OPERATING AND SERVICE MANUAL

FOR

MICRO-TECH™ 2000

MODEL 2102/2202

BATCH CONTROLLER

SOFTWARE VERSION 45.00.03.XX

REC 4048 REV D 9/01
PART NO. 058495

REVISION HISTORY

REVISION	DATE	SOFTWARE VERSION
REVISION A	APRIL 1998	
REVISION B	DECEMBER 1998	
REVISION C	APRIL 2001	45.00.03.02
REVISION D	SEPTEMBER 2001	45.00.03.05

PLEASE READ AND OBSERVE THE FOLLOWING SAFETY PRECAUTIONS FOUND THROUGHOUT THIS MANUAL.

DANGER

FAILURE TO OBSERVE WILL CAUSE VERY SERIOUS PERSONAL INJURY OR DEATH.

WARNING

FAILURE TO OBSERVE COULD CAUSE SERIOUS PERSONAL INJURY.

CAUTION

FAILURE TO OBSERVE MAY CAUSE MINOR OR MODERATE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT.

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RAMSEY PRODUCTS

MICRO-TECH 2000 MODEL 2102/2202 BATCH CONTROLLER

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CHAPTER 1.0
INTRODUCTION

1.1 GENERAL

This instruction manual contains information on the installation, operation, calibration, and maintenance of the Micro-Tech 2000 Model 2102/2202 Batch Controller. The Model 2102 is designed for non-commercial use and the Model 2202 for higher accuracy. The manual refers to Model 2102 only as both operate the same.

1.2 APPLICATION

The Micro-Tech 2102 Batch Controller is a microprocessor based menu driven controller designed to accurately weigh and control the batching process of the selected recipe. In its maximum configuration, the controller accepts up to four scale inputs and forty components.

The Micro-Tech 2102 Batch Controller interfaces with the batching system through digital and analog inputs and outputs. The batch controller can be expanded by installing optional plug-in circuit boards.

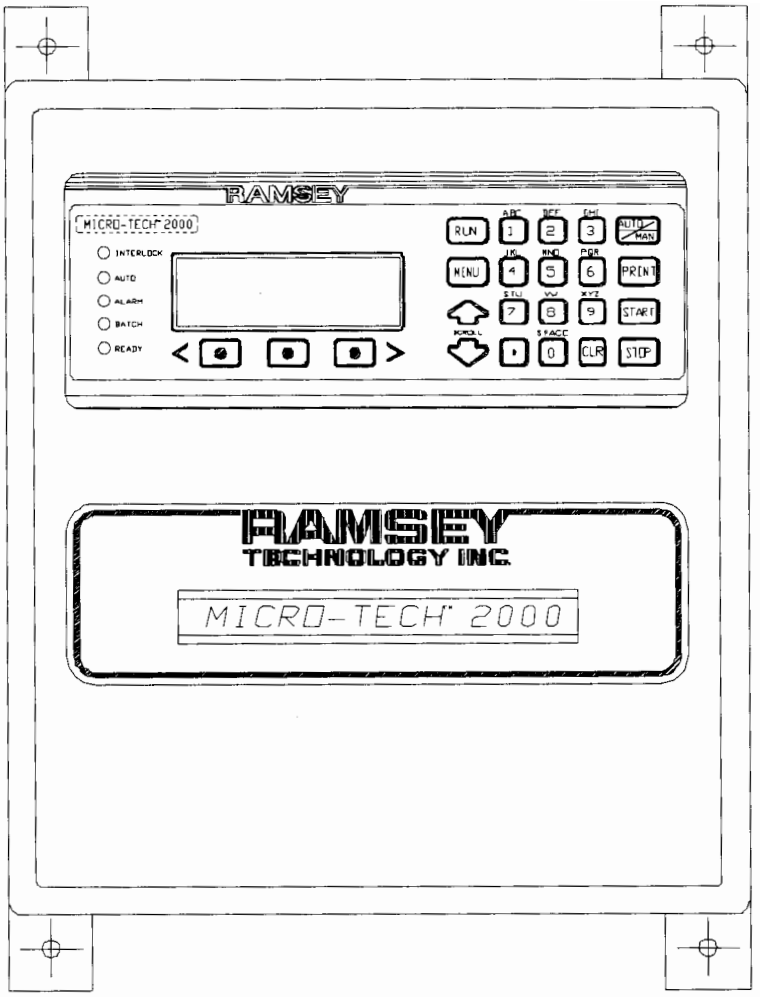
The following table shows the maximum expansion of the system.

Number of scales	4
Components	40
Digital Inputs	52
Digital Outputs	52
Analog Outputs	4
BCD Inputs	16 multiplexed (4 digits)
BCD Outputs	16 multiplexed (4 digits)
Recipes	100
Recipe Lines	500

1.3 MAIN FEATURES

The Model 2102 Batch Controller (Figure 1-1) or panel mount (Figure 1-2) has many hardware and software features necessary to control most any batching process. Other features are listed in specific sections of this manual.

- Menu driven scroll entries on a multiple line display
- Five LED status indicators
- Visible and electrical outputs representing load measurement
- Automatic zero and span calibration
- Auto zero tracking
- Several software options that may be turned on by keypad entry or by installing optional plug-in PC boards
- Opto-coupled digital inputs and outputs
- Alarms and failure detection
- Communication standards: RS232C, RS485 networking and multidrop, 20 mA current loop passive
- Allen-Bradley Remote I/O
- PROFIBUS-DP



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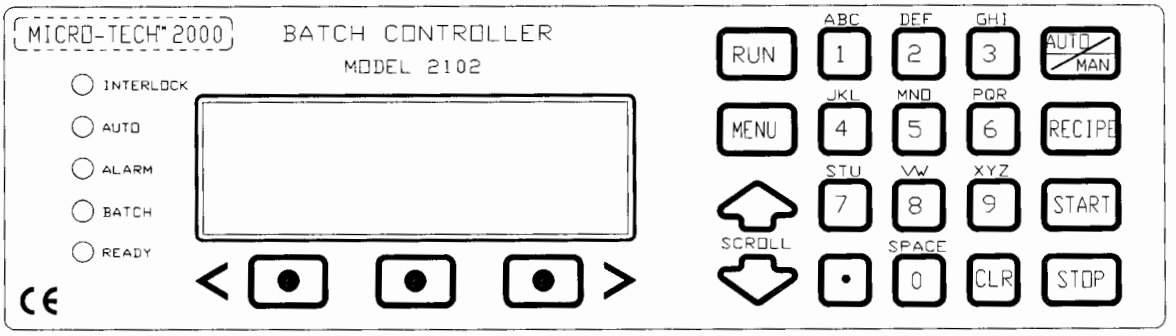
MICRO-TECH 2000
MODEL 2102 FIELD MOUNT BATCH CONTROLLER
FIGURE 1-1



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MICRO-TECH 2000
MODEL 2102 PANEL MOUNT BATCH CONTROLLER
FIGURE 1-2

1.3.1 Batch Controller Configuration

The standard configuration of the batch controller includes one single channel A/D board and one 4 in/16 out digital I/O board.

Four more circuit board expansion slots are available. The following boards can be inserted if the need arises.

- Dual channel A/D board
- Premium A/D board
- Dual channel current (analog) output board
- Single channel current (analog) output board
- 16 digital outputs / 4 digital inputs
- 4 digital inputs/ 16 digital outputs
- Serial communication board
- Allen-Bradley remote I/O board
- PROFIBUS DP

1.3.2 Monitoring Functions

The batch controller is supplied with an alarm and indication system. Indication can be in the form of:

- status indications
- process alarms
- programming errors
- equipment failures

If any of the controlled conditions takes place, it is signaled by the lighting of a LED on the front and by a digital output.

Through the keypad it is possible to call on the display all the existing alarms and acknowledge them.

1. Status Indications
   - Controller on automatic: The "AUTO" LED is lighted.
   - Controller on remote set-point: The "REM" LED is lighted, the relevant output is closed provided the controller is also on automatic mode. This output is used to indicate to external equipments that the controller can be remotely controlled.
   - Feeder ready: The "RUN" LED will flash and the relevant output will close when all the conditions listed below become true:

     FEEDER NOT RUNNING

     NO FAILURE ALARM

     NO SHUT DOWN CONDITION

     NO CALIBRATION MODE

     CONTROLLER ON AUTOMATIC MODE
   - Feeder running: When the feeder running input contact is closed. The "RUN" LED is lighted.

2. Process Alarms

   The following process conditions are monitored and may produce alarms or shut-down according to keypad selection. A delay time before the abnormal condition is monitored may be set for each individual alarm.

   - High Load
   - Low Load
   - Bad Start Weight
   - Stop Cycle
   - End Cycle
   - Abort Cycle
   - Component timeout

   Each abnormal condition may be set as:

   - NONE: Neither alarm nor shut-down.
   - ALARM: Warning, the feeder continues to run.
   - SHUT-DOWN: The feeder stops.

3. Programming Errors

   Errors may occur only during programming or calibration as a consequence of entering data above or below the operating range of the feeder controller. If data above or below the limits are entered, the system will display a warning message and the minimum/maximum limits will be shown.

4. Equipment Failures

   The feeder controller has an internal diagnostic system which detects the following instrument failures:

   - Clock Calendar circuit failure
   - Load cell failure
   - RAM failure
   - ROM failure
   - Power on
   - Default constants installed at power on
   - Power down during calibration
   - Calibration time expired
   - General purpose external alarms
   - Communication error
   - BCD error
   - Mathematical error

1.3.3 Print Functions

Available print functions are:

- Print on command
- Print at preselected times of day (up to four)
- Print a preselected intervals of time
- Print Set-Up
- Print alarms

1.3.4 Communications (Optional)

1. Serial Communications

   The communication protocol allows a remote intelligent device to read and eventually write the contents of the registers.

   During the communication activity, the Micro-Tech 2102 always acts as a Slave, meaning it responds to a request from a Master device on the line, but never attempts to send messages out.

   One electrical interface may be selected accessed through one communication port. Up to three communication boards may be installed.

2. Field Bus I/O

   Allen-Bradley Remote or PROFIBUS DP I/O communication link board is typically used to transfer I/O images between a main PLC and remote devices (normally remote I/O racks - rack adapters) or to transfer (read and write blocks of data with intelligent remote devices (node adapters). The Micro-Tech 2102 in this case.

   The Remote I/O is a typical master/slave communication where the main PLC is the master or scanner and the remote devices are slaves or adapters.

1.4 WARRANTY

THERMO RAMSEY

WARRANTY

The seller agrees, represents, and warrants that the equipment delivered hereunder shall be free from defects in material and workmanship. Such warranty shall not apply to accessories, parts, or material purchased by the seller unless they are manufactured pursuant to seller's design, but shall apply to the workmanship incorporated in the installation of such items in the complete equipment. To the extent purchased parts or accessories are covered by the manufacturer's warranty, seller shall extend such warranty to buyer.

Seller's obligation under said warranty is conditioned upon the return of the defective equipment, transportation charges prepaid, to the seller's factory in Minneapolis, Minnesota, and the submission of reasonable proof to seller prior to return of the equipment that the defect is due to a matter embraced within seller's warranty hereunder. Any such defect in material and workmanship shall be presented to seller as soon as such alleged errors or defects are discovered by purchaser and seller is given opportunity to investigate and correct alleged errors or defects and in all cases, buyer must have notified seller thereof within one (1) year after delivery, or one (1) year after installation if the installation was accomplished by the seller.

Said warranty shall not apply if the equipment shall not have been operated and maintained in accordance with seller's written instructions applicable to such equipment, or if such equipment shall have been repaired or altered or modified without seller's approval; provided, however, that the foregoing limitation of warranty insofar as it relates to repairs, alterations, or modifications, shall not be applicable to routine preventive and corrective maintenance which normally occur in the operation of the equipment.

"EXCEPT FOR THOSE WARRANTIES SPECIFICALLY CONTAINED HEREIN, SELLER DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO THE EQUIPMENT DELIVERED HEREUNDER, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE. THE SOLE LIABILITY OF SELLER ARISING OUT OF THE WARRANTY CONTAINED HEREIN SHALL BE EXCLUSIVELY LIMITED TO BREACH OF THOSE WARRANTIES. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF THE WARRANTIES SET OUT ABOVE SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF ANY DEFECTIVE ACCESSORY, PART OR MATERIAL WITH A SIMILAR ITEM FREE FROM DEFECT, AND THE CORRECTION OF ANY DEFECT IN WORKMANSHIP. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES."

FIELD SERVICE

Purchaser agrees to underwrite the cost of any labor required for replacement; including time, travel, and living expenses of Ramsey Field Service Engineer at closest factory base.

THERMO RAMSEY
501 90th Avenue N.W.
Minneapolis, MN 55433
Phone: (763) 783-2500
Fax: (763) 783-2525

1.5 UNPACKING AND INSPECTION

The Micro-Tech 2102 Batch Controller has been properly packaged for shipment and storage, when necessary. Refer to the appropriate manual in the Appendix for unpacking procedures for optional equipment.

Inspect all packages for damage before opening as oftentimes the carrier may be responsible for shipping damage. Refer to the appropriate manual in the Appendix for inspection procedures for optional equipment.

1.6 STORAGE

The Micro-Tech 2102 Batch Controller can be safely stored, with cover latches secured and hole plugs installed, between -40° to +158° F (-40° to +70° C). The units should be protected against moisture.

1.7 SYMBOL IDENTIFICATION

Table 1-1 below describes the symbols used in this manual.

TABLE 1-1
SYMBOL IDENTIFICATION

Symbol	Description
	Alternating current
	Earth (ground) TERMINAL
	PROTECTIVE CONDUCTOR TERMINAL
	Caution, risk of electric shock
	Caution (refer to accompanying documents)

1.8 HARDWARE SPECIFICATIONS

1.8.1 Enclosure

1. Field

   - NEMA 4X, dust and watertight
   - size 15 x 13 x 7 inches
   - fiberglass reinforced polyester molded blue
   - door window UVA acrylic UL#E6458
   - Stainless steel "Quick" type latch
   - 2 position mounting feet
   - Steel chassis providing EMI/RFI shielding
   - Provision for 7 solid-state input/output modules (4 output, 3 input)
   - power on/off switch (field terminal board option)

2. Panel mount

   - size: DIN43700 96 X 288 mm
   - enlarged bezel for field mount and U.S. panel mount to allow "dust seal"
   - Material: chromated mild steel

1.8.2 Temperature (Ambient)

1. Storage: -40° to +158° F (-40° to +70° C)
2. Operating: +14° to +122° F (-10° to +50° C)

1.8.3 Power Requirements

1. Nominal voltage: 110/120/220/240 VAC, selectable
2. Nominal frequency: 50/60 Hz
3. Operating range: Nominal voltage +10%, -15%

   93.5 VAC - 121 VAC (110 VAC Nom.)
   102.0 VAC - 132 VAC (120 VAC Nom.)
   187.0 VAC - 242 VAC (220 VAC Nom.)
   204.0 VAC - 264 VAC (240 VAC Nom.)

4. Fusing: 1.0 Amp Slo-Blo 110/120 VAC, Type T

   0.50 Amp Slo-Blo 220/240 VAC, Type T

5. Maximum non-destructive input voltage: 150/300 VAC for 1 minute
6. Power Switch: Field mount with field terminal board only: switches both L1 and L2.
7. Transient overvoltage according to installation category (Overvoltage Category II)

1.8.4 AC Power Supply

- EMI/RFI protection
- 110/120/220/240 VAC input selection by means of TWO switches (UL, CSA, VDE approved) mounted internally.
- 50/60 Hz transformer

1.8.5 DC Power Supplies

- Auxiliary Power Supply Output (Alarm Contacts, etc.)
  - Output voltage: +24 VDC +27/-21% (19.0/30.4) (unregulated).
  - Output ripple: 1.0 V peak to peak typical.
  - Output circuit: 600 mA maximum.
  - Short-circuit protection

1.8.6 Load Cell (Weight) Plant

1. •Load cell non-approval single or dual channel
   - Number: Up to SIX 350 ohm load cells in parallel. Cable distance 200 ft. or less. More than six requires an external power supply.
   - Sensitivity: 0.5 mV/V to 3.5 mV/V (keyboard selectable).
   - Input impedance: 100 MΩ minimum.
   - Maximum usable signal: 114% of 3 mV/V.
   - Isolation: Non-isolated.
   - Maximum non destructive input voltage: ±6 V relative to ground.
   - Transient/RFI protection: NO
   - Load cell cable shield: Connected to earth ground.
2. Load Cell Excitation Power Supply
   - 10 VDC ±10%, 220 mA
   - Minimum load impedance (operating) 58 ohms
   - Output short circuit, 1.5 A maximum
3. Excitation-sense circuitry (single channel)
   - 6 Wire System. Cable distance over 200 ft. (not to exceed 3000 ft.).
   - Nominal input voltage: ±5 VDC (10 volts)
   - Input impedance: 38 kΩ minimum.
   - Jumper selectable: Local or remote sense.
4. Excitation-sense circuitry (dual channel)
   - Cable length for both channels must be same length.

1.8.7 Load Cell (Weight) Premium

1. • Load cell premium A/D
   - Number: Up to SIX 350 ohm load cells in parallel. Cable distance 200 ft. or less.
   - Sensitivity: 0.5 mV/V to 3.5 mV/V (keyboard selectable).
   - Input impedance: 100 MΩ minimum.

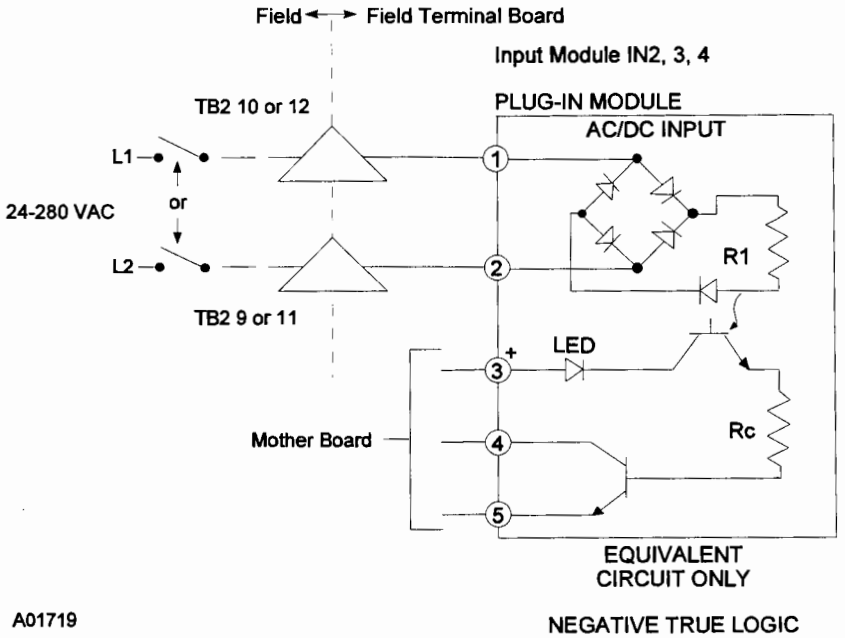
- Maximum usable signal: 114% of 3 mV/V.
- Isolation: Non-isolated.
- Maximum non destructive input voltage: ±6 V relative to ground.
- Transient/RFI protection: YES
- Load cell cable shield: Connected to earth ground.

2. Load Cell Excitation Power Supply
   - 10 VDC ±10%, 220 mA
   - Minimum load impedance (operating) 58 ohms
   - Output short circuit, 1.5 A maximum
3. Excitation-sense circuitry
   - 6 Wire System. Cable distance over 200 ft. (not to exceed 3000 ft.).
   - Nominal input voltage: ±5 VDC (10 volts)
   - Input impedance: 38 kΩ minimum.
   - Jumper selectable: Local or remote sense.

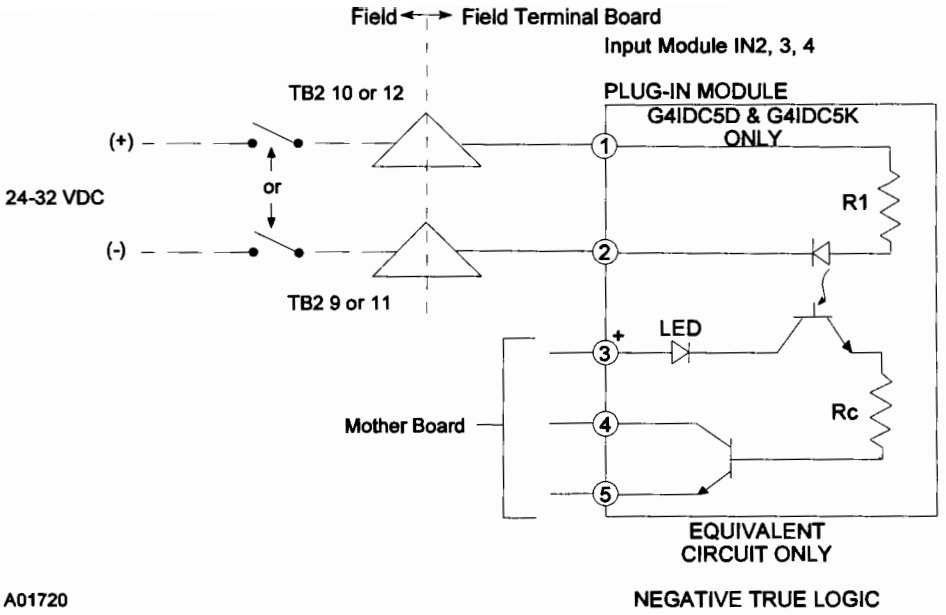
1.8.8 Mother Board Digital Inputs

The field mount integrator has provision on the field terminal board for three OPTO 22/Generation 4 modules. The programmable status inputs may be AC or DC (see Figures 1-3 or 1-4).

The panel mount integrator version only accepts a dry contact input. See Appendix A/3 for specifications and a typical wiring diagram.



AC INPUT MODULE
FIGURE 1-3

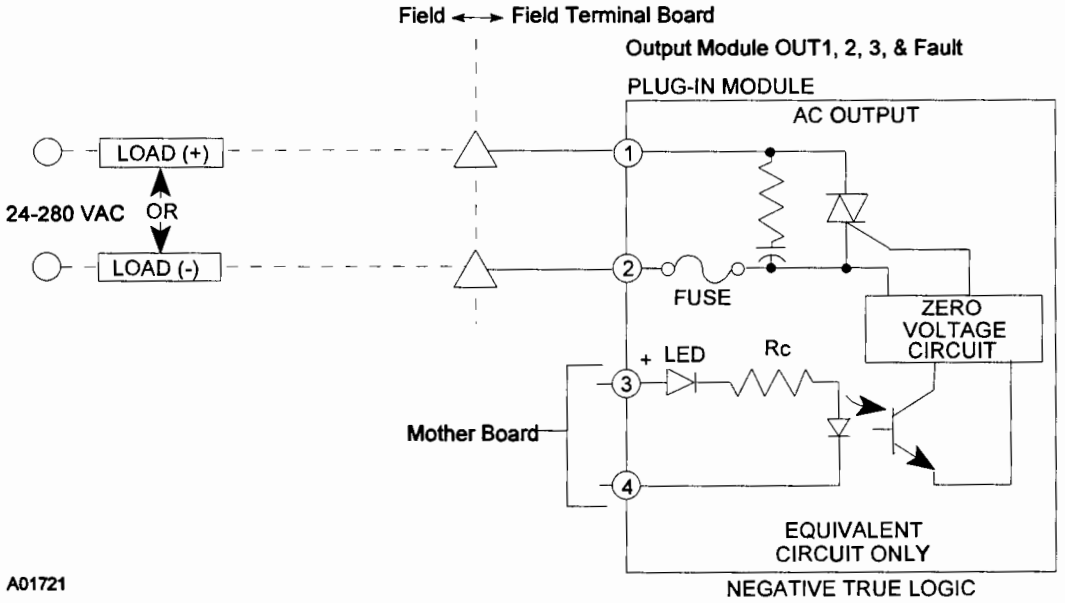


DC INPUT MODULE
FIGURE 1-4

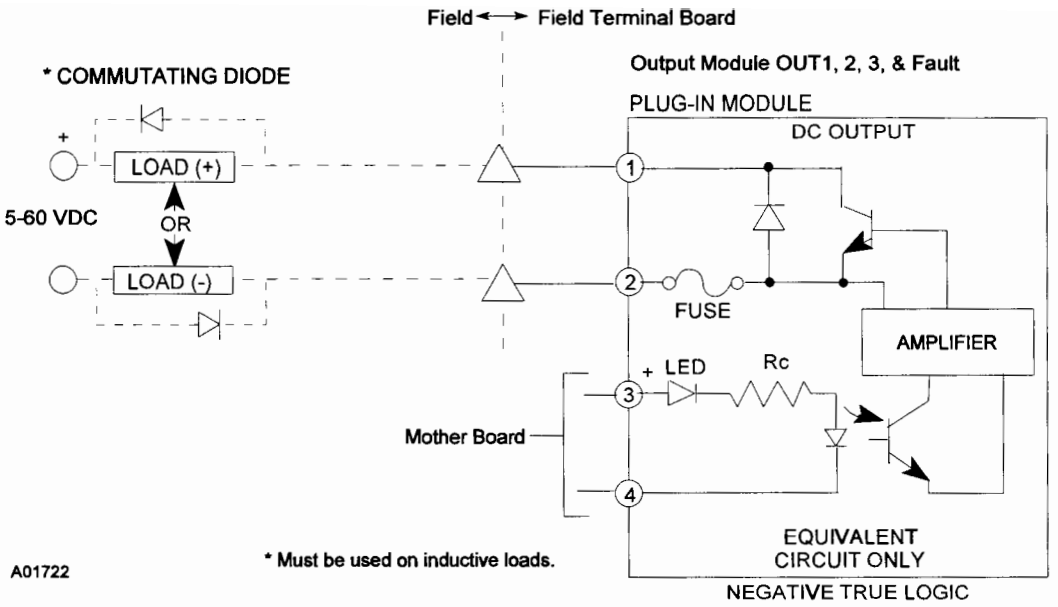
1.8.9 Mother Board Digital Outputs and Fault Output

The field mount integrator has provision on the field terminal board for four OPTO 22/Generation 4 modules. Three are programmable and one is a dedicated fail-safe fault output. All outputs may be AC or DC (see Figures 1-5 or 1-6).

The panel mount integrator version outputs are 24 VDC open collector. See Appendix A/3 for specifications and a typical wiring diagram.



