CONTENTS

⚠ WARNING

ONLY PERMIT QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT.

EXERCISE CARE WHEN MAKING CHECKS, TESTS AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON.

WARNING

THIS MODULE AND ITS ASSOCIATED EQUIPMENT MUST BE INSTALLED, ADJUSTED, AND MAINTAINED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL EQUIPMENT IN THE SYSTEM AND THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY INJURY.

WARNING

WHEN THIS EQUIPMENT IS INCLUDED AS A COMPONENT PART OF A SYSTEM, THE RESULTING DESIGN MUST BE REVIEWED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL COMPONENTS IN THE SYSTEM AND THE POTENTIAL HAZARD INVOLVED. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

1.0 SPECIFICATIONS

Physical

Enclosure:	NEMA XII mild steel wall mount or NEMA IV stainless steel wall mount
Size:	15" W X 16.5" H X 5" D
Weight:	27 lbs 12 kg

Environment

Operating Temp.:	-10° C to 40° C
Humidity:	10% to 95% relative humidity, non-condensing

Electrical

Operating Voltage:	115/230 VAC
Power:	15 watts nominal
Frequency:	50/60 hertz

Instrument Specifications

Analog Input

Sensitivity:	0.50 uV/Grad to 45uV/Grad
Full Scale Range:	5mV to 45mV

Load Cell Excitation

Voltage:	12.5V
Load:	4-350 ohm load cells (max.)

Analog to Digital Conversion

Type:	Triple slope ratio metric
Resolution:	1,000 to 10,000 displayed graduations, 100,000 internal divisions

Calibration

Digital:	Accessed through keyboard

Accuracy

Span temperature coefficient:	8 PPM/degrees Celsius (typical) maximum
Zero temperature coefficient:	0.35 uV/degrees Celsius (typical) maximum
Linearity:	+/- 0.1% of full scale

Front Panel Displays

Type:	Six digit: .5"; 7 segment blue-green vacuum fluorescent display
Under zero:	Blank display below five graduations with minus sign in left most digit.
Over Capacity:	Blank display over 5 increments of selected scale capacity
Annunciators:	Cursors above the ZERO, LB, KG, GROSS, NET and PRINT legends

CONTROLLER SPECIFICATIONS

Data Input

Hardware Type:	20mA current loop
Format:	Receives data from instrument in the Masstron accessory format.
Baud Rate:	300, 1200, 2400, 4800 or 9600 baud

Printer Output

Hardware Type:	20mA current loop
Format:	1 start bit, 8 data bits, 1 stop bit, no parity standard ASCII character set
Baud Rate:	300, 1200, 2400, 4800 or 9600 baud

Accessory Output

Hardware Type: 20mA current loop only

Format: Echoes data received from instrument

Baud Rate: Baud rate is the same as the instrument baud rate

Control I/O

Hardware Type: Solid state plug-in modules - AC or DC

Number of I/O: 16

Overload Protection: All outputs protected by a 5 Amp PICO fuse.

AC Output Specifications:

Load voltage minimum	-	12V RMS
Load voltage maximum	-	140V RMS
Minimum Load Current	-	50mA RMS
Maximum Load Current	-	2 A RMS
Frequency Range	-	47 to 63 HZ
On State Voltage	-	1.5V Peak at maximum current
Off State Leakage	-	5 mA RMS
Turn On Time	-	1/2 cycle
Turn Off Time	-	1/2 cycle

DC Output Specifications:

Load voltage minimum	-	3 VDC
Load voltage maximum	-	60 VDC
Minimum Load Current	-	20mA
Maximum Load Current	-	2 A
On State Voltage	-	1.5 VDC Peak at maximum current
Off State Leakage	-	5 mA RMS
Turn On Time	-	100 microseconds
Turn Off Time	-	100 microseconds

AC Input Specifications

Input on voltage minimum	-	90 V, RMS
Input on voltage maximum	-	140 V RMS
Input off voltage minimum	-	0 V RMS
Input off voltage maximum	-	30 V RMS
Allowable current for off state	-	3 mA RMS
Input current @ 120 VAC	-	60 mA RMS
Frequency range	-	47 to 420 HZ

DC Input Specifications

Input on voltage minimum	-	10 VDC
Input on voltage maximum	-	32 VDC
Input off voltage maximum	-	2 VDC
Allowable current for off state	-	1.5 mA
Input current @ 12 VDC	-	9 mA
Input current @ 32VDC	-	32 mA

2.0 GENERAL DESCRIPTION

The M8147 combines the weighing capabilities of the M8140 instrument with the batching capabilities of the MD3017 to provide the user with a flexible single material batching system in a self contained wall mount enclosure. The unit can be programmed to run a variety of weigh sequences to batch a single material in a weigh-in mode or a weigh-out mode of operation, providing an economical solution to most single material batching applications.

The controller also provides prompting of data entry on its 16 character by 2 line LCD dot matrix display making operator interface simple and straightforward.

All weighing sequences may be selected to provide single speed or 2 speed cutoffs. The 2 speed cutoffs may be selected to operate in an alternate or simultaneous mode. The controller can also be operated in a semi-auto mode which provides software controlled manual operation. In addition to the selectable weigh sequences, several other setup options may be selected to further tailor the controller to a specific application. These options are:

Time and Date
Batch ID
Preact
Tolerance Check
Accumulation
Batch Counter
Preset Number of Batches
Continuous Run
Guarded Entry for Setpoints, Accept Off Tolerance and preset number of batches

The controller comes standard with three (3) 115 VAC output modules for fill and discharge cutoffs. These are sufficient for basic applications. Additional I/O's may be installed for the following:

Out of Tolerance Output
Batch Ready/Fill Complete Output
Cycle Complete Output
Remote Start Input
Remote Stop Input
Remote Discharge Input
Remote Print Input
Guarded Entry Input

24 VDC output modules may be installed for applications requiring 24 VDC control I/O.

3.0 INSTALLATION

Unpacking

Upon opening the shipping carton, verify that all equipment is included and physically undamaged. Report any damage to your carrier immediately. The carton should contain the following:

1 M8147 Controller
1 Manual
1 Warranty Registration Form

Mounting

Select a suitable location and mount the controller using the mounting tabs provided.

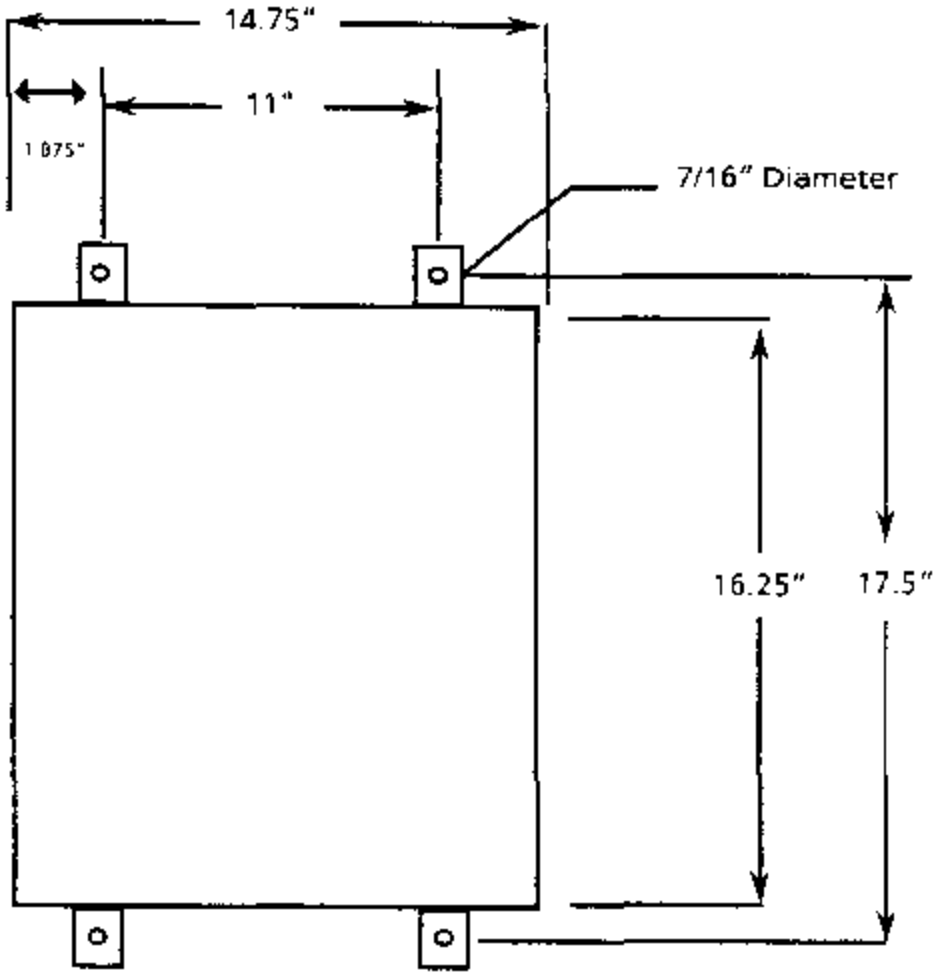


Figure 3.1

Power - Instrument

CAUTION: ***DISCONNECT POWER BEFORE MAKING ADJUSTMENTS.***

Verify that the correct voltage is selected for your application (refer to diagram below). Reinstall dummy spade lugs on unused terminals.

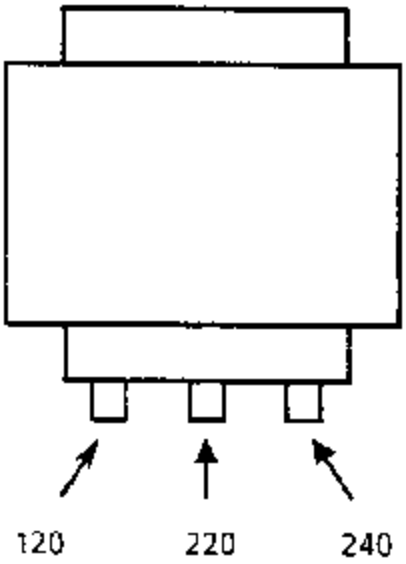


Figure 3.2 Transformer Connections

Power-Controller

Verify that the correct voltage is selected for your application.

