until the "Cycle" LED turns on. To stop the batch, press and hold the lb/kg key for three seconds until the "Cycle" LED turns off.

Zero/Clear - This key sets the indicator to display zero provided the following conditions are met:

1. The indicator is displaying Gross weight.
2. The displayed weight is within the zero reset range that is programmed in F4 of the Setup ("F") Menu.
3. The scale is not in motion.
4. The scale is not in overload (see Appendix D for error codes).

In the case of a numeric entry, this key acts as a backspace key.

Net/Gross - This key toggles the indicator between Gross weight and Net weight only if a Tare has been established.

Tare - This key is used to establish a Tare provided the following conditions are met:

1. The indicator is not at or below Gross zero.
2. The scale is not in motion.
3. The scale is not in overload (see Appendix D for error codes).

Print/Disp T - This key is used to send weight information out to the serial port provided the following conditions are met:

1. The scale is not in motion.
2. The scale is not in overload (see Appendix D for error codes).

When this key is held for three seconds, the indicator briefly displays the tare weight.

Set Point – This key allows you to program the set point values while in normal operating mode. See Section 8.3.5 for more information. Also acts as the Set (save) key while in one of the setup menus.

8.3 GENERAL SCALE OPERATION

8.3.1 WEIGHING AN ITEM

1. Select the desired weighing unit by pressing the lb/kg key until that unit is indicated on the display.
2. If necessary, press the ZERO key to obtain a weight reading of zero.
3. Place the object to be weighed on the scale's platter and allow the weight indication to stabilize. If the item weight exceeds the scale's weight capacity, it displays "❒❒❒❒❒❒".
4. Read the weight shown on the display.

8.3.2 TARING AN ITEM OF UNKNOWN WEIGHT

To weigh an item in a container, the weight of that container must first be subtracted from the overall weight to obtain an accurate weight reading. This is known as taring.

1. Select the desired weighing unit by pressing the lb/kg key until that unit is indicated on the display.
2. If necessary, press the ZERO key to obtain a weight reading of zero.
3. Place the empty container on the scale's platter and allow the weight indication to stabilize.
4. Press the TARE key. The display shows zero weight and turns the NET annunciator on.
5. Place the material to be weighed in the container and allow the weight indication to stabilize.
6. Read the weight shown on the display.
7. You may toggle between the gross weight and the net weight by pressing the NET/GROSS key.

8.3.3 TARING AN ITEM OF KNOWN WEIGHT

If the weight of the container or object is known, you may enter this weight via the keyboard. This value must be rounded to the nearest scale division. For example, on a 100 x 0.02 lb scale, you must enter the tare weight value to the nearest 0.02 lb.

1. Select the weighing unit of the known tare weight by pressing the lb/kg key until that unit is indicated on the display.
2. Using the front panel numeric keys, enter the known tare weight. If a mistake is made, you can press the ZERO/CLEAR key which acts as a backspace key.
3. Press the TARE key. If the tare weight is valid, the display shows zero weight and turns the NET annunciator on. If the tare weight is invalid, you will see an error message. Refer to Appendix D for displayed error codes and their meanings.
4. Place the material to be weighed in the container and allow the weight indication to stabilize.
5. Read the weight shown on the display.
6. You may toggle between the gross weight and the net weight by pressing the NET/GROSS key.

8.3.4 CLEARING THE TARE WEIGHT VALUE

1. Remove all weight from the platform and press the TARE key or enter numeric 0 for a key-in tare.

8.3.5 PROGRAMMING SET POINTS FOR BATCHING

This mode is used to enter your set point weight values for batching. In order to do so, Batch Menu item B1 must be set to either “1” or “2”.

You can enter the set point values in ascending or descending order – but they must be sequential. Please also remember to use net weights where possible.