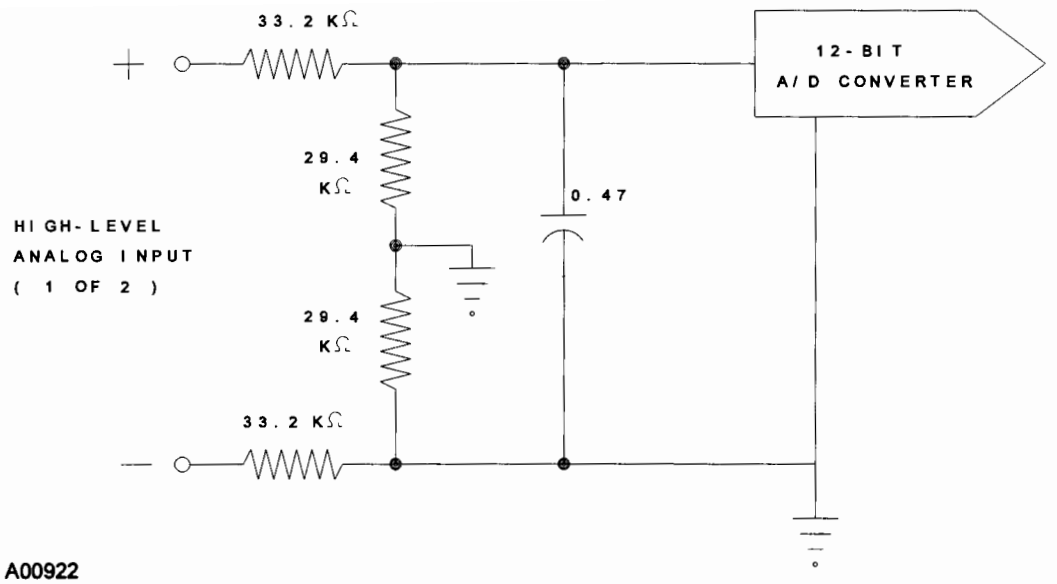
AC OUTPUT MODULE
FIGURE 1-5



DC OUTPUT MODULE
FIGURE 1-6

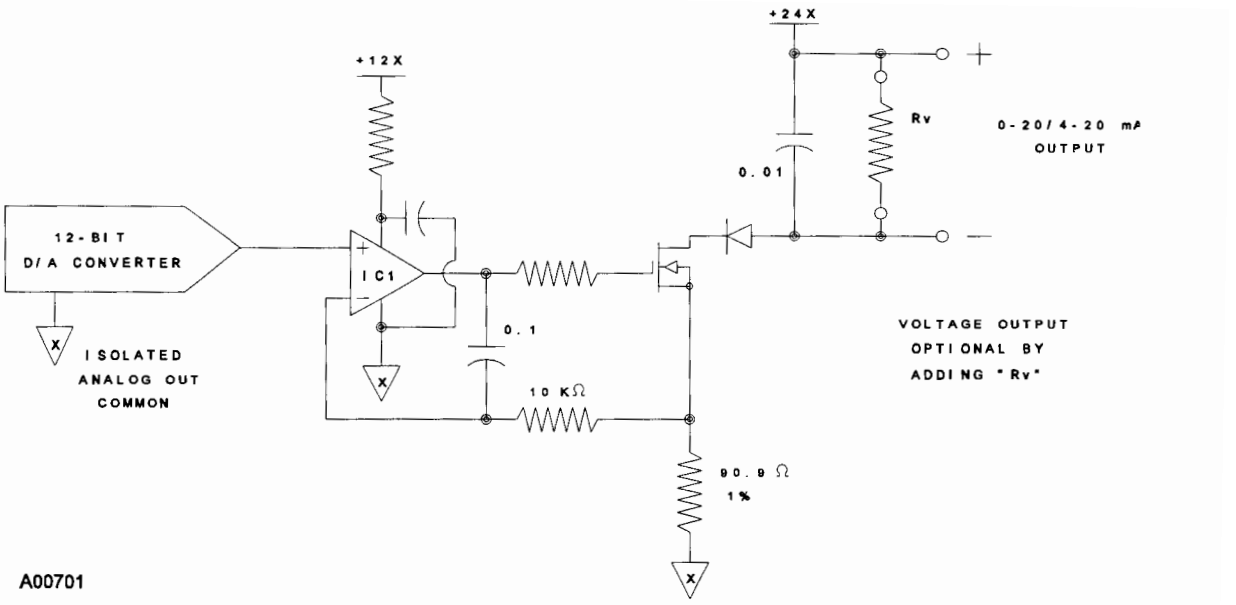
1.8.10 Analog I/O Board B (Optional)

1. (2) high level inputs (Figure 1-7)
   - Type: Differential voltage input. (0-20 mA or 4-20 mA with external resistor)
   - Range: +5 to -5 VDC nominal.
   - Input impedance: 100 k nominal (differential)
   - Maximum usable input voltage: 106 % of full-scale
   - Non-isolated.
   - Maximum non-destructive input voltage: 12 V peak



HIGH-LEVEL ANALOG INPUT
FIGURE 1-7

2. (2) current outputs (Figure 1-8)
   - optically isolated
   - isolated power source
   - Voltage output by adding an internal dropping resistor.
   - Output range: User selectable 0-20 mA or 4-20 mA, representing 0 to 100% variable.
   - Resistive load: 800 ohms maximum
   - Capacitive load: no limit



HIGH-LEVEL ANALOG OUTPUT
FIGURE 1-8

1.8.11 Analog I/O Board A (Optional)

Depopulated version of Analog I/O B:

1. (1) high level output - see Section 1.8.10 (2)
   - Resistive load: 800 ohm maximum loop
   - Capacitive load: no limit

1.8.12 Communication Board A

(See Field Wiring Diagram in the Appendix section.)

1. Serial Interface
   - Type: Conforms to RS-232C, RS-485/422, and 20 mA standards; supports 2 and 4 wire multi-drop in RS-485. 20 mA loop is passive ONLY.
   - Interfacing: RS-485 supports 2-wire or 4-wire multi-drop networking; RS-232C provides support for modem.
   - Data rate: 300 to 19200, operator selectable from the keyboard.
   - Data format: Asynchronous, bit-serial, selectable parity, data length, and stop bits.
   - Optical isolation, 250 Vrms max.
   - Input voltage: ±30 VDC max. (RS-232C) 4000 feet maximum (RS-485 and 20 mA)
2. Clock Calendar
   - Type: Dallas DS1285 with battery backup; provisions of clock/calendar with integrated battery.
   - Support both two digit and four digit year.
3. Refer to Serial Communications manual (REC4037) if this option is installed.

1.8.13 Allen-Bradley Remote I/O

Refer to Allen-Bradley Remote I/O manual REC 4038 if this option is installed.

1.8.14 PROFIBUS-DP

Refer to PROFIBUS-DP manual REC 4064 if this option is installed.

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CHAPTER 2.0
INSTALLATION

2.1 GENERAL

This chapter describes the Batch Controller installation procedure, hardware configuration, and initial programming. Initial programming is a machine directed procedure prompting the operator to enter batch weight indicator scale parameters. After all parameters have been entered, the batch weight indicator performs an unassisted zero and span calibration.

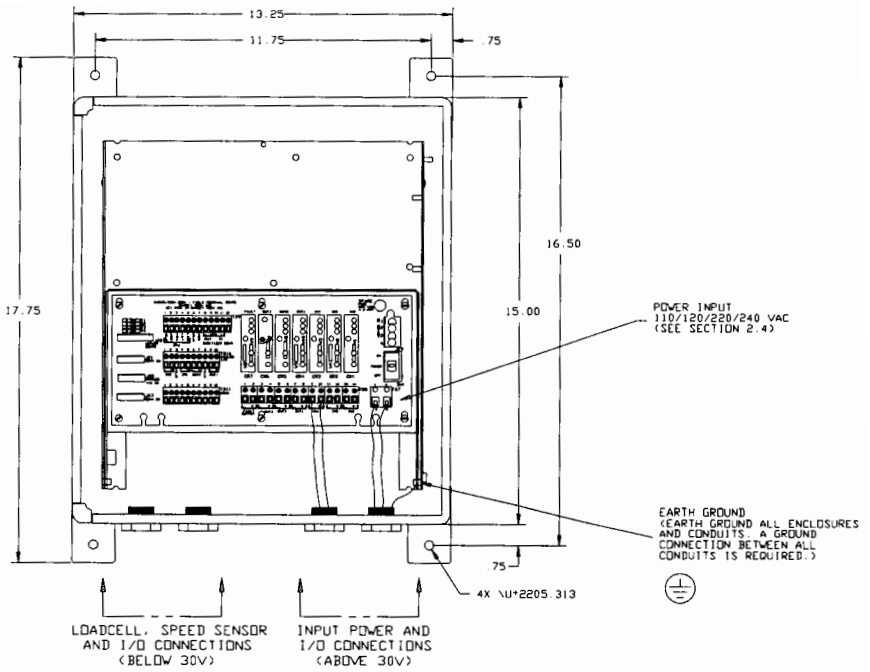
2.2 FIELD MOUNT INSTALLATION

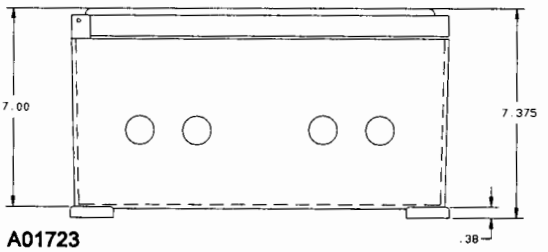
The field mount batch controller should be mounted in a control room environment and not be exposed to excessive vibration, heat or moisture. The batch controller may be mounted up to 3,000 feet from the scale.

2.2.1 Mounting

Mount the batch controller to a rigid, flat, vertical surface using four mounting holes provided on the back of the enclosure (Figure 2-1).

Care should be taken to insure the mounting surface is flat so as not to twist or warp the fiberglass enclosure when tightening the mounting bolts.





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OUTLINE AND MOUNTING DIMENSIONS
MICRO-TECH 2000
MODEL 2102 (FIELD MOUNT) BATCH CONTROLLER
FIGURE 2-1

2.2.2 Safety Precautions

CAUTION

DO NOT INSTALL, OPERATE, OR PERFORM ANY MAINTENANCE PROCEDURES UNTIL YOU HAVE READ THE SAFETY PRECAUTIONS WHICH FOLLOW.

1. Do not connect power to the electronics or turn on the unit until you have read and understood this entire manual. The precautions and procedures presented in this manual must be followed carefully in order to prevent equipment damage and protect the operator from possible injury.

2. **CAUTION**

   Hands and clothing must be kept away from all moving or rotating parts.

3. **WARNING**

   Covers over the electronics should always remain in place during operation. They should be removed only for maintenance procedures with the machine's power OFF. Be sure to replace all covers before resuming operation.

4. **WARNING**

   All switches (such as control or power) must be OFF when checking input AC electrical connections, removing or inserting printed circuit boards, or attaching voltmeters to the system.

5. Incoming voltages must be checked with a voltmeter before being connected to the electronics.

6. **WARNING**

   Extreme caution must be used in testing in, on, or around the electronics, PC boards, or modules. There are voltages in excess of 115 V or 230 V in these areas. Avoid high voltage and static electricity around the printed circuit boards.

7. Maintenance procedures should be performed only by qualified service personnel and in accordance with procedures/instructions given in this manual.

8. During maintenance, a safety tag (not supplied by Ramsey) should be displayed in the ON/OFF switch areas as a precaution instructing others not to operate the unit.

9. Only qualified service technicians should be allowed to open and work in the electronics, power supply, control, or switch boxes.

10. Objects should never be placed or stored on the batch weight indicator.

11. This equipment should not be operated nor utilized in applications other than those stated in the original order. (To adapt production rates or applications, consult Ramsey Products Customer Service for recommendations.)

12. All panels covering the electronics must be in place and tight before wash down procedures. Damage to the electronics could result from water, moisture, or contamination in the electronics housing.

2.2.3 OSHA - Occupational Safety and Health Act

The Occupational Safety and Health Act clearly places the burden of compliance on the user of the equipment and the act is generalized to the extent that determination of compliance is a judgement decision on the part of the local inspection. Hence, Ramsey will not be responsible for meeting the full requirements of OSHA in respect to the equipment supplied or for any penalty assessed for failure to meet the requirements, in respect to the equipment supplied, of the Occupational Safety and Health Act, as interpreted by an authorized inspector. Ramsey will use their best efforts to remedy such violation at a reasonable cost to the buyer.

2.2.4 Utility Connections (Incoming Power)

CAUTION

DO NOT CONNECT POWER UNTIL YOU HAVE READ AND UNDERSTOOD THIS ENTIRE SECTION. IMPROPER CONNECTION MAY RESULT IN DAMAGE TO YOUR BATCH WEIGHT INDICATOR.

CAUTION

VERIFY THAT THE INPUT VOLTAGE IS CORRECT WITH AN AC VOLTMETER BEFORE YOU CONNECT IT TO THE BATCH WEIGHT INDICATOR.

CAUTION

EARTH GROUND MUST BE PROVIDED TO THE BATCH WEIGHT INDICATOR. DO NOT USE CONDUIT TO PROVIDE THIS GROUND.

CAUTION

A READILY ACCESSIBLE DISCONNECT DEVICE (MAXIMUM 20 AMP) SHALL BE INCORPORATED IN THE FIELD WIRING. THIS DISCONNECT DEVICE SHOULD BE IN EASY REACH OF THE OPERATOR AND IT MUST BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.

CAUTION

REFER TO THE FIELD WIRING DIAGRAM (FIGURE 2-2 AND 2-3) AS A GUIDE IF YOU DO NOT HAVE A SPECIFIC WIRING DIAGRAM FOR YOUR SYSTEM. FOLLOW YOUR LOCAL ELECTRONIC CODES AND REGULATIONS FOR MINIMUM WIRE SIZE AND ROUTING.

2.2.5 Wiring

1. Critical wiring conditions:

   A. Insure power is off.

B. Do not route load cell and signal cables in the same conduit with power cables or any large source of electrical noise.

C. Earth ground all enclosures and conduits. A ground connection between all conduits is required.

D. Wiring should be long enough to allow the field terminal entry panel to swing down for circuit board access.

E. Connect the shields ONLY where shown.

F. Check that all wires are tight in their connections.

G. Never use a "megger" to check the wiring.

H. A readily accessible disconnect device (maximum 20 amps) shall be incorporated in the field wiring. This disconnect should be in easy reach of the operator and it must be marked as the disconnecting device for the equipment.

I. All conduits should enter the bottom of the enclosure. Do not run conduit through the top or sides of the enclosure.

2. To connect incoming power, use the following procedure (see Figure 2-1).

NOTE: All units shipped from the factory are configured for 120 VAC. If another input selection is desired, refer to Section 2.4.1 (Mother Board Configuration Jumpers and Switches).

A. Rotate the screw latch mounted on the lower left corner of the front chassis counter-clockwise. Open the door.

B. Route incoming power wiring through a conduit hole at the bottom right of the enclosure (see Figure 2-1). Leave ample loose wiring (typically 8") to facilitate any movement of the field terminal board.

C. Wire safety ground terminal located on the side of the chassis.

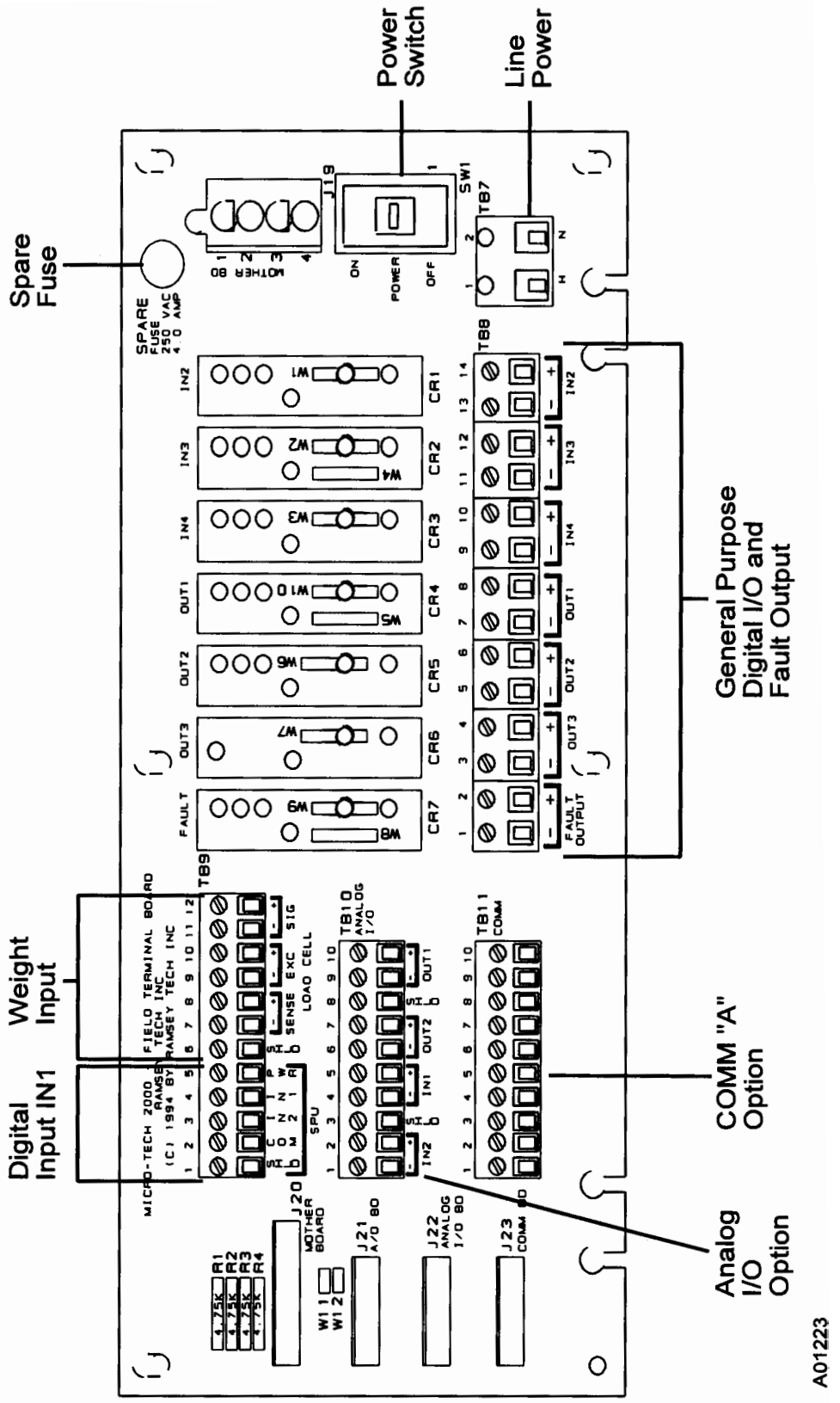
D. Wire HOT to H on TB7 (see Figures 2-2 and 2-3).

E. Wire NEUTRAL to N on TB7.

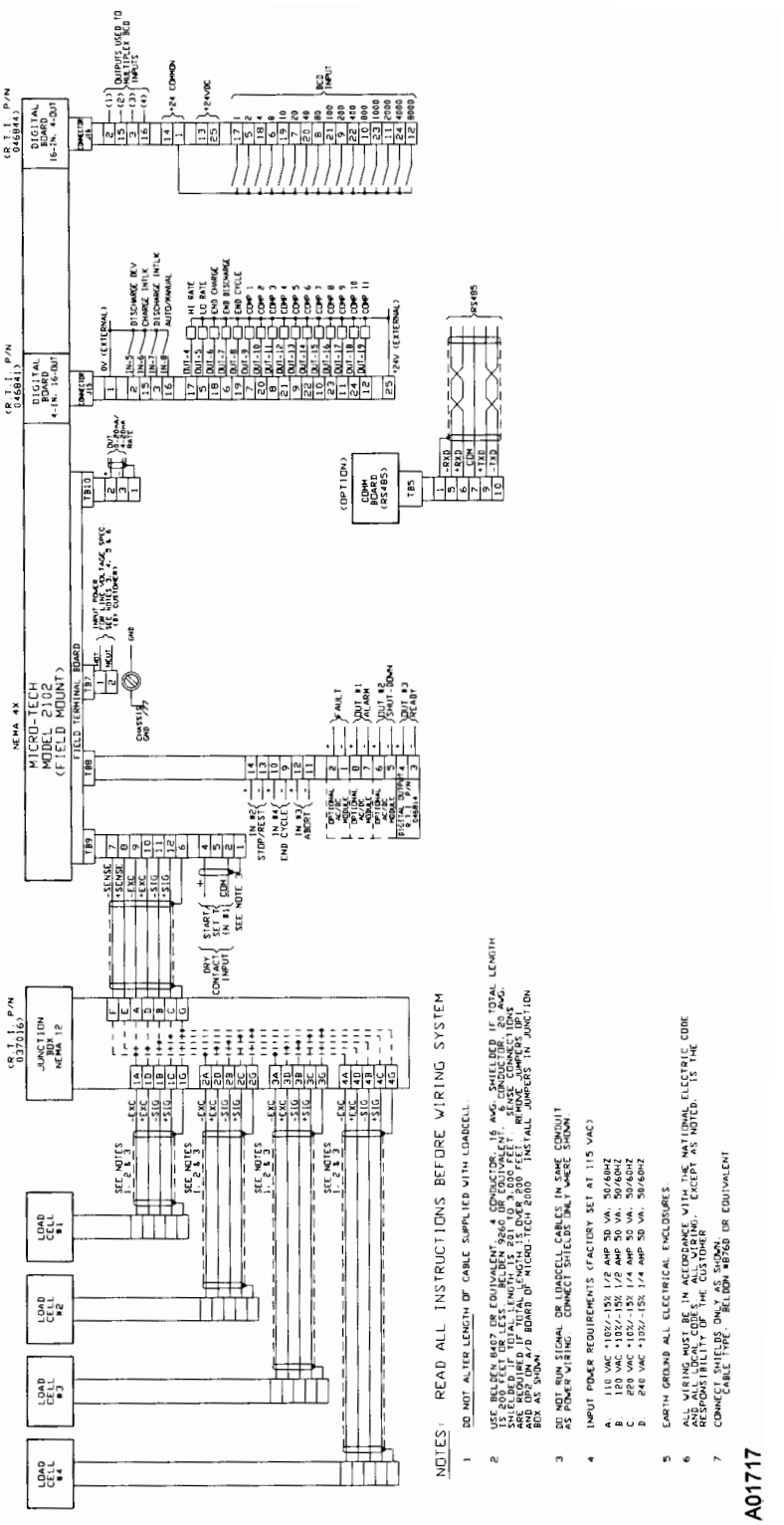
F. If additional I/O is required at line voltages, these wires should be routed through a conduit hole on the bottom right of the enclosure (see Figure 2-1). Leave ample loose wiring (typically 8") to facilitate any movement of the field terminal board.

G. All additional field wiring operation at voltages less than 30 V must be located on the left bottom of the enclosure (see Figure 2-1). Leave ample loose wiring (typically 8") to facilitate any movement of the field terminal board.

H. Close the front chassis cover and rotate the screw lock on the lower left corner counter-clockwise until locked. Verify the door is locked.



FIELD TERMINAL BOARD
FIGURE 2-2



FIELD WIRING DIAGRAM
FIELD MOUNT WITH TERMINAL BOARD
FIGURE 2-3

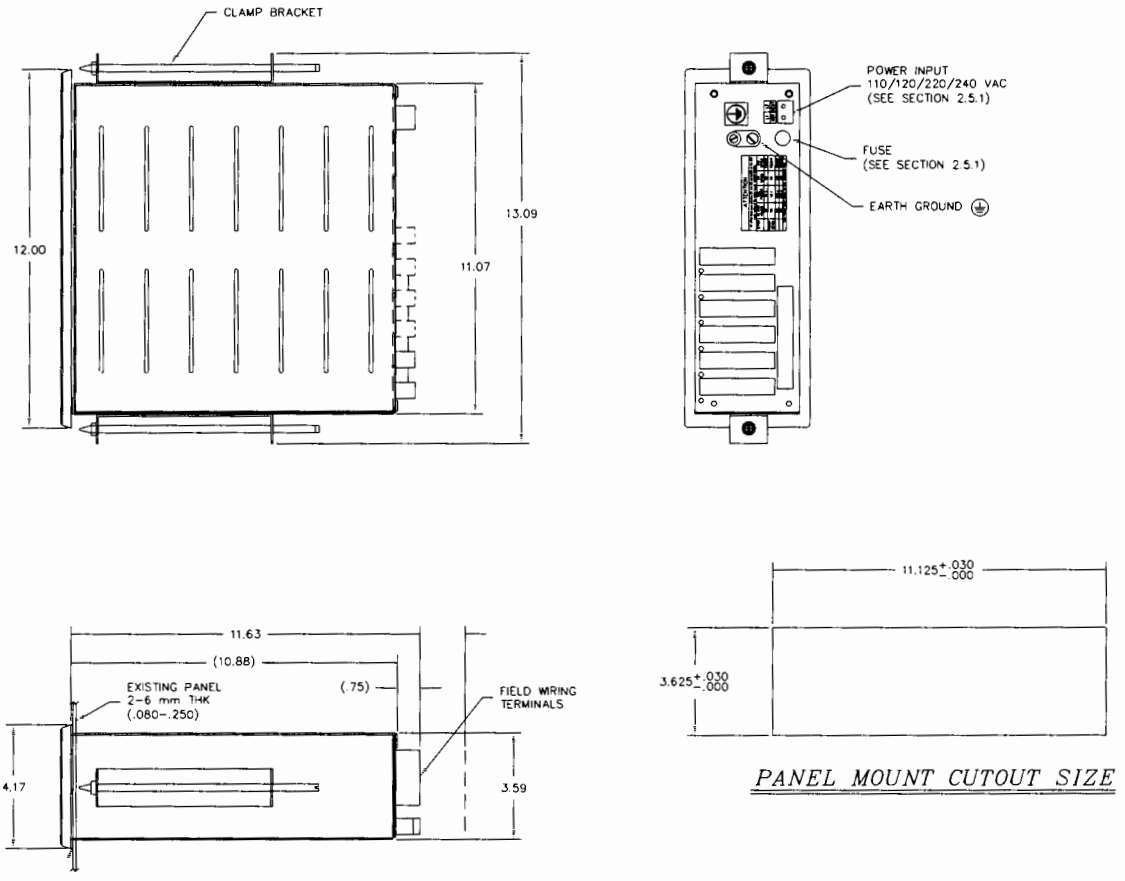
2.3 PANEL MOUNT INSTALLATION

The panel mounted batch weight indicator is suitable for mounting in a control panel. The control panel should not be exposed to excessive vibration, heat or moisture. The front bezel, when properly seated, forms a dust seal.

