FI-80 LCD / FI-80 LED Indicators

User's Manual

Contents subject to change without notice.

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INTRODUCTION TO THE FI-80 SERIES DIGITAL INDICATORS

The FI-80 Series Digital Indicator is a general purpose, industrial grade force indicator. Two models are available with different display types and power supply.

MODEL	DISPLAY TYPE	POWER SOURCE
FI-80 LED	Light Emitting Diode (LED)	110/220 VAC, 50/60 Hz
FI-80 LCD	Liquid Crystal Display (LCD)	Internal 6V battery with 12 VDC 800 ma charger

The LCD model contains a 6V rechargeable battery as the primary power source. The external power supply with these units functions as a charger for the rechargeable battery and may also be used as the main power supply.

The FI-80 is commonly outfitted at the factory with a load cell, hardware accessories and serial cable to fit your specific requirements. It is calibrated and is ready for installation into your application. Alternatively, your reselling distributor may have equipped this indicator for use with a particular load cell and calibrated the system together. Confirm that a certificate of calibration is on hand for the FI-80 Indicator and load cell combination. Prior to installation, you should view and record the calibration values in your FI-80. This is found at the end of the SETUP section.

Please read this manual carefully and completely prior to using the indicator. Store the manual in a safe and convenient place so it will be available if you have questions concerning the operation of your system.

INSTALLATION

INSTALLING THE LOAD CELL

Install the load cell according to your specific equipment and application. Set-up will vary between systems. Some things to keep in mind for best measurement performance

1. Insert the load cell fully in-line with the tensile or compressive force axis. Off center loading may result in measurement errors.
2. Allow for movement and relief of undesired loads.
    a. Compression load cells typically have one load cell end fixed in all directions and the other end uses a load button or ball bearing to apply a single point load that is free of undesired bending and torque loads.
    b. Tension load cells are often not rigidly affixed to surfaces. In this arrangement it becomes self aligning under load. Two convex surfaces contacting each other offers good immunity from undesired bending loads and a limited range of torque loads. An example is a lifting eye suspended from a shackle bolt.

CONNECTING THE POWER SUPPLY

The FI-80 LED indicator includes a hardwired AC line cord. Simply plug the unit into a standard wall outlet.

The FI-80 LCD indicators ship with the rechargeable battery pre-installed. The external power supply (included) can also be used to power the indicator. The adapter acts as the battery charger and the FI-80 LCD must use a 12 VDC, 800 mA adapter.

1. Simply plug the AC adapter into the indicator's DC Power Jack first, and then plug into a standard wall outlet. ***Make sure that the AC voltage appearing at the wall outlet***

matches the input voltage marked on the AC adapter.

OPERATION

DISPLAY

The two display types are 6 digit LCD (Liquid Crystal Display) and 6-digit LED (Light Emitting Diode) display. Typically, LCD's are used for outdoor applications while LED's are used indoors where brightness is needed. Table 7-1 summarizes both types of display annunciators.

LIQUID CRYSTAL DISPLAY (LCD)