1. If the “Cycle” LED is on, press and hold the lb/kg key to turn it off.
2. Press the SET POINT key. The indicator displays “Pt 1 t” briefly followed by the current value programmed for SPT1 (Set Point 1). The SPT1 LED is on to let you know which set point you are working with.
3. If the value shown is correct, press the ZERO/CLEAR key to move on to the next set point. Otherwise, use the front panel numeric keys to key-in the set point weight value. If a mistake is made, you can press the ZERO/CLEAR key, which acts as a backspace key.
4. After entering the correct value, press the SET POINT key to save the value and move to the next set point.
5. Repeat steps 3-4 for SPT2-SPT4. At the end of this sequence, the indicator returns to Normal Operating Mode.

8.3.6 STARTING A BATCH CYCLE

This section assumes that your indicator has been properly wired and configured for batching operation. If not, refer to Chapter 2, Chapter 6 and Appendix E.

There are two ways to start a batch cycle. The remote switch will be connected to the indicator’s remote input terminal.

FRONT PANEL METHOD

1. Press and hold the lb/kg key until the “Cycle” LED turns on.

REMOTE SWITCH METHOD

1. Press the remote switch once. The “Cycle” LED turns on.

8.3.7 STOPPING A BATCH CYCLE

This section assumes that your indicator has been properly wired and configured for batching operation. If not, refer to Chapter 2, Chapter 6 and Appendix E.

There are two ways to stop a batch cycle. The remote switch will be connected to the indicator’s remote input terminal. Note that in some batching configuration, the cycle LED will never go off because the batch cycle can never be stopped until the indicator is powered off.

FRONT PANEL METHOD

1. Press and hold the lb/kg key until the “Cycle” LED turns off.

REMOTE SWITCH METHOD

1. Press the remote switch once. The “Cycle” LED turns off.

CHAPTER 9: LEGAL FOR TRADE SEALING

9.1 STAINLESS STEEL ENCLOSURE

The TI-2200 indicator in the stainless steel enclosure can be sealed for commercial (Legal for Trade) applications as follows.

1. Power off the indicator by unplugging the power source.
2. Locate the two adjacent drilled head screws securing the rear cover.
3. Thread a wire security seal through both drilled head screws securing the rear cover.

APPENDIX A: SPECIFICATIONS

ANALOG SPECIFICATIONS

Full Scale Input Signal	30mV, including dead load
Minimum Sensitivity - Non H-44	0.4 μV / grad
Minimum Sensitivity - H-44	1.0 μV / grad
Input Impedance	30MΩ, typical
Internal Resolution	Approximately 260,000 counts
Display Resolution	60,000 display division max
Measurement Rate	10 Meas/sec, nominal
System Linearity	Within 0.01% of FS
Calibration Method	Software Calibration, with long term storage in EEPROM
Excitation Voltage	+10VDC, 8 x 350Ω load cells

DIGITAL SPECIFICATIONS

Microcomputer	Intel 80C32	
	Program Memory:	32K x 8, external to μC
	nVRAM	8K x 8, external to μC
	EEPROM:	64 x 16, external to μC
Digital Filtering	Software selectable	

SERIAL COMMUNICATIONS

Serial Port	Full Duplex, 1200, 2400, 4800, 9600 Baud 8 data bits, no parity, 1 stop bit 7 data bits, odd parity, 1 stop bit 7 data bits, even parity, 1 stop bit

OPERATOR INTERFACE

Display	0.6" (15.2 mm) 7-segment, Led, 6 Digit
Additional Symbols	Net, Gross, Motion, Tare, Entered Tare, lb, kg, Zero, Disp T, Cycle, SPT1-SPT4
Keyboard	16-key flat membrane panel

POWER

AC Line Voltage	110/230 VAC , 50/60 Hz
Power Consumption	10 VA, 1-350Ω load cell 15 VA, 4-350Ω load cells 19 VA, 8-350Ω load cells

ENVIRONMENTAL

Operating Temperature	14° to +104° F (–10° to +40° C)
Storage Temperature	–13° to +158° F (-25° to +70° C)

MECHANICAL

Overall Dimensions (no stand)	6" x 10.5" x 3" (152 mm x 267mm x 76mm)
Net Weight	9 lb (4.1 kg)
Enclosure Classification	NEMA 4X