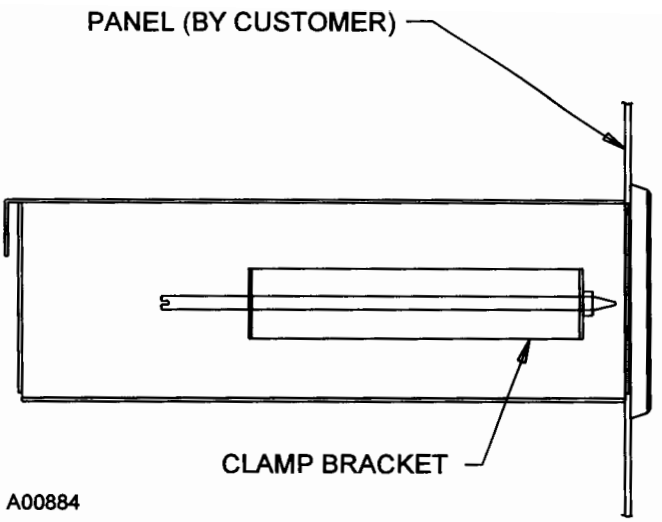
A two (2) inch clearance around the top and bottom of the batch weight indicator is required for convection cooling. Additional clearances may be required if equipment mounted directly below generates excessive heat. Clearance in the back is necessary for wiring access and fuse replacement. Clearance on the side is necessary for inserting the chassis holding brackets from the back after insertion of the batch weight indicator.

2.3.1 Mounting

Provide a cutout in the panel and insert the batch weight indicator after removing the holding brackets (see Figures 2-4 and 2-5). From the back, insert the holding brackets on both sides of the batch weight indicator. Tighten the holding brackets to support the batch weight indicator and form the dust seal.



OUTLINE AND MOUNTING DIMENSIONS MICRO-TECH 2000
MODEL 2102 (PANEL MOUNT) BATCH CONTROLLER
FIGURE 2-4



INSTALLATION MICRO-TECH 2000
MODEL 2102 (PANEL MOUNT) BATCH
WEIGHT CONTROLLER
FIGURE 2-5

NOTES:

1. See Figure 2-4 for panel cutout and outline and mounting dimensions.
2. The large rubber band shipped with the unit can be used to hold clamp brackets in place during installation.
3. Remove clamp brackets and slide chassis assembly through front of cut-out. Re-install clamp brackets into chassis and tighten threaded rods against back of panel until unit is secure.

2.3.2 Safety Precautions

CAUTION

DO NOT INSTALL, OPERATE, OR PERFORM ANY MAINTENANCE PROCEDURES UNTIL YOU HAVE READ THE SAFETY PRECAUTIONS WHICH FOLLOW.

1. Do not connect power to the electronics or turn on the unit until you have read and understood this entire manual. The precautions and procedures presented in this manual must be followed carefully in order to prevent equipment damage and protect the operator from possible injury.

2. **CAUTION**

   Hands and clothing must be kept away from all moving or rotating parts.

3. **WARNING**

   Covers over the electronics should always remain in place during operation. They should be removed only for maintenance procedures with the machine's power OFF. Be sure to replace all covers before resuming operation.

4. **WARNING**

   All switches (such as control or power) must be OFF when checking input AC electrical connections, removing or inserting printed circuit boards, or attaching voltmeters to the system.

5. Incoming voltages must be checked with a voltmeter before being connected to the electronics.

6. **WARNING**

   Extreme caution must be used in testing in, on, or around the electronics, PC boards, or modules. There are voltages in excess of 115 V or 230 V in these areas. Avoid high voltage and static electricity around the printed circuit boards.

7. Maintenance procedures should be performed only by qualified service personnel and in accordance with procedures/instructions given in this manual.

8. During maintenance, a safety tag (not supplied by Ramsey) should be displayed in the ON/OFF switch areas as a precaution instructing others not to operate the unit.

9. Only qualified service technicians should be allowed to open and work in the electronics, power supply, control, or switch boxes.

10. Objects should never be placed or stored on the Batch Weight Indicator.

11. This equipment should not be operated nor utilized in applications other than those stated in the original order. (To adapt production rates or applications, consult Ramsey Products Customer Service for recommendations.)

12. All panels covering the electronics must be in place and tight before wash down procedures. Damage to the electronics could result from water, moisture, or contamination in the electronics housing.

2.3.3 OSHA - Occupational Safety and Health Act

The Occupational Safety and Health Act clearly places the burden of compliance on the user of the equipment and the act is generalized to the extent that determination of compliance is a judgement decision on the part of the local inspection. Hence, Ramsey will not be responsible for meeting the full requirements of OSHA in respect to the equipment supplied or for any penalty assessed for failure to meet the requirements, in respect to the equipment supplied, of the Occupational Safety and Health Act, as interpreted by an authorized inspector. Ramsey will use their best efforts to remedy such violation at a reasonable cost to the buyer.

2.3.4 Utility Connections (Incoming Power)

CAUTION

DO NOT CONNECT POWER UNTIL YOU HAVE READ AND UNDERSTOOD THIS ENTIRE SECTION. IMPROPER CONNECTION MAY RESULT IN DAMAGE TO YOUR BATCH WEIGHT INDICATOR.

CAUTION

VERIFY THAT THE INPUT VOLTAGE IS CORRECT WITH AN AC VOLTMETER BEFORE YOU CONNECT IT TO THE BATCH WEIGHT INDICATOR.

CAUTION

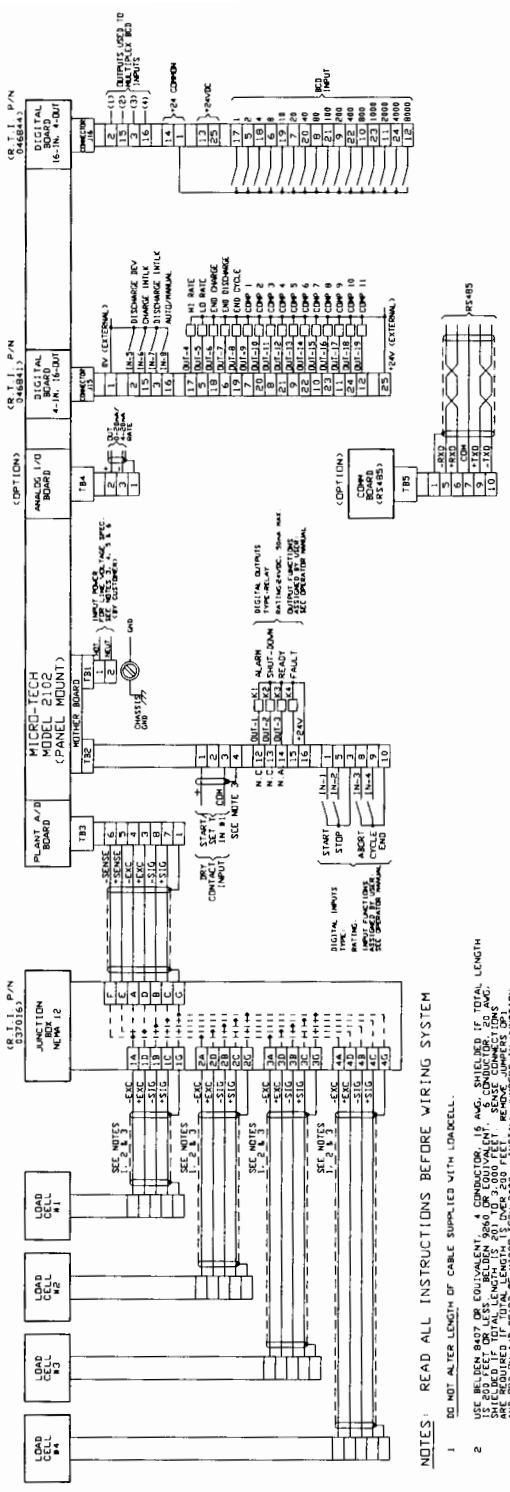
EARTH GROUND MUST BE PROVIDED TO THE BATCH WEIGHT INDICATOR. DO NOT USE CONDUIT TO PROVIDE THIS GROUND.

CAUTION

A READILY ACCESSIBLE DISCONNECT DEVICE (MAXIMUM 20 AMP) SHALL BE INCORPORATED IN THE FIELD WIRING. THIS DISCONNECT DEVICE SHOULD BE IN EASY REACH OF THE OPERATOR AND IT MUST BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.

CAUTION

REFER TO THE FIELD WIRING DIAGRAM (FIGURE 2-6) AS A GUIDE IF YOU DO NOT HAVE A SPECIFIC WIRING DIAGRAM FOR YOUR SYSTEM. FOLLOW YOUR LOCAL ELECTRONIC CODES AND REGULATIONS FOR MINIMUM WIRE SIZE AND ROUTING.



FIELD WIRING DIAGRAM
PANEL MOUNT
FIGURE 2-6

2.3.5 Wiring

1. Some critical wiring considerations:

   A. Insure power is off.

   B. Do not route load cell and signal cables in the same conduit with power cables or any large source of electrical noise.

   C. Wiring should be long enough, and routed to allow the chassis to be removed from the front for servicing if necessary.

   D. Connect the shields ONLY where shown.

   E. Check that all wires are tight in their connections.

   F. Earth ground all enclosures and conduit.

   G. Never use a "megger" to check the wiring.

   H. A readily accessible disconnect device (maximum 20 amps) shall be incorporated in the field wiring. This disconnect should be in easy reach of the operator and it must be marked as the disconnecting device for the equipment.

2. To connect incoming power, use the following procedure (see Figure 2-4).

   NOTE: All units shipped from the factory are configured for 120 VAC. If another input selection is desired, refer to Section 2.4.1 (Mother Board Configuration Jumpers and Switches).

   A. For input power, use 14 AWG stranded wire.

   B. Wire the safety ground terminal located on the right back side of the enclosure.

   C. Wire the HOT to terminal labeled HOT.

   D. Wire the NEUTRAL to the terminal labeled NEUTRAL.

2.4 BATCH CONTROLLER CONFIGURATION

The Micro-Tech 2102 is one of a family of products that is supported by a common hardware platform. Configuration of the hardware platform and additional circuit boards enable the hardware platform to be used for several discrete instruments.

Wire jumpers are installed at the factory for the instrument ordered, and should not have to be reconfigured in the field.

Switches and removable jumpers are described in this section. The default position is noted in each description and, in most cases, is not changed.

CAUTION

2.4.1 Mother Board Configuration Jumpers and Switches

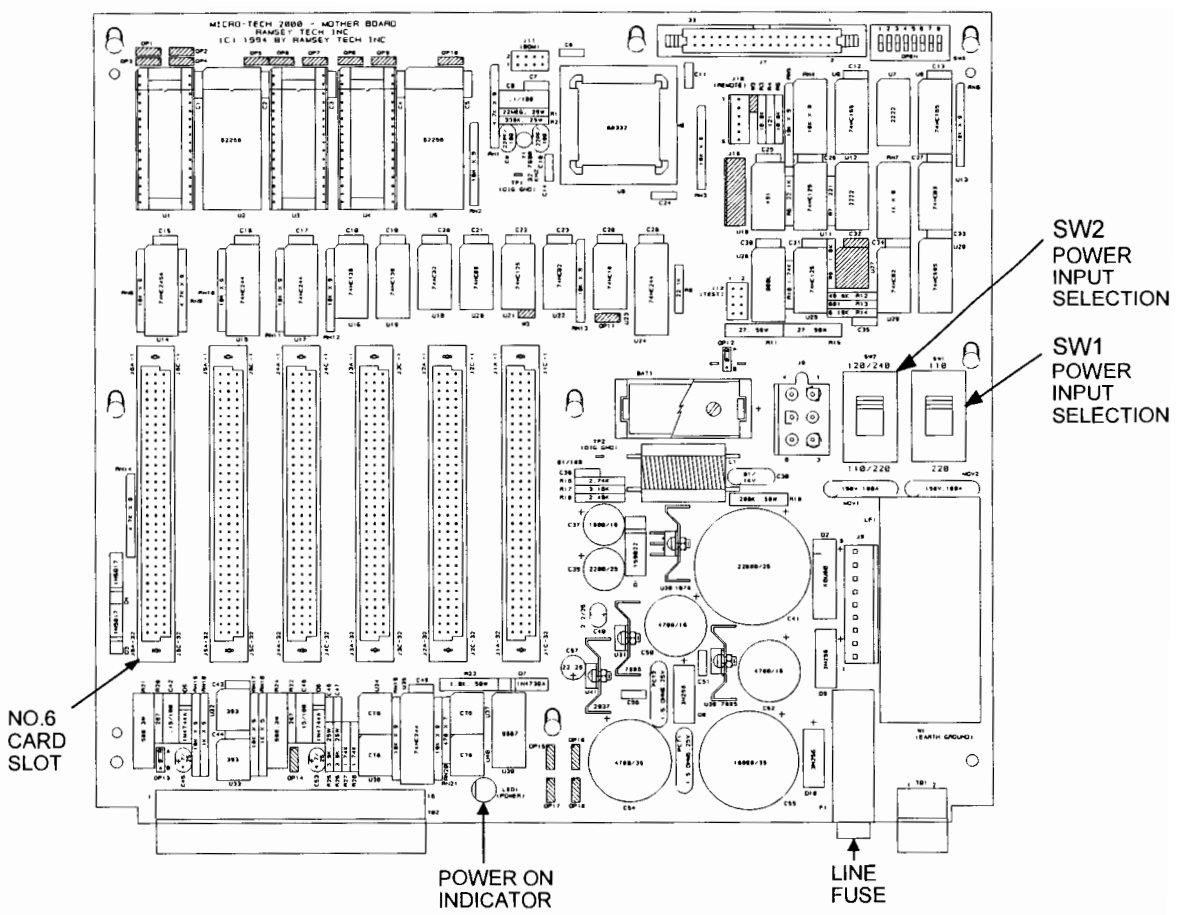
TO BE PERFORMED BY QUALIFIED SERVICE PERSONNEL ONLY.

1. AC voltage input power selection SW1 and SW2 are located on the right center section of the mother board (see Figure 2-7).

	AC INPUT VOLTAGE	FUSE F1 (SB)	SW1 SETTING	SW2 SETTING
	110	1.0 A	110	110/220
Default	120	1.0 A	110	120/240
	220	0.5 A	220	110/220
	240	0.5 A	220	120/240

First, set SW1 for nominal 110 VAC or 220 VAC. Next, set SW2 close to the actual input voltage.

Example: Input Voltage = 117 VAC
SW1 = 110
SW2 = 120/240



MODEL 2102 MOTHER BOARD
FIGURE 2-7

2. General Purpose Contact Inputs

There are three (3) user definable, optically isolated, normally open, dry contact-type, general purpose, digital inputs.

The power supply for the general purpose digital inputs is a +24 V unregulated DC supply.

The user definable input choices are:

The following table shows the available logical functions:

Logical function	Default
External Alarm 1	0 NO
External Alarm 2	0 NO
External Alarm 3	0 NO
Print Ctot	0 NO
Print Rtot	0 NO
Start/Set tare	1 NO
Start/Set tare S1	0 NO
Start/Set tare S2	0 NO
Start/Set tare S3	0 NO
Start/Set tare S4	0 NO

Stop/Reset tare	2 NO	
Stop/Reset tare S1	0 NO	
Stop/Reset tare S2	0 NO	
Stop/Reset tare S3	0 NO	
Stop/Reset tare S4	0 NO	
End cycle	4 NO	
End cycle S1	0 NO	
End cycle S2	0 NO	
End cycle S3	0 NO	
End cycle S4	0 NO	
Abort	3 NO	
Abort S1	0 NO	
Abort S2	0 NO	
Abort S3	0 NO	
Abort S4	0 NO	
Charge interl.	6 NO	
Charge interl. S1	0 NO	
Charge interl. S2	0 NO	
Charge interl. S3	0 NO	
Charge interl. S4	0 NO	
Disch. interl.	7 NO	
Disch. interl. S1	0 NO	
Disch. interl. S2	0 NO	
Disch. interl. S3	0 NO	
Disch. interl. S4	0 NO	
Disch. dev.	5 NO	
Disch. dev. S1	0 NO	
Disch. dev. S2	0 NO	
Disch. dev. S3	0 NO	
Disch. dev. S4	0 NO	
Auto / Man	8 NO	
Auto / Man S1	0 NO	
Auto / Man S2	0 NO	
Auto / Man S3	0 NO	
Auto / Man S4	0 NO	
Go On	0 NO	
Go On S1	0 NO	
Go On S2	0 NO	
Go On S3	0 NO	
Go On S4	0 NO	
Reset alarms	1 NO	
Reset Tot C	0 NO	
Reset Tot R	0 NO	
Remote cntrl	0 NO	(only if high level communication)
Print Batch	0 NO	
Print Batch S1	0 NO	
Print Batch S2	0 NO	
Print Batch S3	0 NO	
Print Batch S4	0 NO	
Pr. Old Btc	0 NO	
Pr. Old Btc S1	0 NO	

Pr. Old Btc S2 0 NO
Pr. Old Btc S3 0 NO
Pr. Old Btc S4 0 NO

Any three inputs may be selected. Additional inputs can be selected by adding additional DIO board. See Section 2.4.6.

3. General Purpose, Digital Outputs

There are three (3) user definable open collector outputs, normally open.

The user definable output choices are:

Comp. 1
Comp. 2
Comp. 3
Comp. 4
Comp. 5
Comp. 6
Comp. 7
Comp. 8
Comp. 9
....
Comp. 40
Alarm
Shut down
Ready
High load
High load S1
High load S2
High load S3
High load S4
Low load
Low load S1
Low load S2
Low load S3
Low load S4
High rate
High rate S1
High rate S2
High rate S3
High rate S4
Low rate
Low rate S1
Low rate S2
Low rate S3
Low rate S4
End charge
End charge S1
End charge S2
End charge S3
End charge S4
End discharge

End discharge S1
End discharge S2
End discharge S3
End discharge S4
End cycle
End cycle S1
End cycle S2
End cycle S3
End cycle S4
Need refill
Need ref S1
Need ref S2
Need ref S3
Need ref S4

Load WTS

Any three (3) outputs may be selected. Additional outputs can be selected by adding additional DIO boards. See Section 2.4.6.

4. Fault Output

   A single open collector output, normally closed, indicates a software or hardware failure. The fault output cannot be configured as a general purpose, digital output.

2.4.2 A/D Board Jumpers

1. Load Cell Sense

   Load cell sense is controlled by selectable jumpers OP1 and OP2 located on the lower left corner of the non-commercial or premium A/D board located in Mother board slot #6 (Figure 2-8 or 2-9). The jumpers should be in position "A" local sense if the distance is less than 200 feet between load cell and batch controller.

   For distances greater than 200 feet and less than 3,000 feet, the jumper should be in position "B". A special 6 wire cable is required. Refer to the field wiring drawing for jumper requirement in the scale junction box.

JUMPERS			
Mode	OP1	OP2	
Less than 200 feet	"A"	"A"	[Default]
Greater than 200 feet	"B"	"B"	

NOTE: The load cell cable length must be the same length if excitation sense is required for dual channel A/D inputs.

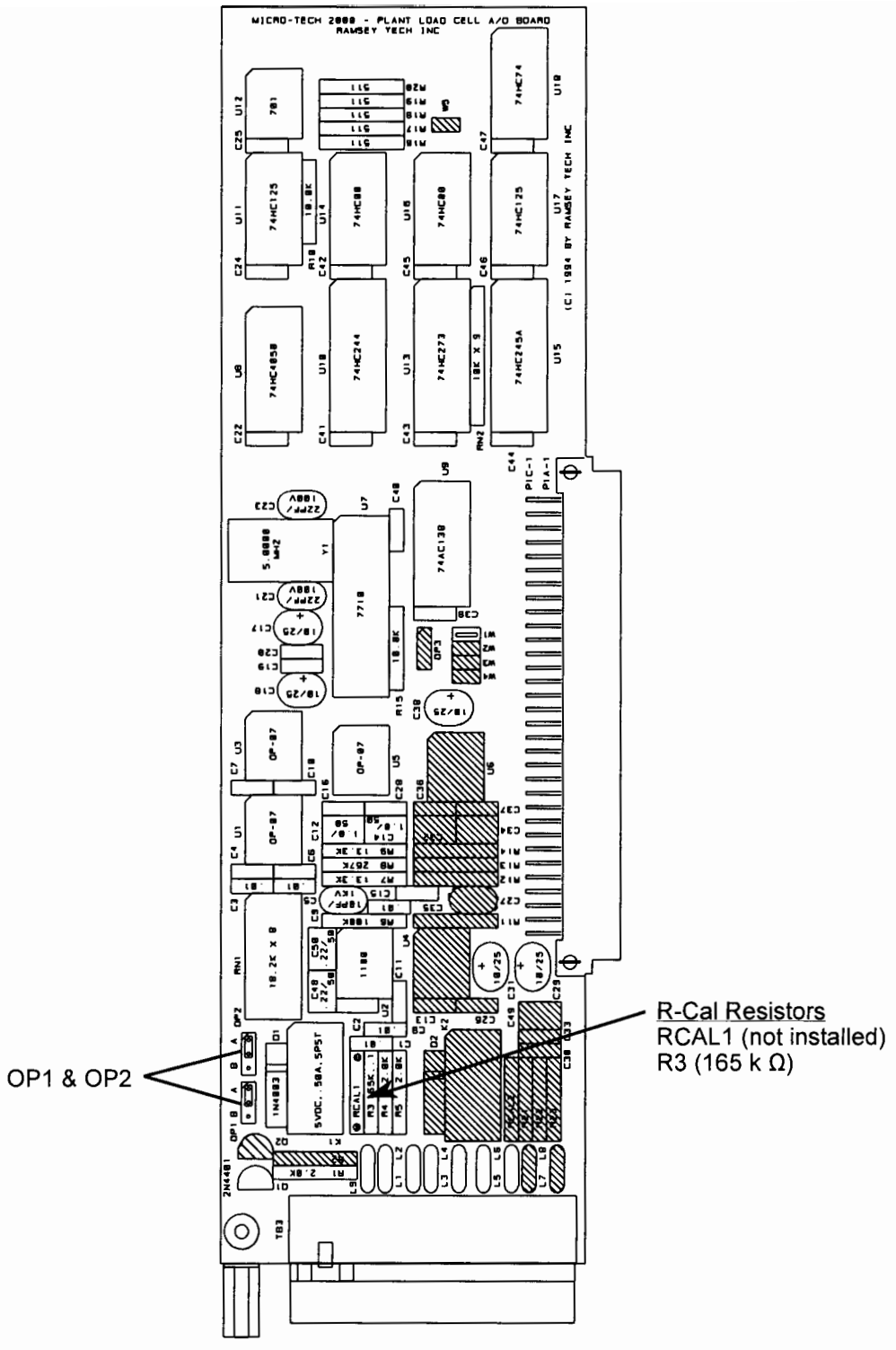
2.4.3 Field Terminal Board (Field Mount Only)

Provision is provided on the field terminal board for installing up to three (3) input, three (3) output, and one (1) fault output AC or DC solid-state plug-in modules.

These modules may be used in conjunction with the digital inputs, outputs, and fault output. (See Figure 2-10.)

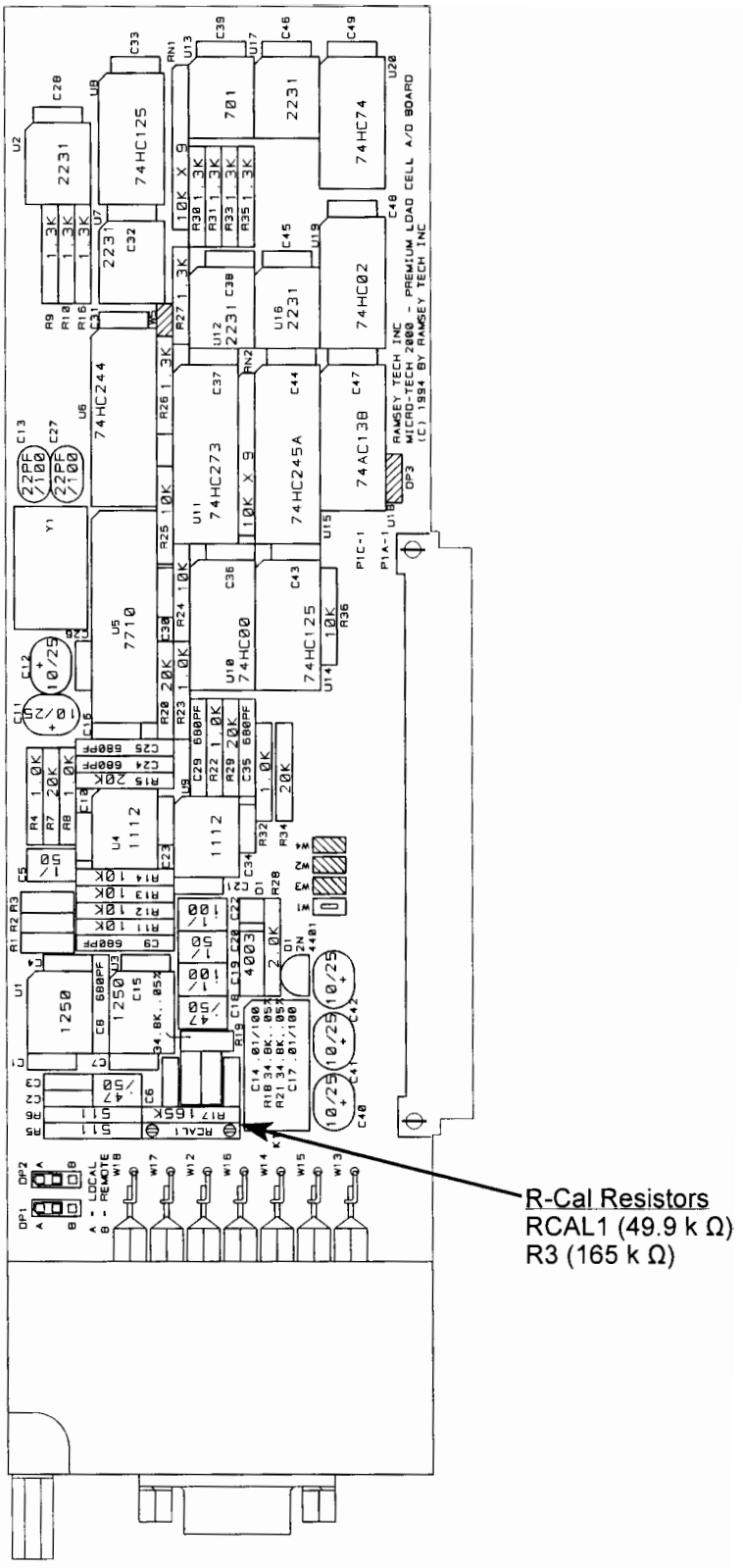
The field terminal board is not available on the panel mount version. An optional solid-state module rack is required to interface with the panel mount version when solid-state modules are required.