FI-80 LCD Detail

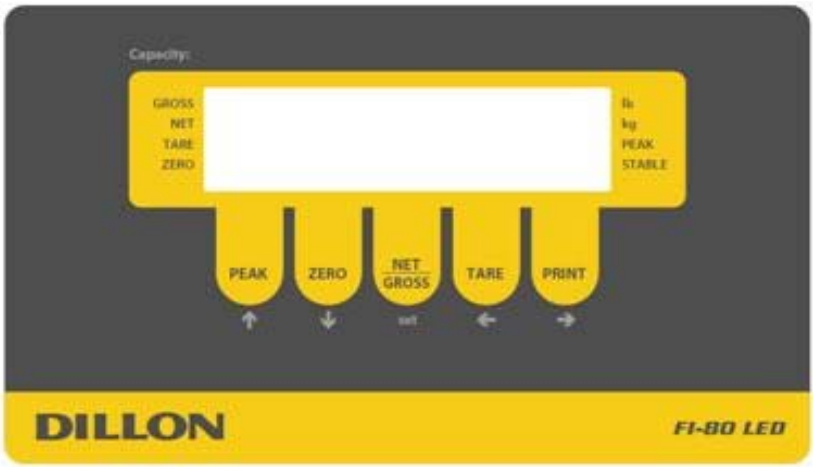
LIGHT EMITTING DIODE (LED) DISPLAY

FI-80 LED Display Detail

LCD Annunciator	LED Annunciator	MEANING
→0←	ZERO	Better known as the "Center of Zero" annunciator, this light is active whenever the displayed load is within ± 0.25 divisions of true zero.
N	NET	The FI-80 is displaying net load.
G	GROSS	The FI-80 is displaying gross load.
P	PEAK	The FI-80 is displaying peak load.
T	TARE	A tare load has been saved.
lb, kg	lb, kg	The active unit of measure.
◣◢	STABLE	Appears whenever the load is stable.

TABLE 7-1: FI-80 Series Annunciator Definitions

FRONT PANELS



LED version front panel

LCD version front panel

FUNCTION KEYS

PEAK – Toggles the indicator between normal live display mode and peak hold mode (Setup A5 must be set at “0” on the LCD version).

ZERO - Sets the FI-80 to display “0” provided the following conditions are met:
1. The FI-80 is displaying Gross load.
2. The displayed load is within the zero reset range (F4 in setup).
3. The load is not in motion (F5 in setup).
4. The FI-80 is not in overload (see Appendix D for error codes).

NET/GROSS - Toggles the indicator between Gross load and Net load only if a Tare has been established.

TARE - Establishes a Tare provided the following conditions are met:
1. The reading is not at or below Gross zero.
2. The load is not in motion.

3. The FI-80 is not in overload (see Appendix D for error codes).

PRINT - Sends display reading through the serial port when the following conditions are met:
1. The display is not changing.
2. The FI-80 is not in overload (see Appendix D for error codes).

See Appendix B for connection and print format details.

UNITS – (LCD model only) Toggles the indicator between lb and kg if enabled (A5 at "1") and peak hold is not configured (A11 at "0"). In any other conditions, the FI-80 LCD will display only the default unit of measure.

OFF – (LCD model only) When held for five seconds, shuts the unit off.

ON – (LCD model only) Turns the FI-80 on.

GENERAL OPERATION

DISPLAYING LOAD

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

TARING AN ITEM

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.

PEAK HOLD

Overview

1. The indicator has two modes of operation: NORMAL OPERATING mode and PEAK-HOLD mode.

2. Press the **PEAK** key to toggle the indicator back and forth between NORMAL OPERATING mode and PEAK-HOLD mode. (Peak Hold mode must be enabled in the FI-80 LCD – see

Normal Operating Mode

1. All keys perform as described in the manual while in this mode.

Peak-Hold Operation

In Peak-Hold mode, the display updates as the load increases, but not as the load decreases.

LCD version

1. Press PEAK to enter peak hold mode. The “P” annunciator appears on the left side of the display when PEAK HOLD mode is engaged and the value on screen is the peak value.
2. The **ZERO** key clears the previously stored peak value and zeroes the indicator. *Hint: To clear the peak without rezeroing, press the PEAK key twice.*
3. The **PRINT** key operates as it does in the NORMAL OPERATING mode.

LED version

1. Press PEAK to enter peak hold mode. The PEAK LED is lit when PEAK HOLD mode is engaged and the value on screen is the peak value.
2. The **ZERO** key clears the previously stored peak value but does not zero the indicator. *Hint: If rezero is required, enter Live display mode, zero and return to Peak display*
3. The **NET/GROSS** and **TARE** keys are locked out function in this mode.

SETUP

SETUP OVERVIEW

The indicator contains two main setup menus:

1. The “F” menu items configure the indicator to the attached load cell and is known as “Configuration” settings. Most of these are entered by a qualified instrumentation technician.
2. The “A” menu items configure the serial communication port and general user options.