APPROVALS

NTEP	Class III COC 94-080A2

APPENDIX B: SERIAL PORT INFORMATION

B.1 SERIAL PORT MODES

B.1.1 FULL DUPLEX MODE

The Full Duplex Mode provides a Demand serial transmission mode and is selected by setting A3 to “d”. The Demand mode allows control from a host device, usually a PC, and can be activated by pressing the PRINT key on the indicator’s front panel. Figure B-1 shows a suggested cable diagram for interface to a PC. Note that the DSUB9 in the figure does not exist on the TI-2200. Use terminal J12 (newer boards) or J4 (older boards) instead.

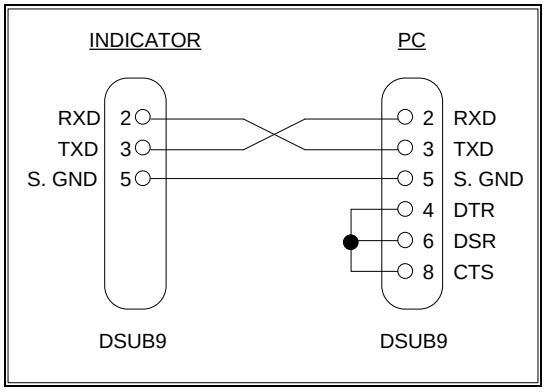

FIGURE B-1. Cable Diagram for Indicator to IBM PC

Figure B-2 shows the serial data format for the Demand Mode.

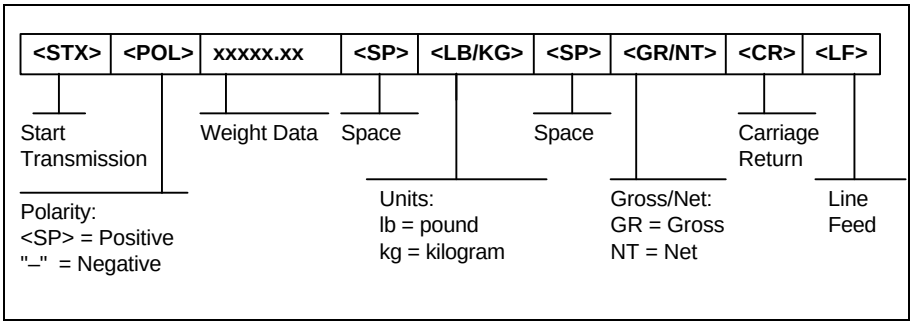

FIGURE B-2. Consolidated Controls Demand Mode

B.1.1.1 RECOGNIZED HOST COMMANDS

"P" - This command is sent to the indicator to print the indicated display. The indicator will not respond if the scale is in motion, positive overload or negative overload.

"Z" - This command is sent to the indicator to zero the scale. The indicator will not respond if the scale is in motion, positive overload or negative overload. The indicator will also not respond if it is not in gross mode or within the zero range specified in F4 of the Setup Menu.

"T" - This command is sent to the indicator to tare the scale. The indicator will not respond if the scale is in motion, positive overload or negative overload. The indicator will also not respond if it displaying a negative gross value.

"G" - This command is sent to the indicator to revert to gross mode. The indicator will not respond if the scale is in motion, positive overload or negative overload. The indicator will also not respond if it is not in net mode.

"N" - This command is sent to the indicator to revert to net. The indicator will not respond if the scale is in motion, positive overload or negative overload. The indicator will also not respond if it is not in gross mode or a tare has yet to be established.

"C" - This command is sent to the indicator to toggle among the configured units.

B.1.2 SIMPLEX MODE

The Simplex Mode provides a continuous serial transmission mode and is selected by setting A3 to "C". The Continuous mode is used to interface to computers, scoreboards, and other remote devices requiring constant data updating. The transmission occurs at the end of each display update. Figure B-3 shows the serial data format for Continuous Mode.

