



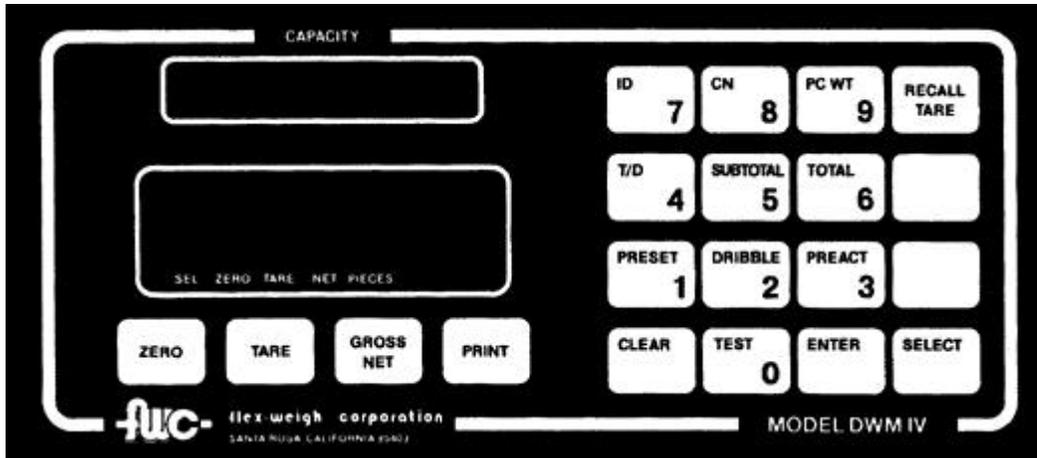
# Operator Manual

## Model DWM-IV



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## Standard Features:

**Keyboard programmable setup:** All select functions, setup and calibration are programmable through the keyboard. Access to setup mode is enabled by internal switch.

**Pushbutton Zero:** Used for establishing gross zero.

**Pushbutton Tare:** Automatically tares the weight of object placed on the scale and places scale in the net mode.

**Auto Zero Tracking:** Automatically tracks zero (0) within 1/4 digit to ensure a stable zero (0) over time.

**Gross/Net Pushbutton:** View net and gross weight when tare weight has been entered.

**Print Pushbutton:** Transmits data out of serial port.

**Numeric ID:** Single register to enter up to seven (7) digits of numeric identification.

**CN:** Six (6) digit consecutive number increments each time the [PRINT] button is pressed.

**Recall Tare Pushbutton:** Used for recall viewing of tare weights.

**Keyboard Tare Pushbutton:** 10 Tare look-up (0–9) to enter predetermined tare values.

**PC WT Entry:** 9 piece weight look-up (1–9) determines count by entering predetermined piece weight.

**Weight Accumulation:** 10 weight accumulation registers with subtotal.

**Digital Filter:** Compensates for vibration or motion, keyboard selected from 1 to 32 updates per average.

**Data Output:** Serial ASCII 20 mA current loop with selectable baud rates (150–19.2K), selectable auto or manual print, continuous data out, or bi-directional communication.

**Remote Control Inputs:** Zero, Tare, Net/Gross, Print. Requires voltage-free contacts.

**Enclosure:** NEMA-12 wall mount/dust-tight.

### ***Options:***

**Outputs:** Dual port serial RS-232, RS-422, RS-485, and/or 20mA current loop; Parallel BCD; Analog 4-20mA or 0-5 VDC.

**Time and Date:** Battery backed up time and date with selectable 12 or 24 hour mode.

**Setpoints:** Up to six (6) single speed or three (3) two speed setpoints with “Zero Interlock” and “Fill Complete” output.

**Table Stand:** Provides 60 degree angle mount stand for wall mount enclosure.

**N4S Enclosure:** NEMA-4 Stainless Steel watertight wall mount enclosure.

**Custom Systems:** Flex-Weigh offers full engineering support for customized systems. Contact your local dealer for further details.

### ***Specifications:***

**Keyboard:** Sealed keyboard with tactile keys.

**Display:** 6 digits and (-) sign. Seven (7) segment, 0.5" high blue vacuum fluorescent type, with annunciators for: function select, center zero, tare, net, pieces, F1, and F2.

**Internal Raw Count:** 100,000 counts maximum.

**Display Resolution:** 1 part in 10,000 maximum “Legal for Trade”, 1 part in 24,000 extended, 1 part in 100,000 maximum in high resolution mode.

**Display Increments:** x1, x2, x5, x10, x20, x50, x100.

**Decimal Point Location:** Selectable 1–4 places to the left.

**A/D Conversion Rate:** 15 updates per second.

**Response Time:** Zero (0) to full scale capacity, selectable to 0.5 to 4 seconds.

**Display Rate:** Selectable 0.25, 0.5, 1, 2, 5, 10, or 20 updates per second.

**Over Capacity:** Displays OLOADat 102% of Full Scale Capacity.

**Center Zero:** Light indication when scale is within +/-0.25 digit of center of zero (0).

**Load Cell Excitation:** 15 VDC, powers up to twelve (12) 350 ohm load cells.

**Input Sensitivity:** 0.6 to 12 microvolts per digit.

**Accuracy:** 0.01% of full scale or +/- one digit, whichever is greater.

**Data Output:** Serial ASCII 20 mA current loop with selectable baud rates (150–19.2K), selectable auto or manual print, continuous data out, or bi-directional communication.

**Operating Temperature:** -10 degrees C to +40 degrees C (+14°F to +104°F).

**Humidity: Maximum:** 95% RH non-condensing.

**Power:** 120 or 240 VAC, 50–60 Hz, 25 watts.

**Fuse:** 1/4A @ 120 VAC, 1/8A @ 240 VAC.

**Dimensions:** 12" (30.48 cm) H x 10" (25.4 cm) W x 5" (12.7 cm) D.

**Weight:** 16 lb (7.25 kg).

## **Compliance with FCC Rules**

Please note that this equipment generates, uses and can radiate radio frequency energy. If this equipment is not installed and used in accordance with the instruction manual you are warned that it may cause interference to radio communications. This unit has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a commercial environment. However, if this unit is operated in a residential area, it is likely to cause interference and under these circumstances the user will be required to take whatever measures are necessary to eliminate the interference, at his/her own cost.

## **Warranty**

Flex-Weigh Corporation (hereinafter called FWC) warrants that articles, materials and work furnished by them will conform to specifications, drawings and to other data cited, further stipulating that such material and workmanship shall be free from defect. FWC will repair or replace at its discretion, free of charge, any equipment covered by this warranty which is returned within one year of installation or fifteen months after initial delivery and which upon examination proves to be defective in nature or workmanship.

This warranty does not apply to any FWC product that has been:

- 1) Repaired or modified by anyone other than someone authorized by FWC if in their judgment such repair or modification has detrimentally affected the performance or reliability of the product.
- 2) Improperly installed or not adjusted in accordance with instructions provided by FWC.
- 3) Mishandled, abused, or in the judgment of FWC has been exposed to an environment for which the product was not designed.

This warranty constitutes FWC's exclusive warranty, there being no other warranties expressed or implied, including any warranty of merchantability or fitness for a particular purpose.

## **Installation Requirements**

Maximum performance is guaranteed only when installation of the scale system is performed by a qualified scale technician. For best performance, the AC mains supplying the scale system must be an isolated circuit free from other loads and not in close proximity to inductive or SCR controls.

**WARNING: THIS SCALE MUST BE OPERATED FROM AN AC POWER SOURCE THAT PROVIDES AN EARTH GROUND FOR THE SCALE CHASSIS TO ENSURE SAFE OPERATION AND PROPER PERFORMANCE. THE POWER CORD IS THE POWER DISCONNECT DEVICE. CARE SHOULD BE TAKEN NOT TO BLOCK ACCESS TO THE OUTLET IN CASE OF AN EMERGENCY.**

## **Unpacking and Inspection**

Remove the weightmeter display from its shipping container. Discard the protective materials. Do not plug the meter into an AC voltage source until completing the inspection of the instrument. With a proper screw driver, loosen the screws holding the lid clasps in place. Open the lid and visually inspect to make sure there are not signs of shipping damage such as broken wires, loose components, or fractured printed circuit boards. This visual inspection is necessary if a shipping claim needs to be processed. Every care has been taken to minimize potential damage that could occur if rough handling is experienced in transit.

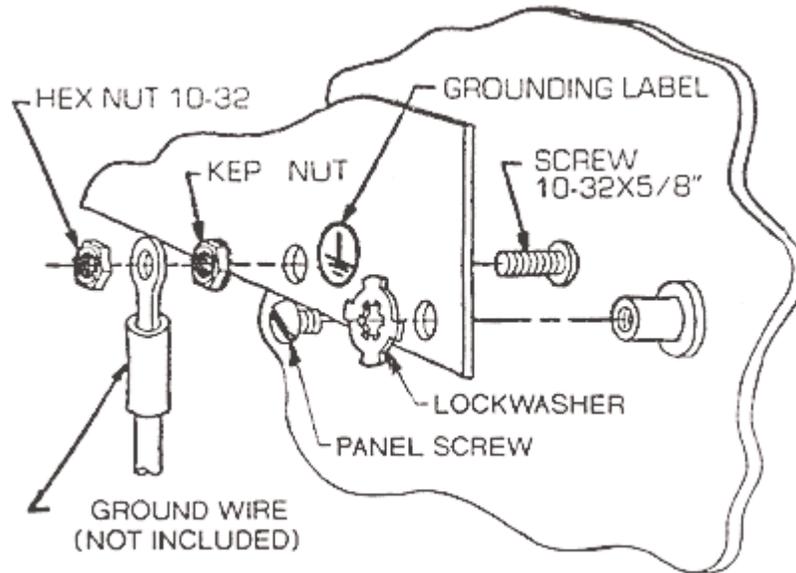
## **Handbook 44 Requirements**

The following applies to Model DWM-IV weightmeters used on Handbook 44 applications.

- 1) Wire seal provision is required on access lid.
- 2) Piece count feature must be disabled (Step F5.0 of SET-UP procedure).
- 3) RFI (Radio Frequency Interference) protection kit option is required in areas where RFI is present.

# Installation Instructions for Grounding Kit

Part No. 99411-399



1. Insert the 5/8" long screw through the hole in the panel as shown.
2. Secure screw with kep nut. The kep nut must bite into the paint to insure electrical continuity.
3. Attach the ground wire and secure with 10-32 hex nut as shown.
4. Install the lockwasher under one of the screws securing the panel to insure grounding between the panel and the enclosure.
5. Attach grounding label included adjacent to the bolt as shown.

Rev. D

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# Operating Instructions

## A. DISPLAY

The display indicates the arithmetic result of the analog signal derived from the scale base. The display indicates: OLOAD at 102% of capacity and above.

## B. STATUS INDICATORS

The DWM-IV illuminates a triangular arrow above the proper legend for current status of the display. The status indicators are:

1. SEL - illuminated while accessing the front panel options.
2. ZERO - illuminated when the scale base is within +/- 0.25 increment of zero
3. TARE - when lit, indicates that a tare value is being displayed.
4. NET - when lit, indicates that a non-zero tare value is currently being used.
5. PIECES - illuminated when in the piece count mode to indicate that the display is showing pieces instead of weight.
6. F1 - Future option. (not labeled on standard units)
7. F2 - Future option. (not labeled on standard units)

## C. KEYBOARD



1. [Zero] Button: This button allows re-zeroing of the scale over a +/- 2% range of scale capacity or full scale capacity (programmable). During set-up, the automatic zero tacking may be disabled if desired. This button must be pressed for approximately two seconds to capture zero.