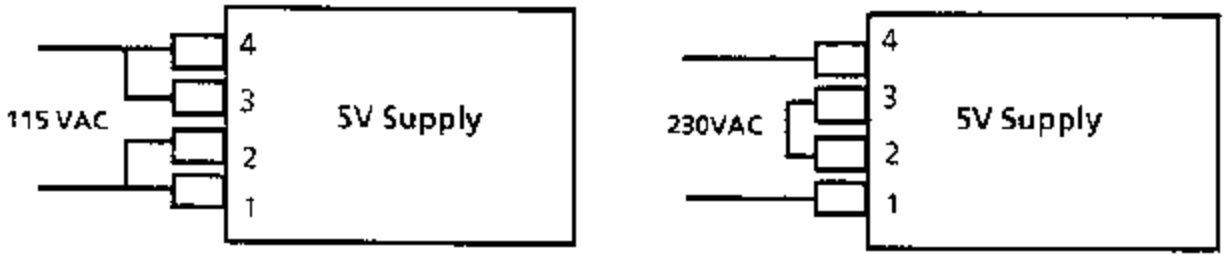


Figure 3.3 Power Supply Connections

Load Cell Connection

Designations for the load cell terminal block TB4 is shown in Figure 3.4. If the load cell cable has only 4 wires then a jumper must be added from (+) excitation to (+) sense and from (-) excitation to (-) sense.

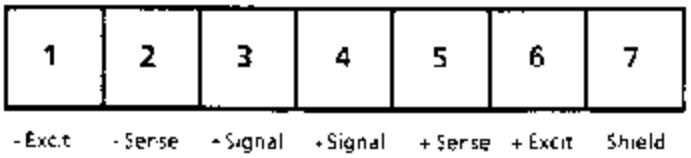


Figure 3.4 Load Cell Connection

Installation of I/O Modules

The standard M8147 package includes three (3) AC output modules for the feed and discharge outputs. If additional I/O's are being used, or DC output modules are required, simply plug the I/O module into the appropriate I/O location. See Figures 3.5 and 3.6 for I/O assignments.

Connecting Control I/O's

The feed and discharge I/O locations change depending on whether a weigh-in or weigh-out mode of operation is selected. Refer to Figure 3.5 if you are using a weigh-in sequence or Figure 3.6 if you are using a weigh-out sequence for termination of control I/O's.

Because of the noise generated when switching inductive loads, it is recommended that the control power for driving the I/O's be supplied from a separate power source than the one powering the instrument. Be sure to observe polarities when connecting devices to the external I/O's. Also be sure to install quenchares across all outputs as shown on the interconnect drawing in the back of this manual. The quenchare should be installed as close to the load as possible. See wiring diagram at the back of this manual for more information.

X3 and X4 designate control power
when using 115 VAC I/O's, X3 = 115 VAC and X4 = 115 VAC common
when using 24VDC I/O's, X3 = + 24 VDC and X4 = 24VDC ground

WARNING

IF THIS DEVICE IS USED IN AN AUTOMATIC OR MANUAL FILLING CYCLE, ALL USERS MUST PROVIDE A HARD WIRED EMERGENCY STOP CIRCUIT OUTSIDE THE MODEL M8147 CIRCUITRY. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN BODILY INJURY.

I/O Assignments for Weigh-In Sequences

I/O 1 Fast Feed Output
I/O 2 Slow Feed Output
I/O 3 Discharge Output
I/O 4 Not Used
I/O 5 Off Tolerance Output
I/O 6 Batch Ready Output
I/O 7 Cycle Complete Output
I/O 8 Not Used
I/O 9 Remote Start Input
I/O 10 Remote Stop Input
I/O 11 Remote Discharge Input
I/O 12 Remote Print Input
I/O 13 Guarded Entry Input
I/O 14 Not Used
I/O 15 Not Used
I/O 16 Not Used

FIGURE 3.5

I/O Assignments for Weigh-Out Sequences

I/O 1 Fast Discharge Output
I/O 2 Slow Discharge Output
I/O 3 Fill Output
I/O 4 Not Used
I/O 5 Off Tolerance Output
I/O 6 Fill Ready Output
I/O 7 Cycle Complete Output
I/O 8 Not Used
I/O 9 Remote Start Input
I/O 10 Remote Stop Input
I/O 11 Remote Discharge Inout
I/O 12 Remote Print Input
I/O 13 Guarded Entry Input
I/O 14 Not Used
I/O 15 Not Used
I/O 16 Not Used

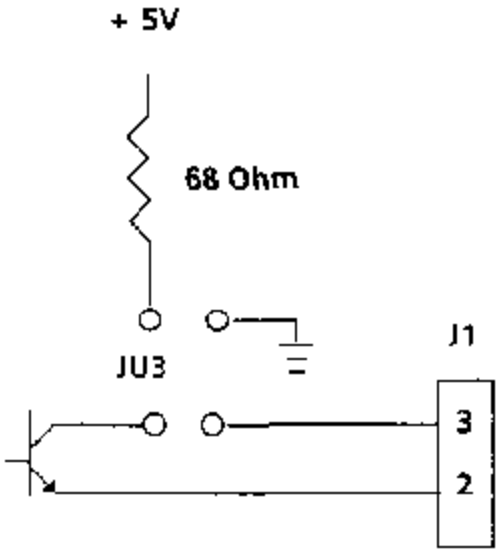
FIGURE 3.6

Printer Interface

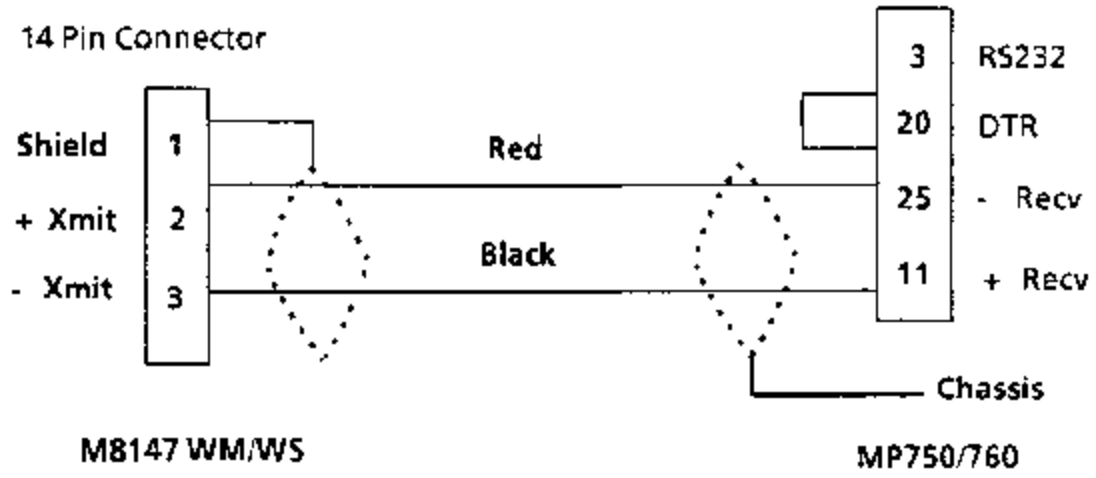
The printer output is a 20mA current loop output. The port may be configured active or passive. The format of the data is 1 start bit, 8 data bits, 1 stop bit, no parity. The baud rate is selectable in the setup mode as 300, 1200, 2400, 4800 or 9600 baud. All data transmitted is standard ASCII data.

Jumper JU3 is used to configure the printer port as active or passive. If using a Masstron MP750 or MP760 printer, the port should be configured active, refer to Figure 3.9 for jumper locations. Refer to Figure 3.8 for interface wiring.

If you are interfacing the controller to some other type of printer, configure JU3 as required. Refer to Figure 3.7 for more detailed information regarding the printer output port.



PRINTER PORT OUTPUT CIRCUIT
FIGURE 3.7



INTERFACE TO MP750/760 PRINTER
FIGURE 3.8

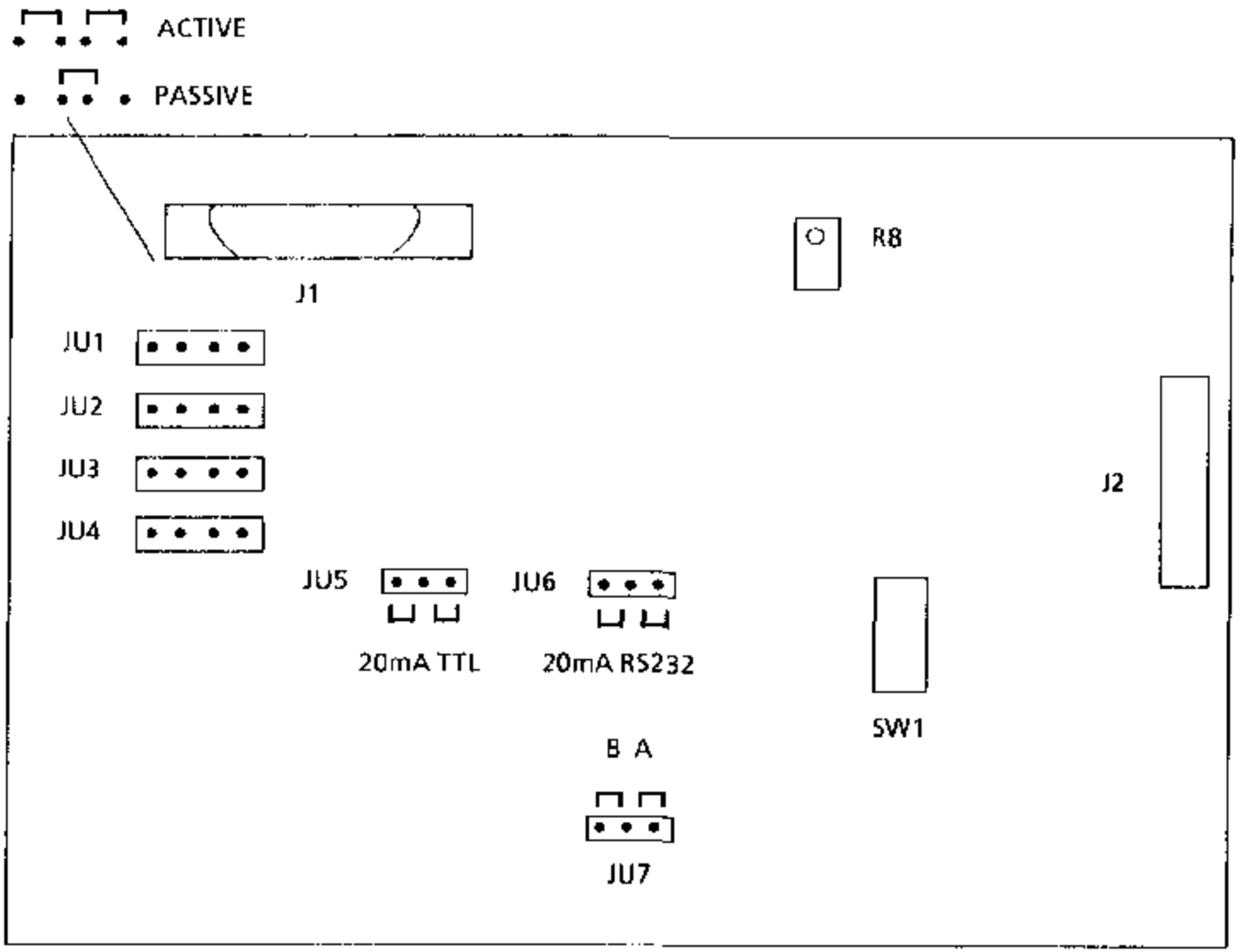
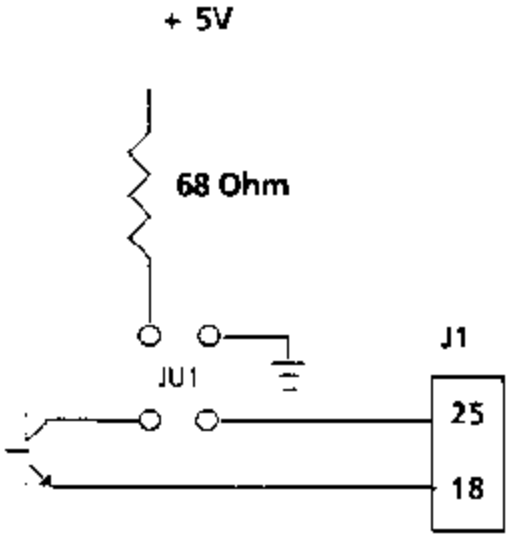