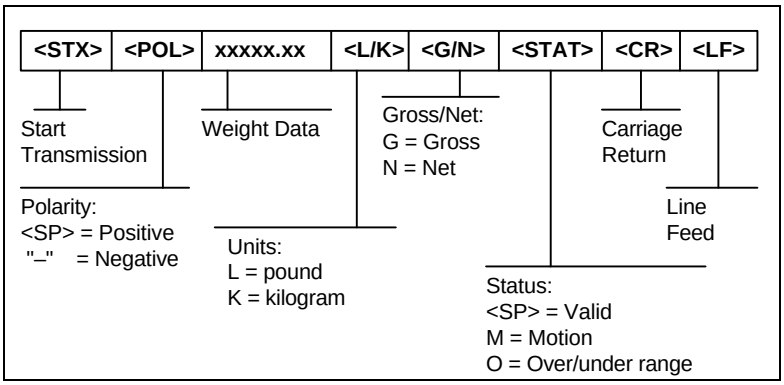

FIGURE B-3. Consolidated Controls Continuous Mode

APPENDIX C: DETERMINING PROPER SPAN GAIN (F2)

C.1 SPAN GAIN OVERVIEW

The Span Gain parameter found in F2 of the Setup Menu is directly related to the ADC (Analog to Digital Converter) integration time. This means that the lower the setting, the higher the number of measurements per second. A span gain setting of **25** produces about 25 to 30 measurements per second, while a span gain of **200** produces only about 3 or 4 measurements per second.

There is really no wrong setting for span gain – except in two cases. Using a low setting for a high resolution, low output system could yield instability. Using a high setting in a high output system could yield non-linearity.

C.2 SETTING THE INITIAL VALUE FOR SPAN GAIN

1. Determine the number of desired external graduations and choose the corresponding value listed in Table C-1 under the number closest to your full-scale input range in millivolts.
2. Enter the Setup Menu and save this number for the Span Gain parameter in F2.
3. Perform a system calibration. If the calibration proves unsuccessful, or you wish to view the internal counts, proceed to the next set of instructions.

C.3 VIEWING THE INTERNAL COUNTS

1. Enter the zero calibration menu (F16) and follow steps 1 to 3, ***but do not save the zero point.***
2. After pressing **ZERO** to zero the offset, place the test weight(s) on the platform. The displayed count is the internal count. If the count remains on zero, check your load cell connections.
3. At full scale, the displayed count should be a minimum of 2 times the desired external graduations. However, for maximum stability, a ratio of 6:1 or higher is recommended.
4. If the displayed count is large enough, remove the test weight(s), re-zero the indicator if necessary, and proceed with the calibration. If the displayed number is *not* large enough, increase the Span Gain to the next highest choice in the Setup Menu and re-calibrate.

# of External Grads	Full Scale Input Range (mV/V)														
	0.2	**0.4**	**0.6**	**0.8**	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**2.0**	**2.2**	**2.4**	**2.6**	**2.8**	**3.0**
500	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
1,000	50	25	25	25	25	25	25	25	25	25	25	25	25	25	25
1,500	75	50	25	25	25	25	25	25	25	25	25	25	25	25	25
2,000	100	50	50	25	25	25	25	25	25	25	25	25	25	25	25
2,500	150	75	50	50	25	25	25	25	25	25	25	25	25	25	25
3,000	150	75	50	50	50	25	25	25	25	25	25	25	25	25	25
4,000	200	100	75	50	50	50	50	25	25	25	25	25	25	25	25
5,000	–	150	100	75	50	50	50	50	50	25	25	25	25	25	25
6,000	–	150	100	75	75	50	50	50	50	50	25	25	25	25	25
8,000	–	200	150	100	75	75	75	50	50	50	50	50	50	50	25
10,000	**–**	**–**	**200**	**150**	**100**	**100**	**75**	**75**	**75**	**50**	**50**	**50**	**50**	**50**	**50**
12,000	–	–	200	150	150	100	100	75	75	75	50	50	50	50	50
15,000	–	–	–	200	150	150	100	100	100	75	75	75	75	50	50
20,000	–	–	–	–	200	200	150	150	150	100	100	100	75	75	75
30,000	–	–	–	–	–	–	200	200	200	150	150	150	150	100	100
40,000	–	–	–	–	–	–	–	–	–	200	–	–	150	150	–