In setup mode the front panel keys become directional navigators to move around in the menus and to save the selections.

ENTERING THE SETUP MENU

1. Power off the indicator.
2. Locate the slide switch on the rear cover and move it to the right.

   NOTE: A metal plate held on by two drilled-head screws may conceal the slide switch. The back cover may have a seal to keep unauthozed personnel from making changes to the indicator.
3. Power on the indicator. The indicator shows ” F 1” to indicate that you are in Setup Menu mode.

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. Press ← and → keys to move left and right to advance to the next or previous “F/A” setup heading.
2. Press the ↓ key once. The current saved setting is shown.
3. Press ← and → keys to scroll through selections for the current setup heading.
4. press the **Set** key to save the new selection. Press the ↑ key to escape without saving and return to the current heading,.
5. Repeat Steps 1 through 4 until the desired Setup & Configuration changes are made.

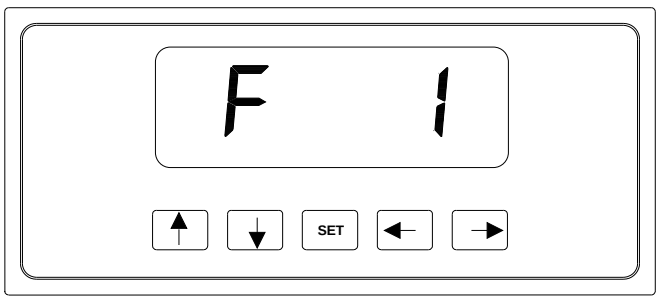


Figure 3-1: Setup Menu Key Assignments

EXITING THE SETUP MENU

1. Power off the indicator.
2. Move the slide switch on the rear cover back to the left.
3. Power on the indicator. 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.

SETUP MENU DESCRIPTIONS

List and detailed descriptions of the items within the setup screens. Factory-set defaults are shown in bold with a checkmark (√).

Note: Most "F" menu items configure the indicator to the attached load cell and are entered by a qualified instrumentation technician. These parameters do not appear in this manual. **Do not change these parameters, or the indicator may not function properly or may report highly inaccurate readings!**

NAME/CODE	DESCRIPTION	CODE/VALUE
F1	This item is for configuration by a qualified load cell indicator technician. Do not change this value or the instrument readings may be in error.	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
F2	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	25 50 **75**√ 100 150 200
F3	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument may respond unpredictably.	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% <u>FI-80 LCD extras:</u> 2% 20%
F5 Motion Band	Defines 'motion' in number of divisions of change between the present display update and the previous display. If motion has been detected within the prior two seconds, the Print and Zero commands are disabled. If a stable reading is not needed for printing or zeroing in your application, set this value at its highest number.	**1d**√ 3d 5d 10d <u>FI-80 LCD extras:</u> 0.25d 15d 20d 30d 40d 50d

F6 Digital Filter	Averages load readings to produce higher stability. The higher the filter setting, the greater the stability but the slower the indicator's response time. Choose 8 unless a very fast response is needed.	1 2 4 **8√** FI-80 LCD extras: 16 32 64 128
F7	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument may respond unpredictably.	FS **FS + 2%√** FS + 1d FS + 9d
F8	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	**1√** 2
F9	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	**1√** 2 5
F10	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	**0√** 0.0 0.00 0.000 0.0000 00
F12 (LCD version only	Not presently used. Keep parameter on 10.	5 **10√** 20 50 75 100
F16	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	Do not press ↓ key
F17	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	Do not press ↓ key
F18 View Calibration	Shows both the zero and span calibration value.	Press ↓ key to begin sequence
F19	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	Do not press ↓ key
F20	This item is for configuration by a qualified load cell indicator technician. Do not alter this value or the instrument readings may be in error.	Do not press ↓ key
F21 Factory Reset	This sub-menu will reset all parameters in the "F" and "A" menus to the default settings. USE WITH CAUTION!	Press the ↓ key twice to execute.
F23 (LED version only	Not presently used.	Arbitrary value
F24 (LED version only)	Not presently used. Keep parameter on 0.	**0√** 1