ACTIVE
PASSIVE
J1
R8
JU1
JU2
JU3
JU4
J2
JU5
JU6
20mA TTL
20mA RS232
SW1
B A
JU7

FIGURE 3.9

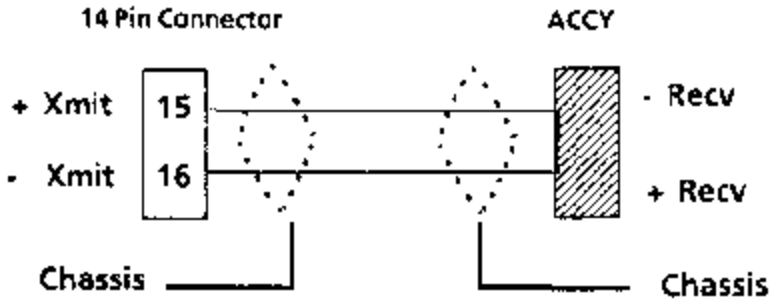
Accessory Interface

The accessory port is a hardware interface that simply echoes whatever data is received back out in the exact same format and at the exact same baud rate. It is provided for applications that require an additional accessory such as a remote display, analog output, etc. to be connect to the instrument.

Jumper JU1 is used to configure the accessory port as active or passive. If you are interfacing to a Masstron accessory, the port should be configured active. Refer to Figure 3.9 for jumper locations. Connection to most Masstron accessories is shown in Figure 3.11. Figure 3.10 shows more detailed information about the accessory port.



Accessory Port Output Circuit
FIGURE 3.10



Typical Interface to Masstron Accessory
FIGURE 3.11

ACCESSORY FORMATS

The serial transmission format in the continuous mode is as shown in Table 3.1 Displayed weight, tare weight, and status information is continuously transmitted.

The continuous output port functions are as follows. At the end of each display update, a 15 byte transmission will occur over the continuous output port. This transmission will contain all pertinent information about the scale. The current display value, tare weight and miscellaneous other status functions, are transmitted in this message format. The specific format is shown in the tables that follow (Tables 3.2 through 3.4).

The continuous transmission feature of the port is intended to be used with Masstron options, such as remote displays, scoreboards, etc. The transmission format will allow several options to be daisy chained on the same transmission loop with each one extracting the data it requires to operate.

BYTE	DESCRIPTION
00	sync byte #1 (always 00 hex)
01	sync byte #2 (always FF hex)
02	message format indicator (always 00 hex)
03	MSB of main display weight
04	NSB of main dislay weight
05	LSB of main display weight
06	MSB of tare
07	NSB of tare
08	LSB of tare
09	setpoint status (not used with M8140)
10	status #1
11	status #2
12	status #3 (always 00 hex)
13	ID character (always 00 hex)
14	LRC (exclusive of bytes 00-13)

Table 3.1 Continuous Transmission Format

Table 3.2 Main Display Weight/Tare Format

The main display weight (either gross or net) and the tare weight will be transmitted as an 18 bit signed magnitude binary mantissa with a 5 bit 2's compliment decimal exponent.

FORMAT:

BYTE	BIT	DESCRIPTION
MSB	7	- Sign of mantissa
	6-2	- decimal exponent (in 2's compliment)
	1-0	- MSB's of mantissa
NSB	7-0	- NSB's of mantissa
LSB	7-0	- LSB's of mantissa

Table 3.3 Status #1

BIT	DESCRIPTION
0	0 = gross mode 1 = net mode
1	0 = kg mode 1 = lb mode
2-7	always set to 0

Table 3.4 Status #2

BIT	DESCRIPTION
0-1	always set to 0
2	0 = no motion 1 = scale in motion
3	0 = no coz 1 = center of zero
4	always set to 0
5	0 = weight is less than overload value 1 = overload (soft function)
6-7	always set to 0

4.0 SETUP & CALIBRATION

INSTRUMENT SETUP

Jumpers are in position for normal operation when shipped. Verify they are correct for your application .

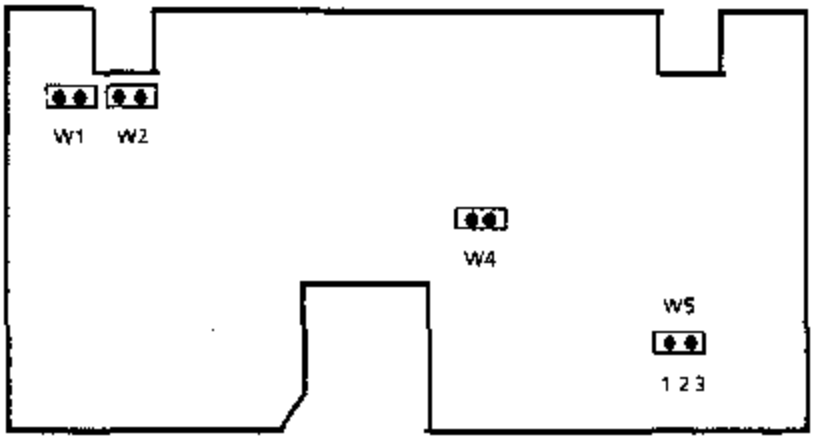


Figure 4.1 Jumper Locations

W1 - External memory
Must be installed for correct operation

W2 - Calibrate enable
The W2 jumper is wired to the Normal/Calibrate toggle switch.

W4 - Comma enable
Installed - a comma will be displayed instead of a decimal point.
Removed - a decimal point is displayed when required.

W5 - 30mV/45mV load cell output select
30mV - Install in this position for 2mV/V output load cells (pin 1 & 2)
45mV - Install in this position for 3mV/V output load cells (pin 2 &3)

POWER UP

The M8147 requires an independent power line with a dedicated ground. The units are shipped with a U.S. standard 110 VAC power cord. Verify proper voltage levels before plugging in. Upon power up the display should light up with dashes across the top segments, then go to weigh mode.

Operating Modes

The M8147 operates on one of two modes; Setup/Calibration or Weigh. The mode is selectable via the Normal/Calibrate toggle switch.

Keyboard Functions in Setup/Calibration Mode

In the setup/calibration mode the six front panel switches perform functions other than what is depicted. Figure 4.2 summarizes these functions.

NOTE: Some keys have different functions during certain steps of Setup/Calibration.

WEIGH MODE	Zero	Test	Tare	Clear	lb kg	Print
SETUP/CAL. MODE	Previous Step	Yes 1	No 0	Exit Program	Not Used	Enter

Figure 4.2 Functions of Keyboard in Setup/Cal. Mode

Some keys have different functions during certain steps of Setup/Calibration, but three (3) have the same function throughout. These are:

ENTER (Print) - Accepts the displayed value and increments to the next step.

EXIT (Clear) - Accepts the displayed value and goes to the last step "S FILE".

PREVIOUS (Zero) - Decrements to the previous step. Not operational during calibration or "S FILE".

STEP	PARAMETER	SELECTABLE VALUES
F0	Span Adjustment	0 = Go to F1 1 = Enter weight value
F1	Expand Mode	0 = Disable; 1 = Enable
F2	Display Filtering Rate	1, 2, 4, 8, 16 A/D cycles averaged (Affects F6)
F3	Keyboard Tare	0 = Disable; 1 = Enable
F4	Tare Interlock	0 = Disable; 1 = Enable
F5	Tare Auto Clear	0 = Disable; 1 = Enable
F6	Motion Sensitivity	0 or 1 (see detailed desc.)
F7	Lb/Kg Calibration	0 = Kg; 1 = Lb
F8	Lb/Kg Power Up	0 = Kg; 1 = Lb
F9	Lb/Kg Switching	0 = Disable; 1 = Enable
F10	Auto Zero Maintenance	0 = Disable; 1 = Enable (also affects zero key)
F11	Analog Verify	(0) = Disable; 1 = Enable
F12	Serial Output	→Enter = Allows serial output setup No = Goes to calibration
1	Output Select	(0) = Continuous data output 1 = Printer data output
2	Baud Rate	300, 1200, 2400, 4800 or 9600 for printer: 1200, 2400, 4800, or 9600 for continuous data
3		Must be set to 0
4		Must be set to 3
5	Printer Format	0 = Displayed weight 1 = G-T-N on a single line 2 = G-T-N on three lines
6	Expanded Print	0 = Disable; 1 = Enable Must be set to 1
7		
CAL		
C1	Full Scale Resolution	1000, 2000, 2500, 3000, 4000, 5000, 6000, 8000, and 10,000 graduations
C2	Count by	1, 2, or 5
C3	Multiplier	0.001, 0.001, 0.01, 0.1, 1, 10
SFILE	Save Calibration	YES = Retain Setup/Calibration in non-volatile memory NO = Retain Setup/Calibration until power down EXIT = Disregard all Setup/Calibration entered.
CALOFF	Setup/Calibration is done	Return toggle switch to the "Normal" position.