Table C-1: Minimum Recommended (6:1) Span Gain Table

APPENDIX D: DISPLAYED ERROR CODES

CODE	MODE	MEANING / POSSIBLE SOLUTION
❒❒❒❒❒❒	Normal Operating Mode	Gross Overload. A weight greater than the rated capacity has been applied to the scale. Remove the weight from the platter or try re-calibrating the scale. Otherwise, check for a bad load cell connection or possible load cell damage due to overloading.
Err 0	Span Calibration Mode (F17)	Keyed-in weight value is larger than full scale capacity. Use a smaller test weight or check keyed-in value.
Err 1	Span Calibration Mode (F17)	Keyed-in weight value is less than 1% of full scale capacity. Use a larger test weight or check keyed-in value.
Err 2	Span Calibration Mode (F17)	There is not enough load cell signal to produce the internal counts necessary to properly calibrate the scale. First check all load connections. Use F16 mode to view internal counts. See Appendix C for more information.
Err 3	All Modes	Non-volatile memory read error. One or more setup parameters have been lost.
Err 4	All Modes	Non-volatile memory write error. Indicator needs service.
Err 5	Key-in Span Calibration Mode (F20)	You have attempted to enter a zero value for C1, C2 or C3. Enter a known calibration value greater than zero.
Err 6	Span Calibration Mode (F17)	You have attempted to enter a value for C1, C2 or C3 whose resolution is higher than the resolution of the scale For example, on a 100 x 0.02 lb scale, you cannot enter, say, 10.01 lb since the resolution is 0.02 lb.
Err 7	Initialization	No reading from the ADC. Make sure there is a load cell(s) connected to the indicator at start-up.
Err 8	Initialization	Diagnostics check error – nVRAM read/write problem. Indicator needs service.
Err 9	Normal Operating Mode	Span calibration value has been lost. Re-calibrate the scale.
t Err 1	Normal Operating Mode	You have attempted to key-in a tare weight that is greater than the scale's maximum capacity. For example, on a 6,000 lb scale, you cannot enter, say, 7,000 lb.
t Err 6	Normal Operating Mode	You have attempted to key-in a tare weight whose resolution is higher than the resolution of the scale For example, on a 100 x 0.02 lb scale, you cannot enter, say, 10.01 lb since the resolution is 0.02 lb.
Err 10	Initialization or Setting Code Entry	Indicator cannot read serial number. Indicator must be returned for service.

More =>

Err 11	Initialization	Serial number mismatch. Re-enter setting code from product ID tag.
Err 12	Initialization or Setting Code Entry	Invalid setting code. Re-enter proper setting code from product ID tag.
Err 13	Setting Code Entry	Non-volatile memory is in write-protect mode. Toggle position of setup switch (See Chapter 3).

Note: Contact Service Department at Transcell for instructions on how to re-enter setting code.

APPENDIX E: BATCHING MODE INFORMATION

E.1 WIRING DIAGRAMS

E.1.1 OPTIONAL I/O MODULE RACK

An optional I/O Module rack - with I/O Modules installed - is available for the TI-2200. This is the recommend interface between the indicator and live loads. Figure E-1 shows the wiring diagram between the indicator and Grayhill I/O Module Rack #70RCK4 or equivalent.