NOTE: You must choose between wiring dry contact inputs and open collector outputs direct or through the solid-state relay module options. The two options cannot be mixed.



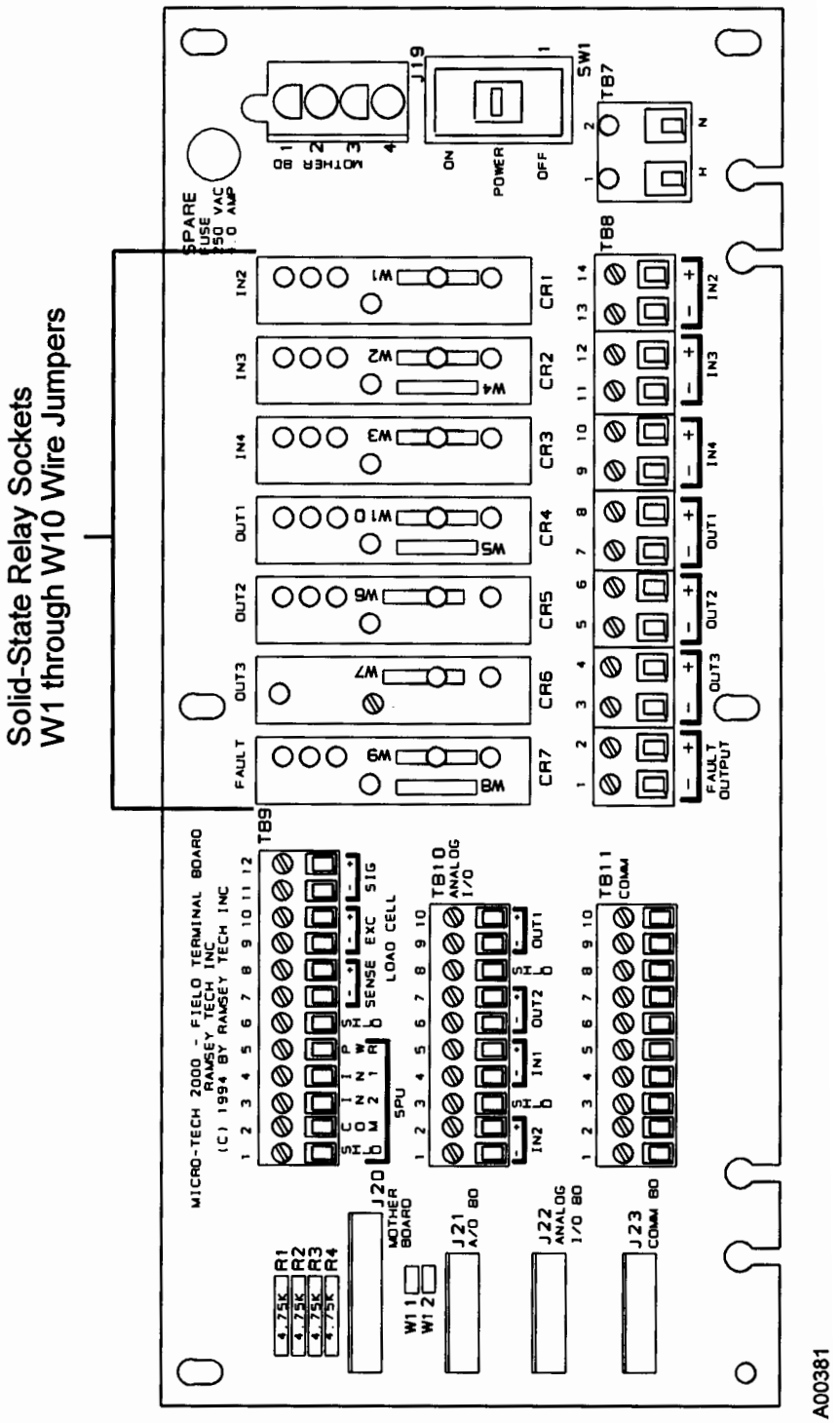
A01918

LOAD CELL SINGLE CHANNEL
A/D BOARD
FIGURE 2-8



A01917

LOAD CELL SINGLE CHANNEL
PREMIUM A/D BOARD
FIGURE 2-9



FIELD TERMINAL BOARD
FIGURE 2-10

2.4.4 Analog Input/Output Board

The optional analog output board is available in two configurations described below. (A) has one current output only; whereas, (B) has two current outputs (Figure 2-11). Optional type (A) or type (B) can be added at any time.

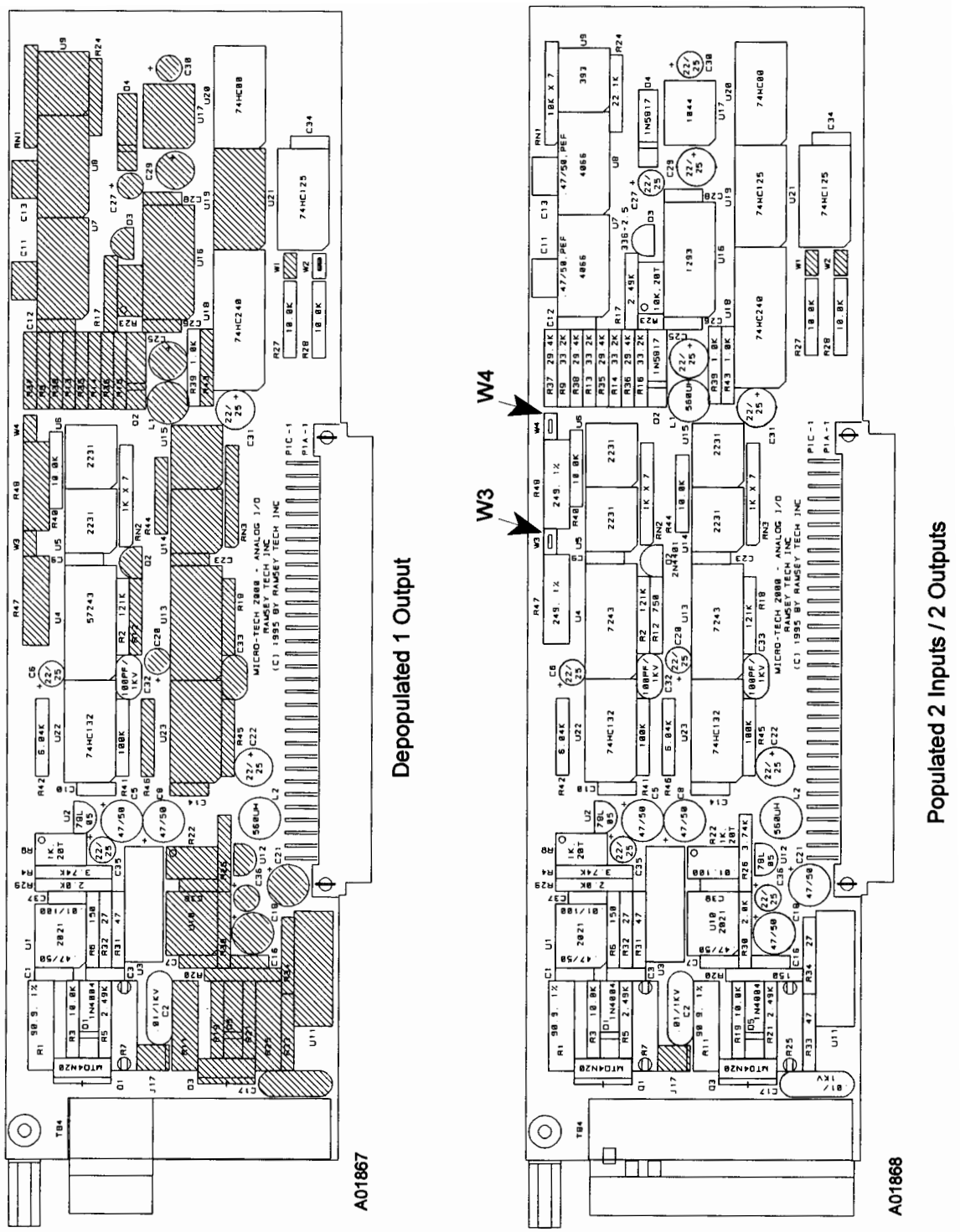
No configuration switches or jumpers exist on the current output board.

A. One user definable 0-20/4-20 or 20-4/20-0 mA output.

None (Default)
Net
Gross
Diff

B. Two definable 0-20/4-20 or 20-4/20-0 mA outputs.

Outputs
- None (Default)
- Net
- Gross
- Diff



ANALOG I/O BOARD
FIGURE 2-11

2.4.5 Communications Board Configuration

The communication protocol allows a remote intelligent device to read and eventually write the contents of the registers.

During the communication activity, the batch controller always acts as Slave, meaning it responds to a request from a Master device on the line, but never attempts to send messages out.

The batch controller reads the message and looks for the address, which is contained in an address byte in the query package. The message is then processed only if the address contained in the message matches the address specified in the set up data of the instrument.

The clock/calendar is located on the communication board. During AC losses or power off, RAM data retention and operation of the clock/calendar is provided by the battery located on the mother board.

One electrical interface may be selected accessed through one communication port. Up to three communication boards may be installed.

Below is a table which summarizes the jumper positions required for selection of each electrical interface mode (see Figure 2-12).

JUMPERS							
Mode	OP1	OP2	OP3	OP4	OP5	OP6	
RS-232	"A"	"A"	"A"	"A"	"A"	"B"	
RS-485	"B"	"A"	"B"	"B"	"MDP"	"TRM"	[Default]
20 mA	"B"	"B"	"A"	"A"	"A"	"C"	

TABLE "MDP"
FOR RS-485 ONLY

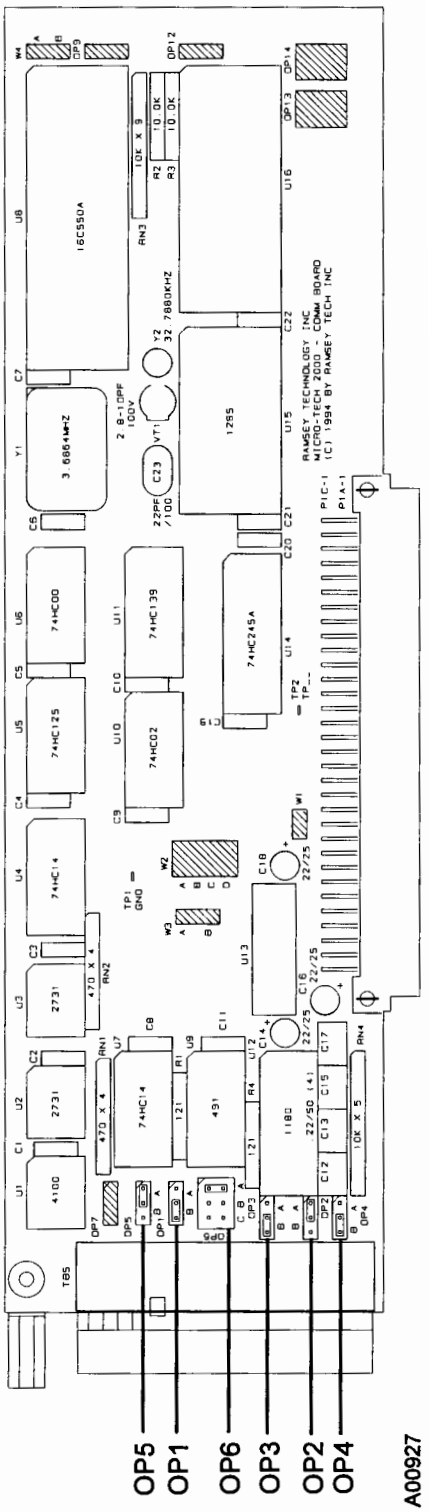
OP5

"A" NORMAL
"B" MULTI-DROP

TABLE "TRM
FOR RS-485 ONLY

OP6

"A" TERMINATED
"B" NOT TERMINATED



COMM "A" BOARD
FIGURE 2-12

2.4.6 Digital Input/Output Board Configuration

In addition to the general purpose digital inputs and outputs on the mother board, optional Digital I/O (DIO) expansion boards can be added. Available boards are DIO input board 16 inputs/4 outputs, output board 16 outputs/4 inputs, or 20 inputs/20 outputs by adding both boards. The batch controller is supplied with one output board 16 outputs/4 inputs. Other boards may be added at any time.

Both DIO boards provide isolated contact closure inputs and 24 volt current sinking (default) or current sourcing (consult factory) isolated outputs. The DIO input board connector J16 is a male 25 pin sub-miniature D connector and the DIO output board connector J15 is a female connector.

Internal or external 24 VDC power for the DIO boards is controlled by selectable jumpers OP1 and OP2 located on the lower right hand side of the DIO boards (Figure 2-13). All inputs and outputs use the same selected power supply. See the table below for jumper positions.

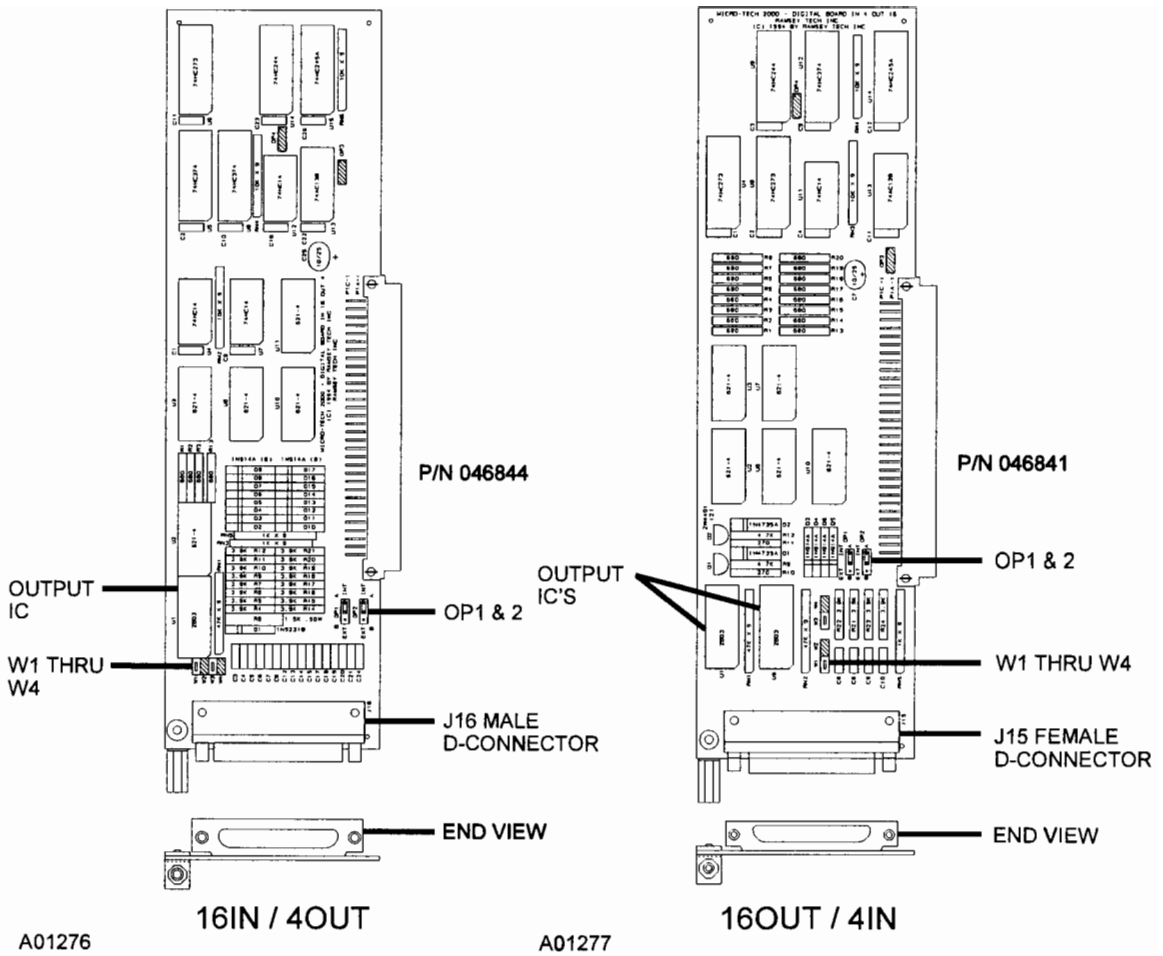
JUMPERS			
POWER SOURCE	OP1	OP2	
Internal	"A"	"A"	[Default]
External	"B"	"B"	

The isolated contact closure inputs are activated by completing the circuit from the input to the negative side of the 24 VDC supply. Approximately 6 mA of current flows out of each input during contact closure.

The outputs of the DIO boards use 2803 current sinking (default) type IC's. The output IC's are installed in sockets to allow replacing the output IC only, rather than the board if the IC is damaged.

The output 2803 ICs can be replaced with 2981 type ICs for current sourcing applications. Wire jumpers W1 thru W4 must be relocated for current sourcing (see Figure 2-13). In most cases, it is recommended that the boards be returned to the factory for converting from current sinking (default) to current sourcing. See table below for jumper positions.

JUMPERS					
CURRENT	W1	W2	W3	W4	
Sinking	"Yes"	"No"	"Yes"	"No"	[Default]
Sourcing	"No"	"Yes"	"No"	"Yes"	

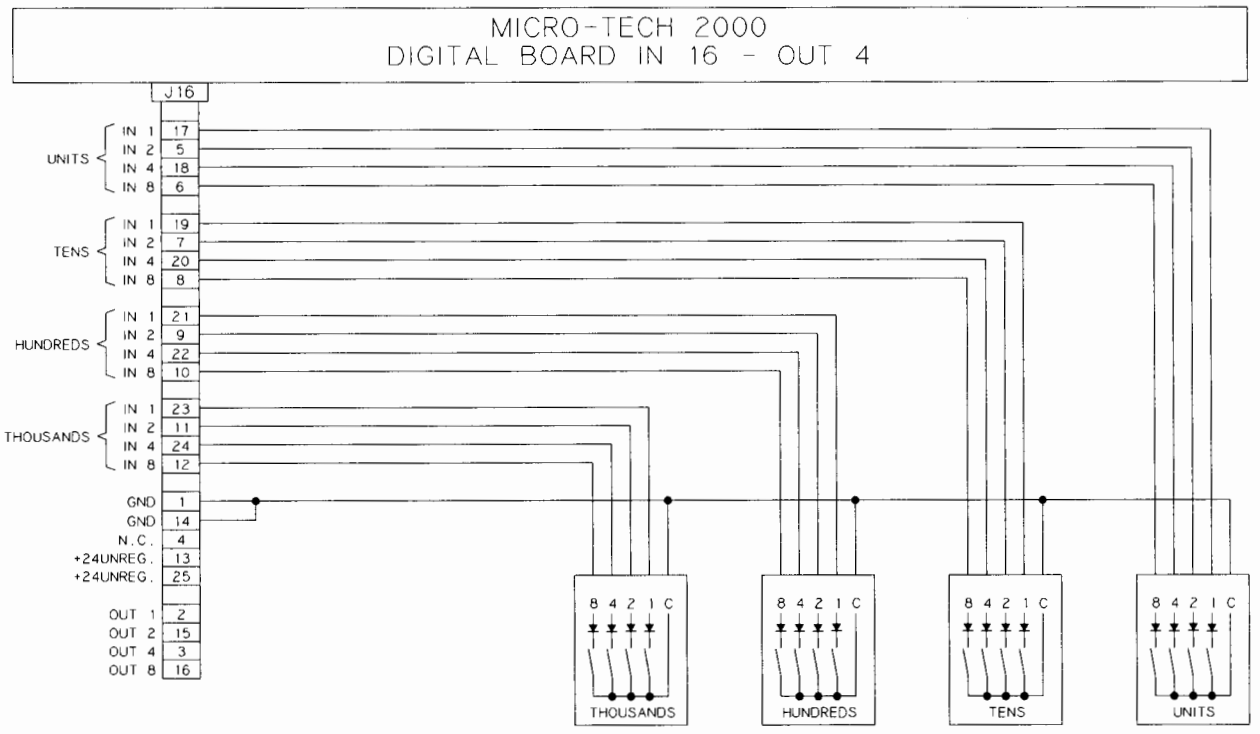


DIGITAL INPUT/OUTPUT BOARDS
FIGURE 2-13

2.4.7 BCD Input Option

Load sizes for load out or batching applications can be remotely entered by BCD. An optional Load Out 16 input/4 output board is required.

See Figure 2-14 for wiring.



A01278

BCD INPUT
FIGURE 2-14

2.5 INITIAL SETUP PROCEDURE

Following mechanical and electrical installation, it is necessary that you program field data that is specific to your application into the Micro-Tech 2102 Batch Weight Indicator memory. Refer to Appendix A/1 for detailed description of all set-up menus.

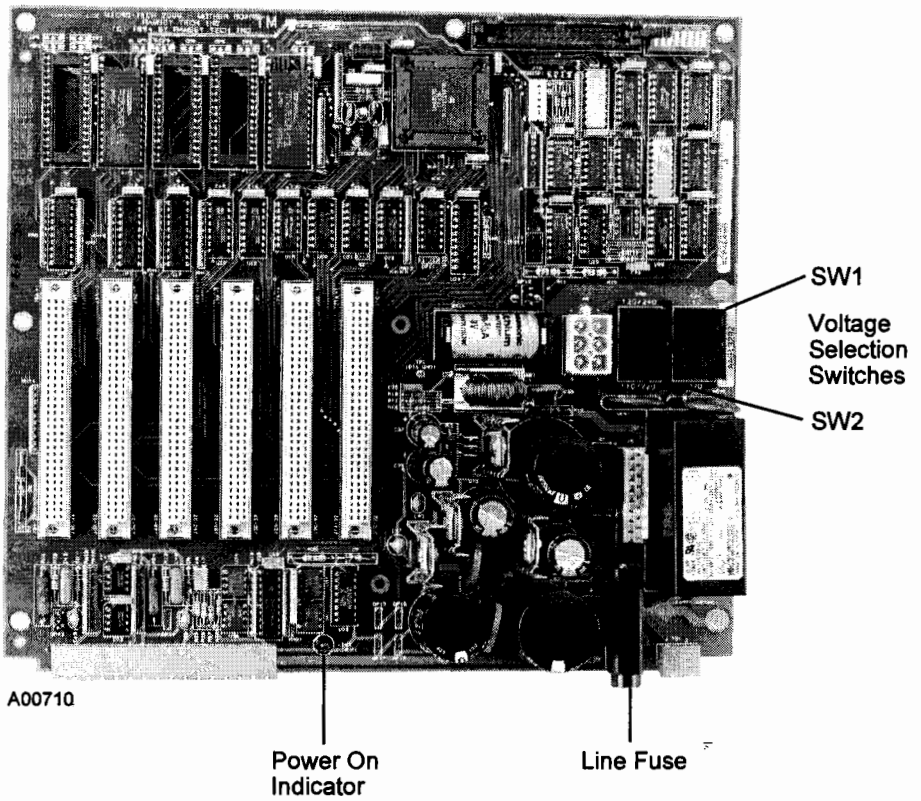
2.5.1 Programming the Micro-Tech 2102 Batch Weight Indicator

When power is first applied to the batch weight indicator, the system steps the operator through menus and options that bring the system to a weighing state. Soft keys, numeric keys and the scroll control keys are used to select choices. The **RUN** and **MENU** control keys are inactive during this procedure.

After successful initial programming and scale calibration, proceed to Appendix A/1 Main Menu 4, I/O Scroll setup.

CAUTION

Inside the Batch Weight Indicator's front panel are two voltage selection slide switches (see Figure 2-15). Ensure they are in the correct position --either 110/120 or 220/240 VAC -- before applying power or equipment damage will occur. See Section 2.4.



MICRO-TECH 2102 CPU BOARD
FIGURE 2-15

1. Programming the Batch Weight Indicator - Initialization

When the unit is powered on the first time, some data must be entered before the unit can be operated. The user has to enter each parameter according to the plant specifications. During this procedure, the **RUN** and **MENU** keys are inactive.

Selecting the language.

```
-  MEMORY ERASED   -
Choose the language
key to continue to
ESP              USA
```

The batch weight indicator is a dual language instrument. USA is always the first language. The standard configuration provides Spanish (ESP) as the second language. Press the **DOWN SCROLL** key.

```
Initial scale setup
and calibration.
Press down SCROLL.
```

Press the **DOWN SCROLL** key.

```
Press key under HELP
for more information

HELP
```

"HELP" is flashing

Press the **HELP** soft key.

```
Key with dot (soft
key) performs action
of word above it.
MORE    RETURN
```

When **RETURN** is pressed, the operator is returned to the previous screen. Pressing **MORE** advances the system to the next screen.

Press the **MORE** key.

```
Use down SCROLL key
to advance through
the menus.
MORE    RETURN
```

Pressing **MORE** or **RETURN** reverts the screen back to previous screens in this series. By pressing the **DOWN SCROLL** key, the system is enabled to proceed through the menus needed for system setup.

NOTE: Menus appearing during initial setup may operate differently in normal operation.

2. Define the Number of Scales

The batch weight indicator can control from one to four independent scales. The number of scales can be programmed according to the number of A/D boards installed.