Table 4.1 Setup Parameters

Parameter Setup

The following is a more detailed description of the parameters in Table 1.

F0 - Span Adjustment:	Makes adjustments to span without going through the complete calibration.
Procedure:	Enter a "1" and the display will go to (X00000), X = blank, requesting the test weight value. Press NO (Tare) to increment the blank digit to the desired value. Press YES (Test) to move to the next digit to be edited. Press ENTER (Print) to accept the displayed value.
Note:	Calibration of hopper/tank scales where a supporting device is required for the test weights; After a rough calibration, attach the supporting device and press TARE. Add the test weight and follow the span adjustment procedure above.
Enter:	0 = Goes to F1 1 = Enters into span adjustment mode
F1 - Expand Mode	Displays the internal counts of the instrument (for test purposes only).
Enter:	0 = Normal Mode 1 = Expanded Mode
F2 - Display Filtering Rate:	The number entered controls the number of A/D conversions that are averaged together before being displayed. This affects F6. 1 = fastest update, 16 = slowest update. Selected by pressing the NO (Tare) key.
Enter:	Number of divisions
Select:	1, 2, 4, 8, 16
F3 - Keyboard Tare	Enables or disables the keyboard tare function.
Enter:	0 = Disables tare function 1 = Enables function
Note:	Keyboard tare must be enabled if a sequence is being used that requires use of auto tare.

Parameter Setup (Continued)

F4 - Tare Interlock

When enabled, the gross weight must be at zero before tare may be cleared. This also disables the weight display at power up. It will show "E E E" until zero has been captured.

Enter:

0 = Disable tare interlock function
1 = Enables function

Note:

This function should be disabled.

F5 - Tare Auto Clear

When enabled, tare will be automatically cleared after a stable gross weight greater than 10 graduations has been displayed and the scale returns to zero gross weight.

Enter:

0 = Disables auto clear function
1 = Enables function

Note:

This function should be disabled.

F6 - Motion Sensitivity

When motion is detected, the zero, tare, and print functions are disabled. When this parameter is set to "1", motion sensitivity is +/- 2 graduations. When set to "0", motion sensitivity is dependent on the setting of F2. See the table below for the values.

Enter:

0 = Motion sensitivity is dependent on F2
1 = Motion sensitivity is +/- 2 graduations.

F2 Value	Sensitivity when F6 = 0 (Graduations)
1	+/- 1/2
2	+/- 1
4	+/- 2
8	+/- 4
16	+/- 8

F7 - Lb/Kg Calibration

A "1" indicates the test weights used for calibration are in pounds (lb). A "0" indicates the test weights are in kilograms (kg).

Enter:

0 = Calibrate in kilograms
1 = Calibrate in pounds

F8 - Lb/Kg Power Up

A "1" indicates the instrument will power up in pounds (lb). A "0" indicates the instrument will power up in kilograms (kg).

Enter:

0 = Powers up in kilograms
1 = Powers up in pounds

Parameter Setup (Continued)

F9 - Lb/Kg Switching:	Enables the Lb/Kg switching functions on the keypad.
Enter:	0 = Disables Lb/Kg switching function 1 = Enables function
Note:	Lb/kg switching should be disabled unless required. Setpoint values do not automatically get converted when the instrument is switched from lbs. to kgs.
F10 - Auto Zero Maintenance	When enabled will track off weight changes of 0.1 grads per second or slower. Up to +/- 2% of capacity. Also this enables the use of the ZERO push button.
Enter:	0 = Disables auto zero and front panel zero functions 1 = Enables functions
F11 - Analog Verify	If enabled, an automatic analog verify cycle will be initiated approximately every 4 hours.
Enter:	0 = Disables verify function 1 = Enables function
F12 - Serial Output	"ENTER" (Print) - Allows entry to serial port setup "NO" (Tare) - Skips to calibration
1 - Output Select	A "0" selected will output continuous data. Steps 3, 4, 5, and 6 are skipped. A "1" selected will output printer data on demand. Step 7 is skipped.
Enter:	0 = Enables continuous output 1 = Enables printer output
Note:	Must be set to "0"
2 - Baud Rate	Depending on which output is selected, the choices are selected by pressing the NO (Tare) key. Continuous output - 1200, 2400, 4800, 9600 baud. Printer Output - 300, 1200, 2400, 4800, 9600 baud.
Enter:	Selected baud rate
Note:	4800 baud is recommended
3 -	Must be set to "0"
4 -	Selected by pressing the NO (Tare) key. Must be set to "3".

Parameter Setup (Continued)

5 - Print Format	This allows one of three output formats selected by pressing the NO (Tare) key.
Enter:	0 = Prints displayed weight only 1 = Prints Gross/Tare/Net on a single line 2 = Prints Gross/Tare/Net on 3 separate lines.
Note:	All printing is done by the controller. The PRINTkey for the instrument is not used.
6 - Expanded Print:	If enabled, the net or gross (not tare) weight will be printed in double width print.
Enter:	0 = Disables function 1 = Enables function
7 -	Must be set to "1"
CAL - Calibrate Mode	Allow an ample time for the indicator and load cell(s) to warm up.
C1 - Full Scale	Selectable by pressing the NO (Tare) key to 1000, 2000, 2500, 3000, 4000, 5000, 6000, 8000, or 10,000 graduations.
C2 - Count By	Sets the size of each graduation. Selectable by pressing the NO (Tare) key to 1, 2, 5.
C3 - Multiplier	Sets the position of the decimal point. Selectable by pressing the NO (Tare) key to 0.0001, 0.001, 0.01, 0.2 or 1 or 10.
E SCL - Empty Scale	Remove weight for storing of the dead load. Press ENTER (Print) when complete.
10 SEC	Delay while dead load is stored.
Add Ld - Add Load	Add the calibration weights. Press ENTER (Print).
(X0000) - Test Weight	Enter test weight value by: Pressing NO (Tare) to increment the blank digit to the desired value. Pressing YES (Test) to move to the next digit to be edited. Pressing ENTER (Print) to accept the displayed weight value.
10 SEC	Delay while span value is stored.
E SCL - Empty Scale	Remove weight for verification of zero. Press ENTER (Print) when done.
10 SEC	Delay while dead load is verified.

Parameter Setup (Continued)

CAL d - Calibration Done	This will be displayed while the calibration conversion factors are calculated.
S FILE - Save File?	Where is the setup/calibration to be stored? "Yes" (Test) retains the values in non-volatile memory for use after power down. "No" (Tare) retains the values only until a power down "Exit" (Clear) ignores the entered values and the values previously stored will be used.
CALOFF -	Returning the toggle switch to the "Normal" position protects the non-volatile memory from being overwritten and exits the Setup/Calibration mode

MUST GO THRU "TEST" IF YOU POWER UP TO A RAMER

CONTROLLER SETUP

Most of the setup requirements for the M8147 are done in the setup mode with the exception of configuring the serial ports. Make sure that the jumpers on the controller board are configured properly as follows:

JU1 - As required for accessory interface. See section "Accessory Interface"

JU2 - Not used

JU3 - As required for printer interface see section "Printer Interface"

JU4 - Not used

JU5 - Place in "TTL" position

JU6 - Place in "20mA" position

JU7 - "A" selects setup mode
"B" position selects operating mode

Under normal operating conditions, the dip switches on the controller board should be left in the "Open" or "Off" position. The dip switches are used to select the test mode. If SW1 position 1 is in the closed position, the test mode will be enabled. The micro only reads the dip switches on power up. Therefore, you must select the test mode before applying power to the unit. See the troubleshooting section for more details.

The contrast of the display may be changed by adjusting potentiometer R8. Simply adjust R8 for optimum viewing.

Setup Mode

The operation of the M8147 can be configured for a particular application by selecting one of several operating modes or sequences. In addition to the mode selected, several features may be enabled or disabled to further tailor the unit to your system needs.

Since the controller does not convert setpoint values when the instrument switches between lbs. and kgs., it is recommended that the lb/kg switching be disabled in the instrument.

Select the setup mode by placing jumper 'JU7" in the "A" position (see Figure 4.3). The display will display the first setup option "Operating Mode". Enter the number corresponding to the desired mode of operation, then press ENTER. If no change is required, simply press ENTER to retain the current setting. The display will advance to the next setup option. If no further changes are required, return jumper "JU7" to the "B" position and the unit will return to the operating mode. When all setup options have been completed, the unit will display the message "SETUP DONE - REMOVE JUMPER". At this point, you may remove the jumper to exit the setup mode, or press ENTER to repeat the setup procedure.