2. [Tare] Button: This button is used to remove the container weight value from the weight indication. When pressed with weight on the scale no motion present, this tare value will be stored and subtracted from the gross weight to indicate a net weight display of zero. Pressing the [TARE] button places the system in net weighing mode.



3. [Gross/Net] Button: If a tare has been entered, this button will alternately select between the gross and net weight modes. If the tare has been cleared to zero, the DWM-IV will automatically select the gross weight mode. This button will be inactive while the tare value remains equal to zero.



4. [Print] Button: This button initiates a print cycle to an external peripheral device such as a ticket printer or computer. The output format may be programmed during the set-up procedure.



5. [Recall] Tare: The instrument is equipped with a key board to provide a means of entering a known tare weight. Up to six (6) digits of digital tare may be entered up to the full capacity. Entries greater than full capacity will be cleared to zero. The least significant digit (LSD) is automatically rounded to conform to the pre-programmed instrument LSD. Press the [RECALL TARE] button then a numeric button corresponding to the tare register desired (if ten (10) tare look-up feature is enabled) and the [ENTER] button. The previously displayed data will be shown. Enter the required value and press [ENTER]. This value is then stored in memory. A non-zero value places the system in net weighing mode.



6. [Select]: This button is used to access the pre-programmed front panel functions as indicated on the corresponding buttons zero through nine.



7. [Clear]: Used to clear a mistaken entry while in one of the data entry modes.



8. [Enter]: This button is used to store data into memory and also to sequence through the data entry procedure.

## D. FRONT PANEL FUNCTIONS



TEST — Allows the operator to test the integrity of the weight display by sequentially lighting each segment of all digits, all segments, and each arrow indicator. These results show that all drivers and displays operate in both the on and the off conditions.



PRESET — The DWM-IV provides up to eight (8) outputs which may be used to control solid state relays. The system may be configured for three (3) two-speed or six (6) single-speed, cascaded setpoints. In addition, zero interlock and FILL COMPLETE outputs are provided which, when used with additional, external hardware, may be used to simplify batching operations. Enter the weight value desired for each preset starting with number zero through to number three (3) or six (6). The zero interlock preset is number zero. If it is desired to merely view the presets already in memory, simply press [ENTER] without pressing any numeric buttons or [CLEAR]. The weight values will be displayed from zero (0) to three (3) or six (6) then return to normal weight display mode.



DRIBBLE — The value entered as the dribble amount is subtracted from the final setpoint (PRESET-PREACT) and this amount is the fast feed cut-off setpoint. It represents the amount of material desired to be filled at the slow rate. The values are entered in the manner as described for PRESET above where number one (1) corresponds to PRESET number one (1) above, etc. This function is only active if the two-speed configuration has been selected.



PREACT — Enter the value of weight that is to be subtracted from the preset value in computing the final cut-off value for the output. This value represents the amount of in-flight material.



T/D — This function allows the operator to enter the current time and date for print-out purposes. The time and date option must be installed and enabled for this feature to be operative.



SUBTOTAL — The DWM-IV contains ten (10) registers for weight accumulation. The subtotal of all previously recorded weights or pieces may be recalled and/or printed using this button. The totals registers remain intact after use.



TOTAL — The totals may be viewed/printed as described in SUBTOTAL above with the exception that after printing, the current total register is cleared to zero along with the consecutive numbering register. The current register used for totalizing is selected by this function.



ID — The ID function allows the operator to enter up to seven (7) digits of numeric ID. The current value of ID is displayed and may be changed by use of the numeric and [ENTER] buttons.



CN — The consecutive number may be viewed or changed using this button. The CN is automatically cleared to zero by totalizing but may be initialized to any value by use of the numeric buttons. The CN increments before a print cycle begins, as initiated by the [PRINT] button.



PC WT — This function allows the instrument to be used for piece counting by entering the known weight per piece. This mode is automatically selected if the current piece weight register is OTHER than zero. The front panel indicator for PIECES will illuminate while in the pieces mode. Any of nine (9) different registers may be selected with different piece weight factors.

## Front Panel Data Entry

Select the desired function from the examples given below. Then press the buttons in the order shown from left to right. The following symbols are used to indicate numeric button entry which may be comprised of multiple numeric entries.

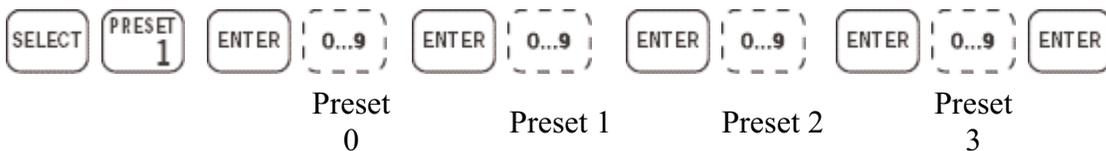


The dotted line symbol indicates that numeric entry at this point in the sequence is not required unless the data are to be changed.

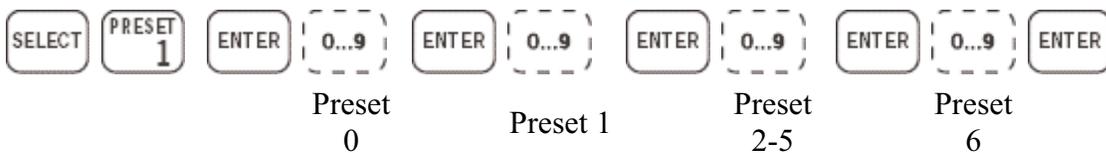
**FUNCTION 0: TEST** all display segments.



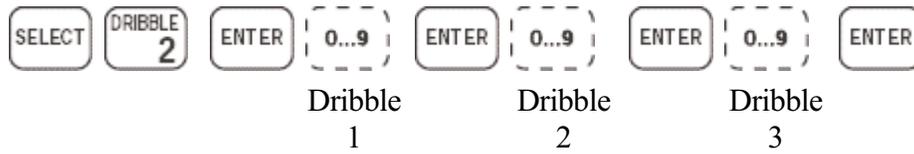
**FUNCTION 1: PRESET** entry of weight values. Two speed feed enabled.



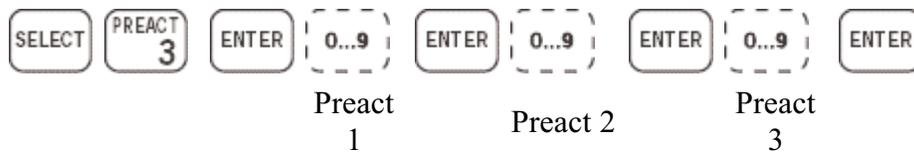
**FUNCTION 1: PRESET** entry of weight values. Single speed feed enabled.



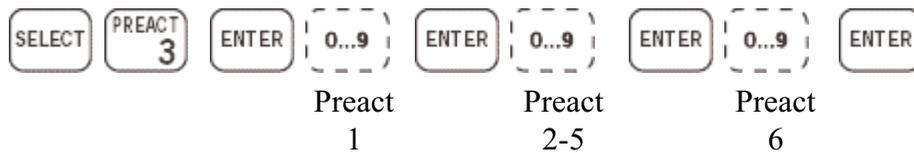
**FUNCTION 2: DRIBBLE** entry of weight values.



**FUNCTION 3: PREACT** entry of weight values. Two speed feed enabled.



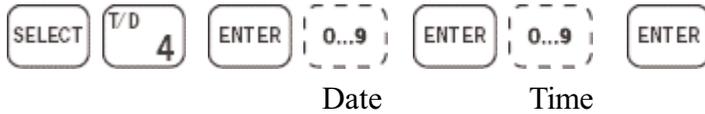
**FUNCTION 3: PREACT** entry of weight values. Single speed feed enabled.



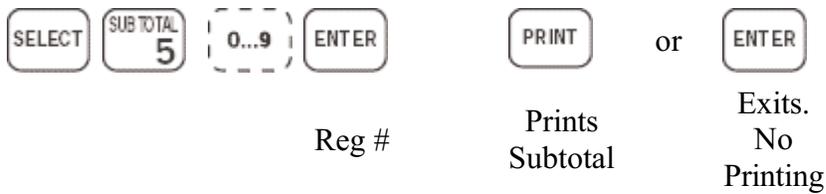
**FUNCTION 4: T/D** Time and Date Entry - 12 Hour Mode.



**FUNCTION 4: T/D Time and Date Entry - 24 Hour Mode.**



**FUNCTION 5: SUBTOTAL** Subtotal viewing or printing of selected register.



**FUNCTION 6: TOTAL** Total viewing or printing of selected register.  
**Also selects the current register.**



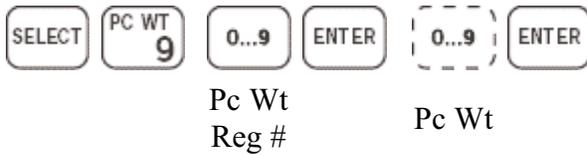
**FUNCTION 7: ID** Numeric ID entry of up to seven digits.



**FUNCTION 8: CONSECUTIVE NUMBERING** CN viewing or changing.



**FUNCTION 9: PIECE WEIGHT** Weight per Piece Entry and Piece Mode Selection. Note: Selecting Register 0 will disable the piece counting mode and return the display to the weight mode.



**RECALL TARE:** Keyboard Tare Entry of Known Tare Value.



**RECALL TARE:** Keyboard Tare Entry (Ten Tare Look -up)



## How to Enter and Exit System Setup

Locate the small dip switch block in the lower right corner of the mother board. Turn on S1, the display should then show FSE F1.

From the FSE Fn display you may scroll forwards and backwards using the [TARE] and [ZERO] buttons. When the page you want is displayed, press [PRINT] to accept and view the first step in that page.

Example: If the setup switch S1 is turned on, the display will show FSE F1. Press [ZERO] button. The display will show FSE F6, press [PRINT], display will show F6.0 n. You may now change the current setting for F6.0 by pressing [TARE], accept the setting by pressing [PRINT], or backup to F5.9 by pressing [ZERO].

You may also go directly to the page you wish to change by pressing the page number minus 1 on the keypad, after S1 is turned on. (Example: Operate S1. Display shows FSE F1. Press 3. Display shows FSE F4.)

Upon completion of your changes you may exit and save without having to go all the way to the end of the setup steps by pressing the [F1] button (on most units this will be an unlabeled button under [RECALL/TARE], second down from the top, on the right hand side). The display will go to FCd0. Press [PRINT] to save changes or press [TARE] to change option to 1 or 2. Option 1 will discard all changes you have made (you can also do this by turning off S1 at any time before the display shows FILEd. Option 2 (not available on earlier software) is used to reset the factory defaults into the EEPROM where all of the setup data is stored (U14 under the A/D board.).

Once you have selected which “FCd” option to use (usually “0” which is how it comes up automatically) save your selection by pressing [PRINT] after about a second the display should read FILEd, at this time you may turn off the setup switch S1 and return to the weighing mode.