If only one A/D board single channel is installed, the following scroll is not displayed.

```
- SC DATA SCROLL 1 -
Number of scales
 1
ENTER
```

Default: 1
Min: 1
Max: The absolute maximum number of scales is 4. The maximum number of scales depends on the combination of A/D boards installed. The following A/D boards are available:
- Plant scale A/D single channel
- Plant scale A/D dual channels
- Premium scale A/D single channel

In cases where more scales are defined, it is necessary to define how these scales should be handled by the batch weight indicator. This option can only be changed during the cold start procedure. The two ways to handle the scales in multi-scale mode is described in Appendix A/2.

```
- SC DATA SCROLL 1A -
Mode to handle the
scales    > Single <
CHOICE         ENTER
```

Default: SINGLE
Selections: SINGLE, GROUP

3. The SCALE  Soft Key

There are many parameters that must be defined for each scale. If you have more than one scale, the SCALE soft key is displayed. This key has a double function. First, it indicates at which scale the parameter is referring. For example,  **1** indicates you are entering a parameter for scale 1. Second, it allows you to change the scale. Pressing the soft key below the indication changes the scale number. This key is indicated by SCALE#.

4. Select Measure Units

Measure units can be individually selected. The operator must first decide if the English units will be used, or the Metric units, or a combination of both.

```
- DISPLAY SCROLL 1 -
Measure units
> English <
CHOICE  ENTER
```

If USA or ENG language: Default: ENGLISH
If other language: Default:: METRIC
Selections: ENGLISH, METRIC, MIXED

Press **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.

The weights are displayed according to the units selected here.

```
- DISPLAY SCROLL 2 -
Weight Units
> Pounds <
CHOICE  ENTER SCALE#
```

If ENGLISH: Default: Pounds
Selections: Tons, Ltons, Pounds
If METRIC: Default: kg
Selections: tonnes, kg
If MIXED: Default: Pounds
Selections: Tons, Ltons, Pounds, tonnes, kg

The totals are displayed according to the units selected here.

```
- DISPLAY SCROLL 3 -
Total Units
> Tons <
CHOICE  ENTER SCALE#
```

If ENGLISH: Default: Tons
Selections: Tons, Ltons, Pounds
If METRIC: Default: tonnes
Selections: tonnes, kg
If MIXED: Default: Tons
Selections: Tons, Ltons, Pounds, tonnes, kg

5. Define Scale Capacity and Scale Divisions

The next entry is the scale capacity which is the maximum capacity of the scale. This entry also defines the default number of decimal places that are

used for display weight values. Use numeric keys for entering the number, confirm with **ENTER**. Scroll down.

```
- SC DATA SCROLL 2 -
Max. scale capacity
 500.0       lb.
ENTER          SCALE#
```

Default: 500.0
Min: 1
Max: 1000000

When the Scale capacity is entered, the number of decimal places is also defined. If, for example, the operator enters 500.0, this sets the "Scale Divisions" parameter to 0.1. Advancing to the next scroll, the operator first sees the Scale Division corresponding to the just entered Scale Capacity (in the example 0.1). If required, the operator is able to alter the Scale Division to any of the available options.

Press the **ENTER** soft key to accept the default division, or the **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.

```
- SC DATA SCROLL 3 -
Scale divisions
> 0.1 <
CHOICE  ENTER SCALE#
```

Default: 0.1
Selections: 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 0.01, 0.02, 0.05, 0.001, 0.002, 0.005

6. Defining the Load Cells

   Enter the number of load cells of your scale.

```
- SC DATA SCROLL 5 -
# of load cells
        1
ENTER         SCALE #
```

Default: 1
Min: 1
Max: 6

Enter the load cell capacity as it appears on the label placed on the load cell.

```
- SC DATA SCROLL 6 -
Load cell capacity
250.0     W.U.
ENTER          SCALE#
```

If ENGLISH or MIXED:		If METRIC:	
Default:	250.0 Lbs	Default:	100 kg
Min:	1 Lbs	Min:	1 kg
Max:	15000 Lbs	Max:	5000 kg

Enter the load cell sensitivity in mV/V as marked on the label of the load cell. Ramsey load cells are normally 2.000 or 3.000 mV/V.

```
- SC DATA SCROLL 7 -
Load cell sensit.
3.00 mV/V
ENTER          SCALE#
```

Default:	3.000 mV/V
Min:	0.500 mV/V
Max:	3.500 mV/V

The resistance of the bridge of each load cell has to be entered here. The number of scrolls depends on the number of load cells specified per each scale.

Load cell resistance is entered on this screen. The resistance for the load cell has been recorded in the System Data Sheet. (It is also stamped on the load cell cable.) Enter the ohms for the load cell(s).

```
- SC DATA SCROLL 8A -
Load cell #1
Res     350.0 Ohms
ENTER          SCALE#
```

Default:	350 Ohms
Min:	10 Ohms
Max:	2000 Ohms

If # of Load Cells is 2 or more:

```
- SC DATA SCROLL 8B -
Load cell #2
Res     350.0 Ohms
ENTER          SCALE#
```

Same default and limits of load cell #1.

If # of Load Cells is 3 or more:

```
- SC DATA SCROLL 8C -
Load cell #3
Res     350.0 Ohms
ENTER           SCALE#
```

Same default and limits of load cell #1.

If # of Load Cells is 4 or more:

```
- SC DATA SCROLL 8D -
Load cell #4
Res     350.0 Ohms
ENTER           SCALE#
```

Same default and limits of load cell #1.

If # of Load Cells is 5 or more:

```
- SC DATA SCROLL 8E -
Load cell #5
Res     350.0 Ohms
ENTER           SCALE#
```

Same default and limits of load cell #1.

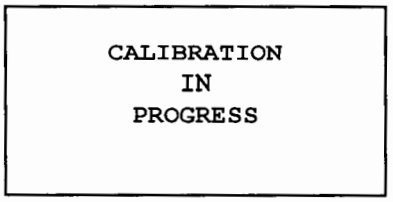
If # of Load Cells is 6:

```
- SC DATA SCROLL 8F -
Load cell #6
Res     350.0 Ohms
ENTER           SCALE#
```

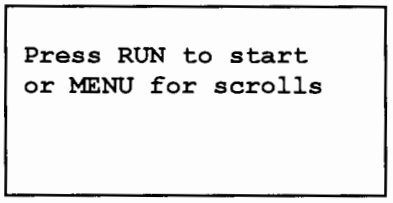
Same default and limits of load cell #1.

7. Quick Automatic Calibration of the Scale(s)

   The system performs a quick calibration of the scale(s). The scale is first zeroed (3 seconds) and then calibrated using the load cell capacity, sensitivity and resistance just entered. During this time, the following screen is displayed.



When calibration procedure is completed, the 'SCALE CALIBRATED' or, in case the load cell is not connected or a failure is detected, 'SCALE NOT CALIBRATED' message is displayed. At this point, the procedure is complete and the following message is displayed.



The field data entered during this procedure enabled the Micro-Tech 2102 to perform an unassisted zero balance and span calibration. Assuming no mistakes were made, the scale is calibrated and ready for use at this time.

NOTE: The span number was calculated from the data that was entered during this initial calibration setup procedure. This span number is based on a perfect mechanical alignment of the scale. Therefore, verify this by performing a span calibration procedure.

Detailed explanation of all menus is located in Appendix A/1.

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CHAPTER 3.0
OPERATION

3.1 GENERAL

Your Ramsey batch weight system is capable of accurate weighing, provided it is installed, calibrated, operated, and maintained in complete accordance with the instructions contained in this manual, along with your weighbridge installation manual.

3.2 OVERVIEW

Model 2102 batch weight indicator is a bus-based microcomputer-based instrument that accepts and conditions weight signals and provides visual and electrical outputs for total weight. A stable 10 volt DC excitation voltage capable of exciting up to six 350 ohm strain gauge load cells is produced by the batch weight indicator. Sense lead terminations are also provided for six wire load cell cable.

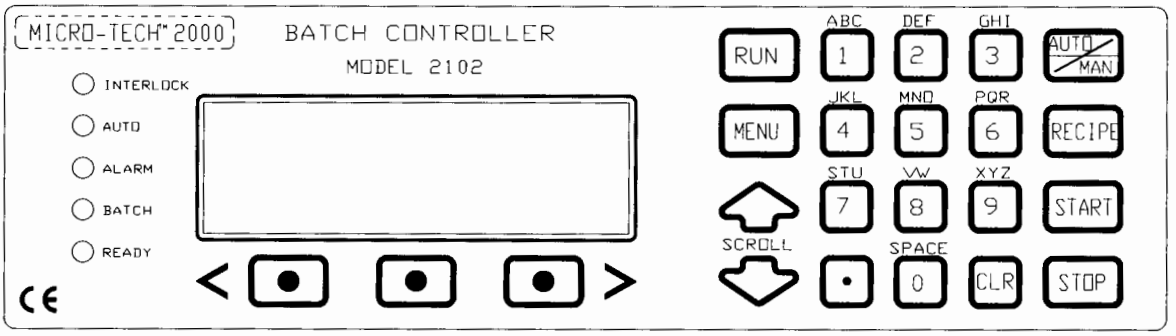
Auto Zero Track enables the scale system to automatically zero itself during extended periods when the scale is empty. Auto Zero Track is menu selectable. The letter "Z" appears on the second line of the display to indicate the Auto Zero Track option is enabled.

Life expectancy of the RAM support battery is approximately ten years, if power is not applied. Under normal operation where power is on continuously, life expectancy will be much longer.

Errors may occur during initial calibration and their reason must be corrected during initial calibration. During normal operation, an error would most likely indicate a failure in the system or improper operation.

3.3 FRONT PANEL

The front panel (see Figure 3-1) contains the necessary status indicators and keys to enable the operator to perform calibrations and all required operations after the batch weight indicator has been configured in Section 2.4.



A01725

MODEL 2102 BATCH WEIGHT INDICATOR FRONT PANEL
FIGURE 3-1

3.3.1 LED Status Indicators

The five red status indicators show the status of the batch weight indicator.

1. INTERLOCK

   ON indicates the cycle is waiting for an external signal to proceed, or STOP indicates it is waiting for a restart command. If a cycle is not running, this indicator stays off.

2. AUTO

   AUTO indicator is on when the instrument is in automatic.

3. ALARM

   ALARM indicator flashes if an alarm is pending, either the alarm is NEW or ACKNOWLEDGE.

4. BATCH

   BATCH indicator is on when a cycle is running. It also stays on if the cycle is in stop condition.

5. READY

   READY indicates the batch weigher is ready and a cycle can be started. It turns on when the following conditions are satisfied:

   - the batch weigher is calibrated (a span calibration has been executed).
   - the batch weight indicator is in automatic.
   - no shutdown conditions are active.
   - the cycle is not running.

   If more scales are defined, the status indication refers to the displayed scale.

3.3.2 Keyboard

1. **Run** - Access the Run Menu. Returns batch weight indicator to Run Mode whenever pressed, see Section 3.5 for detailed description.
2. **Menu** - Permits entry to menus, see Section 3.4.
3. **Up** and **Down Arrow** - Scrolls up or down in the selected menu.
4. Soft Keys - Select displayed function directly above the key. Moves cursor left and right during string editing.
5. Alpha/Numeric Keys 1 through 0 - Enter numerals and letters when string editing. Similar to telephone keys.
6. Decimal Point Key - Enters decimal point.
7. **Clear** Key - Removes wrong entries prior to pressing **ENTER** soft key.
8. **Total** - Total key accesses menus that contain detailed information on the totalizer.
9. **Auto/Man** key - Switches batch weight indicator from automatic to manual and back.

10. **Recipe** key - Defines components and recipes for each scale.
11. **Start** - Interrupts load out. Aborts load out if already interrupted.
12. **Stop** - Stop keys are only active with load out option.

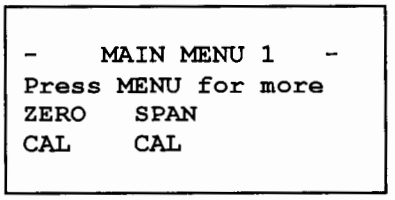
NOTE: Start - Stop keys are only active with Load Out option.

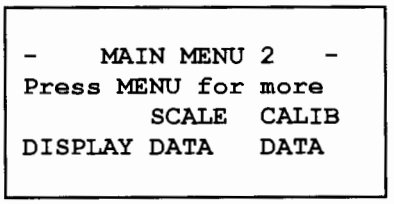
3.4 MENU DISPLAYS

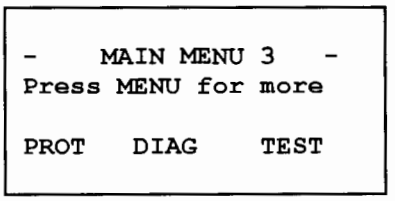
The batch weight indicator is a menu driven machine that allows the operator to access all setup, test and calibration parameters. Main Menu screens 1 through 6 can be accessed at anytime by pressing the **MENU** key until the desired menu screen is displayed. Menu scrolls may be selected by pressing the soft key directly below the desired scroll, and then using the Up/Down scroll key.

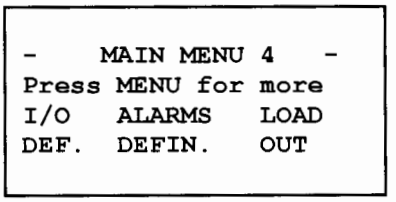
If the batch weight indicator is password protected, the appropriate password must be entered prior to making changes or performing routine calibration. Menus may be viewed without entering a password, but no entries are allowed unless the password is entered.

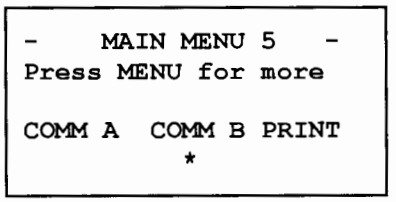
Optional menu scrolls are only available if the available option has been installed. The following screens are activated by the **MENU** key.



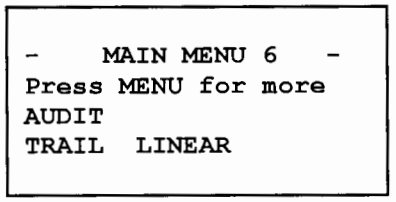








*Can be AB RIO or PRO DP



3.5 NORMAL POWER ON

When the batch weight indicator is powered on after initial programming, the RUN Menu is displayed unless the hardware configuration has been changed.

```
C1 cccccc 000.00 lbs

ABORT          ALARM
```

3.5.1 Hardware Configuration

If the hardware configuration detected at power on differs from the one recorded in memory, the following screen is displayed. This only happens if a circuit board has been added or removed during power off, or a board has failed.

```
-SLOT #   n  CHANGED
Acquire new
configuration ?
YES    NO
```

The screen disappears after 10 seconds if the question is not answered. The batch weight indicator assumes the answer is **NO**. "HW CONFIG. CHANGED" alarm is on and cannot be reset. The above screen appears each time power is cycled.

If a board is removed or added, and this is a permanent change in configuration, answer **YES**.

1. A board is removed and is not replaced:

   The batch weight indicator cancels from memory the setup data of the board that is removed. If the board is added again, the setup data for the board has to be entered again.

2. A board is added:

   The batch weight indicator acquires the new hardware configuration. Setup data for the new board must be entered.

NOTE: Check the setup configuration in the I/O Definition Scroll if an I/O board is removed or added. I/O assignments change when the number of I/O boards change (see Appendix 1.5 Main Menu 4).

If **YES** is pressed, the alarm "HW CONFIG" is cleared.

If the reason for the message is not known, or if the change in configuration is temporary and the operator does not want to lose the original setup, answer **NO**.

1. A board is removed:

   The batch weight indicator resumes operation, retaining setup data of the board that was removed. All other boards continue working normally. No change occurs in I/O Definition.

2. A board is added:

   The batch weight indicator resumes normal operation without recognizing the new board.

   If **NO** is pressed, the "HW CONFIG. CHANGED" alarm stays on.

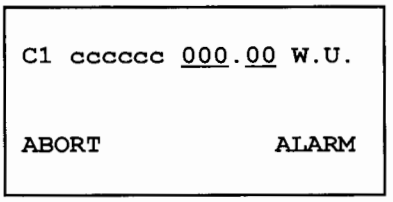
3.6 RUN MENU

When the batch weight indicator is normally powered on after initial programming, the Run Menu is displayed. The Run Menu can always be accessed by pressing the **RUN** key on the front panel.

The Run Menu is made up of four scrolls that can be scrolled during scroll DOWN and scroll UP keys.

In the first scroll, all the information about the cycle is collected. It appears as follows:

3.6.1 Main RUN Scroll



Line 1: The component number and name are displayed with the actual weight on the scale. The weight could be net or gross weight depending on the phase of the cycle. If the cycle is not running, it is the gross weight.

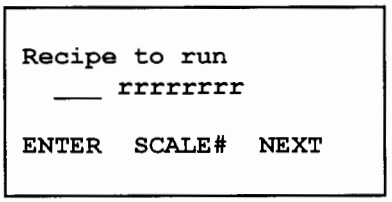
Line 2: When the cycle is not running, it is blank. Otherwise, the component set-point is displayed.

Line 3: A message is displayed to indicate the phase of the cycle.

Line 4: ABORT key appears when the cycle is running. It allows the operator to abort the running cycle. ALARM key is displayed if an alarm is pending.

3.6.2 Recipe Scroll

The second scroll allows the operator to define which recipe must be executed or it is executing if the cycle is running. It appears as follows.



If the cycle is running, ENTER and NEXT key disappear because it is not possible to change the recipe number while it is running.

NEXT key can be used to scroll existing recipes.

3.6.3 Cycles Scroll

The third scroll allows the operator to define how many cycles should be executed. It appears as follows:

```
Cycles run      ____    (or 'Cycle running __'
Cycles to run   ____    (AUTO)

ENTER       END C.
```

The number of executed cycles is displayed in the first line. The number of cycles to run is displayed in the second line. This value can be changed during a cycle. If at least one cycle remains to be executed, the END C. Key is displayed. The END C. Key disappears when pressed, stopping the cycles sequence. The running cycle is the last one.

Zero can be entered as cycles to run. In this case, the AUTO message appears instead of 0, AUTO REPEAT mode becomes active. After a START command, the recipe is repeated until END C. key is pressed.

3.6.4 Weight and Message Scroll

The fourth scroll appears as follows:

```
Net      0000.00 W.U.    (or Gross   0000.00 W.U.
(1)
(2)
PRINT SCALE# ALARMS
```

The first line displays the actual NET WEIGHT or GROSS WEIGHT if no tare weight has been acquired.

The second (1) and third (2) line are by default blank, but can be programmed to show:

- the tare weight
- the gross weight
- date and time (if COM board is installed)
- a bar graph indicator

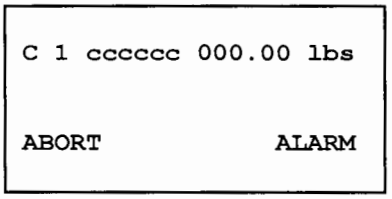
The **SCALE#** key allows the operator to switch between scales if more scales are selected.

Section 3.6.6 explains the **PRINT** key.

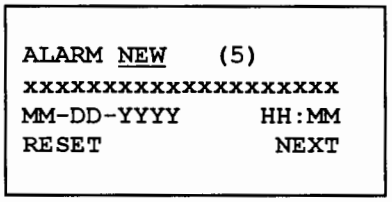
If an alarm is pending, **ALARMS** key is assigned to key F3.

3.6.5 Alarm Pending

The message ALARM appears in the right soft key if an alarm is pending. The alarm status indicator is flashing.



The following menu is displayed after pressing the ALARM soft key.



The keyword "**NEW**" is indicating an alarm that has not been acknowledged yet. When the operator presses the **RESET** key to clear the alarm, the alarm disappears only if the reason that caused the alarm to occur does not exist any more. If the alarm is still pending, the keyword "**ACK**" is displayed instead of "**NEW**".

The third line shows date and time if the optional COM board is installed.

The **NEXT** key is used to scroll between the pending alarms. The string "xxxxxxxxxxxxxxxxxxx" represents one of the following alarm conditions.

Pressing RUN returns to the main RUN Menu.

1.	Clock Fail
2 through 6.	Load Cell Fail S#
7.	RAM Fail
8.	ROM Fail
9 through 13.	High Load S#
14 through 18.	Low Load S#
19.	Warm Start
20.	Cold Start
21.	P.D. Calibration
22 through 26.	Calib Time S#
27 through 29.	Ext. Alarm n
30 through 35.	HW Conf. Changed
36.	BCD Overflow
37.	Math Error
38.	Printer Error
39.	Communication Error
40 through 44.	Bad Start Weight S#

45 through 49. Stop Cycle S#

50 through 54. End Cycle S#

55 through 59. Abort Cycle S#

60 through 64. Comp. Time Out

65 through 69. Deviation S#

70. Allen-Bradley RI/O Error

71. PROFIBUS-DP Error

Refer to Chapter 4.0, Maintenance, for more information.

3.6.6 The PRINT Key

If the optional COM board is installed, the **PRINT** key is active if selected in Main Menu 5, COMM A Scroll.

When **PRINT** is pressed, the following screen is displayed:

```
- PRINTER SCROLL -
COM #1 no data (1)
Start print TOTALS (2)
PRINT        COM (3)
```

Password: Not Required

The second line (1) gives the status of the printer:

NO DATA Indicates the printer is idle, no data is being sent to the printer.

IS RUNNING The system is sending data to the printer.

The third line (2) indicates what kind of data is printed if the **PRINT** key is pressed. The **UP** and **DOWN** keys select between:

TOTALS C. Print component totals (all scales if more scales are defined)

TOTALS R. Print recipe totals (all scales if more scales are defined)

SETUP Print the setup data of the instrument.

TRAILS If audit trails option is active, print audit trails data.

BATCH Print the batch data of the last cycle (even if aborted) if 1 scale is set.

BATCH S1 Print the batch data of the last cycle (even if aborted) if 2 scales are set.

BATCH S2 Print the batch data of the last cycle (even if aborted) if 2 scales are set.

BATCH S3 Print the batch data of the last cycle (even if aborted) if 3 scales are set.

BATCH S4 Print the batch data of the last cycle (even if aborted) if 4 scales are set.

OLD BTC Print the batch data of the 2^{ND} to last batch cycle if 1 scale is set.

OLD BTC S1 Print the batch data of the 2^{ND} to last batch cycle if 2 scales are set.

OLD BTC S2 Print the batch data of the 2^{ND} to last batch cycle if 2 scales are set.

OLD BTC S3 Print the batch data of the 2^{ND} to last batch cycle if 3 scales are set.

OLD BTC S4 Print the batch data of the 2^{ND} to last batch cycle if 4 scales are set.

If scales mode is “GROUP” only “BATCH” and “OLD BATCH” selection are possible.

Print starts after the **PRINT** key is pressed.

The **COM** key (3) allows printer selection if more than one is installed.

Examples of data that can be printed:

Print TOTALS, default:

```
COMPONENT TOTALS
DATE:        03-10-1998
TIME:        8:12a

C1 comp_name                0.00 Tons
C2 comp_name                0.00 Tons
.....
Cn comp_name                0.00 Tons

RECIPE TOTALS
DATE:        12-10-1998
TIME:        8:12a
R1 rec_name                 0.00 Tons 0 cyc
R2 rec_ name                0.00 Tons 0 cyc
.....

Rn rec_name                 0.00 Tons 0 cyc
```

The batch report can be printed automatically at the end of a batch.

```
BATCH REPORT

DATE:        12-10-1998
TIME:        8:18a

RECIPE                      1 rec_name
CYCLE                       1 / 5
EX. TIME                    1 h 12' 25" (max. 8 hours)

C1 comp_name                0.00 Tons
.....
Cn comp_name                0.00 Tons
                            ----------
                            00.00 Tons
```

Print ALARM:

12-10-1998 8:14a
Clock fail

Print AUDIT TRAILS:

TRAIL RECORD NR 1
DATE 12-10-1998 TIME 11:59p
VARIABLE scale cap
NEW 400.00
OLD 500.00

TRAIL RECORD NR 2
DATE 12-10-1998 TIME 11:31p
VARIABLE span
NEW 250000
OLD 300000

3.7 COMMAND KEYS

Command keys define the batch weight indicators mode of operation, components and recipes.

3.7.1 AUTO/MAN Key

The **AUTO/MAN** key allows switching from manual to automatic and back.

Switching from auto to manual while the recipe is running causes the cycle to abort. A warning message is displayed.

```
Running cycle will
be aborted.
Press YES to confirm.
YES      NO
```

The **AUTO/MAN** key is inhibited when remote **AUTO/MAN** is selected.

3.7.2 RECIPE Key

The **DATA** key allows the operator to define components and recipes for each scale. After pressing **RECIPE**, the following scroll is displayed.

```
-   DATA SCROLL    -
COMP.           REC.
DEFINE TOTALS DEFINE
```

1. Components Definition

Choose COMP. DEFINE to define a new component or change an existing one. The following scroll is displayed.

```
-  COMP. DEFINE    -
Component number
   ___   cccccc
ENTER   CHNG-> EDIT
```

The number of the first component is displayed along with the component name if defined. Use **UP DOWN** scroll keys to scroll between existing components or when entering component numbers.

A list of components is available to make the component definition easier.

The function key F3 meaning can be changed by pressing the **CHNG->** key.

EDIT Edit the selected component data.

COPY Copy the data of the selected component in another one.

DELETE Delete a pre-defined component.

Press EDIT to approach the component data.

Define the component type.

```
-COMPONENT #        -
Component type
    > Not used <
CHOICE  ENTER
```

Protection: SERVICE

Default: NOT USED
Selections: NOT USED, BATCH CHARGE, BATCH DISCH, DISCHARGE, REFILL, TIME BASED

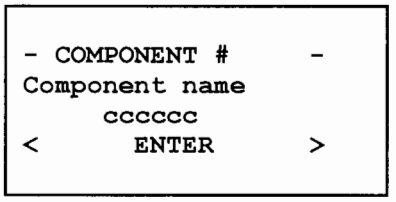
Press the **DOWN** key if more scales are defined. The following scroll is displayed.

```
- COMPONENT #      -
Assigned to scale
    > SCALE 1 <
CHOICE ENTER
```

Protection: OPERATOR

Default: SCALE 1
Selections: SCALE 1, SCALE 2, SCALE 3 (if defined), SCALE 4 (if defined)

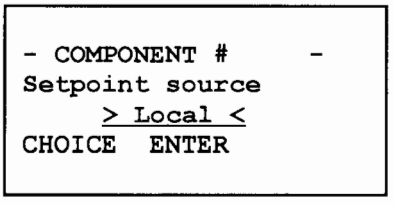
Press the **DOWN** key. The following scroll is displayed. Enter the name of the component name in 6 alphanumeric digits.