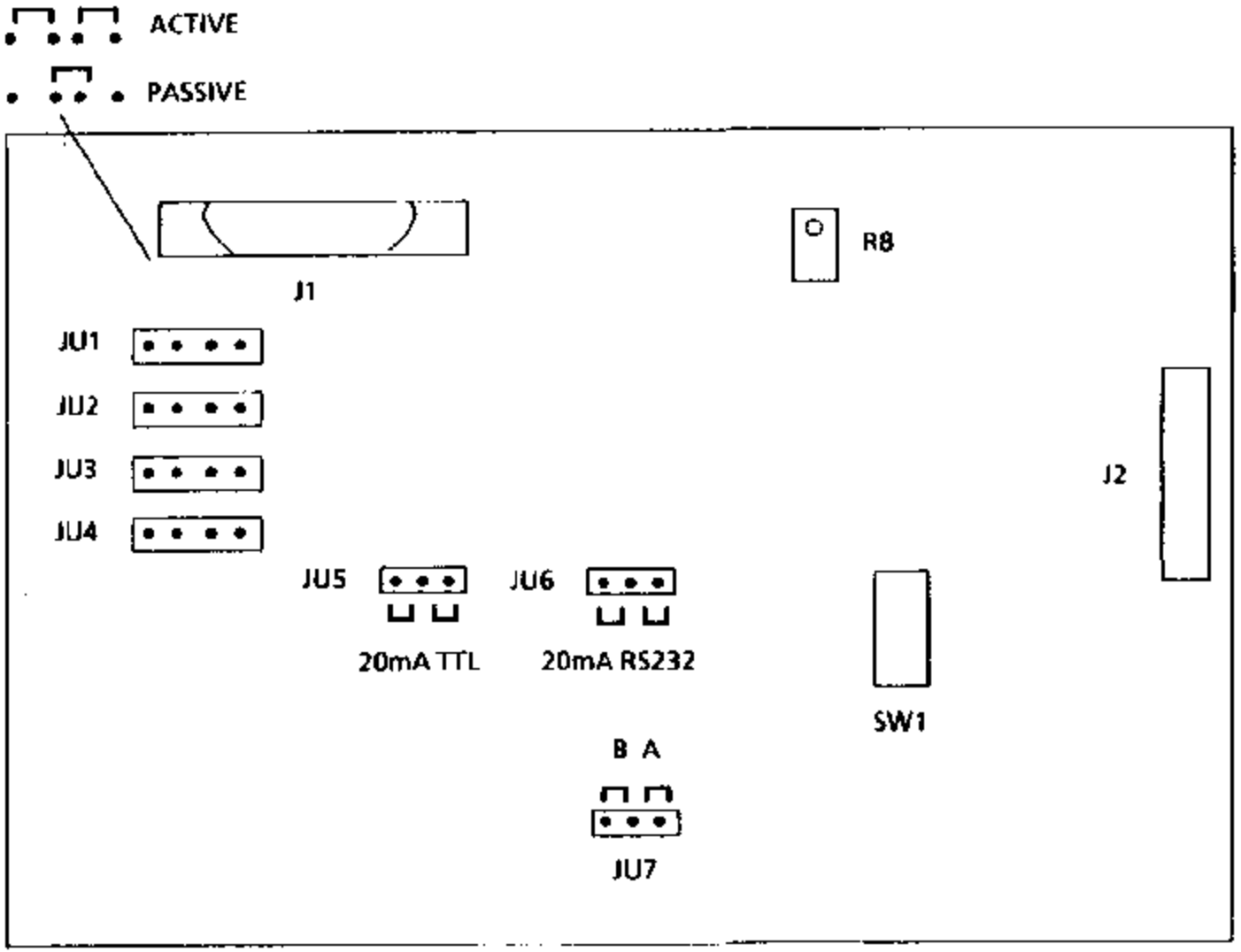

ACTIVE
PASSIVE
J1
R8
JU1
JU2
JU3
JU4
J2
JU5
JU6
20mA TTL
20mA RS232
SW1
B A
JU7

FIGURE 4.3

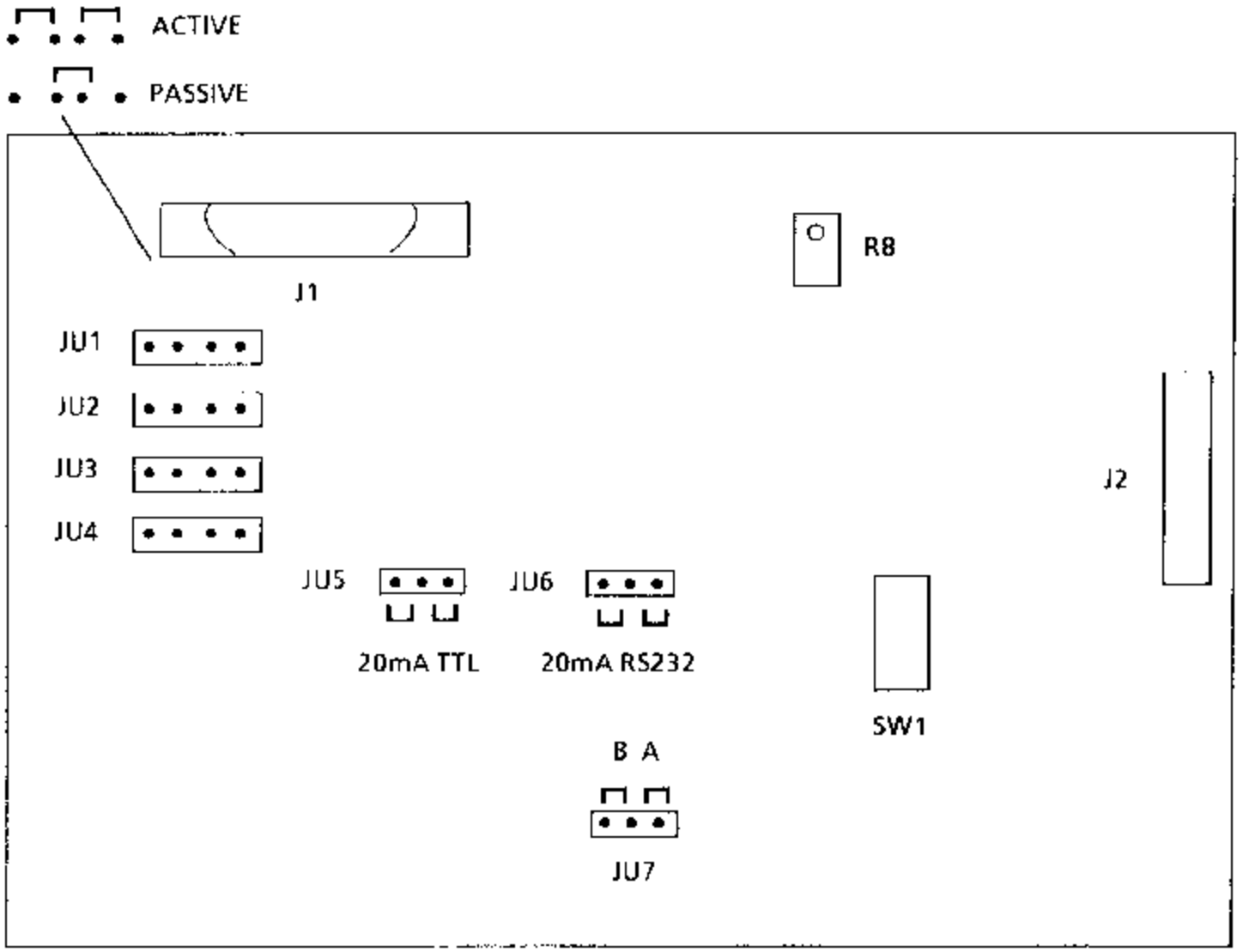

ACTIVE
PASSIVE
J1
R8
JU1
JU2
JU3
JU4
J2
JU5
JU6
20mA TTL
20mA RS232
SW1
B A
JU7

FIGURE 4.3

CONTROLLER SETUP OPTIONS

Operating Mode

The controller may operate in a weigh-in mode or a weigh-out mode. This setup option selects the mode, or sequence of operation for the controller. Enter the number that corresponds to the required operating mode.

Selectable weigh sequences for weigh-in operation.

00 - WEIGH HOLD - Single Speed Feed
01 - WEIGH HOLD - 2 Speed Alternate Feed
02 - WEIGH HOLD - 2 Speed Simultaneous Feed
03 - WEIGH PRINT HOLD - Single Speed Feed
04 - WEIGH PRINT HOLD - 2 Speed Alternate Feed
05 - WEIGH PRINT HOLD - 2 Speed Simultaneous Feed
06 - WEIGH DISCHARGE HOLD - Single Speed Feed
07 - WEIGH DISCHARGE HOLD - 2 Speed Alternate Feed
08 - WEIGH DISCHARGE HOLD - 2 Speed Simultaneous Feed
09 - WEIGH HOLD DISCHARGE HOLD - Single Speed Feed
10 - WEIGH HOLD DISCHARGE HOLD - 2 Speed Alternate Feed
11 - WEIGH HOLD DISCHARGE HOLD - 2 Speed Simultaneous Feed
12 - WEIGH PRINT DISCHARGE HOLD - Single Speed Feed
13 - WEIGH PRINT DISCHARGE HOLD - 2 Speed Alternate Feed
14 - WEIGH PRINT DISCHARGE HOLD - 2 Speed Simultaneous Feed
15 - WEIGH PRINT HOLD DISCHARGE HOLD - Single Speed Feed
16 - WEIGH PRINT HOLD DISCHARGE HOLD - 2 Speed Alternate Feed
17 - WEIGH PRINT HOLD DISCHARGE HOLD - 2 Speed Simultaneous Feed
18 - TARE WEIGH GROSS HOLD - Single Speed Feed
19 - TARE WEIGH GROSS HOLD - 2 Speed Alternate Feed
20 - TARE WEIGH GROSS HOLD - 2 Speed Simultaneous Feed
21 - TARE WEIGH PRINT GROSS HOLD - Single Speed Feed
22 - TARE WEIGH PRINT GROSS HOLD - 2 Speed Alternate Feed
23 - TARE WEIGH PRINT GROSS HOLD - 2 speed Simultaneous Feed
24 - TARE WEIGH GROSS DISCHARGE HOLD - Single Speed Feed
25 - TARE WEIGH GROSS DISCHARGE HOLD - 2 Speed Alternate Feed
26 - TARE WEIGH GROSS DISCHARGE HOLD - 2 Speed Simultaneous Feed
27 - TARE WEIGH GROSS HOLD DISCHARGE HOLD - Single Speed Feed
28 - TARE WEIGH GROSS HOLD DISCHARGE HOLD - 2 Speed Alternate Feed
29 - TARE WEIGH GROSS HOLD DISCHARGE HOLD - 2 Speed Simultaneous Feed
30 - TARE WEIGH PRINT GROSS DISCHARGE HOLD - Single Speed Feed
31 - TARE WEIGH PRINT GROSS DISCHARGE HOLD - 2 Speed Alternate Feed
32 - TARE WEIGH PRINT GROSS DISCHARGE HOLD - 2 Speed Simultaneous Feed
33 - TARE WEIGH PRINT GROSS HOLD DISCHARGE HOLD - Single Speed Feed
34 - TARE WEIGH PRINT GROSS HOLD DISCHARGE HOLD - 2 Speed Alternate Feed
35 - TARE WEIGH PRINT GROSS HOLD DISCHARGE HOLD - 2 Speed Simultaneous Feed
36 - TARE WEIGH HOLD - Single Speed Feed
37 - TARE WEIGH HOLD - 2 Speed Alternate Feed
38 - TARE WEIGH HOLD - Speed Simultaneous Feed
39 - TARE WEIGH PRINT HOLD - Single Speed Feed
40 - TARE WEIGH PRINT HOLD - 2 Speed Alternate Feed
41 - TARE WEIGH PRINT HOLD - 2 Speed Simultaneous Feed

42 through 49 are reserved for future use. Entering any of these settings will inhibit operation of the controller.

Selectable weigh sequences for weigh-out operation:

50 - TARE DISCHARGE GROSS HOLD FEED HOLD - Single Speed Discharge
51 - TARE DISCHARGE GROSS HOLD FEED HOLD - 2 Speed Alternate Discharge
52 - TARE DISCHARGE GROSS HOLD FEED HOLD - 2 Speed Simultaneous Discharge
53 - TARE DISCHARGE PRINT GROSS HOLD FEED HOLD - Single Speed Discharge
54 - TARE DISCHARGE PRINT GROSS HOLD FEED HOLD - 2 Speed Alternate Discharge
55 - TARE DISCHARGE PRINT GROSS HOLD FEED HOLD - 2 Speed Simultaneous Discharge

Time and Date

This setup option enables the time and date function for display and printing.