A1 Baud Rate	Baud rate for data transmission through the serial port.	1200 2400 4800 **9600**√ 19200
A2 Data Bits and Parity	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 "7n" = 7 data bits with no parity bit and two stop bits	**8n**√ 7O 7E 7n
A3 Mode of Serial Transmission	Data send mode: "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	Illuminates all digit segments, decimal points, and LCD annunciators in a test sequence.	Press ↓ key to begin sequence
A5 Disable the UNITS key	Disables the UNITS key so the operator does not inadvertently change the displayed units. "0" = Disable the lb/kg key "1" = Enable the lb/kg key This function is only relevant on the FI-80 LCD when **A11** peak hold functionality is disabled.	0 **1**√
A6 Serial Port Mode	RS-232 serial port mode: "0" = Full Duplex Mode "1" = Print Ticket Mode Refer to Appendix B for more information.	0 **1**√
A7 ID No. Enable	Include ID number in the Print Ticket mode. Valid only when **A6** is set to "1". "0" = Disable the ID No. "1" = Enable the ID No.	**0**√ 1
A8 ID No. Entry	Change ID Number printed on ticket. Valid only when **A6** is set to "1".	0 - 999999 **123456**√
A9 No. of Line Feeds	Number of line feeds printed on ticket. Valid only when **A6** is set to "1".	0 – 99 **8**√
	LED version only (see below for LCD version)	
A10 ***(LED version)*** Handshaking Enable	Enables hardware handshaking for Print Ticket Mode. Valid only when **A6** is set to "1". "0" = Disable Handshaking "1" = Enable Handshaking	**0**√ 1
A11 ***(LED version)***	Not presently used. Keep parameter on 0.	**0**√ 1
	LCD version only	
A10 ***(LCD version)*** Auto Power Off Period	Selects the auto off time period in minutes: "Off" = Disabled (Always ON) Auto-off occurs when display does not change or buttons are not pressed within the timescale.	Off 1, 2, 3, **5**√, 8, 10, 15, 20, 30

A11 ***(LCD version)*** Peak-Hold Mode	Enables “Peak Hold” mode. The display will only increment upward and the peak reading is retained. Press PEAK key to enter and exit the mode once active. “0” = Peak Hold disabled, “3” = Peak Hold enabled Note: UNITS are locked in default when **A11** is enabled.	**0**√ 3
A12 ***(LCD version)*** Handshaking	Enables hardware handshaking for Print Ticket Mode. Valid only when **A6** is set to “1”. "0" = Disable Handshaking "1" = Enable Handshaking	**0**√ 1
A13 ***(LCD version)***	Not presently used. Keep parameter on 0.	**0**√ 1

USER MENU PROCEDURES

This section provides instructions for some parameters.

ID Number Entry (A8)

1. Scroll to "**A 8**" and press the ↓ key.
2. The display will momentarily show "**ID NO**", followed by a value with one flashing digit. This value will be the current ID number value.
3. Use the four directional keys to adjust the displayed value to the actual ID Number value. Increase and decrease the flashing digit by pressing ↓ or ↑. Decrease the flashing digit by pressing the ZERO key. The ← and → keys will change the position of the flashing digit.
4. After entering the exact value, press the **Set** key to save the ID Number value. The display will show "**SET**" momentarily and revert back to A8.

LF (Line Feeds) Number Entry (A9)

1. Scroll to "**A 9**" and press the ↓ key.
2. The display will momentarily show "**LF**", followed by the current line feeds value.
3. Use the four directional keys to adjust the displayed value to the actual ID Number value. Increase and decrease the flashing digit by pressing ↓ or ↑. Decrease the flashing digit by pressing the ZERO key. The ← and → keys will change the position of the flashing digit.
4. After setting the exact value, press the **Set** key to save the line feeds value. The display will show "**SET**" momentarily and revert back to A9.