### ***Function Select Enable Descriptions:***

**F1** Contains settings that control the overall operation of the scale, such as averaging, update rate, motion detection, zero tracking, etc.

**F2** Tare functions, setpoint options & powerup options are set here.

**F3** Serial port parameters, enabling of print fields, and custom formatting.

**F4** Serial data output formats, modes.

**F5** Enables individual right hand keyboard functions.

**F6** Calibration, capacity and increment size selection.

**F7** Only available on custom systems.

## ***Configuration Setting Descriptions***

### **F1.0 Raw Counts Display**

Enable Raw counts mode is used for diagnostic purposes and is also useful for precalculating calibration settings. Once enabled, it will display the internal counts from the A/D (analog/digital) converter which should fall between 250-100,000 counts on standard software. If your display is showing top or bottom dashes it is already out of range and raw counts will show the same indication. Check your wiring and millivolt output from the load cell(s). This is the only configuration setting that does not have to be written to permanent memory to take effect, just push [TARE] to set it to “E”, press [PRINT] to accept the setting and turn off S1. The display will show all of the annunciator arrows to show that it is in raw counts mode. To disable raw counts and return to normal weighing, either repeat the above procedure setting to “d”, or simply remove power. When you power the system back up raw counts mode will be disabled.

### **F1.1 Digital Averaging**

Used to increase the stability of the weight readings. Higher settings will make the display more stable in a noisy environment (wind, vibration, etc.), but will slow down the display response. Lower settings will speed up the response but may cause excessive motion and jitter in the display.

### **F1.2 Display Update Rate**

This setting controls how often new readings are sent to the display. Higher settings will make the display more responsive and give more of a scrolling number effect. Lower settings will cause readings to appear to change all at once and may mask some instabilities.

### **F1.3 Motion Detection**

This controls how much the readings have to change to cause “motion” to be detected. Motion detection is used to prevent printing, taring and zeroing of the scale when the weight is unstable.

### **F1.4 Auto Zero Tracking Enable**

### **F1.5 Auto Zero Tracking Width**

Used to control the automatic ZEROING of the scale. It will automatically track small drifts in weight such as caused by small amounts of debris, rain, or thermal drift. Tracking width sets how much drift can be automatically zeroed out. Example, if you have a truck scale with 20 lb increments and your tracking width is set to 3, anything that weighs 60 lb or less will be zeroed out. This may not be desirable if you are using your system for filling/batching and have a very slow fill rate or if you are trying to weigh very small items (which is not recommended) as the tracking may happen faster than you are filling and will cause it to appear that the scale is not working.

### **F1.6 - 2% Zero Range**

Will prevent the scale from being “Zeroed” if the reading is more than 2% of the capacity set in F6. Useful to prevent accidental re-zeroing and subsequent restarting of batch systems when a batch is already being processed.

### **F1.7 Right Hand Keyboard Enable**

Turns on/off the right hand side of the keyboard. Has no effect on the four (4) function buttons under the display.

### **F1.8 Output Options**

Controls the function of the J4 connector on the mother board. Should be disabled if not used as it will slow down the system.

### **F1.9 High Resolution Mode**

Allows you to bypass the normal four (4) raw counts per digit requirement that would limit you to about 24,000 display units. You should not use this unless necessary as neither the internal circuitry of the A/D board nor the load cells connected to it were designed for such extremes.

### **F2.0 Tare Enable**

Controls whether or not the front panel [TARE] button will operate. The *tare* function should be used to remove an empty container weight without having to *zero* the scale. When the [TARE] button is pushed the scale will enter the *tare* weight automatically and switch to the *net* mode. You can switch between the *gross* mode and *net* mode using the [GROSS/NET] button.

### **F2.1 Tare Interlock**

Prevents the *tare* from being cleared if the scale is not at *zero*. Used mostly to prevent the accidental clearing of the *tare* value while it is still in use.

## **F2.2 Auto Clear Tare**

Causes the *tare* value to be cleared automatically when the scale returns to *zero*. Use this to force entry of a new *tare* weight for each container being used (such as in a recycle center application, where you have multiple bins).

## **F2.3 Ten Tare Look-up**

Enables the storage of up to ten (10) *tare* values. You can use this to store the *tare* values for several containers and retrieve them by *register number* as needed.

## **F2.4 Battery Back-up Enable**

Prevents values in the random access memory from being cleared by a *power-up* sequence. This consists of *ID numbers*, *Consecutive Numbers*, *tare* values, *preset*, *dribble*, *preact*, *totals*, etc. Revision “D” and higher mother boards have a 24-hour back-up circuit built-in. This can be extended to approximately ten (10) years on all mother boards with an addition of a *time/date* module.

## **F2.5 Stand-by Mode on Power-up**

Will cause the display annunciator arrows to light upon power-up. The display will be disabled until either the [ZERO] or [TARE] buttons are pressed. Required by “Weights and Measures” in some areas to show that a power failure has occurred.

## **F2.6 External Gross/Net Enable**

When enabled the front panel [GROSS/NET] button will not operate. The system will instead take an input (contact closure) from TB1-3 of the mother board. Unlike the front panel switch this input is closed for *net* and open for *gross*.

## **F2.7 Two-Speed Feed**

Part of the *preset* function, enables the [DRIBBLE] button on the front panel. The value in the *dribble* will be subtracted from the *preset*, and used to operate the two speed relay function. If enabled there are three (3) *presets*, disabled there are six (6).

## **F2.8 Sequential Feed**

Controls how the output relays (connected to J7) operate during two-speed feed operation. When disabled, both the slow and fast feed relays are energized initially. The fast feed relay is de-energized when the weight reaches the preset minus the dribble value. The slow feed relay is de-energized when the preset weight minus the preact is reached.

When this setting is enabled, only the fast feed relay is initially energized. The fast feed relay is de-energized and the slow feed relay is simultaneously energized when the weight reaches the preset minus the dribble value. The slow feed relay is de-energized when the preset weight minus the preact is reached.

## **F2.9 Invert Relays**

If enabled the On/Off function of the output relays (J7) is reversed. The relays will be off below the presets and turn on as they are reached. Exception: relays “K7” and “K8” (fill complete and zero interlock) are not affected by this setting.

## **F2.A Parallel Feed**

Allows presets to operate independently of each other. In this mode presets can be set to any value. It is not necessary for each preset to be of a higher value than the one before it. Each output will operate as if it were the only one. If disabled the outputs operate sequentially. First preset one (1) and then preset two (2), then preset three (3), etc. The value of each preset must be higher than the one before it for the system to operate properly.

## **F3.0 Baud Rate**

Used to set the *baud rate* (speed) of all serial ports. Serial data is available at TB2 and J6 on the mother board. This must be set the same as the device to which it is connected.

## **F3.1 Parity**

The checksum bit used in serial communication. It can be even, odd or none. This is also where you would set the number of data bits (7 or 8). This must be set the same as device to which it is connected.

## **F3.2 Checksum**

This checksum is for an entire data stream (one line of print, etc.) as opposed to parity which is for one character. It is used during communications to verify that the received data contains no errors.

## **F3.3 Delay After Carriage Return/Line Feed**

Used to cause the system to pause after a carriage return. Needed with some devices to allow the data which was just sent to be processed (such as some older printers without buffering). If not needed set to “0” as it slows down the system.

### **F3.4 Consecutive Number Print**

### **F3.5 ID Print**

Controls whether or not these items will be included in the data sent out of the serial port (such as to a printer).

### **F3.6 Negative Print Enable**

Allows printing of negative weight readings. This is not allowed in “Legal for Trade” applications.

### **F3.7 - 24-Hour Clock**

If enabled and you have a *time/date* module, all times will be in “Military Time” (24 hour). If disabled, times are 12 hour AM/PM.

### **F3.8 Preamble/Postamble/Custom Formatting**

Note: When this step is entered, “F3.8” is not displayed. The display advances immediately to the preamble entry field, “FF FF FF”.

This is used with the serial ports. It allows you to add characters to the beginning and ending of the data stream. For example, this can be used to cause a printer to reset or change the print size at the beginning of a print, and reset, cut-off or paper release at the end of a print. Only three (3) preamble and three (3) postamble characters are allowed. All preamble and postamble values are in hexadecimal (base 16, 0-9, A-F). If not used they should be set to “FF”. Note, that if custom print formatting has been enabled in “F4.7” or “F4.8” custom print formatting will begin after the postamble has been entered. All custom print formatting is done in decimal (base 10, 0-9). Custom print formatting consists of two (2) pages. The first is used for normal print output (F4.7) and is ended by the first “255”. The second is used for totals printing (F4.8) and is ended by the second “255”.

### **F4.0 Print Mode**

Controls how prints are initiated. “1” is the normal setting and will latch the request for print from any input (front panel [PRINT] button, contact closure TB1-1, print command from bi-directional interface) and print when stable weight data is available as per F1.3. “2” will only print if the weight data is stable as per F1.3 at the time the request is made. “3” is autoprint and will print based on F1.3, F4.2 and F4.3 without an external request. Print data is available on TB2 of the mother board or from channel 1 (demand) of “DDO” (dual-data output) option board which, if installed, is connected to J6.

## **F4.1 Continuous Data Format**

Selects the data format used for continuous data output. Normally used for remote displays and scoreboards and in some computer applications. This data is available from TB2 of the mother board and from channel 2 (continuous) of the “DDO” (dual-data output) option board which, if installed, is connected to J6. Note, that if both demand and continuous data are used the data on TB2 will contain both data streams and may cause errors. Therefore, if both demand and continuous data are to be used it is recommended that they both be connected to the “DDO” board. If this function is not used, disable it as it will slow down the system.

## **F4.2 Weight Change Percentage**

Used with the *auto-print* function in F4.0. Specifies the percentage of change based on full capacity (as set in the calibration procedure (F6)) necessary to rearm the *auto-print*. For example, if your scale has a capacity of 100,000 lb and F4.2 is set to 15%, a weight change of 15,000 lb would be required to rearm the *auto-print*.

## **F4.3 Minimum Print**

Used with the *auto-print* function in F4.0. Sets the number of increments (as set in F6.1 and F6.2) above zero required before the *auto-print* is allowed to function. For example, if F6.1 is set to 20 and F6.2 is set to “0” and F4.3 is set to “30” then the *auto-print* will not operate until the weight on the scale exceeds 600 lb. This would be useful on a truck scale to prevent prints occurring when people walk across the scale.

## **F4.4 Bi-Directional Communications**

Any function that can be performed from the keyboard can be performed through the bi-directional interface. Connection to this interface is provided on TB2 on the mother board (in *current loop*) If a *current loop* device is not available and RS232 is needed then a “DDO” option board must be installed and connected to J6 on the mother board and the built in current loop input port must be disabled by cutting JP1 located just below J3 and to the left of J6 on the mother board. The response rate on this function is very low. Send the data as slowly as possible to avoid errors. Disable this function if not used, as it may pick up random noise.