Protection: OPERATOR

Default:

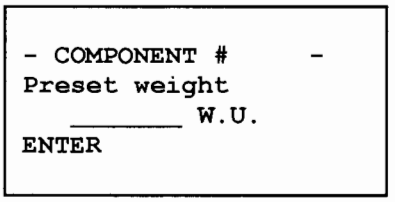
Press the **DOWN** key. If a CHARGE BATCH or DISC. BATCH component and BCD optional input has been configured as setpoint, the following scroll is displayed.



Protection: OPERATOR

Default: LOCAL
Selections: LOCAL, BCD INPUT

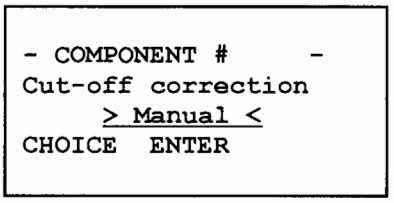
The next scroll defines preset weight.



Protection: OPERATOR

Default: 0
Min: 0
Max: Scale Capacity

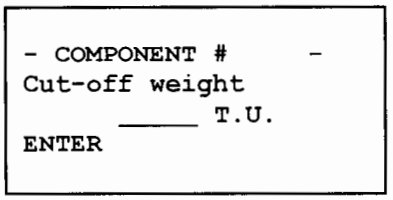
Press the **DOWN** key if a CHARGE BATCH or DISC. BATCH component. The next scroll is displayed. Enter the cut-off correction mode.



Protection: OPERATOR

Default: MANUAL
Selections: MANUAL, AUTOMATIC

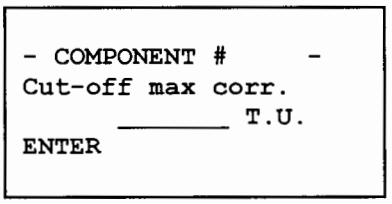
If AUTOMATIC is selected, the following scroll shows the actual value of the correction. If MANUAL is selected, the cut-off can be entered in this scroll.



Protection: OPERATOR

Default: 0
Min: 0
Max: Scale Capacity

If AUTOMATIC was selected above, the following scroll is displayed. Enter the maximum cut-off correction.

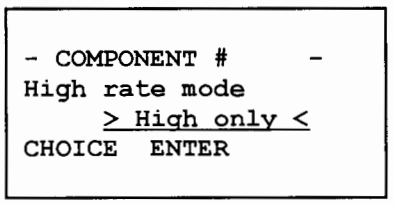


Protection: OPERATOR

Default: 0
Min: 0
Max: Scale Capacity

Press the **DOWN** key. If a CHARGE BATCH or DISC. BATCH component was selected, the next scroll is displayed.

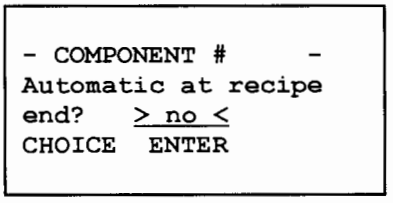
This defines the high and low rate outputs during high rate batch.



Protection: OPERATOR

Default: HIGH ONLY
Selections: HIGH ONLY, HIGH+LOW

The next scroll defines if a component is to be automatically executed at the end of all the recipes. Typical application is for the discharge component but a refill component can also be used. This avoids the need to define the end recipe component in all the memorized recipes because only one component can be defined as the end recipe component. If it has already been defined, the next scrolls are not displayed. They are not displayed in any case if the component is not a REFILL or DISCHARGE type.



Protection: OPERATOR

Default: NO
Selections: NO, YES

The following three scrolls are displayed only if a REFILL component has been defined as end recipe component.

The first scroll defines the amount of material to refill.

```
- COMPONENT #     -
Refill high load
   _______ W.U.
ENTER
```

Protection: OPERATOR

Default: 0
Min: 0
Max: 10000

The second scroll defines how to handle the CHARGE INTERLOCK input.

```
- COMPONENT #     -
Charge interlock
     > Not used <
CHOICE  ENTER
```

Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

And the third scroll defines how to handle the END CHARGE output.

```
- COMPONENT #     -
End charge
     > Not used <
CHOICE  ENTER
```

Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

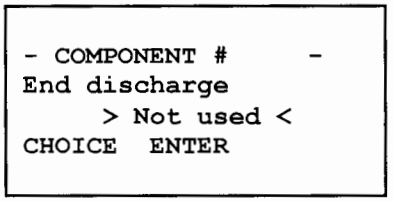
The following two scrolls are displayed only if a DISCHARGE component has been defined as end recipe component. They define how to handle the DISCHARGE INTERLOCK input and the END DISCHARGE output.

```
- COMPONENT #     -
Disch. interlock
     > Not used <
CHOICE  ENTER
```

Protection: OPERATOR

Default: NOT USED

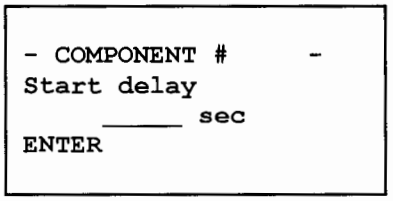
Selections: NOT USED, PULSE, STABLE



Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

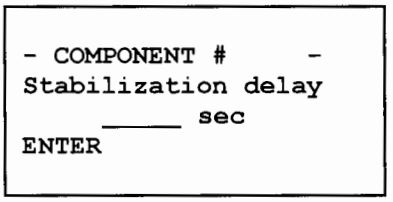
Press the **DOWN** key. The following scroll is displayed. It defines the delay at the start before activating the component.



Protection: OPERATOR

Default: 0 sec
Min: 0 sec
Max: 3600 sec

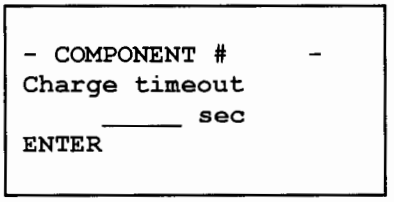
Press the **DOWN** key. The following scroll is displayed. Enter the stabilization delay.



Protection: OPERATOR

Default: 0 sec
Min: 0 sec
Max: 3600 sec

Press the **DOWN** key. The following scroll is displayed. Enter the maximum time for component activation.



Protection: OPERATOR

Default: 0 sec
Min: 0 sec
Max: 3600 sec

Component definition is now complete. Pressing the **DOWN** key returns to the first component scroll. Pressing **RUN** returns the batch weigher to the RUN mode.

3.7.4 TOTAL Key

The **TOTAL** key accesses menus which contain detailed information on the totalizers. There are two sets of totalizers: totals for recipe and totals for component. In the first menu, one of them must be chosen.

```
    TOTALS MENU
 Choose total regs
COMP.         RECIPE
TOTALS        TOTALS
```

If COMP. TOTALS key is pressed, the following scroll is displayed.

```
COMP.# cccccc
Total 0000.00 T.U.
Last  0000.00 W.U.
ENTER EXIT   RESET
```

First line displays the component number and name.

Second line displays the cumulative total.

Third line displays the amount of material batched out in the last cycle.

This information is cleared at the start of a new cycle. The third line is empty if the weight value is zero.

Press **UP/DOWN** keys to scroll through the components or enter the component number.

Press **RESET** key to reset the displayed total registers. The following scroll is displayed.

```
Only the total of
the component or
all?
ALL    COMP    EXIT
```

Press ALL to clear all the totals. Press COMP to clear the component register only.

If RECIPE TOTALS key is pressed, the following scroll is displayed.

```
R# rrrrrrrr 0000 Cyc
Total  0000.00 T.U.
Last   0000.00 W.U
ENTER  EXIT  RESET
```

First line displays the recipe number, recipe name and the number of cycles.

Second line displays the cumulative total.

Third line displays the amount of material batched out in the last cycle. The third line is empty if the weight value is zero.

Press **UP/DOWN** keys to scroll through the recipes or enter the recipe number.

Press **RESET** key to reset the total registers. The following scroll is displayed.

```
Only the total of
the recipe or all?

ALL   RECIPE   EXIT
```

Press ALL to clear all the totals. Press RECIPE to clear the register of that recipe only.

3.7.5 Recipes Definition

Choose RECIPE DEFINE to define a new recipe or change an existing one. The following scroll is displayed.

```
- RECIPE DEFINE   -
Recipe number
  __  rrrrrrrrrr
ENTER   CHNG-> EDIT
```

Recipe number and name (if defined) is displayed. Use **UP/DOWN** keys to scroll existing recipes or enter a recipe number directly.

A series of recipes is available to make the recipes definition easier. The meaning of the function key F3 can be changed by pressing the CHNG-> key. F3 key can be:

EDIT Edit the selected recipe.
COPY Copy the selected recipe in another one. Number of the destination recipe is required.
DELETE Delete the recipe.
VERIFY Check if the recipe is correct. See Appendix A/2 for more information.
PRINT Only if COMM A board installed. Print the recipe.

Example:

PRINT RECIPE
DATE: 12-20-1998
TIME: 8:03a

RECIPE 10 - rec_name

C1 comp_name
SET 10.0 Tons
DEV 1.0%
LABEL 0
C2 comp_name
SET 30.0 Tons
DEV 1.0%
LABEL 0

Press EDIT to approach the recipe data. The following scroll is displayed. Enter the name of the recipe in 8 alphanumeric digits.

```
- RECIPE #          -
Recipe name
     rrrrrrrr
<      ENTER        >
```

Protection: OPERATOR

Default:

Press **DOWN** key if more scales are defined. The following scroll is displayed. It defines the scale membership.

```
- RECIPE #          -
Assigned to scale
    > SCALE 1 <
CHOICE ENTER
```

Protection: OPERATOR

Default: SCALE 1
Selections: SCALE 1, SCALE 2, SCALE 3 (if defined), SCALE 4 (if defined)

Press **DOWN** key. The following scroll is displayed. Enter the component.

```
- RECIPE___ LIN__   -
Component ___
 #  ccccccccc
ENTER  CHNG->   EDIT
```

Protection: OPERATOR

Default: 0
Min: 1
Max: Number of defined components

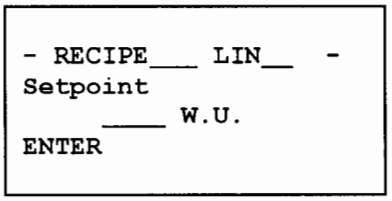
Use **UP/DOWN** keys to scroll through the recipe lines. Press EDIT if you want to display the line's data, EXIT to come back to (2). Component 0 means end recipe. In this case, EDIT key is substituted by EXIT key. Press it to come back to point (2). Other functions of the F3 key are:

DELETE Delete the current line.

INS/CP Insert a line between the actual and the next one. The new line is equal to the actual one, so this command can also be used as COPY command. If used in the last recipe line, it adds a new line to the recipe.

If EDIT key is pressed, a series of scrolls are displayed. They are different, depending upon the component type.

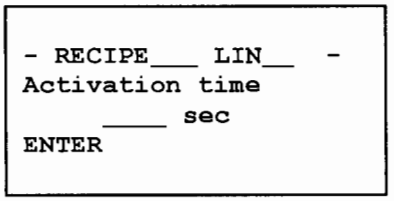
The following scroll is displayed only if the component is a CHARGE BATCH or DISCH. BATCH type and if the set-point source has been defined as LOCAL (if active BCD input option).



Protection: OPERATOR

Default: 0
Min: 0
Max: Scale Capacity

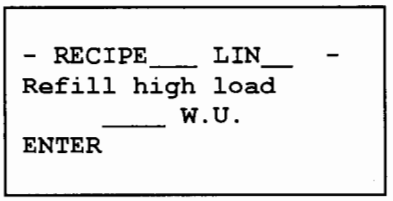
The next scroll is displayed if the component is a TIME BASED type.



Protection: OPERATOR

Default: 0
Min: 0
Max: Scale Capacity

The following scrolls are displayed only if the component type is REFILL. It defines the weight set-point for refill.



Protection: OPERATOR

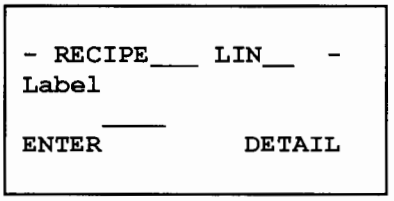
Default: 0
Min: 0
Max: 10000

In the next scroll, the batching label should be defined. The label gives information on how the instrument should handle that batch phase. The operator enters a number that is obtained by adding a constant number for each option he/she wants to activate. The table below summarizes all the possibilities.

OPTION	POSSIBLE SELECTION	CONSTANT NUMBER
Refill Mode (1)	Auto	0
	Forced	2
Charge/Disch. Interlock	None	0
	Pulse	4
	Stable	8
End Charge/Disch.	None	0
	Pulse	16
	Stable	32
Restart Batch if neg err (2)	No	0
	Yes	64

(1) Only for REFILL type components.

(2) Only for BATCH CHARGE or BATCH DISCH. components.

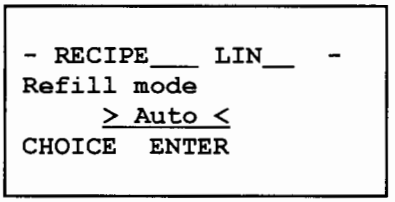


Protection: OPERATOR

Default: 0
Min: 0
Max: 32767

Pressing the DETAIL key makes it possible to select the batch options without entering the label. The label number is computed automatically by the instrument. The following scrolls are displayed in this case.

Only for REFILL type components, it defines how the refill function works. If FORCED, a refill starts independently by the actual weight on the scale. If AUTO, the refill cycle starts each time before doing a DISCH BATCH component if the set-point of this component is higher than the actual weight on the scale.

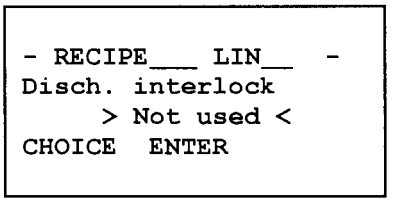


Protection: OPERATOR

Default: AUTO
Selections: AUTO, FORCED

The next two scrolls are displayed only if component is BATCH DISCHARGE or DISCHARGE type.

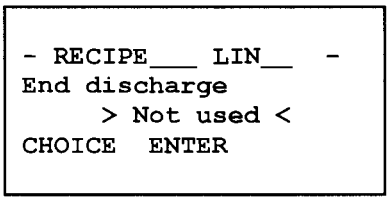
The first scroll defines how to check the DISCHARGE INTERLOCK input.



Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

The second scroll defines how to handle the END DISCHARGE output.

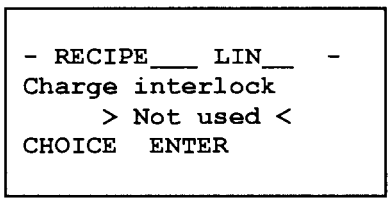


Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

The next three scrolls are displayed only if a component is BATCH CHARGE or REFILL type.

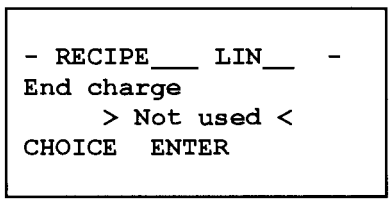
The first scroll defines how to check the CHARGE INTERLOCK input.



Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

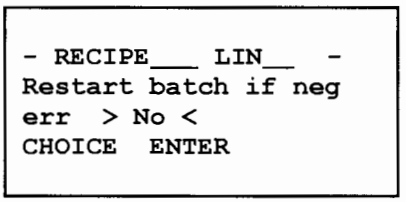
The second scroll defines how to handle the END CHARGE output.



Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

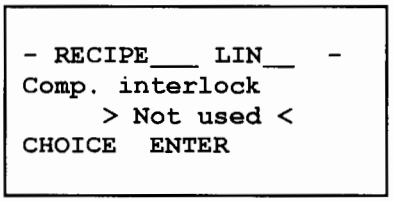
The third scroll enables the instrument to restart the batch, reactivating the component, if at the end of the stabilization time, the net weight is below the component set-point.



Protection: OPERATOR

Default: NO
Selections: NO, YES

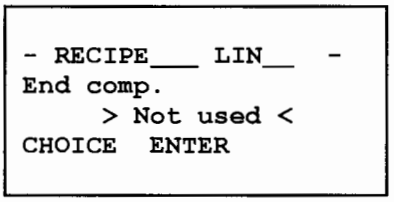
The next two scrolls are displayed only if the component is a TIME BASED type. The first one defines how to check the COMPONENT INTERLOCK input.



Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

The second scroll defines how to handle the END COMP. output.



Protection: OPERATOR

Default: NOT USED
Selections: NOT USED, PULSE, STABLE

NOTE: 'Charge interlock' and 'Charge End' outputs are used as 'Comp. Interlock' and 'Enc comp.' in case of time based components.

3.7.6 START Key

START key has a double function. If the instrument is in AUTOMATIC, it starts a batch cycle.

If the instrument is in MANUAL, it can be used to acquire the tare weight (SET TARE).

If more than one scale is defined, both the functions are inherent only to the displayed scale.

3.7.7 STOP Key

STOP key has a double function. If the instrument is in AUTOMATIC, it stops the batch cycle.

Stopping a cycle means temporarily suspending the cycle, a suspended cycle can be restarted and terminated with a start command or aborted with an abort command.

If the instrument is in MANUAL, the STOP key can be used to clear the tare weight (RESET TARE).

If more than one scale is defined, both the functions are inherent only to the displayed scale.

3.7.8 The MENUS

The setup data of the Micro-Tech 2000 are collected into menus which are accessed using the **MENU** key. Once the **MENU** key has been pressed, use the scroll keys to select the menu that you need.

3.8 CALIBRATION

The MAIN MENU 1 contains the calibration menu. Main Menu 1 is selected by pressing the **MENU** key until Main Menu 1 appears. Desired calibration scrolls are selected by pressing the soft keys directly below the required scroll.

```
-    MAIN MENU 1    -
Press MENU for more
ZERO    SPAN
CAL     CAL
```

3.8.1 Zero Calibration Scroll

The Zero process is implemented as a machine directed procedure.

1. Auto Zero

   If only one scale is defined:

```
-      ZERO CAL      -
Empty scale, then
press START.
START   SCALE# MANUAL
```

Password: OPERATOR

The scale must be kept empty during auto zero since a complete zeroing procedure requires 10 second. The function can be reduced by pressing END in the next scroll.

Indication **S#** in the following scrolls appear only if more than one scale is defined. # represents the active scale number.

When **START** is pressed, the following screen is displayed.

```
S# AUTOZEROING
Time remaining 0000
Gross     000.0 W.U.
END     ABORT
```

During Auto Zero, resolution of the total is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test.

When zero is reached or END is pressed, the system displays the following screen.

```
S# AUTOZERO COMPLETE
Error       +000.00%
    Change zero ?
YES       NO
```

The word COMPLETE is flashing. The percentage of error is related to the scale capacity.

If YES is pressed, the next screen is shown.

```
S# ZERO # CHANGED
Old zero # 00000
New zero # 00000
RUN      MENU
```

The old and new zero constants are shown in A/D counts.

3.8.2 Manual Zero

The Manual Zero procedure allows the operator to directly enter the zero constant if known.

```
-   MANUAL ZERO   -
Gross     000.0 W.U.
Zero #   00000
ENTER  SCALE#  EXIT
```

Password: OPERATOR

Default:	40000
Min:	0
Max:	120000

3.9 SPAN CALIBRATION SCROLL

The span calibration can be done in two different ways: R-CAL or Test Weights. The system allows the operator to select which one of the two methods to use for normal calibration and calibration checks. The selection is made in CAL DATA Scroll 1. The Auto Span procedure requires 10 seconds.

3.9.1 Automatic Span Calibration with R-CAL

1. Starting an R-Cal Calibration

```
- AUTOSPAN R Cal -
Empty scale, then
press START.
START  SCALE# MANUAL
```

Password: OPERATOR

After **START** is pressed, a half second delay enables the indicator to stabilize after the R-Cal relay energizes. The operator must ensure the scale is empty before pressing START.

2. Executing the Span Calibration

   Indication **S#** in the following scrolls appears only if more than one scale is defined. # represents the active scale number.

   Whichever method is used to start automatic span calibration, after **START** is pressed, the following screen is displayed.

   (1) Entry point when **REPEAT** is pressed (see below).

```
S# AUTOSPANNING
Time remaining 0000
Gross     00.0 W.U.
END   ABORT
```

   During Auto Span, resolution of the total is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test. The END key can be used to conclude the function in less time.

3. Record the Material Factor

   This part of the procedure is only executed if a span calibration with weights was done before, and if R-Cal has not been factored.

   It is very important to understand that when this procedure is executed, the system will not alter the span. The span is assumed to be correct after a calibration with weights. The system acquires the R-Cal Factor factoring R-Cal to the test weight span calibration. Subsequent R-Cal calibration is factored to the test weights.

```
AUTO SPAN COMPLETE
Error +/-00.00 %
Unfactored Calcon
EXIT  FACTOR REPEAT
```

   The word "COMPLETE" is flashing.

   If **EXIT** is pressed, the system acknowledges the R-Cal Factor is not used. The effect of this is the system does not ask for a material factor anymore for this calibration method until a manual span entry is done. By pressing **EXIT**, the operator tells the system that he/she does not want to use material

factors, but wants to use the test results for changing the span number. After **EXIT** is pressed, go to (2) below.

If **REPEAT** is pressed, go to (1) above.

If **FACTOR** is pressed, the following screen is displayed.

```
  FACTORING RCAL
New factor: 000.00 %
  Change factor ?
YES       NO
```

If **NO** is pressed, old factor is preserved, then go to (2) below.

If **YES** is pressed, the following screen is displayed.

```
R-CAL Matl FACTOR
Old factor: 00.00 %
New factor: 00.00 %
RUN  REPEAT
```

Can be R-CAL or WTS

The **REPEAT** key returns the operator to (1) above. **RUN** can be used for ending the procedure. After this pint is reached, the system does not proceed to the next section.

4. Recording the New Span

The system calculates the new span.

(2)

```
S# AUTOSPAN COMPLETE
Error +/-00.00 %
Change span ?
YES      NO
```

The word "COMPLETE" is flashing.

If **YES** is pressed, the following screen is displayed.

```
S# SPAN # CHANGED
Old span # 000000
New span # 000000
RUN  REPEAT
```

REPEAT moves back to (1) above and calibration restarts.

If **NO** is pressed, the following screen is displayed.

```
S# SPAN # UNCHANGED
Old span # 000000
New span # 000000
RUN  REPEAT
```

NOTE: The old span and new span are shown equal. This is because no change to the span has been done.

If **FACTOR** is pressed, the R-CAL Factor is computed. The following screen is displayed.

```
S# FACTOR ACQUIRING
New fact 000000 %
 Change factor ?
YES    NO
```

NO moves back to (2) above.

YES acquires new factor. If pressed, the following screen is displayed.

```
S# FACTOR CHANGED
Old fact 000000 %
New fact 000000 %
RUN   REPEAT
```

5. Ending an Auto Span Procedure with R-CAL

   After **RUN** is pressed, the R-CAL relay is de-energized and the display is locked for 3 seconds.

3.9.2 Automatic Span Calibration with Test Weights

1. Starting a Test Weights Calibration

```
- AUTOSPAN Weights -
Apply Weights then
press START.
START  SCALE# MANUAL
```

Password: OPERATOR

The operator must apply the test weights on the scale before pressing START. When START is pressed, the span function begins.

2. Executing the Span Calibration

   Indication **S#** in the following scrolls appears only if more than one scale is defined. # represents the active scale number.

   After **START** is pressed, the following screen is displayed.

   (1) Entry point when **REPEAT** is pressed (see below).

```
S# AUTOSPANNING
Time remaining 0000
Gross     000.0 W.U.
END    ABORT
```

During Auto Span, resolution of the total is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test. The END key can be used to conclude the function in less time.

3. Recording the New Span

The batch weight indicator calculates the new span based on the result of the test performed with the selected method.

```
S# AUTOSPAN COMPLETE
Error +/-00.00 %
Change span ?
YES      NO
```

The word "COMPLETE" is flashing.

If **YES** is pressed, the following screen is displayed.

(2)

```
S# SPAN # CHANGED
Old span # 000000
New span # 000000
RUN  REPEAT FACTOR
```

FACTOR key is displayed only if an autospan with R-CAL has been previously executed.

REPEAT moves back to (1) above, and calibration restarts.

If **NO** is pressed, the following screen is displayed.

```
S# SPAN # UNCHANGED
Old span # 000000
New span # 000000
RUN  REPEAT
```

NOTE: The old span and the new span are shown equal. This is because no change to the span has been done.

If **FACTOR** is pressed, the R-CAL factor is computed. The following screen is displayed.

```
S# RCAL FACTORING
New fact 000000 %
  Change factor ?
YES      NO
```

NO moves back to (2) above.

YES acquires new factor. If pressed, the following screen is displayed.

```
S# FACTOR CHANGED
Old fact 000000 %
New fact 000000 %
RUN   REPEAT
```

3.9.3 Manual Span

If the span constant is known, the manual span procedure makes a direct change of span.

If the span is manually entered, the R-CAL factor is set to INVALID.

```
-   MANUAL SPAN   -
Gross     000.0 W.U.
Span # 0000000
ENTER  SCALE#  EXIT
```

Password: OPERATOR

Default:	1166667
Min:	500000
Max:	45000000

The **RUN** key returns to Run Menu.

CHAPTER 4.0
MAINTENANCE

4.1 SERVICE AND REPAIR

The maintenance information in this manual should meet your service needs. If problems occur that require technical assistance, please call (800-227-8891.

Thermo Electron has a repair center located at our plant in Minneapolis, Minnesota. Contact our Repair Representative at 800-227-8891 for assistance. To expedite your service request, please have your machine model and serial number available.

When returning parts for repair, please use the Return Material Authorization form located in the Replacement parts section of this manual.

4.2 FREQUENT CHECKPOINTS

The Micro-Tech 2102 Batch Weight Indicator is a solid-state device, and as such, should require very little maintenance. The front panel can be wiped clean with a damp cloth, and if necessary, a mild detergent (never use abrasive cleaners, especially on the display window). As a preventative measure, check that all wires, plugs, and integrated circuits are tight in their connectors. Also keep the enclosure door tightly closed to prevent dirt infiltration.

More often than not, a quick visual inspection leads to the source of trouble. If a problem does develop, check the following before proceeding to more specific troubleshooting procedures.

1. Check Power
   - A. Check that the two (2) Line Voltage Selector Switches are set to the correct line voltage (see Section 2.4.1).
   - B. Check the fuses.
   - C. Check that the power switch is ON and that power is supplied to the unit.
2. Check Connections
   - A. Check that all terminations are secure.
   - B. Check that the Display Module and Keyboard connectors are firmly seated in their connectors.
   - C. Check that the Remote Counter and optional input/output modules are secure in their sockets.
   - D. Check that all Jumpers are in their correct position.