ENTER: 00 - Disable
01 - Enable

Batch I.D.

This setup option enables the operator to enter a batch I.D. to be printed after each weighment. The batch I.D. can be fixed or incremented after each print.

ENTER: 00 - Disable
01 - Fixed I.D.
02 - Increment I.D.

Preact

This setup option enables the preact feature. If enabled, the operator may enter a preact value. The preact value determines the point at which the final cutoff actually turns off.

SETPOINT - PREACT = FINAL CUTOFF

ENTER: 00 - Disable
01 - Enable

Tolerance Check

This setup option enables the operator to enter a tolerance value. When enabled, the controller will check the tolerance of the batch weighed or discharged after no motion. The tolerance value entered is the weight value +/- the setpoint value that is considered within tolerance.

ENTER: 00 - Disable
01 - Enable

Accumulate

This setup option enables accumulation of batch weights. Each time a batch is completed, it will be added to the accumulator.

ENTER: 00 - Disable
01 - Enable

Batch Counter

This setup option enables a batch counter. Each time a batch is weighed, the batch counter is incremented. The batch count is printed along with the subtotal or total.

ENTER: 00 - Disable
01 - Enable

Preset # Batches

This setup option enables the operator to enter the number of batches to be weighed. This feature can be enabled whether the controller is set up to run continuously or not. The operator will be prompted to enter the number of batches any time the counter equals zero.

ENTER: 00 - Disable
01 - Enable

Continuous Run

This setup option enables the controller to operate in a continuous mode. This feature should only be used when the controller is set up to control both the weigh and discharge cycles. When enabled, the controller will cycle continuously. If the preset number batches feature is enabled, the controller will stop after the selected number of batches has been completed or the STOP key is pressed.

ENTER: 00 - Disable
01 - Enable

Auto Refill

This setup option enables the auto refill feature when using one of the weighout sequences. When enabled, the controller will check the amount of material in the scale at the end of each batch. If there is not enough material in the scale to complete another batch, the controller will automatically refill the scale. This feature may be turned on and off in the operating mode.

Enter: 00 - Disable
01 - Enable

Guarded Entry

This setup option enables the feature which allows the operator to access setpoints, accept off tolerance, and preset number of batches only when the input to I/O 13 is turned off.

Enter: 00 - Disable
01 - Guarded entry for setpoints and accept off tolerance
02 - Guarded entry for setpoints, accept off tolerance and preset number of batches.

Instrument Baud Rate

This setup option determines the baud rate at which the controller will receive data from the instrument. A baud rate of 4800 baud is recommended. A low baud rate will cause a delay between the time the instrument displays a weight and the controller receives the weight from the instrument. This lag can cause inconsistency in batch weights.

ENTER: 00 - 300 BAUD
01 - 1200 BAUD
02 - 2400 BAUD
03 - 4800 BAUD
04 - 9600 BAUD

Printer Baud Rate

This setup option determines the baud rate at which the controller will transmit data to the printer. It is recommended that the printer baud rate be set the same as the instrument baud rate. When the two baud rates are different, the controller cannot transmit and receive data simultaneously. This may cause a slight delay in operation when printing.

ENTER:
00 - 300 BAUD
01 - 1200 BAUD
02 - 2400 BAUD
03 - 4800 BAUD
04 - 9600 BAUD

Print Time Delay

This setup option enables a time delay between lines of data sent to the printer. This is only required when a printer is used that does not buffer data, such as the MP760 or 8855 Strip Printer without the optional buffer.

Entry value x .25 = time delay in seconds

ENTER:
00 to 08
00 - DISABLES TIME DELAY
08 - MAXIMUM TIME DELAY
04 - RECOMMENDED VALUE FOR MP760

5.0 KEYBOARD & DISPLAY FUNCTIONS

ZERO - This key provides for re-zeroing of the scale over a range of +/- 2% of scale capacity from zero. A setup parameter (F10) permits disabling the push button Zero and Automatic Zero Maintenance. The ZERO key must be depressed for approximately 2 seconds to initiate this function.

TEST - Pressing the TEST key will cause the display to blank and then sequentially light each segment of all digits and each cursor. These results show that all drivers and displays operate in both OFF and ON conditions.

TARE - When the TARE key is depressed and no motion is present, the displayed weight will be taken as a tare weight providing a net displayed weight of zero. If the weight is removed from the scale, the tare weight will be displayed as a negative value. Chain tares are allowed for batching operations.

CLEAR - Tare may be cleared by the use of the CLEAR key or automatically by the use of Automatic Clear. Automatic Clear may be enabled in setup parameter (F5).

LB/KG - A push button is provided for pounds/kilogram selection. When switching, the increment size will be adjusted and the decimal point will be shifted, if required. The instrument can be locked into the LB or KG mode by a setup parameter (F9) which disables the LB/KG key.

PRINT- The PRINT key for the instrument is not used. All print functions must be initiated via the controller keyboard.

The function of the keyboard is fairly straightforward. However, some of the keys serve dual functions. Some of the functions described here only apply if selected by the corresponding setup option.

0 - 9 Decimal Point

The numeric keys along with the decimal point key are used to enter setpoint values, time and date, batch ID, preset number of batches and setup option values.

Clear

The clear key is used to clear erroneous entries.

Setpoint

The setpoint key is used to initiate entry of setpoint, dribble, preact, tolerance, discharge, turn Auto Refill off and on, and enter the batch ID. Once pressed, the controller will prompt the operator for entries.

Auto/Semi

The AUTO/SEMI key is used to select between the auto mode of operation or the software enabled manual mode of operation. Selecting the semi-auto mode will allow the operator to turn on the feed and discharge outputs by pressing the FEED and/or DISCHARGE keys. The outputs will remain on as long as the keys are pressed.

Time/Date

The TIME/DATE key is used to initiate entry of time and date. If time and date has already been entered, the current time and date will be displayed for 3 seconds. If the PRINT key is pressed while time and date is being displayed, the current time and date will be printed. The controller will then return to the normal operating mode.

Reset

The RESET key allows the operator to reset the controller back to cycle complete. When pressed, the controller will prompt the operator to verify that the cycle is to be reset.

Accept O.T.

When the tolerance check option is enabled, the accept off tolerance key must be pressed to allow the controller to proceed after a batch is weighed that is out of tolerance.

Subtotal

The SUBTOTAL key is used to display or print the current accumulated weight. When pressed, the controller will display the current accumulated weight for 3 seconds. If the SUBTOTAL key is pressed again within the 3 second time period, the controller will display the current batch count. Pressing the PRINT button while the subtotal is being displayed will force the controller to print the current time and date, the current subtotal and the current batch count. Pressing the PRINT button while the batch count is being displayed will force the controller to print the current time and date and the current batch count.

Total

The TOTAL key is used to display or print the current accumulated weight. When pressed, the controller will display the current accumulatd weight for 3 seconds. If the TOTAL key is pressed again within the 3 second time period, the controller will display the current batch count. Pressing the PRINT button while the total is being displayed will force the controller to print the current time and date, the current total and the current batch count. The accumulator and batch count will be reset to"0". Pressing the PRINT button while the batch count is being displayed will force the colntroller to print the current time and date and the current batch count. The batch count will be reset to "0".

Print

Pressing the PRINT key will force the controller to print the currently displayed weight. The weight will not be added to the accumulator. The PRINT key may be used along with other keys such as the TIME/DATE, SUBTOTAL and TOTAL keys.

Discharge

The DISCHARGE key is used to initiate the start of the discharge cycle. Also used to manually turn on the discharge output when the semi-auto mode is selected.

Start/Feed

The START/FEED key is used to initiate the start of the Feed/Fill cycle. Also used to manually turn on the FEED/FILL output when the semi-auto mode is selected.

Stop

The STOP key will force the controller to stop the sequence and turn off all feed and discharge outputs. The sequence is resumed where it was stopped when the START or DISCHARGE key is pressed (whichever is appropriate).

Display Legend

The M8147 displays a cursor above the proper status legends as described below:

ZERO - Will be illuminated when the instrument is within $\pm$ 0.25 graduations of zero and there is no motion.

LB - Will be illuminated when there is no motion and the LB mode has been selected.

KG - Will be illuminated when there is no motion and the KG mode has been selected.

GROSS - Will be illuminated when a gross weight is displayed.

NET - Will be illuminated when a net weight is displayed.

PRINT - Will be illuminated when the PRINT key is depressed.

The main display shows the digital representation of the weight. In an over capacity condition the display will blank. In an under zero condition the display will blank with a minus (-) sign in the left most digit.

6.0 ENTERING OPERATOR INFORMATION

The entry of setpoint information by the operator will vary depending on the operating mode selected and setup options selected. Therefore, it is assumed here that all setup options are enabled and the sequence with the most steps is selected.

Guarded Entry

If the guarded entry feature is enabled, entry of setpoints is inhibited when the guarded entry input (I/O 13) is turned on. The input may be wired to a keylock switch to provide the use with a means of prohibiting unauthorized entry of setpoint data.

Time and Date

To enter Time and Date, proceed as follows:

1. Press the TIME/DATE key. If time and date have been set, the current time and date will be displayed. To change the current time and date, proceed to the next step. If the time and date have not been set, the display will show "12:00AM 00/00/00".

   If an error is made while entering information, pressing the CLEAR key will clear the current entry.

2. Enter the time in the same format as it is displayed. 4 digits must be entered. The cursor indicates what digit is being entered.

3. Press the decimal point key to toggle the time between "AM" and "PM". If the AM/PM indicator is OK. Proceed to the next step.

4. Enter the Month/Day/Year using two digit numbers for each value entered. The cursor indicates what digit is being entered.

5. After all information is entered, press the ENTER key. If all data was not entered or an invalid entry was made, the display will prompt for entry again. Otherwise, the controller will resume normal operation.

Setpoint Entry

The controller will prompt the operator for entry of setpoint data when in the entry mode. If an error is made while entering data, press the CLEAR key to clear the current entry. Then re-enter the correct data. If an invalid entry is made, the controller will display the message "ENTRY ERROR" for 3 seconds. The display will then return back to the prompt for data entry.

When entering setpoint data, it is not necessary to enter the decimal point. If no decimal point is entered, the controller will assume one is to be placed after the last digit entered. If a number is entered with more decimal places than the instrument is displaying, the extra decimal places will be ignored. The number will not be rounded.