## **F4.5 Weight Data Format**

Controls the way weight data is sent out to the serial ports. Setting “0” {Displayed weight only} will send whatever weight is currently displayed whether it be *gross* or *net*. Setting “1” {Single line gross/tare/net} will send a gross/tare/net string with only one (1) CR/LF at the end. If the display is in the *net* mode, this will put all three (3) items on one (1) line (if there is room. See printer for more information). Setting “2” {Multiple line gross/tare/net} will send a gross/tare/net string with a CR/LF after each item. If the display is in the *net* mode, this will put each item on its own line. Setting “3” {Status

weight and tare} should be used when communicating with a computer. It contains information on the current modes and status of the system sufficient to compute the *gross*, *tare* and *net* and whether the scale is in *gross* or *net* mode.

#### **F4.6 Time and Date Format**

Controls the order in which time and date is printed.

#### **F4.7 Print Format**

Controls the order print data items are sent out to the port.

#### **F4.8 Total Format**

Controls the order totals items are sent out to the port.

#### **F4.9 Weight Accumulation**

Causes a running total based on displayed weight to be maintained. There are a total of ten (10) registers that can be used to store totals. To view a current total without clearing it or to select a new accumulation register use the *sub-total* function. To view and clear totals use the “total” function. Note: You don’t have to use the same total and sub-total registers, you can total one while accumulating to another.

#### **F5.0 Piece Weight Enable**

Enables the front panel [PC WT] button. This function is used for counting. You are given nine (9) registers in which you store weight values for single items. When a register is selected the weight on the scale is divided by the value in the register and the number of items is displayed. To turn this function off and return to the normal weighing mode, set the register to “0”. Note, that this counting function is limited to display resolution and will not be as accurate as a dedicated counting scale it is provided for convenience only. This mode must be disabled in “Legal for Trade” applications.

#### **F5.1 Consecutive Number**

Enables the front panel [CN] button. This allows you to view and set a consecutive number which may be printed. It will automatically be incremented by one each time a print is performed.

#### **F5.2 ID Number**

Enables the front panel [ID] button. This allows you to view and enter *ID* values, used only for printing.

### **F5.3 Total/SubTotal**

Enables the front panel [TOTAL] and [SUBTOTAL] buttons. This allows you to view and clear totals data.

### **F5.4 Time and Date**

Enables the front panel [T/D] button. Allows you to set the time and date.

### **F5.5 Presets**

Enables the front panel [PRESET], [PRACT], and [DRIBBLE] (if F2.7 is enabled) buttons. Allows setting of set points. This includes the zero interlock value which is displayed as set point 0 (this value should never be set to “0”, and should always be less than the first set point). Any unused set points should be set to “0”. Set point outputs are provided on J7 of the mother board. These outputs are TTL compatible. If other voltage levels are needed a solid-state opto-coupled relay board is available as an option. Specify AC or DC output and voltage level when ordering.

### **F5.6 Recall Tare**

Enables the front panel [RECALL TARE] button. This button allows you to view the current tare value and change it if necessary. If F2.3 is enabled it also allows you to select the current register being used. This is the button you use to enter keyboard tares. Both the [TARE] and the [RECALL TARE] buttons store their values in the same register.

### **F6.0 Weight Units Used for Printing**

Controls the weight unit abbreviation used in printing and has no effect on the display. For example, if the scale display shows 100 and you press [PRINT] you would get “100 lb” on your printout if F6.0 is set to “0” and “100 TONNE” if F6.0 is set to “4”. Note, that no units conversion takes place; only the unit name is changed.

### **F6.1 Increment Size**

Sets the ‘count-by’ size used for displaying weights. For example, a setting of “20” would allow a minimum display of 20 and would count by 20. Note, this leaves a *dead zero* and if you set a decimal point position the *dead zero* will remain.

### **F6.2 Decimal Position**

Sets where the decimal point will be. Example, if you want an increment size of “.002” set F6.1 to “2” and F6.2 to “3”. Note that increasing the decimal position by one will increase the number of counts displayed by 10 times. Maximum display resolution is

normally approximately 20,000 counts. To compute the number of counts divide the set capacity by the increment size.

### **F6.3 Enter Cal Mode**

This is how you calibrate the scale. Enable this and continue on to F6.4. If you do not enable it you will advance to CAL d (calibration done) and the calibration will be unchanged and you will exit from set-up mode.

### **F6.4 Linearity**

Allows you to correct for small linearity errors in the middle of the weight range. This is not allowed in “Legal for Trade” applications. If not used, this should be set to “0” if set to “-0”, linearity will not be affected but you will be required to place “full capacity” weight for calibration.

### ***Set-Up Procedure***

Place the internal CAL switch (S1-1) to the ON position. The scale must be configured before operation by programming the needed parameters. Use the following front panel switches to view and/or change existing data values:

**[ZERO]** Used to scroll backward through the programming sequence steps.

**[TARE]** Used to scroll forward through the programming sequence steps when in function select mode and to sequence through available choices of individual functions.

**[PRINT]** Used to accept displayed data then to advance one step in the programming sequence.

**[CLEAR]** Used to return to the Function Select Enable portion of the SET-UP procedure.

**[F1]** Used to advance to the end of the SET-UP procedure to save or discard the changes entered. This button is not labeled and is located below the [RECALL TARE] button.

**FSE Function Select Enable** Selects the starting function group to be programmed. Use [ZERO] and [TARE] buttons to move back and forth through this menu. Press print to enter that section at the first item.

**Choices: F1, F2, F3, F4, F5, F6 (F7 on some custom systems)**

### **FSE F1**

#### **F1.0 Raw Counts Display Enable**

d - Show normal counts on display.

E - Display the internal raw counts.

### **F1.1 Digital Averages**

Number of A/D conversions which comprise the running average.

Choices: 1, 2, 4, 8, 16, 32

### **F1.2 Display Update Rate**

Number of display updates per second.

Choices: 20, 10, 5, 2, 1, 0.50, 0.25

### **F1.3 Motion Limit in Digits**

Select the width of the motion window by use of the TARE key. A selection of 'd' will disable the no-motion requirement for use by the zero, tare and print functions.

Choices: 0.5, 1, 2, 3, 4, 5, 6, d

### **F1.4 Auto zero tracking Enable**

d - AZT disabled.

E - AZT enabled.

### **F1.5 Auto zero tracking width**

Number of digits over which zero will track.

Choices: 0.5, 1, 2, 3

### **F1.6 Two Percent Zero Range Enable**

d - Zero active at any weight.

E - Zero active to +/-2% of capacity about zero.

### **F1.7 Key Functions Enable**

d - All right-hand keys disabled.

E - All key functions enabled.

### **F1.8 Output Options**

d - Neither of the following options installed.

1 - Analog output card installed.

2 - BCD output card installed.

### **F1.9 High Resolution Enable**

d - Minimum four raw counts per digit.

E - Minimum one raw count per digit.

### **FSE F2**

#### **F2.0 Tare Enable**

d - Tare disabled.

E - Tare enabled.

#### **F2.1 Tare Interlock**

d - Tare may be changed at any weight indication.

E - Weight must be at zero to clear tare.

#### **F2.2 Auto Clear Tare**

d - Not Active.

E - Tare will automatically clear when indication returns to less than 10 positive digits of zero and no motion.

#### **F2.3 Ten Tare Look-Up**

d - Provides single tare register.

E - Enables ten register tare look-up.

#### **F2.4 Battery Option Enable**

d - Battery backed option not installed.

E - Battery backed option installed.

### **F2.5 Enter Stand-By Mode on Power-Up Enable**

d - Weight indication appears after display test.

E - Weight display will be disabled and all status indicators will be on until zero or tare button is pressed.

### **F2.6 External Gross/Net Enable**

d - Front panel gross/net switch active.

E - External gross/net input determines the mode of weight.

### **F2.7 Two Speed Feed Enable**

d - Single speed outputs (six presets).

E - Two speed feed active (three presets).

### **F2.8 Sequential Feed Enable**

d - Relays act in parallel fashion; both fast and slow relays energize below preset.

E - Relays act in sequential fashion; fast relay energizes, then slow relay energizes.

### **F2.9 Invert Relays Enable**

d - RLY1 through RLY6 non -inverted output.

E - RLY1 through RLY6 inverted output. RLY7 (Fill Complete) and RLY8 (Zero Interlock) remain as before.

### **F2.A Parallel Feed Enable**

d - Relays operate in sequential order.

E - Independent action of relay output.

## **FSE F3**

### **F3.0 Baud Rate Selection X100**

Select the desired BAUD rate according to the chart. Older DDO boards have a limited rating on the current loop ports of 1200 BAUD. If Continuous Data output is selected, BAUD rate should be 2400 or greater.

Choices: 192, 96, 48, 24, 12, 6, 3, 1.5

### **F3.1 Parity Selection**

d - 7 Bits, No Parity.

1 - 7 Bits, Even Parity.

2 - 7 Bits, Odd Parity.

8b - 8 Bits, No Parity.

8be - 8 Bits, Even Parity.

8bo - 8 Bits, Odd Parity.

### **F3.2 Checksum Transmit Enable**

d - No checksum

E - Checksum transmitted, prior to CR-LF, as the 2's compliment of previously sent characters.

### **F3.3 Delay After CR-LF**

The amount of delay, after a carriage return or line feed is transmitted, in seconds.

Choices: 0, 0.1, 0.2, 0.5, 0.75, 1.0, 1.5

### **F3.4 Consecutive Number Print Enable**

d - Disable the printing of the CN.

E - Enable the printing of the CN.

### **F3.5 ID Print Enable**

d - Disable the printing of the ID.

E - Enable the printing of the ID.

### **F3.6 Negative Print Enable**

d - Disable printing of negative weights.

E - Enable printing of negative weights (non HB44).

### **F3.7 24 Hour Clock Enable**

d - 24 hour clock disabled (12 hour with AM/PM).

E - 24 hour military time enabled.

### **F3.8 Preamble Characters**

xxxxxx Enables the user to define up to three characters to be sent at the beginning of a print. The characters are entered in hexadecimal. A value of 'FF' is not transmitted. The front panel keys are re-defined during this step as follows:

ZERO - Decrements current digit.

TARE - Increments current digit.

GROSS - Selects next digit to the right.

PRINT - Accepts displayed value and advances to next step.

xxxxxx Postamble Characters

Enables the user to define up to three characters to be sent at the end of a print as above for Preamble.

## **FSE F4**

### **F4.0 Print Mode**

d - Print output disabled.

1 - Print button latches Print Request. Printing will occur when motion ceases and scale positive.

2 - Print will occur if not in motion and positive at the time Print button is pressed.

3 - Auto print after motion and positive weight is above value specified in F4.3 below and change greater than the value specified in F4.2 below has occurred.

#### **F4.1 Continuous Data Format**

d - Continuous output disabled.

1 - Status, weight, and tare data sent.

2 - Z660 Scoreboard output.

3 - Remote display, RD-IV, output.

4 - Straight ASCII output only with preamble and postamble sent.

#### **F4.2 Weight Change Percentage**

The following values specify the percentage change of Full Scale Capacity before the auto print latch is re-armed.

Choices: 5, 10, 15, 20, 25%

#### **F4.3 Minimum Print**

Digits above zero before auto print is latched.

Choices: 0, 10, 20, 30

#### **F4.4 Bidirectional Communications**

d - Bidirectional communications disabled.

1 - Bidirectional communications to customer computer enabled and configured for half-duplex operation. Information sent to the weigh meter is not echoed.

#### **F4.5 Weight Data Format**

0 - Displayed weight only.