4.3 TROUBLESHOOTING

This unit has built-in troubleshooting capabilities. A number of possible problems are automatically detected and screen messages are displayed. Also refer to the Diagnostics Test Scrolls in Main Menu 3.

4.3.1 Alarm Message

The ALARM message is assigned to the right hand soft key when an alarm is pending. The ALARM message and its LED flash at the same time.

The following screen is displayed when the right hand soft key is pressed.

```
ALARM      NEW
xxxxxxxxxxxxxxxxxxx
MM-DD-YYYY    HH:MM
RESET           NEXT
```

The keyword "NEW" indicates an alarm that has not yet been acknowledged. When the operator presses the **RESET** key to clear the alarm, the alarm disappears only if the reason that caused the alarm to occur does not exist any more. If the alarm is still pending, the keyword "ACK" is displayed instead of "NEW".

The third line shows the date and time only if the optional COMM board is installed.

The **NEXT** key is used to scroll between the pending alarms. The string "xxxxxxxxxxxxxxxxxxx" represents one of the following alarm conditions.

4.3.2 Alarms List

1. Clock Fail

   The system has detected a failure on the clock calendar circuit. This alarm only occurs if the optional COM board is installed.

   - Check the COM board to see if it is properly inserted.
   - Replace the COM board.

2 through 6. Load Cell Fail S#

   S# identifies the scale if more scales are defined.

   The system has detected an error on the load cell signal.

   - Check the load cell connections.
   - Check the load cell(s).

7. RAM Fail

   The system has detected an error on the RAM checksum during the internal periodical test. The RAM (Random Access Memory) is used to store variables and set up data.

   - Replace the CPU board.

8. ROM Fail

The system has detected an error on the ROM checksum during the internal periodical test. The ROM (Read Only Memory) is used to store the program.

- Replace the CPU board.

9 through 13. High Load S#

S# identifies the scale if more scales are defined.

The high load limit has been reached.

14 through 18. Low Load S#

S# identifies the scale if more scales are defined.

The low load limit has been reached.

19. Warm Start

The system has detected a power loss condition, or power was removed for an undefined period of time.

20. Cold Start

The system has detected the loss of the set up data after power was removed. The instrument needs to be set up and calibrated.

- Replace either the mother board or the battery (see Figure 4-1).

21. P.D. Calibration

When the system is powered off while a calibration sequence is in progress, the scale may not be properly calibrated.

- Check calibration.

22 through 26. Calib Time S#

S# identifies the scale if more scales are defined.

If a calibration check time period is entered and the time expires, this alarm occurs. The purpose is to remind the operator that the calibration has not been checked for a considerably long period of time.

- Check calibration.

27 through 29. Ext. Alarm n

Digital inputs can be programmed to detect external alarm conditions such as emergency switches, max level switches or other. This alarm is associated to the external alarm #n.

- Check external alarm #n.

30 through 35. HW Conf. Changed

When a new board is installed or an old board removed, this message appears. Refer to Chapter 2.0 of this document (normal power on).

36. BCD Overflow

This message is only displayed if the optional BCD output board is installed. If the variable to be converted in BCD format has more than 4 digits, the alarm is generated.

- Check size of variables and BCD data setup.

37. Math Error

A divide by zero or overflow error is encountered during internal calculations. This message indicates some abnormal dimensional parameter is entered in setup.

- Check setup data.

38. Printer Error

This message is displayed if the system has data to print and the printer is disconnected or the paper feed is empty.

39. Communication Error

This message is only displayed if the optional COM board is installed. It indicates that a time out or handshake error is detected during a data transfer on the COM line.

- Check the COM line connections.
- Check the COM line setup data.

40 through 44. Bad Start Weight S#

A cycle has started but the weight on the scale is over the threshold of 'zero-start batch set' weight in case of charge batch or below the threshold if in case of discharge batch. The instrument executes this control only if the first component of the recipe is a 'charge batch' component.

45 through 49. Stop Cycle S#

This alarm is generated when a cycle is suspended. There can be three causes:

1. After a stop command from the keyboard, contact or serial line.
2. Following a shutdown condition.
3. A stop condition has been detected by the instrument during the batch phase. See Appendix A/2 for more information.

50 through 54. End Cycle S#

An END CYCLE command has been given from the keyboard, contact or serial line.

55 through 59. Abort Cycle S#

A cycle has been aborted. There can be two causes:

1. After an abort command from the keyboard, contact or serial line.
2. An abort condition has been detected by the instrument during the batch phase. See Appendix A/2 for more information.

60 through 64. Comp. Time Out

The component is tacking more than maximum time to complete its batch.

- An interlock input is missing or a stop condition has occurred.

65 through 69. Deviation S#

The maximum deviation limit for the component has been exceeded.

70. Allen-Bradley Remote I/O COMM Error

    This message is displayed if communication is interrupted. The green LED on the A-B RI/O board will be flashing. The alarm does not come on if communication has never started.

71. PROFIBUS-DP COMM Error

    This message is only displayed if the optional PROFIBUS board is installed. The following two conditions activate the alarm.

    a. If the Siemens SPC3 controller installed on the PROFIBUS interface board does not recognize any successful data transfer within the watch dog timer interval.

    b. If the received data contains errors (value overlaps limits, register number does not exist, group number does not exist).

4.3.3 Micro-Tech 2000 Cold Start

It may be necessary to cold start the Micro-Tech 2000 in the event the software becomes corrupted. You have the option of installing the factory default constants or simply returning the Micro-Tech 2000 to its previous running state.

Steps required to cold start are:

1. Press and hold in at the same time the LEFT HAND ARROW key and the CLEAR key until the following screen appears.

```
    Install Factory
       Defaults?

NO         YES
```

Pressing NO returns the Micro-Tech 2000 to the RUN mode.

If YES is pressed, the following screen appears.

```
   - MEMORY ERASED -
Choose the language
key to continue to
ESP                USA
```

When the above screen appears, all field entry data has been replaced by the factory default constants. Proceed to Initial Setup Procedure, Section 2.5.

NOTE: If the software corruption was catastrophic and the memory would not erase in the above step, do the following:

A. Press and hold in the LEFT HAND ARROW key and the CLEAR key. While holding in both keys, cycle line power. In the event the MEMORY ERASED screen does not appear, consult the Factory.

4.3.4 Internal Test Procedure

Pressing **START** on the screen (located in Main Menu 3) enacts a self-test of the internal microprocessor.

```
-  TEST SCROLL 2   -
Internal test of
microprocessor.
START
```

Password: SERVICE

After **START** is pressed, the following screens are displayed in sequence.

```
-  TEST SCROLL 2A  -
Testing  ROM
Test PASSED
```

```
-  TEST SCROLL 2B  -
Testing  RAM
Test PASSED
```

```
-  TEST SCROLL 2C  -
Testing E2PROM
Test PASSED
```

Only if Audit Trail Option is installed

The message "Test PASSED" is displayed if the test runs correctly. If something wrong is detected, then the message "Test FAILED" is displayed, and the soft key **CONTINUE** is shown. The operator has to press the key to go on to the next test.

If the internal test has failed, call Ramsey's Customer Service Department.

4.3.5 Load Cell Excitation and Signal Voltage (Field Mount)

1. Measure excitation voltage across terminal 21 negative and 20 positive in the scale junction box. This should be 10 VDC +/- 5%.
2. If the excitation voltage is incorrect, then measure the excitation voltage in the Batch Weight Indicator across terminal TB9-9 negative and TB9-10 positive. This should be 10 VDC +/- 5%.
3. Measure DC millivolt signal voltage across terminal 22 positive and 23 negative in the scale junction box. This should be within 0-30 millivolts DC (3 mV/V load cell).
4. Measure DC millivolt signal voltage across terminal TB9-12 positive and TB9-11 negative in the Batch Weight Indicator. This should be the same as Step 3 above.

5. The millivolt output is in direct relation to weight applied. As weight is increased, output should increase.

4.3.6 Load Cell Excitation and Signal Voltage (Panel Mount)

1. Measure excitation voltage across terminal 21 negative and 20 positive in the scale junction box. This should be 10 VDC +/- 5%.
2. If the excitation voltage is incorrect, then measure the excitation voltage in the Batch Weight Indicator across terminal TB3-4 negative and TB3-3 positive. This should be 10 VDC +/- 5%.
3. Measure DC millivolt signal voltage across terminal 22 positive and 23 negative in the scale junction box. This should be within 0-30 millivolts DC (3 mV/V load cell).
4. Measure DC millivolt signal voltage across terminal TB3-7 positive and TB3-8 negative in the Batch Weight Indicator. This should be the same as Step 3 above.
5. The millivolt output is in direct relation to weight applied. As weight is increased, output should increase.

4.3.7 Resetting Master Total Procedure

Steps required to reset master total or to reset remote counter overflow are given below.

A. If No Password is Installed

1. Select Main Menu 3.
2. Press **DIAG** soft key and scroll down to the Service Password screen.
3. Type in a password (Example: 123) and press **ENTER**.
4. Re-enter the password and press **ENTER**.
5. Select Main Menu 3.
6. Press **PROT** scroll and press **PROT** soft key.
7. Press the **NONE** soft key.
8. Type in password 7832500 and press **ENTER**. The protection level should be RAMSEY.
9. Press the **TOTAL** key on the touch panel. Scroll up or down if needed to reach the Master Total screen.
10. Press the **RESET** soft key and answer YES to Reset Master Total?
11. Select Main Menu 3. Press the **DIAG** soft key and scroll down to Service Password.
12. Press **ENTER** twice, erasing the password installed in Step 3.
13. Press the **RUN** key to return to normal operation.

B. If Password is Already Active

1. Select Main Menu 3.

2. Press the **PROT** scroll and press the **PROT** soft key.
3. Press the **NONE** soft key.
4. Type in password 7832500 and press **ENTER**. The protection level should be RAMSEY.
5. Press the **TOTAL** key on the touch panel. Scroll up or down if needed to reach the Master Total screen.
6. Press the **RESET** soft key and answer YES to Reset Master Total?
7. Select Main Menu 3.
8. Press the **PROT** scroll and choose the password level desired.

4.3.8 To Remove a Forgotten Password

1. Select Main Menu 3.
2. Press the **PROTECT** scroll and press the **PROT** soft key.
3. Press the **NONE** soft key.
4. Type in password 7832500 and press **ENTER**. The protection level should be RAMSEY.
5. Press **NONE**.
6. Select Main Menu 3.
7. Press the **DIAG** soft key and scroll down to Service Password.
8. Press **ENTER** twice. The display should respond with New Password Acquired.
9. Scroll down to Operator Password. Press **ENTER** twice. The display should respond with New Password Acquired.
10. Select Main Menu 3. The **PROT** soft key should not appear, indicating all passwords have been erased. If **PROT** should appear, repeat Steps 1 through 9.
11. See Appendix A/1 for entering new passwords.

4.4 LITHIUM BATTERY REPLACEMENT

The Micro-Tech volatile memory backup battery can be replaced without any special tools. See Figure 4-1 for battery location on the mother board.

1. Record all configuration, setup and calibration data before removing battery. All information is lost when the battery is removed.
2. Turn the Micro-Tech power off at the mains.
3. Remove the battery from its compression socket.
4. Observe the polarity markings on the battery socket base before inserting the new battery. The lithium battery is .3 V, 1.2 AH, 2/3 A., Ramsey part number 037188.
5. Insert battery.
6. Restore power to the Micro-Tech.

7. Cold start the Micro-Tech. See cold start procedure, Section 4.3.3.

8. Re-enter all data recorded in Step 1.

CAUTION

DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED.

Replace only with same or equivalent type recommended by Ramsey. Dispose of used battery according to manufactures instruction on battery or return to Ramsey. See Section 4.5 below.

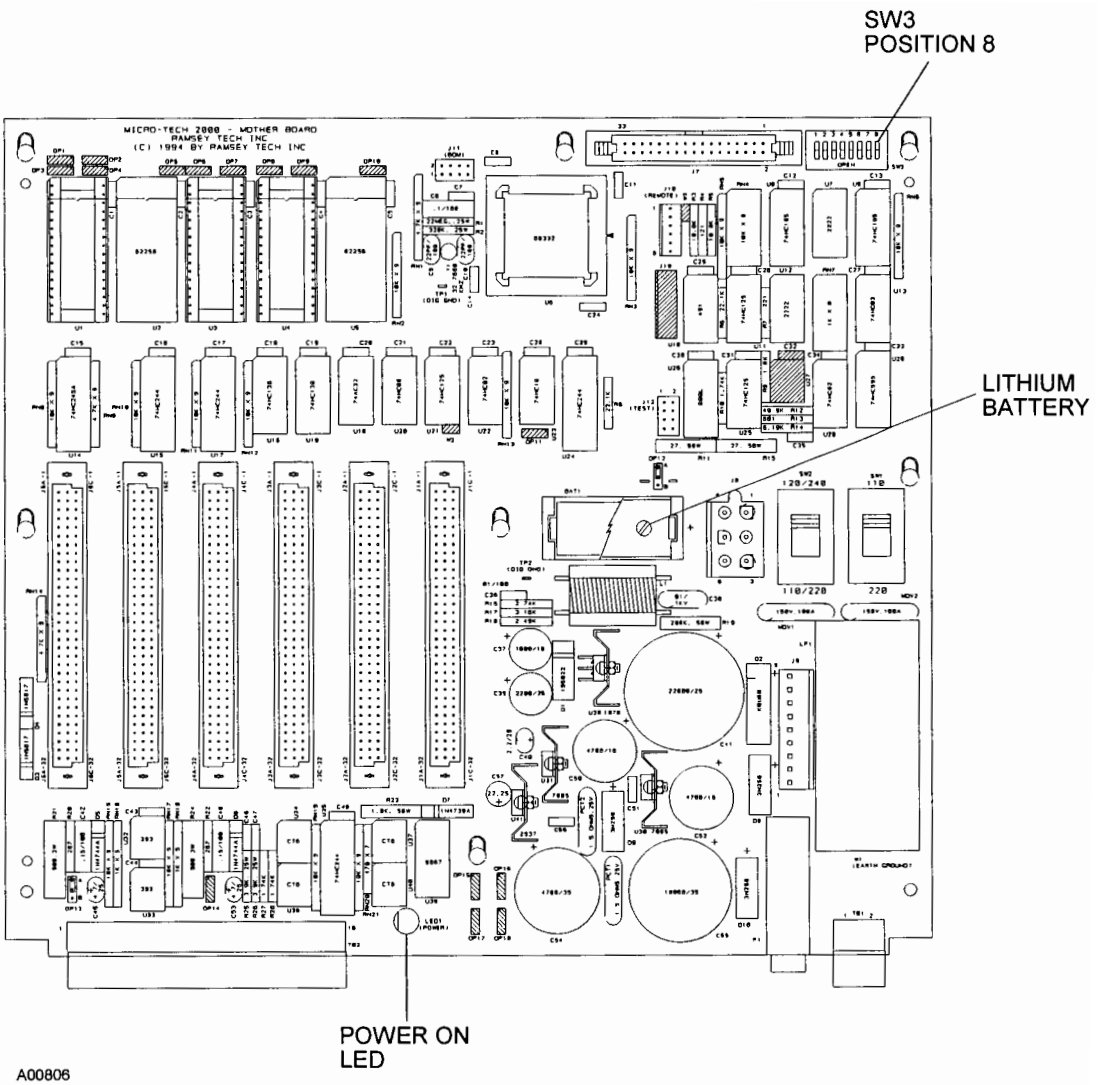
4.5 DISPOSAL OF HAZARDOUS WASTE

Disposal of Lithium batteries and soldered printed circuit boards should be in accordance with your local Hazardous Waste Policy.

As an alternative, you may return product supplied by Ramsey, freight prepaid for disposal. Contact our repair department for a Return Authorization Number before shipping any product for disposal.

4.6 CLEANING INSTRUCTIONS

The Micro-Tech 2102 Batch Weight Indicator is a solid-state device, and as such, should require very little maintenance. The front panel can be wiped clean with a damp cloth, and if necessary, a mild detergent (never use abrasive cleaners, especially on the display window). As a preventative measure, check that all wires, plugs, and integrated circuits are tight in their connectors. Also keep the enclosure door tightly closed to prevent dirt infiltration.



MODEL 2102 MOTHER BOARD
FIGURE 4-1

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CHAPTER 5.0
REPLACEMENT PARTS

5.1 GENERAL

This chapter gives information on how to order replacement parts for your Micro-Tech 2102 Batch Weight Indicator.

5.2 ORDER INFORMATION

For faster service when ordering parts, fax or telephone Thermo Electron Parts Department.

The recommended procedure for ordering parts is as follows:

1. Determine the broken or faulty part(s).
2. Locate the part(s) in the parts list given.
3. Find the part number(s) for the item(s) needed and determine the quantity you require.
4. Write or telephone:

   Thermo Electron
   Customer Service Department
   501 90th Ave. NW
   Minneapolis, MN 55433

   Fax: (763)783-2525

   Phone: 800-227-8891

   Normal Customer Service hours are 8:00 a.m. to 4:30 p.m., Central Time.

5. With your order, list the following information:

   Batch weight indicator model and serial number
   Purchase order number
   Date required
   Method of shipment preferred
   List of parts, including part number, description and quantity

Your parts order will handled as expeditiously as possible.

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5.2.2 Parts List

EQUIPMENT	PART NUMBER
MICRO-TECH 2000 Model 2102 or 2202 Batch Weight Indicator	
Chassis Assembly, Panel Mount, Model 2102	050177
Chassis Assembly, Field Mount, Model 2102	051315
PCBA, Mother Board, Model 2102	051321
PCBA, Plant A/D, 1 Channel, Model 2102	046409
PCBA, Plant A/D, 2 Channel, Model 2102	048985
PCBA, Premium A/D, 1 Channel, Model 2202	046856
Mating Connector, Premium A/D Board	047264
PCBA, Analog Output (1 out)	049004
PCBA, Analog Output (2 in/2 out)	049003
PCBA, DIO (4 in/16 out)	046841
PCBA, DIO (16 in/4 out)	046844
PCBA, Comm "A" Select one only	046853
RS-232C	
RS-485, std. (point to point)	
RS-485, multi-drop	
20 mA (digital) current loop	
PCBA, LED Assembly	046847
PCBA, Display Assembly	046860
PCBA, Field Terminal Entry	047572
PCBA, Load Out DIO (4 in/16 out)	049475
PCBA, Load Out DIO (16 in/4 out)	049476
PCBA, Allen-Bradley RI/O	055517
PCBA, PROFIBUS-DP	056713
Prom, U1, MT-2000 Audit Trail	050500
Touch Panel Model 2102	047076
Touch Panel Model 2202	051179
Fuse, Slo-Blo, .5 Amp (F1 220V) (Type T)	001366
Fuse, Slo-Blo, 1.0 Amp (F1 110V) (Type T)	002443
Fuse, Fast-Blo, 4.0 Amp (FT Board) (Type T)	037287
Battery, Lithium, 3.0 V, 1.2 AH, 2/3 A.	037188
Transformer, Power	046863
Module, Power Input 180-240 VAC	047646
Module, Power Input 90-120 VDC	047575
Module, Power Input 10-32 VDC	048162
Module, Power Output 24-240 VAC	046814
Module, Power Output 5-60 VDC	046815

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RAMSEY PRODUCTS

MICRO-TECH 2102/2202 MENUS

TABLE OF CONTENTS

APPENDIX A/1
MAIN MENUS

1.0 THE MENUS

The setup data of the Micro-Tech 2000 are collected into menus which are accessed using the **MENU** key. Once the **MENU** key has been pressed, use the scroll keys to select the menu that you need.

1.1 CALIBRATION

The MAIN MENU 1 contains the calibration menu. Main Menu 1 is selected by pressing the **MENU** key until Main Menu 1 appears. Desired calibration scrolls are selected by pressing the soft keys directly below the required scroll.

```
-    MAIN MENU 1   -
Press MENU for more
ZERO    SPAN
CAL     CAL
```

1.1.1 Zero Calibration Scroll

The Zero process is implemented as a machine directed procedure.

1. Auto Zero

   If only one scale is defined:

```
-     ZERO CAL      -
Empty scale, then
press START.
START  SCALE# MANUAL
```

Password: OPERATOR

The scale must be kept empty during auto zero since a complete zeroing procedure requires 10 second. The function can be reduced by pressing END in the next scroll.

Indication **S#** in the following scrolls appear only if more than one scale is defined. # represents the active scale number.

When **START** is pressed, the following screen is displayed.

```
S# AUTOZEROING
Time remaining 0000
Gross     000.0 W.U.
END     ABORT
```

During Auto Zero, resolution of the total is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test.

When zero is reached or END is pressed, the system displays the following screen.

```
S# AUTOZERO COMPLETE
Error       +000.00%
    Change zero ?
YES       NO
```

The word COMPLETE is flashing. The percentage of error is related to the scale capacity.

If YES is pressed, the next screen is shown.

```
S# ZERO # CHANGED
Old zero # 00000
New zero # 00000
RUN      MENU
```

The old and new zero constants are shown in A/D counts.

1.1.2 Manual Zero

The Manual Zero procedure allows the operator to directly enter the zero constant if known.

```
-   MANUAL ZERO   -
Gross     000.0 W.U.
Zero #    00000
ENTER  SCALE#  EXIT
```

Password: OPERATOR

Default: 40000
Min: 0
Max: 120000

1.2 SPAN CALIBRATION SCROLL

The span calibration can be done in two different ways: R-CAL or Test Weights. The system allows the operator to select which one of the two methods to use for normal calibration and calibration checks. The selection is made in CAL DATA Scroll 1. The Auto Span procedure requires 10 seconds.

1.2.1 Automatic Span Calibration with R-CAL

1. Starting an R-Cal Calibration

```
-  AUTOSPAN R Cal  -
Empty scale, then
press START.
START  SCALE# MANUAL
```

Password: OPERATOR

After **START** is pressed, a half second delay enables the indicator to stabilize after the R-Cal relay energizes. The operator must ensure the scale is empty before pressing START.

2. Executing the Span Calibration

   Indication **S#** in the following scrolls appears only if more than one scale is defined. # represents the active scale number.

   Whichever method is used to start automatic span calibration, after **START** is pressed, the following screen is displayed.

   (1) Entry point when **REPEAT** is pressed (see below).

```
S# AUTOSPANNING
Time remaining 0000
Gross     00.0 W.U.
END    ABORT
```

   During Auto Span, resolution of the total is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test. The END key can be used to conclude the function in less time.

3. Record the Material Factor

   This part of the procedure is only executed if a span calibration with weights was done before, and if R-Cal has not been factored.

   It is very important to understand that when this procedure is executed, the system will not alter the span. The span is assumed to be correct after a calibration with weights. The system acquires the R-Cal Factor factoring R-Cal to the test weight span calibration. Subsequent R-Cal calibration is factored to the test weights.

```
AUTO SPAN COMPLETE
Error +/-00.00 %
Unfactored Calcon
EXIT   FACTOR REPEAT
```

   The word "COMPLETE" is flashing.

   If **EXIT** is pressed, the system acknowledges the R-Cal Factor is not used. The effect of this is the system does not ask for a material factor anymore for this calibration method until a manual span entry is done. By pressing **EXIT**, the operator tells the system that he/she does not want to use material factors, but wants to use the test results for changing the span number. After **EXIT** is pressed, go to (2) below.

   If **REPEAT** is pressed, go to (1) above.

   If **FACTOR** is pressed, the following screen is displayed.

```
  FACTORING RCAL
New factor: 000.00 %
  Change factor ?
YES       NO
```

If **NO** is pressed, old factor is preserved, then go to (2) below.

If **YES** is pressed, the following screen is displayed.

```
R-CAL Matl FACTOR
Old factor: 00.00 %
New factor: 00.00 %
RUN  REPEAT
```

Can be R-CAL or WTS

The **REPEAT** key returns the operator to (1) above. **RUN** can be used for ending the procedure. After this pint is reached, the system does not proceed to the next section.

4. Recording the New Span

The system calculates the new span.

(2)

```
S# AUTOSPAN COMPLETE
Error +/-00.00 %
Change span ?
YES      NO
```

The word "COMPLETE" is flashing.

If **YES** is pressed, the following screen is displayed.

```
S# SPAN # CHANGED
Old span # 000000
New span # 000000
RUN  REPEAT
```

REPEAT moves back to (1) above and calibration restarts.

If **NO** is pressed, the following screen is displayed.

```
S# SPAN # UNCHANGED
Old span # 000000
New span # 000000
RUN  REPEAT
```

NOTE: The old span and new span are shown equal. This is because no change to the span has been done.

If **FACTOR** is pressed, the R-CAL Factor is computed. The following screen is displayed.

```
S# FACTOR ACQUIRING
New fact 000000 %
 Change factor ?
YES     NO
```

NO moves back to (2) above.

YES acquires new factor. If pressed, the following screen is displayed.

```
S# FACTOR CHANGED
Old fact 000000 %
New fact 000000 %
RUN    REPEAT
```

5. Ending an Auto Span Procedure with R-CAL

   After **RUN** is pressed, the R-CAL relay is de-energized and the display is locked for 3 seconds.

1.2.2 Automatic Span Calibration with Test Weights

1. Starting a Test Weights Calibration

```
- AUTOSPAN Weights -
Apply Weights then
press START.
START   SCALE# MANUAL
```

Password: OPERATOR

The operator must apply the test weights on the scale before pressing START. When START is pressed, the span function begins.

2. Executing the Span Calibration

   Indication **S#** in the following scrolls appears only if more than one scale is defined. # represents the active scale number.

   After **START** is pressed, the following screen is displayed.

   (1) Entry point when **REPEAT** is pressed (see below).

```
S# AUTOSPANNING
Time remaining 0000
Gross     000.0 W.U.
END    ABORT
```

During Auto Span, resolution of the total is 10 times higher than normal. The number of seconds in line 2 corresponds to the time remaining for completing the test. The END key can be used to conclude the function in less time.

3. Recording the New Span

The batch weight indicator calculates the new span based on the result of the test performed with the selected method.

```
S# AUTOSPAN COMPLETE
Error +/-00.00 %
Change span ?
YES      NO
```

The word "COMPLETE" is flashing.

If **YES** is pressed, the following screen is displayed.

(2)

```
S# SPAN # CHANGED
Old span # 000000
New span # 000000
RUN  REPEAT FACTOR
```

FACTOR key is displayed only if an autospan with R-CAL has been previously executed.