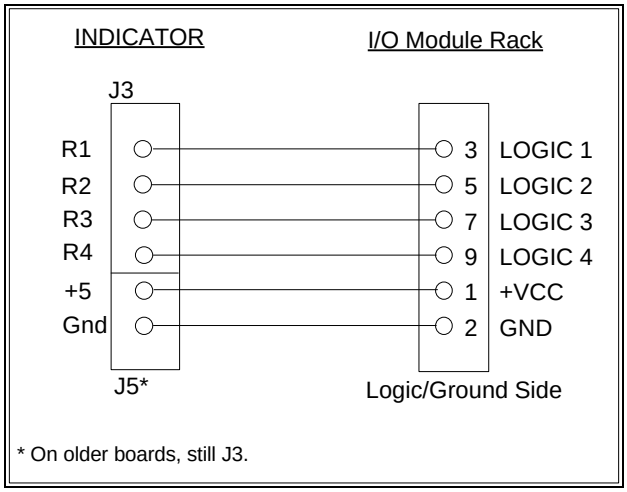

FIGURE E-1. Wiring Diagram for Logic Side of I/O Module Rack

Figure E-2 shows the wiring diagram between the optional Grayhill I/O Module Rack #70RCK4 and the load device(s). Consult Grayhill specification sheet for more information.

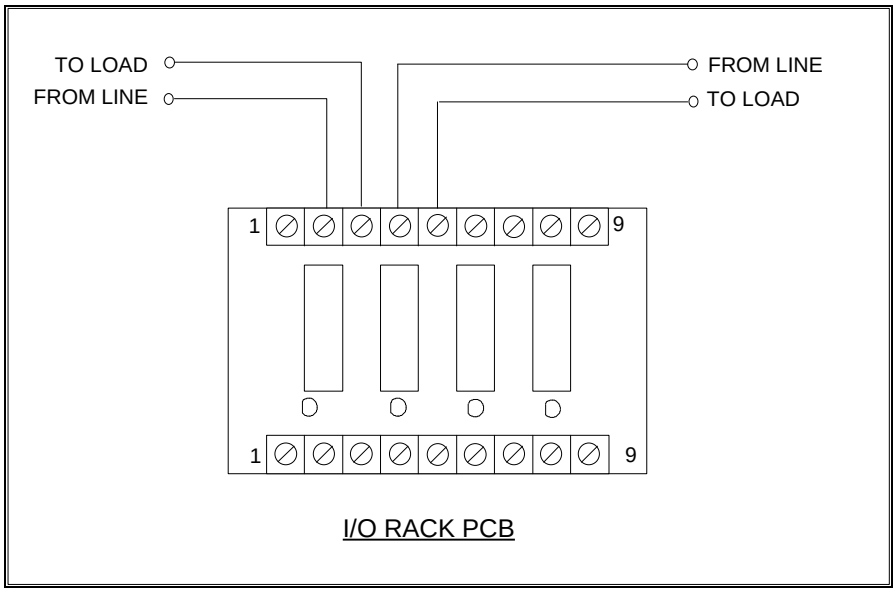

FIGURE E-2. Wiring Diagram for Load Side of I/O Module Rack

E.1.2 REMOTE SWITCH

You can wire a remote switch (not included) to act as the batch start/stop switch. This can be used in addition to or instead of the front panel lb/kg key. A momentary, normally open switch is recommended.

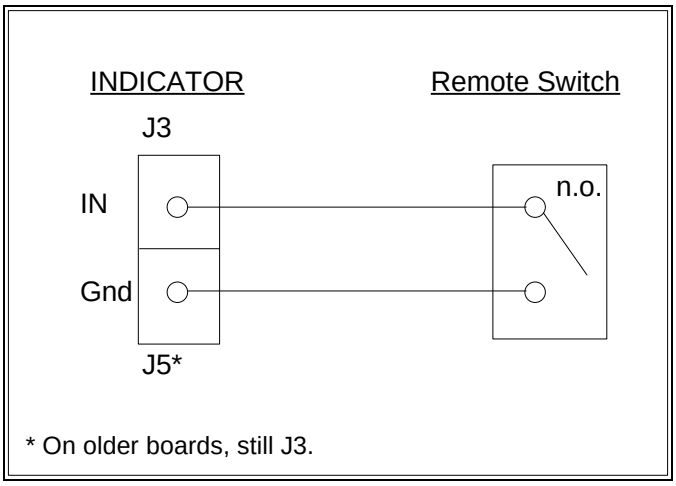

FIGURE E-3. Wiring Diagram for Remote Switch

E.2 PROGRAMMING EXPAMPLES

E.2.1 BATCHING

A mixer must be filled with 20 pounds each of four different ingredients. The mixer sits on the scale, which is configured for 100 x 0.1 pounds. An operator will manually start the cycle since the mixture will be dumped by hand.