1 - Single line Gross, Tare, Net.

2 - Multiple line Gross, Tare, Net.

3 - Status, Weight and Tare.

#### **F4.6 Time/Date Print Format**

d - Time/Date printing disabled.

1 - Time then Date printed.

2 - Date then Time printed.

3 - Time only printed.

4 - Date only printed.

#### **F4.7 Weight, Time/Date, ID and CN Print Format**

0 - Weight, ID, Time/Date, CN

1 - ID Time/Date Weight, CN

2 - ID Time/Date, CN Weight

3 - ID Time/Date CN Weight

4 - Time/Date ID CN Weight

5 - Time/Date ID Weight, CN

6 - ID, Time/Date, CN Weight

7 - ID Time/Date CN, Weight

C - Custom Weight Print Format Enable

#### **F4.8 Total, Time/Date, ID and CN Print Format**

0 - Total, ID, Time/Date, CN

1 - ID Time/Date Total, CN

2 - ID Time/Date, CN Total

3 - ID Time/Date CN Total

4 - Time/Date ID Total CN

5 - Time/Date ID Total, CN

6 - ID, Time/Date, CN Total

7 - ID Time/Date CN, Total

C - Custom Totals Print Format Enable

#### **F4.9 Weight Accumulation Enable**

d - Disable weight accumulation and print out.

E - Enable weight accumulation of all previous displayed weights printed.

#### **FSE F5**

##### **F5.0 Piece Weight Enable**

d - Piece Weight entry disabled.

E - Piece Weight entry enabled.

##### **F5.1 Consecutive Number Enable**

d - Consecutive Number function disabled.

E - Consecutive Number function enabled.

##### **F5.2 ID Number Enable**

d - ID Number function disabled.

E - ID Number function enabled.

##### **F5.3 Total-Subtotal Enable**

d - Total and Subtotal functions disabled.

E - Total and Subtotal functions enabled.

##### **F5.4 Time/Date Enable**

d - Time/Date entry function disabled.

E - Time/Date entry function enabled.

### **F5.5 Presets Enable**

d - Preset, Dribble, and Preact disabled.

E - Preset, Dribble, and Preact enabled.

### **F5.6 Recall Tare Enable**

d - Recall Tare entry disabled.

E - Recall Tare entry enabled.

## ***Calibration Procedure***

### **FSE F6**

#### **F6.0 Weight Units used for Printing**

d - No weight units printed.

0 - Lb

1 - kg

2 - g

3 - Ton

4 - Tonne (metric ton)

5 - oz

6 - oz troy

#### **F6.1 Increment Size**

Least significant digit increment size.

Choices: 1, 2, 5, 10, 20, 50, 100

#### **F6.2 Decimal Position**

Display decimal position from none to four places to the left.

0 - No decimal

**1 - .X**

**2 - .XX**

**3 - .XXX**

**4 - .XXXX**

### **F6.3 Enter CAL Mode**

**d - Continue to last step (CAL d)**

**E - Enter CAL mode.**

### **F6.4 Linearity Factor**

**Corrects non-linearity in weigh system. The value required is determined empirically. Amount of correction depends upon percent usage of the load cell as well as the system capacity and resolution.**

**Choices: 7 to -7**

### **E SCALE Empty Scale**

**Remove all weight from the scale and then press the [PRINT] button.**

### **888888 Full Scale Capacity**

**888888 indicates the previously entered Full Scale Capacity in even units. Use the numeric keyboard to enter the Full Scale capacity. Press the [ENTER] button to advance to the next step.**

### **15 SEC Zero Setting Fifteen Second Delay**

**Counts down from 15 to zero to capture the zero setting. If the [SELECT] button is pressed during the time-out period, the meter will immediately terminate the delay and ignore the motion criterion to capture the weight. Allow at least three (3) seconds after weight has been applied to the scale before pressing [SELECT] or the weight captured may be erroneous.**

### **Add Ld Add Load or Add ALL**

**The weight applied must be at least 5% of the full scale capacity. The message Add ALL will appear if Linearity Factor is not zero indicating that Full Scale Capacity must be applied.**

**[PRINT] - Advances to next step if span must be set.**

**[TARE] - Establishes a new zero calibration setting without changing the span calibration previously set. The display will show CAL d. This feature is disabled if the Add ALL message is displayed.**

### **888888 Test Weight**

**Apply known weight to scale. Fractional or decimal weights are not acceptable—only whole numbers. Use the numeric keyboard to enter the applied weight. Press the [ENTER] button to advance to the next step. If Add ALL was displayed in the previous step, the system will use the Full Scale Capacity as the test weight value and automatically proceed to the next step.**

### **15 SEC Span Setting Fifteen Second Delay**

**Counts down from 15 to zero to capture the span setting. If the [SELECT] button is pressed during the time-out period, the meter will immediately terminate the delay and ignore the motion criterion to capture the weight. Allow at least three (3) seconds after weight has been applied to the scale before pressing [SELECT] or the weight captured may be erroneous.**

### **CAL d Calibration Done**

**Indicates that the calibration procedure is complete.**

**[PRINT] - Advances to next step.**

**[7] - Decreases span setting.**

**[9] - Increases span setting.**

### **FCd File Changed Data**

**Changes will be saved or discarded.**

**0 - Save the entered values in memory and use again on power up.**

**1 - Discard present values and restore previously entered values.**

**2 - Initialize the EEPROM (U14) to the factory settings.**

**[PRINT] - Advance to the next step.**

**FILEd** The programmed data will have been saved or discarded after this message is displayed. Return the CAL switch S1 to the OFF position and the display will return to the normal mode of operation.

## **Error Codes During Calibration**

The following error messages (CE1 to CE5) are shown on the display if the system detects an error:

**CE1** Insufficient test weight. Value must be greater than or equal to 5% of Full Scale Capacity.

**CE2** Full Scale Capacity will exceed internal A/D counts. Remedy by lowering gain on A/D circuit board and/or lowering Full Scale Capacity weight (Step Empty Scale). Deadload may be too high initially. Add a resistor (50k–500k ohm) between +EXC (TB1, pin 7) and -SIG (TB1, pin 1) on A/D circuit board.

**CE3** Insufficient A/D counts for resolution selected. Remedy by increasing gain on A/D circuit board or increasing the Increment Size (Step F6.1). Deadload may be too high initially. Add a resistor (50k–500k ohm) between +EXC (TB1, pin 7) and -SIG (TB1, pin 1) on A/D circuit board.

**CE4** Motion detected during delay period. Ensure that the scale base is not bumped or unstable during calibration.

**CE5** The scale has gone into overcapacity, undercapacity, or negative during delay period. Check load cell connections and polarity of leads. Gain may need to be lowered as described with CE2 above.

Press the [PRINT] button to continue.

## ***Error Displays***

**OLOAD** -Applied weight has exceeded 102% of Full Scale Capacity.

----- Top dashes indicate maximum A/D counts exceeded.

**LO CAP** -Scale has gone below 200 A/D counts.

----- -Bottom dashes indicate incoming load cell signal is the wrong polarity. Check that signal leads are not reversed. If weight indication returns with more applied weight then deadload is insufficient. Remedy by adding a high-quality resistor (50k-500k ohm) between +EXC (TB1, pin 7) and +SIG (TB1, pin 2).

**bAd CAL** -This error indicates that re-calibration and set-up is necessary.

## **Programming Steps Summary**

Record the final settings for each step in the boxes ([ ]) below for future reference.

[ ] **F1.0 Raw Counts Display Enable**

[ ] **F1.1 Digital Averages**

[ ] **F1.2 Display Update Rate**

[ ] **F1.3 Motion Limit in Digits**

[ ] **F1.4 Auto Zero Tracking Enable**

[ ] **F1.5 Auto Zero Tracking Width**

[ ] **F1.6 2 % Zero Range Enable**

[ ] **F1.7 Key Functions Enable**

[ ] **F1.8 Output Options**

[ ] **F1.9 High Resolution Enable**

\*[ ] **F1.A**

\*[ ] **F1.B**

\*[ ] **F1.C**

\*[ ] **F1.D**

[ ] **F2.0 Tare Enable**

[ ] **F2.1 Tare Interlock**

[ ] **F2.2 Auto Clear Tare**

[ ] **F2.3 Ten Tare Look-up**

[ ] **F2.4 Battery Option Enable**

[ ] **F2.5 Stand-By Mode Enable**

[ ] **F2.6 External Gross Net Enable**

**F2.7 Two Speed Feed Enable**

**F2.8 Sequential Feed Enable**

**F2.9 Invert Relays Enable**

**F2.A Parallel Feed Enable**

\* **F2.B**

\* **F2.C**

\* **F2.D**

**F3.0 Baud Rate Selection**

**F3.1 Parity Selection**

**F3.2 Checksum Transit Enable**

**F3.3 Delay After CR-LF**

**F3.4 CN Print Enable**

**F3.5 ID Print Enable**

**F3.6 Negative Print Enable**

**F3.7 24 Hour Clock Enable**

**F3.8 Preamble**

**Postamble**

**Custom formatting - use chart**

**F4.0 Print Mode**

**F4.1 Continuous Data Format**

**F4.2 Weight Change Percentage**

- [ ]F4.3 Minimum Print in Digits
- [ ]F4.4 Computer Communications
- [ ]F4.5 Weight Data Format
- [ ]F4.6 Time/Date Print Format
- [ ]F4.7 Weight Print Format
- [ ]F4.8 Totals Print Format
- [ ]F4.9 Weight Accumulation Enable
- [ ]F5.0 Piece Weight Enable
- [ ]F5.1 CN Enable
- [ ]F5.2 ID Enable
- [ ]F5.3 Total-Subtotal Enable
- [ ]F5.4 Time and Date Enable
- [ ]F5.5 Presets Enable
- [ ]F5.6 Recall Tare Enable
- \*[ ]F5.7
- \*[ ]F5.8
- \*[ ]F5.9
- \*[ ]F5.A
- \*[ ]F5.B
- \*[ ]F5.C
- \*[ ]F5.D
- [ ]F6.0 Weight Units for Printing
- [ ]F6.1 Increment Size

[ ]F6.2 Decimal Position

[ ]F6.3 Enter CAL Mode

[ ]F6.4 Linearity Factor

\*[ ]F7.0

\*[ ]F7.1

\*[ ]F7.2

\*[ ]F7.3

\*[ ]F7.4

\*[ ]F7.5

\*[ ]F7.6

\*[ ]F7.7

\*[ ]F7.8

\*[ ]F7.9

\*[ ]F7.A

\*[ ]F7.B

\*[ ]F7.C

\* only used in custom applications

The following section describes the convention used by the DWM-IV to communicate with a user-supplied computer or terminal. Data is transmitted as: one start bit, seven or eight data bits, one even, odd, or no parity bit, and two stop bits for a total of 11, 12 or 13 bits per character. The BAUD rate, parity and serial communications enable must be configured while in the SET-UP procedure using F3.0, F3.1, F4.4.