VIEW CALIBRATION VALUES (F18)

1. While in the Setup mode, scroll to "**F 18**", then scroll down once using the ↓ key to enter View Calibration menu.
2. The display will momentarily show "**CAL 0**" followed by a value. This value is the **zero calibration value** and should be recorded in the table below. Press any key to continue.
3. The display will momentarily show "**CAL 1**" followed by another value. This value is the **span calibration value** and should also be recorded in the table below. Press any key to return to upper level (F18).

SERIAL NUMBERS*	**ZERO CALIBRATION VALUE**	**SPAN CALIBRATION VALUE**
FI-80: Load cell 1: List any additional cells connected:	CAL 0:	CAL 1:

Table 6-1: Calibration Value Table

* Calibration is only valid for exact system calibrated. If any items are changed or removed, the system must be recalibrated together or significant errors may result.

* Record the new values after each recalibration.

APPENDIX A: SPECIFICATIONS

ANALOG SPECIFICATIONS

Excitation Voltage	+10 VDC (LED), +5 VDC (LCD)
No load input	0.00 mV/V
Load cell output level	up to + 3 mV/V
Sensitivity	0.4 μV / grad
Internal Resolution	Approximately 150,000 counts
Display Resolution	50,000 display division max
Measurement Rate	10 Measurements /sec, nominal
System Linearity	Within 0.02% of FS
Calibration Method	Software Calibration, with long term storage in EEPROM
Maximum load cell support	4 x 350Ω load cells

OPERATOR INTERFACE

Display – LED Indicators	0.56" (14 mm) 7-segment, LED, 6 Digit
Display – LCD Indicators	0.8" (20 mm) 7-segment, Liquid Crystal, 6 Digit
Additional Symbols	Net, Gross, Stable, Tare, lb, kg, Zero, Peak
Keyboard	5-key flat membrane panel

POWER

Rechargeable Battery – FI-80 LCD	6 VDC, 3.0 Ah lead acid with 12 VDC, 800mA charger
DC Power Consumption - FI-80 LCD	55mA + 15mA/350Ω Load Cell
DC Power Consumption - FI-80 LED	200mA + 30mA/350Ω Load Cell

ENVIRONMENTAL

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

MECHANICAL

Overall Dimensions (L x W x H)	10.4" x 3.1" x 7.7" (265mm x 80mm x 195mm)

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” and A6 to “0”. 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. Figure B-2 shows the serial data format for the Demand Mode.

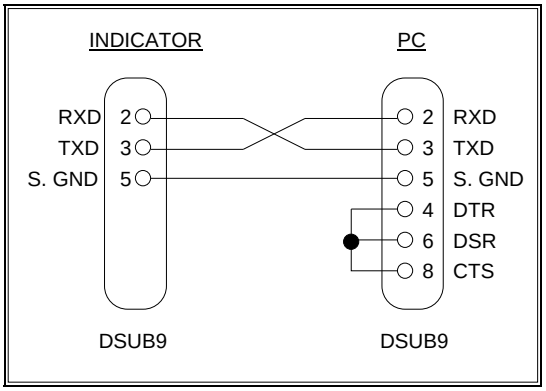


FIGURE B-1. Cable Diagram for Indicator to IBM PC

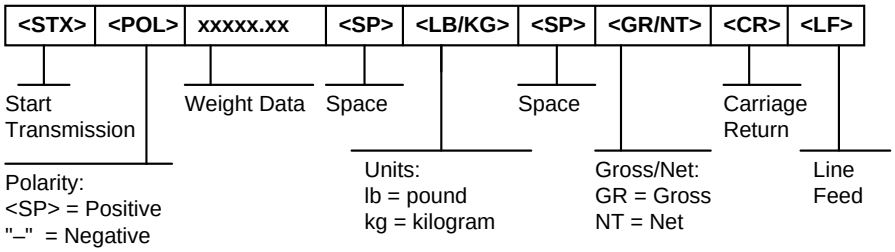


FIGURE B-2. Consolidated Controls Demand Mode

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 PRINT TICKET MODE

The Print Ticket Mode is designed specifically for a serial printer and is selected by setting A6 to "1". Figure B-3 shows the fixed format of the print ticket.