If the instrument is switched from lbs. to kgs., and the decimal position changes, the setpoints must be re-entered. Therefore, it is recommended that lb/kg switching be disabled.

Setpoints may be viewed or changed while the controller is running without affecting operation. If the setpoint data is changed, the new values will be used to calculate cutoffs.

Setpoint Entry - Weigh-In-Mode

1. Press the SETPOINT key. The display will display the current setpoint. To retain the current setpoint, press the ENTER key. To change the setpoint, enter the new target weight via the keypad, then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

2. If a two speed feed sequence is selected, the controller will display the current dribble value. The dribble value determines the point at which the fast feed output will turn off as follows:

   SETPOINT - DRIBBLE = FAST FEED CUTOFF

   To retain the current dribble value, press the ENTER key. To change the dribble value, enter the new dribble value via the keypad, then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

3. If the preact feature is enabled, the controller will display the current preact value. The preact value determines the point at which the final cutoff occurs as follows:

   SETPOINT - PREACT = FINAL CUTOFF

   To retain the current preact value press the ENTER key. To change the preact value, enter the new preact value via the keyboard then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

4. If the tolerance feature is enabled, the controller will display the current tolerance value. The tolerance value is the weight value +/- the setpoint value that is considered within tolerance as follows:

   TOLERANCE OK IF WEIGHT = SETPOINT +/- TOLERANCE

   To retain the current tolerance value press the ENTER key. To change the tolerance value enter the new tolerance value via the keypad, then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

5. The controller will display the current discharge cutoff value. The discharge cutoff value is the weight that the scale must fall below for the discharge output to turn off. To retain the current discharge cutoff value press the ENTER key. To change the discharge cutoff value, enter the new discharge cutoff value via the keypad then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

6. The controller will display the current batch ID. The batch ID may be setup as a fixed ID or it may be set up to increment after each print in the setup mode. To retain the current batch ID, press the ENTER key. To change the batch ID, enter the new ID number via the keypad then press ENTER. Up to six (6) digits may be entered. If less than six digits are entered, the number will be right justified. The controller will return to the normal operating mode.

Setpoint Entry - Weigh-Out Mode

1. Press the SETPOINT key. The display will display the current discharge setpoint. To retain the current setpoint press the ENTER key. To change the setpoint enter the new target weight via the keypad, then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the enter key. The new value will be stored and the controller will return to the normal operating mode.

2. If a two speed weighout sequence is selected, the controller will display the current dribble value. The dribble value determines the point at which the fast discharge output will turn off as follows:

   SETPOINT - DRIBBLE = FAST DISCHARGE CUTOFF

   To retain the current dribble value press the ENTER key. To change the dribble value enter the new dribble value via the keypad, then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

3. If the preact feature is enabled, the controller will display the current preact value. The preact value determines the point at which the final cutoff occurs as follows:

   SETPOINT - PREACT = FINAL CUTOFF

   To retain the current preact value, press the ENTER key. To change the preact value, enter the new preact value via the keypad then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

4. If the tolerance feature is enabled, the controller will display the current tolerance value. The tolerance value is the weight value +/- the setpoint value that is considered within tolerance as follows:

   TOLERANCE OK IF WEIGHT = SETPOINT +/- TOLERANCE

   To retain the current tolerance value press the ENTER key. To change the tolerance value enter the new tolerance value via the keypad, then press the ENTER key. If no further changes are required, press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

5. The controller will display the current refill setpoint value. The refill setpoint value is the weight that the scale will fill to when a fill cycle auto refill cycle is initiated. To retain the current refill setpoint value press the ENTER key. To change the refill setpoint value, enter the new refill setpoint value via the keypad, then press the ENTER key. If no further changes are required press the SETPOINT key instead of the ENTER key. The new value will be stored and the controller will return to the normal operating mode.

6. If the auto refill feature is enabled, the controller will prompt the operator to turn the auto refill on or off. Press the ENTER key to turn the auto refill on. Press the RESET key to turn the auto refill off.

7. The controller will display the current batch ID. The batch ID may setup as a fixed ID or it may be set up to increment after each print in the setup mode. To retain the current batch ID, press the ENTER key. To change the batch ID, enter the new ID number via the keypad, then press ENTER. Up to six (6) digits may be entered. If less than six digits are entered, the number will be right justified. The controller will return to the normal operating mode.

7.0 OPERATION

Operation of the controller will vary depending on the operating mode selected and the combination of setup options selected. Therefore, it is assumed here that all setup options are enabled and the sequence with the most steps is selected.

If the guarded entry feature is enabled, the operator will not be able to accept off tolerance batches or enter the preset number of batches when the guarded entry input (I/O 13) is turned on. The input may be wired to a keylock switch to provide the user with a means of inhibiting unauthorized entry of these functions.

Weigh-In Mode of Operation

1. Press START. The controller will prompt the operator to enter the desired number of batches to be run. After the number of batches has been entered, the operator presses ENTER. The cycle complete output will be turned off.

2. The controller will issue a tare command to the instrument. The controller will wait for the instrument to switch to the net mode or wait for the weight to equal zero.

3. The fast feed output will be turned on. If simultaneous fast and slow feed is selected, both the fast feed and slow feed outputs will be turned on.

4. The controller will wait until the weight reaches the fast feed cutoff as determined by the setup options selected. If a 2 speed feed is selected, the fast feed output will turn off when the weight reaches the setpoint value - the dribble value. If a single speed feed is selected, the fast feed output will turn off when the weight reaches the setpoint value - the preact value. If preact is not enabled, the fast feed output will be turned off when the weight reaches the setpoint value.

5. The controller will turn on the slow feed output. The controller will wait until the weight reaches the final cutoff as determined by the setup options selected. The slow feed output will turn off when the weight reaches the setpoint value - the preact value. If preact is not enabled, the slow feed output will be turned off when the weight reaches the setpoint value.

6. The controller will check to see if the batch is within tolerance. If so, it will proceed to the next step. If not, the out of tolerance output will be turned on and the display will display "OUT OF TOLERANCE". The operator must press ACCEPT O.T. to proceed.

7. The controller will print the batch ID, time and date and the weight, and the weight will be added to the accumulator. If the weight was out of tolerance, the weight will be followed by the message "OFF TOL".

8. The controller will issue a command to the instrument to switch to the gross mode.

9. The batch ready output will be turned on.

10. The operator presses DISCHARGE. The discharge output will be turned on until the weight drops below the discharge value.

11. The cycle complete output will be turned on.

12. If continuous run is enabled, the controller will continue to cycle until the number of batches selected have been completed or until the operator presses STOP.

    If the preset number of batches feature is enabled, the controller will only prompt for entry when the counter reaches zero. If the cycle is stopped before the count reaches zero, the controller will continue to run the remaining batches when operation is resumed. The preset counter may be reset to zero by pressing the RESET key to reset the controller.

    If the continuous run feature is enabled, but the preset number of batches feature is not, the controller will cycle continuously once both the START and DISCHARGE keys have been pressed until the operator presses STOP. To discharge a batch without starting to feed another one, press STOP after the feed cycle is finished. Then press the DISCHARGE key. The controller will discharge the batch, but will not feed another one until the START button is pressed. The next time the START key is pressed, the controller will start to cycle normally. However, when the discharge cycle is reached, the controller will not wait for the operator to press the DISCHARGE key as it did the first time through the sequence, because the last command it received was the discharge command, so the command is still pending. If you want the controller to wait after the feed cycle is complete, press STOP before pressing START.

WEIGH-OUT MODE OF OPERATION

1. Press START. The cycle complete output will be turned off.
2. The controller will issue a command to the instrument to switch to the gross mode.
3. The fill output will be turned on until the weight reaches the refill setpoint.
4. The fill complete output will be turned on.
5. The operator presses DISCHARGE. The controller will prompt the operator to enter the desired number of batches to be run. After the number of batches has been entered, the operator presses ENTER. The controller will issue a tare command to the instrument. The controller will wait for the instrument to switch to the net mode.
6. The fast discharge output will be turned on. If simultaneous fast and slow discharge is selected, both the fast discharge and slow discharge outputs will be turned on.
7. The controller will wait until the weight reaches the fast discharge cutoff as determined by the setup options selected. If a 2 speed discharge is selected, the fast discharge output will turn off when the weight reaches the setpoint value - the dribble value. If a single speed discharge is selected, the fast discharge output will turn off when the weight reaches the setpoint value - the preact value. If preact is not enabled, the fast discharge output will be turned off when the weight reaches the setpoint value.
8. The controller will turn on the slow discharge output. The controller will wait until the weight reaches the final cutoff as determined by the setup options selected. The slow discharge output will turn off when the weight reaches the setpoint value - the preact value. If preact is not enabled, the slow discharge output will be turned off when the weight reaches the setpoint value.
9. The controller will check to see if the batch is within tolerance. If so, it will proceed to the next step. If not, the out of tolerance output will be turned on and the display will display "OUT OF TOLERANCE". The operator must press ACCEPT O.T. to proceed.

10. The controller will print the batch ID, time and date and the weight, and the weight will be added to the accumulator. If the weight was out of tolerance, the weight will be followed by the message "OFF TOL".

11. The controller will issue a command to the instrument to switch to the gross mode.

12. The cycle complete output will be turned on.

13. If the auto refill is enabled, the controller will check to see if there is enough material to discharge another batch. If there is not enough material, and auto refill is turned on, the controller will initiate a fill cycle automatically.

14. If continuous run is enabled, the controller will continue to cycle until the number of batches selected have been completed or until the operator presses STOP.

    If the preset number of batches feature is enabled, the controller will only prompt for entry when the counter reaches zero. If the cycle is stopped before the count reaches zero, the controller will continue to run the remaining batches when operation is resumed. The preset counter may be reset to zero by pressing the RESET key to reset the controller.

    If the continuous run feature is enabled, but the preset number of batches feature is not, the controller will cycle continuously until the operator presses STOP.

Viewing the Time and Date

Press the TIME/DATE key. The current time and date will be displayed. If no key is pressed within 3 seconds, the controller will return the display to the normal operating mode. Pressing a numeric key will begin time and date entry. Pressing the PRINT key will print the time and date. Pressing any other key will return the display to the normal operating mode.

Viewing the Accumulated Weight

To view the current accumulated weight, press the SUBTOTAL or TOTAL key. The subtotal or total will be displayed. Press the SUBTOTAL or TOTAL key again. The batch count will be displayed. If any key is pressed other than the PRINT key, the controller will return the display to the normal operating mode. If no key is pressed within three seconds the controller will return the display to the normal operating mode.