## **Serial Bi-Directional Communications**

All functions accessible from the front panel may also be accessed using a remote communication link. The following table describes the ASCII codes to be transmitted to the DWM-IV which represent the front panel buttons:

BUTTON	ASCII Code (Hexadecimal)	PC Keyboard
ZERO	10	Ctrl-P
TARE	11	Ctrl-Q
GROSS/NET	12	Ctrl-R
PRINT	13	Ctrl-S
ENTER	14	Ctrl-T
CLEAR	15	Ctrl-U
RECALL TARE	16	Ctrl-V
SELECT	17	Ctrl-W
F1	18	Ctrl-X
F2	19	Ctrl-Y
REMOTE ZERO	1A	Ctrl-Z
<b>(Internal)</b>		
0	30	0
1	31	1
2	32	2
3	33	3
4	34	4
5	35	5
6	36	6
7	37	7
8	38	8
9	39	9

## Remote Control Inputs

The functions of ZERO, TARE, GROSS/NET, selection and PRINT may be performed remotely via voltage-free contacts across the indicated pins on TB1 of the DWM-IV motherboard and pins 5 or 6. ZERO, TARE, and PRINT inputs should have a minimum duration of 500 milliseconds while the GROSS/NET input must be maintained closed for net and open for gross.

TB1	FUNCTION
1	Zero
2	Tare
3	Gross/Net
4	Print

## Data Output Formats

The DWM-IV data output is selectable using the Set-up procedure using F3.2, F3.4, F3.5, F3.6, F3.8, F4.1, F4.5, F4.6, F4.7, F4.8, F6.0 as described in the manual. The information sent can optionally include time/date, consecutive number and ID number. Additionally, the output can be configured to send the data in any of eight (8) different formats. The weight data may be configured in any of four (4) formats. The time/date information may be selected from four (4) formats.

Whenever data is transmitted, the first character sent is always an ASCII STX (02h) to signify the start of data block. The data previously selected

is sent and is always terminated by an ASCII ETX (03h). The “Continuous Output” formats do not adhere to this convention, however. In addition to the characters

described, the user may program up to three (3) preamble characters that are sent after the STX character and up to three (3) postamble characters which are transmitted just before the ETX character. These characters may be used for special purposes such as releasing the paper clamp on a ticket printer or performing a double wide print out.

All Weight data fields are six (6) active characters in length. If required by the programmed capacity, this field will be expanded to seven (7) characters to include the decimal point (2Eh) justified in the proper position within the weight field. Non-significant leading zeroes will be transmitted as spaces but the least significant three (3) characters are not zero suppressed.

**Data Block Format:**



**Data Block**

where PR is preamble and PO is postamble.

In the format descriptions below, the following abbreviations apply:

<b>U</b>	represents the programmed units and may be from zero to seven characters long.
<b>N</b>	
<b>T</b>	represents the tare and may be any of the following depending on the programmed configuration:
<b>R</b>	

1. **TR** If single register tare is used and tare was entered via pushbutton.
2. **TR(K)** If single register tare is used and tare was entered via the keyboard.
3. **TRx** If Ten-Tare Look-up is enabled. 'x' represents the tare register currently selected. Tare value was entered via the pushbutton.
4. **TRx(K)** Ten-Tare Look-up as in 3. above but entered via the keyboard.

<b>CK</b>	Represents the checksum data which is the sum of the data previously sent and is in 2's complement binary notation. The checksum is comprised of two ASCII hexadecimal characters. These two characters are only inserted if the 'Checksum Transmit Enable' is enabled.
<b>SM</b>	

<b>S</b>	ASCII character space (20h).
<b>P</b>	
<b>C</b>	ASCII character carriage return (0Dh).
<b>R</b>	
<b>L</b>	ASCII character line feed (0Ah).
<b>F</b>	

### A. Displayed Weight Only

#### Gross wt Only

M					L	S	U	CK	C	L
S					S	P	N	SM	R	F
D					D					

#### Net wt Only

M					L	S	U			S	CK	C	L	
S					S	P	N	N	E	T	P	SM	R	F
D					D									

### B. Single Line GTN

M					L	S	U	S	M				L	S	T
S					S	P	N	P	S				D	P	R
D					D			D							
S	M				L	S	U	S			S	CK	C	L	
P	S				S	P	N	P	N	E	T	P	SM	R	F
D	D				D										

**Note:** If tare equals zero or in the gross mode, the format is the same as in Displayed Weight Only above.

### C. Multiple Line GTN

#### Gross wt

M					L	S	CK	C	L
S					S	P	SM	R	F
D					D				

#### Tare wt

M					L	S	U	T	CK	C	L
S					S	P	R	P	SM	R	F
D					D						

#### Net wt

M					L	S			S	CK	C	L	
S					S	P	N	E	T	P	SM	R	F
D					D								

### D. Status, Weight and Tare

Status words							Weight data				Tare data						
St Ah	St Al	St Bh	St Bl	St Ch	St Cl	M S D					L S D	M S D				L S D	CK SM

Status Words Table					
	Bit		STATUS A	STATUS B	STATUS C
<b>H</b>	8	7	0	0	Relay 8
	4	6	Center Zero	Print Key	Relay 7
	2	5	Motion	Decimal pos	Relay 6
	1	4	Gross	Decimal pos	Relay 5
<b>L</b>	8	3	Negative	Decimal pos	Relay 4
	4	2	Undercap Zero	Incr Size	Relay 3
	2	1	Overcap	Incr Size	Relay 2
	1	0	LB	Incr Size	Relay 1

#### Notes:

1. Conditions noted are true if corresponding bit is a logic 1.
2. Increment Size values correspond to the following table:

Bit	2	1	0	
	0	0	0	By 1's
	0	0	1	By 2's
	0	1	0	By 5's
	0	1	1	By 10's
	1	0	0	By 20's
	1	0	1	By 50's
	1	1	0	By 100's

3. Decimal Position values correspond to the following table:

Bit	5	4	3	
	0	0	0	No Decimal
	0	0	1	Illegal
	0	1	0	XXXXX.X

0	1	1	XXXX.XX
1	0	0	XXX.XXX
1	0	1	XX.XXXX

4. Print Key = 1 if front panel PRINT key is being pressed.

5. Relay = 1 if relay energized.

6. Each Status Word is comprised of two ASCII hex characters ('0' - '9', 'A' - 'F'), representing the two 4-bit patterns that make up each Status Word. Example: 5 1 in the Status B position would be bit pattern 0101 0001 = count by .2 and print button pressed.

#### E) Time/Date Format

12 Hour															
Time							Date								
H	H	:	M	M	A	S	M	M	-	D	D	-	Y	Y	S
						P	S							P	
24 Hour															
Time							Date								
H	H	:	M	M	S	M	M	-	D	D	-	Y	Y	S	
						P								P	

#### F) Totals Format

Total					Register				
M					L	S	U	S	S
S					S	P	N	P	T
D					D			x	P

Where 'x' represents the totals register number currently selected. If checksum is enabled, it is inserted before a CR-LF sequence.

#### G) ID Number

ID Number									
M					L	S	I	D	S
S					S	P			P
D					D				

#### H) Consecutive Number

Consecutive Number

M					L	S	C	N	S
S					S	P			P
D					D				

### I) Z660 Scoreboard

S	M				L	C
T	S				S	R
X	D				D	

### J) ASCII - with Preamble and Postamble (No STX or ETX)

P	M				L	S	U	P
R	S				S	P	N	O
E	D				D			S
A								T
M								A
B								M
L								B
E								L

### K) RD

S	S	S	M				L	C
T	B	B	S				S	R
X	1	2	D				D	

ASCII SB2 0 = GROSS      DIGIT DATA — BIT 0-3 — DIGIT DATA  
 4 = NET                      BIT 4 — DECIMAL  
 8 = PIECES                    BIT 5 — SET (I)  
    BIT 6 — ARROW  
    BIT 7 — SET (I)

## Custom Print Format Programming

By selecting the custom print options, it is possible to design a print output to conform to almost any given requirements.

Custom data sent via the 'PRINT' function (either front panel button, remote input, or external voltage free contact) is enabled by selecting the 'C' option under F4.7, Weight Print Format, of the SET-UP procedure. Similarly, custom totals data is enabled via F4.8, Totals Print Format.

A total of eighty (80) print codes may be entered as a combination of weight print codes and totals print codes. The codes are each one byte (8 bits) long. Any value less than 128 is treated as a literal ASCII character and will print as such. Codes greater than 127 are special print codes and the DWM-IV will interpret them according to the chart below to perform the described action. The code 150 is in essence a NO OPERATION code (print zero spaces) and may be used to reserve space if later it is determined that codes must be inserted. In this way, not all of the codes need be re-entered. Merely replace the 150 codes with the required ones. A

**total of eighty (80) codes may be entered. It is possible to print out particular headers or titles by using the ASCII representations for them in decimal.**

### **Entering Print Codes**

- 1. first enable under F4.7 and/or F4.8.**
- 2. Under F3.8 of the SET-UP procedure, enter the preamble and postamble data, if needed.**
- 3. After the postamble step the weight data codes are entered. The display will show the following:**

**xx.yyy**

**where ‘xx’ is the code count and ‘yyy’ is the print code in decimal. to enter a new code, use the numeric keypad. Press [ENTER] to store the code and advance to the next one. Press [ENTER] without pressing any numeric buttons to retain the existing data. Terminate the codes with a value of 255 and [ENTER]. The display will blink momentarily.**

- 4. Enter the codes for the totals print-out using the same method described above for the weight codes. Remember to always terminate the codes with value 255. Any number greater than 255 will be ignored and the previous data will be re-displayed.**

### **Print Codes and Descriptions**

**For the following table, refer to the ‘Data Output Formats’ (referred to as D.O.F.) and SET-UP procedure sections of this manual.**

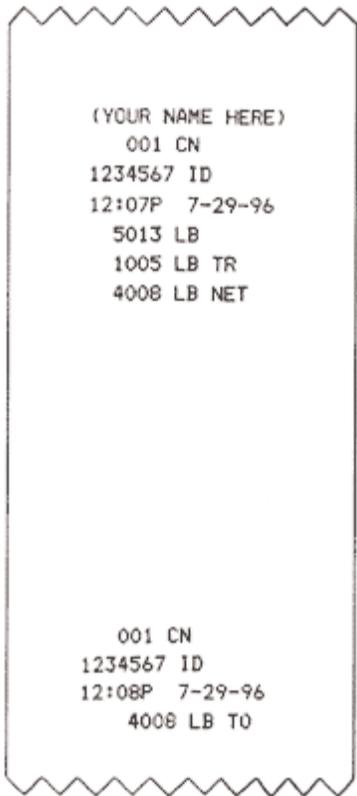
<b>Code</b>	<b>Descriptions</b>
<b>128</b>	Inserts ASCII STX and up to three (3) bytes of preamble codes, as set in step F3.8 of set-up procedure.
<b>129</b>	Formats weight data as described in D.O.F. Type is selected in Step F4.5 of SET-UP procedure.
<b>130</b>	Formats time and date data as programmed in Step F4.6 of SET-UP.
<b>131</b>	Formats the ID number entered using Function 7 from the front panel. Must be enabled under F3.5.
<b>132</b>	Formats the consecutive number. Must be enabled under Step F3.4.
<b>133</b>	Formats the total or subtotal data and register number as described in D.O.F.
<b>134</b>	Prints the total register number currently selected (zero to nine).
<b>135</b>	Internal code for carriage return-line feed. Do not use.