The indicator will use the Grayhill I/O modules shown above to activate the dispensing.

Please program Batching Menu and set points as follows:

B1	1	SPT1	20.0 lbs
B2	don't care	SPT2	40.0 lbs
B3	0	SPT3	60.0 lbs
B4	1	SPT4	80.0 lbs
B5	0		

Program the truth table as follows:

	R1 State	R2 State	R3 State	R4 State
BP1 Range	ON	OFF	OFF	OFF
BP2 Range	OFF	ON	OFF	OFF
BP3 Range	OFF	OFF	ON	OFF
BP4 Range	OFF	OFF	OFF	ON

E.2.2 FILLING

A bag must be filled with 20 pounds of a single material. The bag hangs from the scale, which is configured for 100 x 0.1 pounds. An operator will remove the filled bag by hand. It takes under ten seconds to remove the bag, so the cycle will run continuously with a cycle delay of ten seconds.

The indicator will use the Grayhill I/O modules shown above to activate the dispensing.

Please program Batching Menu and set points as follows:

B1	2	SPT1	20.0 lbs
B2	10	SPT2	0.0 lbs
B3	0	SPT3	0.0 lbs
B4	1	SPT4	0.0 lbs
B5	0		

Program the truth table as follows:

	R1 State	R2 State	R3 State	R4 State
BP1 Range	ON	-	-	-
BP2 Range	OFF	-	-	-
BP3 Range	-	-	-	-
BP4 Range	-	-	-	-

E.2.3 CHECKWEIGHING

A bag must be weigh between 18-22 pounds. The scale is configured for 100 x 0.1 pounds. The indicator is wired to three light bulbs, yellow, green and red. If the bag is less than 18 pounds, the yellow light bulb should come on. If the bag is over 22 pounds, the red light bulb should come on. If the bag is between 18-22 pounds, the green light bulb should come on.

The indicator will use the Grayhill I/O modules shown above to activate the light bulbs.

Please program Batching Menu and set points as follows:

B1	2	SPT1	18.0 lbs
B2	0	SPT2	22.0 lbs
B3	1	SPT3	100.0 lbs
B4	0	SPT4	0.0 lbs
B5	0		

Program the truth table as follows:

	R1 State	R2 State	R3 State	R4 State
BP1 Range	ON	OFF	OFF	-
BP2 Range	OFF	ON	OFF	-
BP3 Range	OFF	OFF	ON	-
BP4 Range	-	-	-	-

APPENDIX F: OPTIONAL ANALOG OUTPUT INFORMATION

F.1 ZERO/SPAN ADJUSTMENTS

The optional 4-20mA analog output is factory calibrated. However, it may still be necessary to "tweak" the outputs to get the results that you want. This is provided via two trimpots – zero and span - located on the piggyback board. Figure F-1 shows the position of the two trimpots.

FIGURE F-1. Location of Analog Output Zero and Span Trimpots

The 4-20mA analog output is calibrated at the factory as follows:

1. A 250-ohm resistor is connected between the IO and the IG terminals.
2. The indicator is connected and calibrated to a load cell simulator. Usually, the zero calibration is performed at the 0.0 mV/V setting and the full-scale span calibration is performed at the 1.6 mV/V setting.
3. A DMM (Digital Multimeter) is set to DC volts and connected across the 250-ohm resistor.
4. The load cell simulator is set to 0.0 mV/V (zero weight). The Zero trimpot is adjusted until the voltage across the resistor is 1.0 VDC.
5. The load cell simulator is set to 1.6 mV/V (full scale weight). The Span trimpot is adjusted until the voltage across the resistor is 5.0 VDC.
6. Steps 4 and 5 are repeated as necessary.