For printers with limited buffers, this mode supports DTR pin handshaking. The DTR pin from the serial printer is wired to the indicator's RXD pin which then functions as a CTS pin. Figure B-4 shows a suggested cable diagram for interfacing to a serial printer. Refer to the printer's user manual to confirm which pin is the DTR pin.

NOTES:

1. **The TARE and NET fields are not printed unless a tare has been established in the system.**
2. **The ID number field is not printed if it is disabled in A7 of the User Menu.**

```
ID. NO.   123456
GROSS      25.00 LB
TARE        1.48 LB
NET        23.52 LB
```

FIGURE B-3. Print Ticket

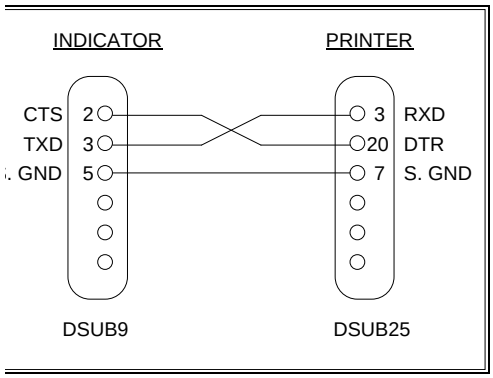


FIGURE B-4.

Cable Diagram for Indicator to Printer

B.1.3 SIMPLEX MODE

The Simplex Mode provides a continuous serial transmission mode and is selected by setting A3 to “C” and A6 to “0”. 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-5 shows the serial data format for Continuous Mode.

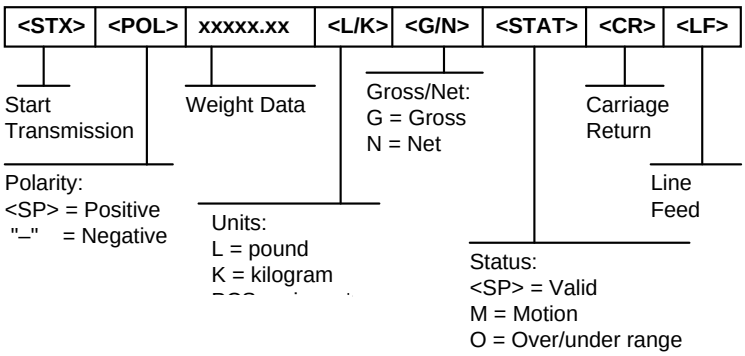


FIGURE B-5. Consolidated Controls Continuous Mode

APPENDIX C: DISPLAYED ERROR CODES

CODE	MEANING / POSSIBLE SOLUTION
❒❒❒❒❒❒	Gross Overload. A load greater than the rated capacity has been applied to the scale. Remove the load and verify operation. Contact your Dillon distributor with any problems.
Err 0	Should not appear in normal operation. Contact your Dillon distributor.
Err 1	Should not appear in normal operation. Contact your Dillon distributor.
Err 2	Should not appear in normal operation. Contact your Dillon distributor.
Err 3	Non-volatile memory read error. One or more setup parameters have been lost. Contact your Dillon distributor.
Err 4	Non-volatile memory write error. Contact your Dillon distributor.
Err 5	Should not appear in normal operation. Contact your Dillon distributor.
Err 7	ADC reading error. Contact your Dillon distributor.
Err 9	Calibration value read error. Contact your Dillon distributor.
	Indicates that the battery voltage is too low for normal operation. Recharge the battery.

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.