136	Internal code for carriage return-line feed and checksum insertion if enabled. Do not use.
137	Inserts the previously entered postamble entered under Step 3.8 of SET-UP procedure.
138	Formats net weight data for a GTN-type print-out. If DWM-IV is in gross mode of operation, this field is padded with spaces in place of the weight data.
139	Formats tare weight data for a GTN-type print. If in the gross mode, field is padded with spaces.
140	Gross weight data for GTN print-out.
141	Formats according to "Displayed Weight Only" as described in D.O.F. section of this manual.
142	Formats the time data in twelve (12) or twenty-four (24) hour mode as pre-programmed in Step F3.7.
143	Formats the Date data as month, day, and year.
144	Inserts the checksum data described in D.O.F.
145	Delay.
146	Store Preamble.
147	Format Tare.
148	Continuous Format.
149	End Buffer (NO ETX).
150-239	Specifies multiple spaces ;150=0 spaces ,151=1 space, 160=10 spaces etc.
240-254	Specifies multiple carriage returns as above.

**Sample DWM-IV Custom Print Codes**

<b>Job:</b>						<b>Date:</b>		
Step	Code	Comment	Step	Code	Comment	Step	Code	Comment
1	150	No Operation	24	10		47		
2	40	(	25	13		48		
3	89	Y	26	130	Formats/Date	49		
4	79	O	27	10		50		
5	85	U	28	13		51		
6	82	R	29	129	Formats Weigh Data	52		
7	32	Space	30	10		53		
8	78	N	31	13		54		

9	65	A	32	255	Ends Print Field	55		
10	77	M	33	132		56		
11	69	E	34	10		57		
12	32		35	13		58		
13	72	H	36	131		59		
14	69	E	37	10		60		
15	82	R	38	13		61		
16	69	E	39	130		62		
17	41	)	40	10		63		
18	10	Line Feed	41	13		64		
19	13	Carriage Return	42	133	Formats Totals	65		
20	132	Formats CN	43	10		66		
21	10		44	13		67		
22	13		45	255	Ends Total Field	68		
23	131	Formats ID	46			69		

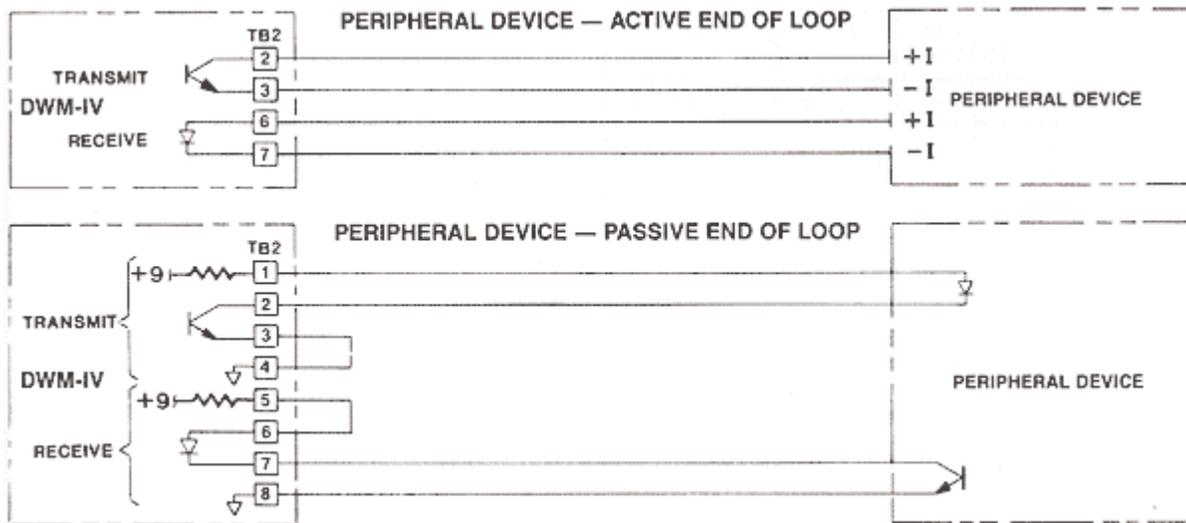


## Standard Current Loop Interface

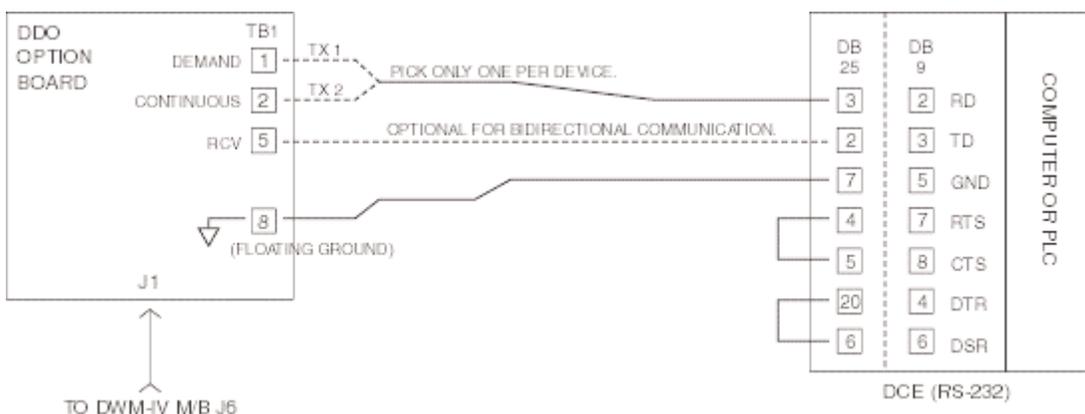
The DWM-IV provides nominal 20 mA, current loop, serial ASCII, interfacing to customer peripheral equipment through optically-isolated circuitry. Refer to FWC drawing MB 3017-B on page 20. TB2 on the motherboard provides the termination pins required. Two modes of operation are possible:

1. Peripheral device has active end of current loop.
2. Peripheral device has passive end of current loop.

The diagrams below describe both configurations:



## Connecting a Computer Terminal to Your DWM -IV



## Data Interface Connector Chart

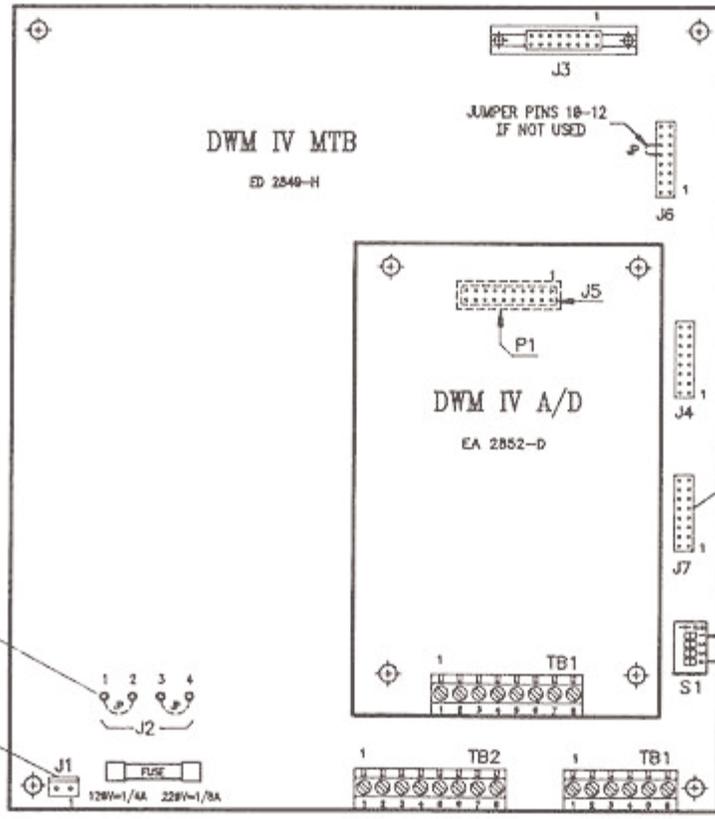
DWM-IV Motherboard TB-2 (Current-Loop)		7000 Printer		4000 Printer			Hecon AO-543		Star SP300		DWM-IV / RD-1 Motherbd TB-2	
Signal Name	Term	Sig	Color	Sig	Pin	Color	Sig	Pin	Sig	Color	Sig	Term
+9	1											
+1	2											
-1	3	I+	Red	I+	25	Red	I+	36	I+	19	I+	6
+9 RTN	4	Data	White	I-	11	White	I-	37	I-	18	I-	7

Dual RS232/Current Loop Interface Bd. TB-1 (RS 232)		PC or PLC DB9 (Computer)		4000 Printer			Hecon AO-543		Star SP300			Dual Data Board Equipped DWM-IV/RD-1 TB1 (Cut JPI on MB)	
Signal Name	Term	Sig	Color	Sig	Pin	Color	Sig	Pin	Sig	Color	Pin	Sig	Term
Tx1	1	RD	2	Data	3	White	Data	14	Data	White	3		
Tx2	2	RD	2	Data	3	White	Data	14	Data	White	3	RCV	5
RTS	3												
CTS	4												
RCV	5	TD	3										
DSR	6												
DTR	7												
Gnd	8	Gnd		Gnd	7	Green	Gnd	28	Gnd	Green	7	Gnd	8

Dual RS232/Current Loop Interface Bd. TB-2 (Current Loop)		7000 Printer		4000 Printer			Hecon AO-543		Star SP300		DWM-IV / RD-1 Motherbd TB-2	
Signal Name	Term	Sig	Color	Sig	Pin	Color	Sig	Pin	Sig	Color	Sig	Term
CHANNEL 1												
+20 mA	1											
I	2											
I	3	I+	Red	I+	25	Red	I+	36	I+	19	I+	6
+20 mA RTN	4	Data	White	I-	11	White	I-	37	I-	18	I-	7
CHANNEL 2												
+20 mA	5											
I	6											
I	7	I+	Red	I+	25	Red	I+	36	I+	19	I+	6
+20 mA RTN	8	Data	White	I-	11	White	I-	37	I-	18	I-	7

### Notes:

1. Install Jumpers as shown in the first Terminal column.
2. Channel 2 and Tx2 are used for the continuous data output option.
3. Some devices (like PC's) require RTS-CTS & DSR-DTR pins be jumpered.