Viewing the Batch Count

To view the current batch count, press the SUBTOTAL or TOTAL key. If accumulation is not enabled, the batch count will be displayed. If accumulation is enabled, the subtotal or total will be displayed. Press the SUBTOTAL or TOTAL key again. The batch count will be displayed. If any key is pressed, other than the PRINT key, the controller will return the display to the normal operating mode. If no key is pressed within three (3) seconds the controller will return the display to the normal operating mode.

Printing Displayed Weight

To print the currently displayed weight, press the PRINT key. The controller will wait for no motion, then print the time and date followed by the current weight in the following format:

12:00 AM 02/24/87
130. LB

The weight will not be added to the accumulator.

Printing Time and Date

To print the current time and date, press the TIME/DATE key, then press the PRINT key while the time and date is being displayed. The time and date will be printed in the following format:

12:00 AM 02/24/87

Printing the Batch Count

To print the current batch count without resetting the batch count to zero, press the SUBTOTAL key. If accumulation is not enabled, the batch count will be displayed. If accumulation is enabled, the subtotal will be displayed. Press the SUBTOTAL key again. The batch count will be displayed. Press the PRINT key while the batch count is being displayed. The batch count will be printed in the following format:

BATCH COUNT 123456

To print and reset the batch counter to zero press the TOTAL key. If accumulation is not enabled, the batch count will be displayed. If accumulation is enabled the total will be displayed. Press the TOTAL key again. The batch count will be displayed. Press the PRINT key while the batch count is being displayed. The batch count will be printed in the same format as above, then the counter will be reset to zero.

Printing Accumulated Weight

To print the accumulated weight without clearing the accumulator, press the SUBTOTAL key. The accumulated weight will be displayed. Press the PRINT key while the subtotal is being displayed. The time and date, the batch count and the subtotal will be printed in the format as follows:

12:00 AM 02/24/87
BATCH COUNT 123456
SUBTOTAL 123456 LB

To print and clear the accumulator and batch counter, press the TOTAL key. The accumulated weight will be displayed. Press the PRINT key while the total is being displayed. The time and date, the batch count and total will be printed in the same format as above. The accumulator and the batch counter will then be reset to zero.

8.0 TROUBLESHOOTING

Troubleshooting the M8147 is best accomplished by isolating the problem to either the instrument or the controller. If the instrument does not appear to be functioning properly, disconnect the connectors from J2 and J5 of the instrument. If the problem is still present, refer to the troubleshooting section for the instrument. If the problem goes away, then the controller board is probably faulty. Proceeding with the troubleshooting procedure should confirm it. Assuming the problem has been isolated to the controller. Proceed as follows:

1. Check the AC supply to the unit for proper voltage and ground. Also check the line fuse.

2. Check the 5 VDC power supply. The output should be 5 VDC +/- .1 VDC.

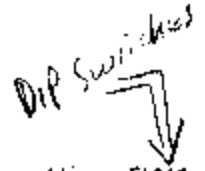
3. Observe the display on the controller. If the display is not displaying valid characters, but the controller seems to function properly, the display is probably faulty and should be replaced. If the display is blank, the controller board is probably faulty.

4. If the display is displaying an error message "SCALE ERROR", the controller is receiving data from the instrument but the instrument is in an error condition such as overload, under zero, internal check error, etc. Proceed to the troubleshooting section for the instrument.

5. If the display is displaying the error message "TIME OUT ERROR", the controller is not receiving data from the instrument. Be sure that the instrument is set up to transmit continuous data and that parameter F7 is set to 1. Also make sure the baud rate for the instrument matches that of the controller. If everything is OK perform the serial I/O test to determine if the controller board is working properly. If so, replace the instrument board.

6. If the display is displaying the error message "LRC ERROR", the controller is receiving data but it is not valid. Be sure that parameter F7 is set to 1. Also make sure the baud rate for the instrument matches that of the controller. If everything is OK, perform the serial I/O test to determine if the controller board is working properly. If so, replace the instrument board.

7. If the display is displaying the error message "RAM FAILURE", the data stored in the battery backed RAM has been lost or corrupted. The controller will not function or allow access to the setup mode until the test mode has been selected. Perform the external RAM test. If the test passes, re-enter the setup data. Power the unit down for several minutes. If the unit displays the "RAM FAILURE" error message again when the unit is powered up, the battery backup circuit is not working properly and the controller board should be replaced.



8. Select the test mode by setting SW1 position 1 to the closed position. Power the unit down then back up. The micro only reads the switches upon power up. The display should display the following message for 2 seconds.

   ****DISPLAY*****
   VERIFICATION

   The display will then prompt to see if you want to perform several tests. After the test is completed, it will prompt you to repeat the same test. The tests function as follows:

Internal RAM Test

The micro will write then read two (2) test patterns to each RAM location. If the data in all RAM locations reads back OK, the message "PASS" will be displayed for two (2) seconds. If any one of the locations does not read back OK, the message "FAIL" will be displayed. If the RAM test fails, the micro should be replaced.

External RAM Test

External RAM is divided up into 256 byte blocks. The controller really only uses the first two (2) blocks of RAM. Block 00 and block 01. The micro will write then read two (2) test patterns to each RAM location. The block being tested will be displayed on the display. If a block tests OK, the next block will be tested. If a block does not test OK, the message "FAIL" will be displayed for five (5) seconds. The test will then resume until all blocks (00 through 31) have been tested. If a block of RAM fails the test, the RAM should be replaced. As long as blocks 00 and 01 pass the test, the controller should work properly. This test does not test the battery backup circuit.

Solid State I/O Test

Before performing the I/O test, control power to the I/O's should be turned off to prevent opening feed or discharge valves or gates. If any inputs are turned on, they will cause the test to fail.

The test will first turn all outputs off then read them all back in. If any inputs fail to read back properly, the message "FAIL" will be displayed. All outputs will then be turned on and read back in. Again, if any fail to be read back properly, the message "FAIL" will be displayed. Next, each output will individually be turned on and read back in. The display will display the number of the I/O being tested. Each output will be turned on for two (2) seconds. Since the watchdog timer circuit shuts the outputs off if the micro does not refresh the outputs at least once every second, the status LED for the output being tested should turn off after one (1) second. If the output stays on for the full 2 seconds, the controller board should be replaced.

The status LED on the I/O board indicates that the output is turned on. If the test passes but the outputs fail to turn on and off, the outputs of the controller board are working properly and the problem is on the I/O board. This may be caused by a bad output module or the LED for the output is bad. Try replacing the I/O module and repeating the test. If the problem still exists, replace the I/O board. If the output module is turning on and off as indicated by the status LED but the device controlled by the output module is not, the output module may be bad or the fuse for the output may be blown. Ohm out the fuse first. If it is OK, replace the output module.

Input modules can be tested by applying power to them and observing the status LED for that module. If the LED does not light, ohm out the fuse for that module. If the fuse is OK, replace the input module.

Serial I/O Test

The serial I/O test is a loop back test. The micro sends a string of data out the printer port, then looks for the same string to be received in through the instrument port. Data is transmitted at the baud rate selected for the printer port. If the printer port is not wired into the instrument port, the display will display the message "FAIL". If the printer port is looped back to the instrument port, the message "PASS" should be displayed. If the test fails, replace the controller board.

To wire the controller for the loop back test, disconnect the serial port connector from the instrument. Also disconnect the serial connector from the printer.

Configure the jumpers on the controller board as follows:

JU3 - Active
JU4 - Passive
JU5 - 20mA position

Jumper the pins on J1 of the controller board as follows:

Pin 10 to Pin 23
Pin 11 to Pin 22

Now run the serial I/O test. If the test fails, replace the controller board.

If the controller is not wired for the loop back test but a printer is connected to the controller, it should print the string of data. The string transmitted is:

0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ

If the controller is receiving data from the instrument OK, it is not necessary to rewire the unit to perform the loop back test. It is a good way to test the printer port though.

Keyboard Test

The keyboard test allows you to test the keypad of the controller. Press any key. The display will indicate what key was pressed. If any key fails to function properly, the keypad may be faulty or the controller board may be bad.

This is the last test that will be run. To exit the test mode, return SW1 position 1 to the open position. The controller will return to the normal operating mode.

Instrument

1. Power down the instrument, then power it back up. If the instrument recovers, verify the power source to the instrument is a clean, properly grounded A.C. supply. If so, allow the instrument to operate and monitor it's operation.

2. Check all electrical connections in the instrument to verify that they are not intermittent or broken.

3. Problems with the main PCB, transformer, keypad, or serial interface are best verified by substitution. Example; if a bad main PCB is suspected, replace it. Verify that the problem is gone, then put the original PCB back in to verify that the problem was not in the connections.

Error Codes

Error codes are displayed by the instrument to indicate whether an error was made in calibration or the instrument has found a problem in itself.

ERROR CODES

ERROR	CAUSE	CORRECTIVE MEASURE
E1	ROM Error	Try Power Down/Replace Main PCB
E2	RAM Error	Try Power Down/Replace Main PCB
E3	NOVRAM Error	Try Power Down/Replace Main PCB
E4	Print Fault	Check Printer Format
E5	Display Verify Error	Replace Main PCB
E6	Analog Verify Error	Recalibrate
E7	EEROM Error	Try Power Down Replace Main PCB
E8	Scale in Motion	Wait Until Motion Stops
E9	Illegal Configuration	Reconfigure Increment Size
E10	Calibration Error	Recalibrate
E11	Calibration Error	Recalibrate
E12	Over Capacity	Reconfigure
E13	Low Capacity	Reconfigure
EA	Insufficient Test Wt.	Use More Test Weights/Try Again

NOTE: The 8140 cannot display a negative six digit net weight with a minus sign since it only has six display digits. If a negative six digit net weight occurs, the display will blank with the net cursor lit.

9.0 SPARE PARTS LIST

176659 MZ0302000093	M8140 Main PCB Assembly
MA01851	Controller PCB Assembly (Includes Display)
TN000035	Display Assembly
MZ0302000105	I/O Board Assembly
MN01432-6	24 VDC Input Module
MN01432-7	120 VAC Input Module
MN01432-8	24 VDC Output Module
MN01432-9	120 VAC Output Module
MC01847	Keypad/Overlay Assembly — VALID # 3/98
MZ0301000011	5 VDC Power Supply
MZ1101000015	1/4 Amp SLo-Blo Fuse
MZ1101000036	2/10 Amp Slo-Blo Fuse

5A Picofuse For OPTO I/O 113590 00B

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