MTB CONNECTOR IDENTIFICATION	
J1	MAJNS SUPPLY
J2	VOLTAGE OPTION
J3	DISPLAY BOARD
J4	I/O EXPANSION
J5	A/D CONNECTOR
J6	UART EXPANSION
J7	RELAY OUTPUT
TB1	REMOTE INPUT
TB2	SERIAL I/O

A/D CONNECTOR IDENTIFICATION	
P1	MTB CONNECTOR
TB1	LOADCELL CONNECTOR

J7 PIN #	FUNCTION	
	TWO SPEED	SINGLE
13	STPT 1 FAST	STPT 1
11	STPT 1 SLOW	STPT 2
7	STPT 2 FAST	STPT 3
9	STPT 2 SLOW	STPT 4
4	STPT 3 FAST	STPT 5
6	STPT 3 SLOW	STPT 6
10	FILL COMPLETE	FILL COM
8	ZERO INTERLOCK	ZERO IP
3, 14	+5 VDC	+5 VDC
1, 16	GND	GND

PIN	
100 VAC	1 TO 2 3 TO 4
240 VAC	2 TO 3

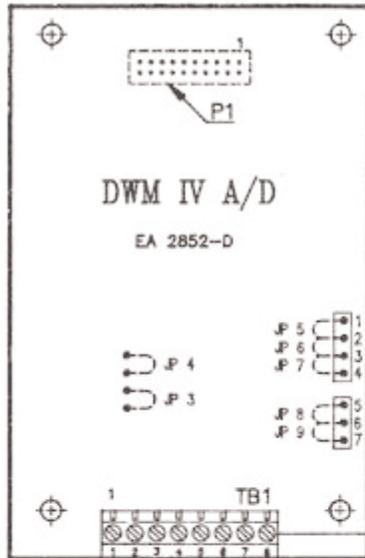
PIN	
L1	1
L2	2

TB2 MTB SERIAL I/O CURRENT LOOP	
1	XMIT 20mA SUPPLY +
2	XMIT COLLECTOR
3	XMIT EMITTER
4	XMIT 20mA RTN
5	RCV 20mA SUPPLY +
6	RCV I+
7	RCV I-
8	RCV 20mA RTN

TB1 MTB REMOTE INPUT	
1	ZERO
2	TARE
3	NET (CLOSE) GROSS (OPEN)
4	PRINT
5	COMMON
6	COMMON

REQUIRES VOLTAGE  
FREE CONTACTS  
ACROSS PINS 1, 2, 3, OR 4  
AND PINS 5 OR 6.

DWM IV  
CONNECTOR/SWITCH CONFIG  
MA 3017-C



MANUFACTURER	COLUMN	MANUFACTURER	COLUMN
ALLEGANY	2	NATIONAL	2
ALPHATRON	1	NCI	4
BEOMULF	2	ORMOND	1
BLH	2	PESAGE PROMOTION	3
CARDINAL	2	REVERE	2
ELECTROSCALE	1	SAMSON	1
EVERGREEN	2	SENSORTRONICS	1
FLEX-WEIGH CORP.	1	STRAINERT	1
HBM	2	TEDEA	5
INTERFACE	1	TOLEDO	2
LEBOW	1	TRANSDUCER	1

DESCRIPTION	TERMINAL NO.	COLOR CODE				
		1	2	3	4	5
+ EXCITATION	7	RED	GREEN		RED	GRE
+ SENSE	6				YELLOW	
- EXCITATION	4	BLACK	BLACK	WHITE	BLACK	BLA
- SENSE	3				BLUE	BRO
+ SIGNAL	2	GREEN	WHITE	RED	WHITE	RE
- SIGNAL	1	WHITE	RED	BLACK	GREEN	WHI
SHIELD	8					

GAIN SELECT  
(SEE TABLE)

GAIN	JP	JP	JP	PINS
81	5			
100	8			
125	8	6		
137	8	7		
187	8	7	6	
200	9			
250	9			3-5
333	9	6		
375	9			2-5
436	9	5		2-5
500				3-6
579	9	7	5	
624				3-6 2-5
688	7			3-6 2-5
756	7	5		3-6 2-5
831				3-6 2-4
902	5			3-6 2-4
1000				3-6 2-4 3-5
1081	5			3-6 2-4 3-5

NOTES:

1. INSTALL JP3 & JP4 FOR QUICKER RESPONSE TIME.
2. FIELD INSTALL HIGH QUALITY LOW T.C., RESISTOR R28 FOR DEADLOAD COMPESATION IF NEEDED.

DWM IV-A/D  
CONNECTOR / JP CONFIGU.  
MA 3245-C

## Glossary

**Auto Print** Generates a print request automatically without user intervention. Is based solely on weight change percentage and motion detection.

**Baud Rate** The speed of the serial port in bits per second.

**CN** Abbreviation for consecutive number(ing).

**Consecutive Number** A number that is automatically increased by one every time a print is performed.

**Continuous Output** A continuous stream of data that requires no external requests. Usually used for remote displays.

**Current Loop** Serial port interface type based upon a 20mA circuit that is rapidly switched on and off. This is not compatible with RS232.

**DDO** Abbreviation for Dual Data Output.

**D.O.F.** Abbreviation for Data Output Format

**Data Output Format** The configured sequence of items that are sent out the serial port.

**Dead Load** The fixed weight of the scale and any permanent hardware that is not included as part of the calibrated weight. Will be permanently included as part of the zero value during calibration.

**Dead Zero** A zero in the least significant digit position that never changes.

**Dribble** Something you do with a basketball..OR..A value used in a system with presets to compute the fast feed cutoff point in a two speed system.

**Dual Data Output** An option board that provides two data channels as well as two interface types. (RS232 and Current Loop)

**FCD** Abbreviation for File Changed Data.

**FSE** Abbreviation for Function Select Enable.

**File Changed Data** Final setup step that allows you to abort, save changes, or reset to factory defaults.

**Function Select Enable** Setup function that allows you to move rapidly from one setup page to the next.

**Gross Total** weight of all items on the scale.

**ID Identification Number.** Used only for printing.

**Junk Yard Dog** See Watch Dog. : )

**Legal for Trade** An application where charges are computed on scale readings. Subject to local regulations.

**Net** The gross weight minus the tare.

**Power-up Self test sequence that occurs when power is applied or after a watch dog event.**

**Preact** The value used to compensate for material in freefall in a system with presets. It will be subtracted from the preset and causes the relay to turn off early.

**Preset Value** used to trigger relays used for target weight in filling systems.

**Register A** number defining the address of a storage location in memory.

**Subtotal** Accumulation of weights printed.

**T/D** Abbreviation for Time/Date.

**Tare** Empty container weight. Subtracted from the gross to compute the net.

**Time/Date** Internal clock/calendar option.

**Total** Same as Subtotal but clears accumulation register.

**Watch Dog** A very mean animal usually found at a junk yard..(see Junk Yard Dog) ...or... Internal hardware that monitors the power supply and software and causes a reset if errors are detected.

**Zero Function** that establishes a new empty weight for the scale.

## U.S. ASCII Character Set

ASCII Char.	EQUIVALENT FORMS				HP-IB	ASCII Char.	EQUIVALENT FORMS				HP-IB
	Dec	Binary	Oct	Hex			Dec	Binary	Oct	Hex	
NUL	0	00000000	000	00		@	64	01000000	100	40	TA0
SOH	1	00000001	001	01	GTL	A	65	01000001	101	41	TA1
STX	2	00000010	002	02		B	66	01000010	102	42	TA2
ETX	3	00000011	003	03		C	67	01000011	103	43	TA3
EOT	4	00000100	004	04	SDC	D	68	01000100	104	44	TA4
ENQ	5	00000101	005	05	PPC	E	69	01000101	105	45	TA5
ACK	6	00000110	006	06		F	70	01000110	106	46	TA6
BEL	7	00000111	007	07		G	71	01000111	107	47	TA7
BS	8	00001000	010	08	GET	H	72	01001000	110	48	TA8
HT	9	00001001	011	09	TCT	I	73	01001001	111	49	TA9
LF	10	00001010	012	0A		J	74	01001010	112	4A	TA10

VT	11	00001011	013	0B			K	75	01001011	113	4B	TA11
FF	12	00001100	014	0C			L	76	01001100	114	4C	TA12
CR	13	00001101	015	0D			M	77	01001101	115	4D	TA13
SO	14	00001110	016	0E			N	78	01001110	116	4E	TA14
SI	15	00001111	017	0F			O	79	01001111	117	4F	TA15
DLE	16	00010000	020	10			P	80	01010000	120	50	TA16
DC1	17	00010001	021	11	LLO		Q	81	01010001	121	51	TA17
DC2	18	00010010	022	12			R	82	01010010	122	52	TA18
DC3	19	00010011	023	13			S	83	01010011	123	53	TA19
DC4	20	00010100	024	14	DCL		T	84	01010100	124	54	TA20
NAK	21	00010101	025	15	PPU		U	85	01010101	125	55	TA21
SYNC	22	00010110	026	16			V	86	01010110	126	56	TA22
ETB	23	00010111	027	17			W	87	01010111	127	57	TA23
CAN	24	00011000	030	18	SPE		X	88	01011000	130	58	TA24
EM	25	00011001	031	19	SPD		Y	89	01011001	131	59	TA25
SUB	26	00011010	032	1A			Z	90	01011010	132	5A	TA26
ESC	27	00011011	033	1B			[	91	01011011	133	5B	TA27
FS	28	00011100	034	1C			\	92	01011100	134	5C	TA28
GS	29	00011101	035	1D			]	93	01011101	135	5D	TA29
RS	30	00011110	036	1E			^	94	01011110	136	5E	TA30
US	31	00011111	037	1F			_	95	01011111	137	5F	UNT
space	32	00100000	040	20	LA0		`	96	01100000	140	60	SC0
!	33	00100001	041	21	LA1		a	97	01100001	141	61	SC1
"	34	00100010	042	22	LA2		b	98	01100010	142	62	SC2
#	35	00100011	043	23	LA3		c	99	01100011	143	63	SC3
\$	36	00100100	044	24	LA4		d	100	01100100	144	64	SC4
%	37	00100101	045	25	LA5		e	101	01100101	145	65	SC5
&	38	00100110	046	26	LA6		f	102	01100110	146	66	SC6
'	39	00100111	047	27	LA7		g	103	01100111	147	67	SC7
(	40	00101000	050	28	LA8		h	104	01101000	150	68	SC8
)	41	00101001	051	29	LA9		i	105	01101001	151	69	SC9
*	42	00101010	052	2A	LA10		j	106	01101010	152	6A	SC10
+	43	00101011	053	2B	LA11		k	107	01101011	153	6B	SC11
,	44	00101100	054	2C	LA12		l	108	01101100	154	6C	SC12
-	45	00101101	055	2D	LA13		m	109	01101101	155	6D	SC13

.	46	00101110	056	2E	LA14	n	110	01101110	156	6E	SC14
/	47	00101111	057	2F	LA15	o	111	01101111	157	6F	SC15
0	48	00110000	060	30	LA16	p	112	01110000	160	70	SC16
1	49	00110001	061	31	LA17	q	113	01110001	161	71	SC17
2	50	00110010	062	32	LA18	r	114	01110010	162	72	SC18
3	51	00110011	063	33	LA19	s	115	01110011	163	73	SC19
4	52	00110100	064	34	LA20	t	116	01110100	164	74	SC20
5	53	00110101	065	35	LA21	u	117	01110101	165	75	SC21
6	54	00110110	066	36	LA22	v	118	01110110	166	76	SC22
7	55	00110111	067	37	LA23	w	119	01110111	167	77	SC23
8	56	00111000	070	38	LA24	x	120	01111000	170	78	SC24
9	57	00111001	071	39	LA25	y	121	01111001	171	79	SC25
:	58	00111010	072	3A	LA26	z	122	01111010	172	7A	SC26
;	59	00111011	073	3B	LA27	{	123	01111011	173	7B	SC27
<	60	00111100	074	3C	LA28		124	01111100	174	7C	SC28
=	61	00111101	075	3D	LA29	}	125	01111101	175	7D	SC29
>	62	00111110	076	3E	LA30	~	126	01111110	176	7E	SC30
?	63	00111111	077	3F	UNL	DEL	127	01111111	177	7F	SC31