REPEAT moves back to (1) above, and calibration restarts.

If **NO** is pressed, the following screen is displayed.

```
S# SPAN # UNCHANGED
Old span # 000000
New span # 000000
RUN  REPEAT
```

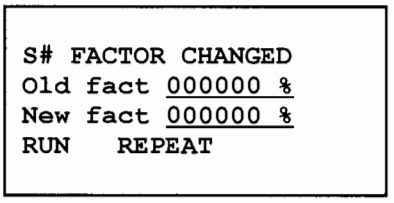
NOTE: The old span and the new span are shown equal. This is because no change to the span has been done.

If **FACTOR** is pressed, the R-CAL factor is computed. The following screen is displayed.

```
S# RCAL FACTORING
New fact 000000 %
  Change factor ?
YES      NO
```

NO moves back to (2) above.

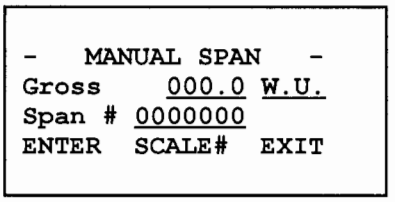
YES acquires new factor. If pressed, the following screen is displayed.



1.2.3 Manual Span

If the span constant is known, the manual span procedure makes a direct change of span.

If the span is manually entered, the R-CAL factor is set to INVALID.



Password: OPERATOR

Default: 1166667
Min: 500000
Max: 45000000

The **RUN** key returns to Run Menu.

1.3 MAIN MENU 2

Main Menu 2 contains the setup and configuration menus. Main Menu 2 is selected by pressing the MENU key until Main Menu 2 appears. Setup scrolls are selected by pressing the key directly below the desired scroll.

```
-    MAIN MENU 2    -
Press MENU for more
        SCALE   CALIB
DISPLY  DATA    DATA
```

1.3.1 Display Scrolls

1. Defining Measure Units

   Measure units can be individually selected. The operator must first decide if the English or Metric units will be used, or a combination of both will be used.

   Press the **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.

```
- DISPLAY SCROLL 1 -
Measure units
> English <
CHOICE     ENTER
```

   Password: SERVICE

If USA or ENG:	Default: ENGLISH
If other language:	Default: METRIC
Selections:	ENGLISH, METRIC, MIXED

   The weights are displayed according to the units selected here.

   Press **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.

```
- DISPLAY SCROLL 2 -
Weight Units
> lb <
CHOICE    ENTER
```

   Password: SERVICE

If ENGLISH:	Default: POUNDS Selections: %, TONS, LTONS, POUNDS
If METRIC:	Default: KG Selections: %, TONNES, KG
If MIXED:	Default: POUNDS Selections: %, TONS, LTONS, POUNDS, TONNES, KG

   The weights are displayed according to the units selected here.

Press **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.

```
- DISPLAY SCROLL 3 -
Total units
> Tons <
CHOICE     ENTER
```

Password: SERVICE

If ENGLISH:	Default: TONS Selections: TONS, LTONS, POUNDS
If METRIC:	Default: TONNES Selections: TONNES, KG
If MIXED:	Default: TONS Selections: TONS, LTONS, POUNDS, TONNES, KG

2. Defining the Language

The Micro Tech 2000 is a dual language instrument. English (ENG or USA) is always the first language, the second can be one from the following list. Press **DOWN SCROLL** key.

```
- DISPLAY SCROLL 4 -
    Language
> USA <
CHOICE    ENTER
```

Password: OPERATOR

Default:	USA
Selections:	USA, ENG, SPANISH (ESP), FRA, GER, DUT, ITA

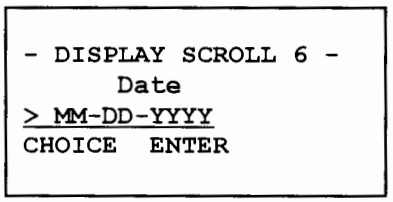
3. Setting Time and Date Mode

This section applies only if COM board is installed. The operator defines the format for displaying and printing time and date.

```
- DISPLAY SCROLL 5 -
    Time
> AM/PM <
CHOICE   ENTER
```

Password: SERVICE

If USA or English:	Default: AM/PM
If other language:	Default: 24 H
Selections:	am/pm, 24 h

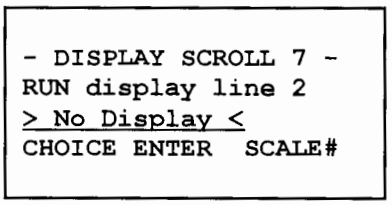


Password: SERVICE

If USA:	Default: MM-DD-YYYY
If other language	Default: DD-MM-YYYY
Selections:	DD-MM-YYYY, MM-DD-YYYY, YYYY-MM-DD

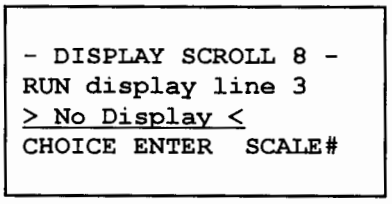
4. Setting Line 2 and 3 of the RUN Menu

   The RUN MENU can be configured to display on line 2 and 3 either tare , gross, peak, master total, reset total, date and time and a graphic indication of the net weight.



Password: OPERATOR

Default:	NO DISPLAY
Selections:	NO DISPLAY, GROSS, TARE, DATE/TIME (Only if COMM board installed), BARGRAPH

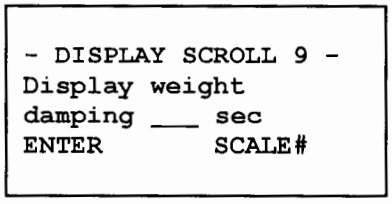


Password: OPERATOR

Default:	NO DISPLAY
Selections:	NO DISPLAY, GROSS, TARE, DATE/TIME (Only if COMM board installed), BARGRAPH

5. Setting Damping Factors for the Display

   The process variables when displayed on the screen can be damped by a programmable factor, to filter out variations that can be introduced by mechanical vibrations. To tune a damping filter, enter the number of seconds corresponding to the desired time constant. If, for example, 10 seconds is entered, the process variable reaches the stability after a step change in 10 seconds.



Password: OPERATOR

Default:	0 sec
Min:	0 sec
Max:	16 sec

6. Enable ALTERNATE Function on RUN Scroll

   The ALTERNATE function allows skipping automatically from one scale to the next without pressing the scale # key in the RUN scroll. Time interval in seconds can be entered in this scroll. 0 disables this function.

```
- DISPLAY SCROLL 10-
Alternate scales in
RUN          ___ sec
ENTER
```

Password: OPERATOR

Default:	0 sec (function disabled)
Min:	0 sec
Max:	60 sec

1.3.2 Scale Data Scroll

Scale data defines the specific parameters of the scale.

1. Define the Number and Type of Scales

   The batch weight indicator can control from one to four independent scales. The number of scales that can be programmed depends on the number of A/D boards installed.

   The following boards are available:

   - Plant scale A/D #1 channel
   - Plant scale A/D #2 channels
   - Premium scale A/D #1 channel

```
- SC DATA SCROLL 1 -
Number of scales
_
ENTER
```

Password: SERVICE

Default:	1
Min:	1
Max:	4

Normally, more scales are defined and it is necessary to define how these scales should be handled by the batch weight indicator.

This option can only be changed during the cold start procedure. Mode is only displayed here. The two ways to handle the scales in multi scale mode is described in the 'Appendix A/2'.

```
- SC DATA SCROLL 1A -
Mode to handle the
scales    > Single <
```

2. Defining Scale Capacity and Divisions

   The next entry is the scale capacity, which is the maximum capacity of the scale. This entry also defines the default number of decimal places that are used for display weight values. Use numeric keys for entering the number, confirm with **ENTER**. Scroll down.

```
- SC DATA SCROLL 2 -
Max. scale capacity
 500.0 lbs
ENTER          SCALE#
```

Default:	500.0
Min:	1
Max:	1000000

When the Scale capacity is entered, the number of decimal places is also defined. If, for example, the operator enters 500.0, this sets the "Scale Divisions" parameter to 0.1. Advancing to the next scroll, the operator then sees first the Scale Division corresponding to the just entered Scale Capacity (in the example 0.1). If required, the operator is able to alter the Scale Division to any of the available options.

```
- SC DATA SCROLL 3 -
Scale divisions
 > 0.1 <
CHOICE  ENTER SCALE#
```

Default:	0.1
Selections:	0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50, 0.01, 0.02, 0.05, 0.001, 0.002, 0.005

The next entry is the set of start batch. This value is used for different purposes:

- as a reference to end the discharge phases
- to generate the BAD START WEIGHT alarm if at the start of a new cycle the weight on the scale is above this value and the first component to batch is a charge batch type.
- to generate the BAD START WEIGHT alarm if at the start of a new cycle the weight on the scale is below this value and the first component to batch is a discharge batch type.

```
- SC DATA SCROLL 4 -
Zero - start batch
set    0.0 lbs
ENTER          SCALE#
```

Default:	0.0
Min:	0.0
Max:	Scale Capacity

3. Enter the Number of Load Cells of Your Scales

   Enter the number of load cells of your scale.

```
- SC DATA SCROLL 5 -
# of load cells
      1
ENTER        SCALE#
```

Password: SERVICE

Default:	1
Min:	1
Max:	6

4. Defining the Load Cell(s)

   Enter the load cell capacity as appears on the label placed on the load cell.

```
- SC DATA SCROLL 6 -
Load cell capacity
250.0 lbs
ENTER          SCALE#
```

Password: SERVICE

If ENGLISH or MIXED:	Default:	250.0 Lbs
	Min:	1
	Max:	15000
If METRIC:	Default:	100 kg
	Min:	10
	Max:	15000

Enter the load cell sensitivity in mV/V as marked on the label of the load cell. Ramsey load cells are normally 2.000 or 3.000 mV/V.

```
- SC DATA SCROLL 7 -
Load cell sensit.
3.00 mV/V
ENTER          SCALE#
```

Password: SERVICE

Default:	3.000 mV/V
Min:	0.500 mV/V
Max:	3.500 mV/V

The resistance of the bridge of each load cell has to be entered here. The number of scrolls depends on the number of load cells specified per each scale.

```
- SC DATA SCROLL 8A -
Load cell #1
Res     350.0 Ohms
ENTER           SCALE#
```

Password: SERVICE

Default:	350 Ohms
Min:	10 Ohms
Max:	1000 Ohms

If # of Load Cells is 2 or more:

```
- SC DATA SCROLL 8B -
Load cell #2
Res     350.0 Ohms
ENTER           SCALE#
```

Password: SERVICE

Same default and limits of load cell #1.

If # of Load Cells is 3 or more:

```
- SC DATA SCROLL 8C -
Load cell #3
Res     350.0 Ohms
ENTER           SCALE#
```

Password: SERVICE

Same default and limits of load cell #1.

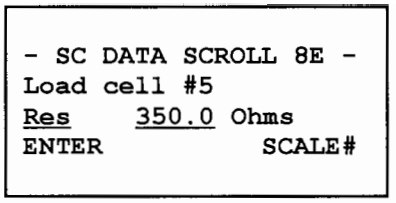
If # of Load Cells is 4 or more:

```
- SC DATA SCROLL 8D -
Load cell #4
Res     350.0 Ohms
ENTER           SCALE#
```

Password: SERVICE

Same default and limits of load cell #1.

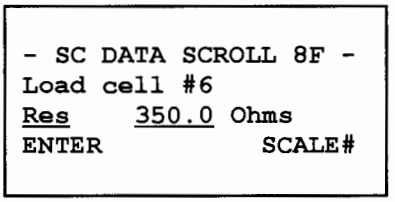
If # of Load Cells is 5 or more:



Password: SERVICE

Same default and limits of load cell #1.

If # of Load Cells is 6:

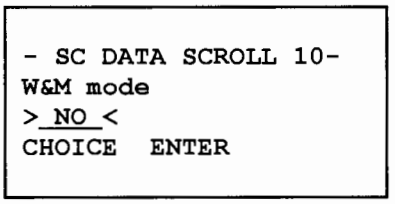


Password: SERVICE

Same default and limits of load cell #1.

5. Weights and Measures Mode

   This scroll details certain parameters to conform with the approval agency selected.

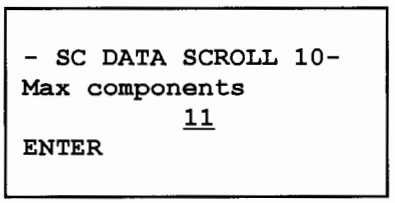


Password: SERVICE

Default:	NO
Selections:	NO, OIML

6. Maximum Number of Components and Recipes

   The next two scrolls define the maximum number of components of the system and the maximum number of recipes. The only purpose of entering these values is to simplify the use of the scrolls when data for recipes and components are displayed and entered.



Password: OPERATOR

Default:	11
Min:	1
Max:	40

```
- SC DATA SCROLL 11-
Max recipes
          10
ENTER
```

Password: OPERATOR

Default:	10
Min:	1
Max:	100

1.3.3 Calibration Data Scroll

The CAL DATA scroll allows the operator to set parameters which relate to the calibration of the scale.

1. Defining the Calibration Mode

   Select which simulated method of automatic calibration is to be used. The selected method is the only one displayed in the calibration section of MENU 1.

```
- CAL DATA SCROLL 1 -
Calibration mode
> R-Cal <
CHOICE  ENTER  SCALE#
```

Password: OPERATOR

Default:	R-CAL
Selections:	R-CAL, WEIGHTS

Detailing the R-CAL Parameters

This section only applies if R-CAL mode was selected as the preferred method. Enter the resistance in Ohms of the R-Cal resistor installed in your batch weight indicator. If no changes have been made after the batch weight indicator has left Ramsey, the default value applies.

```
- CAL DATA SCROLL 3 -
R-Cal selected res
     165000 ohms
ENTER          SCALE#
```

Password: SERVICE

Default:	165000 Ohms
Min:	10 Ohms
Max:	1000000 Ohms

The system calculates the CALCON (Calibration Constant) based on the mechanical and electrical parameters entered in the Scale Data Scroll. This menu is for reference only.

NOTE: In Model 2202, where the premium A/D Board is used, both R-CAL resistors (R-17 and R-CAL1) are installed. These two resistors, 165.0 kΩ and 49.9 kΩ, are in parallel with a resultant resistance of 38313 ohm.

```
- CAL DATA SCROLL 4 -
R-Cal constant
_______ lbs
                SCALE#
```

The RCAL factor can be computed during the autospan function and it is used to make equal the result of the two span methods.

```
- CAL DATA SCROLL 5 -
R-Cal factor
_______ %
ENTER     +/-    SCALE#
```

Detailing the Test Weight Parameters

This section only applies if **TEST WEIGHTS** mode was selected as the preferred method. Enter the weight of the test weights that you are going to use for the calibration.

```
- CAL DATA SCROLL 2 -
Total test weight on
scale    0.000 lbs
ENTER           SCALE#
```

Password: SERVICE

If ENGLISH or MIXED:	Default:	0.000 Lbs
	Min:	0.000
	Max:	5000.000
If METRIC:	Default:	0.000 kg
	Min:	0.000
	Max:	5000.000

2. Entering a Calibration Interval

If an optional COM board is installed, the system can be programmed to prompt the operator when a certain amount of time has passed since the last calibration. If you do not want to use this option, confirm the default 0 days interval, otherwise enter the number of days. The calibration date displayed in scroll 7 is automatically updated whenever a calibration is performed. If a non zero value is entered, an alarm appears after the time is elapsed. The alarm can only be cleared after a calibration check is executed.

```
- CAL DATA SCROLL 6 -
Calibration interval
_____ days
ENTER
```

Password: OPERATOR

Default: 0 Days (function disabled)
Min: 0 Days
Max: 365 Days

This scroll displays the date of the last calibration and the expected date of the next one, based on the entry in the previous screen.

```
-CAL DATA SCROLL 7 -
Calibration date
Last MM-DD-YYYY
Next MM-DD-YYYY SCALE#
```

1.4 MAIN MENU 3

Main Menu 3 is used for protecting and unprotecting the system using passwords, and to perform diagnostic and test functions. The diagnostic functions can only be operated after removing all password protection, and should only be used by experienced technical personnel. Most test functions are not password protected.

```
-   MAIN MENU 3    -
Press MENU for more

PROT    DIAG   TEST
```

The PROTection menu only becomes visible after passwords have been defined (see the Diagnostics Menu).

1.4.1 Changing the Protection Level

The batch weight indicator has three protection levels to which specific passwords are related.

The protection levels and the passwords are defined using the following scheme:

Protection	Password	Status
NONE	SERVICE	The system is totally unprotected, all data can be read or changed.
LIMITED	OPERATOR	Operator functions and data are unprotected. All setup and calibration data are protected except zero calibrate.
PROTECTED		The system is totally protected, process data can be read, no change allowed.

A **SERVICE** password is required to access the **NONE** level. An **OPERATOR** or a **SERVICE** password is required to access the **LIMITED** level.

Use the **NONE** key to access the **NONE** protection level. If the current level is not already **NONE**, the **SERVICE** password is required.

Use the **LIMITED** key to access the limited protection level. If the system is in level **NONE**, change is immediate. If it is in PROT level, the **SERVICE** or **OPERATOR** password is required. Use the **PROT** key to access the protected level. No password is required.

```
- PROTECTION LEVEL -
    > NONE <

NONE    LTD    PROT
```

Default:	NONE	
Selections:	NONE, LIMITED, PROTECTED	
Password:	from NONE to LTD or PROT:	not required
	from LTD to PROT:	not required
	from LTD to NONE:	SERVICE
	from PROT to NONE:	SERVICE
	from PROT to LTD:	OPERATOR or SERVICE

Pressing the soft key gives entry into desired level. Going from a low level to a higher level forces the password entry.

1. On Line Procedure for Changing Protection Level

   The protection level can be temporarily changed by entering a password "on the fly" during normal operation. When the operator tries to enter a variable or select a function which is password protected, and the password is installed, the following screen is displayed.

```
- SYSTEM PROTECTED -
PLEASE ENTER
PASSWORD _____________
ENTER
```

   The operator can enter either the OPERATOR or the SERVICE passwords. However, if the operator enters the OPERATOR password and the variable or function requires the SERVICE password instead, the access is denied and the following screen is displayed.

```
- SYSTEM PROTECTED -
PLEASE ENTER SERVICE
PASSWORD _____________
ENTER
```

If the operator fails to enter the correct password, the following screen appears.

```
- SYSTEM PROTECTED -
INVALID PASSWORD
ACCESS DENIED
RETURN
```

Pressing **RETURN** returns the program to the previous function. If the operator enters the correct password, the previous screen appears and access is allowed.

When the protection level is changed using the on line procedure, the system automatically returns to protected status if no keyboard entries are made within 60 seconds.

1.4.2 Diagnostics Scroll

1. A/D Raw Data

   Diagnostic Scroll 1 shows the raw data from the A/D converter of the integrator (A/D gross) and the net value after the zero constant has been subtracted. The range of the A/D converter is from 0 to 131070 numbers.

```
-DIAG SCROLL SCALE #1
A/D gross  00000
A/D net     0000
               SCALE#
```

2. Readout Load Cell mV

   The system displays the mV output of the load cell. The reading must be positive and must increase when the load increases.

```
-DIAGNOST. SCROLL 2-
Weight on load cell
0.000 mV
    CALIB    SCALE #
```

Password: SERVICE

If **CALIB** is pressed, the next two scrolls are displayed and can be used to fine tune the readout of mV/V.

```
-DIAGNOST. SCROLL 2A
Loadcell output zero
15 A/D counts
ENTER          SCALE#
```

Password: SERVICE

Default: 15
Min: 0

Max: 10000

```
-DIAGNOST. SCROLL 2B
Loadcell output span
3497
ENTER          SCALE#
```

Password: SERVICE

Default: 3497
Min: 0
Max: 30000

3. Change Passwords

The password can be changed by entering a new one. The operator can enter up to eight characters (numeric keys entries). The entered numbers are not echoed on the screen. Pressing just the **ENTER** key removes the password.

```
-DIAGNOST. SCROLL 3-
ENTER SERVICE
PASSWORD      ********
ENTER
```

Password: SERVICE

Default: No password

After the password has been entered, the system asks for confirmation. This prevents losing access control due to a typing mistake while entering passwords.

```
-DIAGNOST. SCROLL 4-
REENTER SERVICE
PASSWORD      ********
ENTER
```

If the password entered the second time matches the first, the following message confirms the entry.

```
-DIAGNOST. SCROLL 4-
NEW PASSWORD
ACQUIRED
RETURN
```

If the two passwords do not match, the system does not accept the new password.

```
-DIAGNOST. SCROLL 4-
INVALID PASSWORD

RETURN
```

```
-DIAGNOST. SCROLL 4-
ENTER OPERATOR
PASSWORD     ********
MENU   ENTER
```

Password: OPERATOR

Default: No password

The OPERATOR password is double checked similarly to the service one.

It is strongly suggested to write down the password and preserve a copy in a safe place. If the password is forgotten, refer to Section 4.3.8 to remove a forgotten password.

4. Display Software Version

   The software version is displayed for reference only.

```
-DIAGNOST. SCROLL 5-
Main software
version:
45.00.00.00
```

5. Setup Date and Time

   This section only applies if a COMM board is installed. The operator can set the current date and time. A battery operated clock calendar then maintains time and date even if power is removed. Day, Month, and Year are entered in sequence.

```
-DIAGNOST. SCROLL 6-
Date:      MM-DD-YYYY
DAY: DD
ENTER
```

Password: SERVICE

Default:	00-00-00
Min:	01-01-00
Max:	12-31-2096

Time is entered in a similar way. The **AM/PM** key is used when time is in the English mode. See Display Scroll 7 in Main Menu 2.

```
-DIAGNOST. SCROLL 7-
Time:      HH:MM
HOURS:HH
ENTER       AM/PM
```

Password: SERVICE

	24 hour	am/pm
Default:	00.00	01.00
Min:	00.00	01.00
Max:	23:59	12:59

6. Check Hardware Configuration

   The system automatically recognizes when optional boards are installed. The following scrolls are used to show the configuration. Remember that when a board is acknowledged, the related information stays in memory even if the board is removed, until the operator deletes it by responding **YES** to the message shown at power on.

   The following screen is displayed for each board installed in each slot.

```
-DIAGNOST. SCROLL 8-
Board type slot #1

BOARD TYPE
```

```
-DIAGNOST. SCROLL 9-
Board type slot #2

BOARD TYPE
```

```
-DIAGNOST. SCROLL 10
Board type slot #3

BOARD TYPE
```

```
-DIAGNOST. SCROLL 11
Board type slot #4

BOARD TYPE
```

```
-DIAGNOST. SCROLL 12
Board type slot #5

BOARD TYPE
```

```
-DIAGNOST. SCROLL 13
Board type slot #6

BOARD TYPE
```

BOARD TYPE can be:

- Premium A/D Board	A/D board approved version. - #1 Load cell input channel
- AD Board #1 channel	An optional depopulated version of the standard A/D board. - #1 Load cell input channel
- AD Board #2 channels	The standard 2 channels A/D board. - #2 Load cell input channels
- Dig I/O 16in/4out	Optional digital input output board. - #16 Optocoupled Digital Inputs - #4 Optocoupled digital outputs
- Dig I/O 16out/4in	Optional digital input output board. - #4 Optocoupled Digital Inputs - #16 Optocoupled digital outputs
- Load Out 16in/4in	Optional digital input output board dedicated to the Load Out. - #16 Optocoupled digital inputs - #4 Optocoupled digital inputs
- Load Out 16out/4in	Optional digital input output board dedicated to the Load Out. - #4 Optocoupled digital inputs - #16 Optocoupled digital inputs
- Analog I/O	Optional analog input output board. - #2 Current outputs - #2 Voltage inputs
- Current Out	Optional current output board. - #1 Current output
- Communication A	Serial communication board (RS232, RS485)
- Communication B	Allen-Bradley Remote I/O PROFIBUS DP

7. Force Cold Start
   This scroll is used to force a cold start of the instrument in the event the software becomes corrupted. Factory default constants will be installed when the instrument restarts: all field entry data will be replaced.

```
-DIAGNOST. SCROLL 14-
Force Cold Start

ENTER
```

If "ENTER" is pressed then he following screen is displayed flashing.

```
      ATTENTION
    ARE YOU SURE

YES    RETURN
```

This screen gives the operator the opportunity to change his/her mind. Pressing the "YES" key will force a cold start, pressing the "RETURN" key will go back to DIAGNOST SCROLL 14.

1.4.3 Tests

1. Lamp Test

   Press **START** to begin a Lamp Test of the integrator. All LED's and digits of the display blink for a number of seconds.

```
- TEST SCROLL 1     -
LAMP TEST

START
```

2. Self Test of the Unit

   The system can perform some internal test functions, which can be used to detect malfunctions to the hardware devices.

```
-  TEST SCROLL 2    -
Internal test of
microprocessor.
START
```

Password: SERVICE

After **START** is pressed, the following screens are displayed in sequence.

```
-  TEST SCROLL 2A  -
Testing  ROM
Test PASSED
```

```
-  TEST SCROLL 2B  -
Testing  RAM
Test PASSED
```

```
-  TEST SCROLL 2C  -
Testing  E2PROM
Test PASSED
```

Only if Audit Trail option is installed.

The message "Test PASSED" is displayed if the test runs correctly. If something wrong is detected, then the message "Test FAILED" is displayed, and the soft key **CONTINUE** is shown. The operator has to press the key to go on to the next test.

3. Test Digital Inputs

   The next screen is used to check the digital input circuitry. The display shows a 1 if the specific input is closed, 0 if open. If more digital I/O boards are installed, the **NEXT** soft key appears, allowing the operator to scroll between boards.

```
-  TEST SCROLL 3   -
Dig input test
Slot#0       ----0000
         NEXT
```

   Slots are numbered 1 to 6, slot 0 is the mother board. 'Digit' (displayed instead of 'slot #') identifies the four Digitizer's inputs. Inputs are shown from right to left. If a board has 16 inputs, two screens are used to show the first and the second half, the lower half is shown first.

4. Test Digital Outputs

   This test shows the status of each digital output and allows the operator to force the output for testing purposes. The output, when forced, stays on until the **CLEAR** soft key is pressed or the Run Menu is entered. If an output is forced and the scroll key is used for reaching some other menu, the output stays in the forced status until **RUN** is pressed. This allows the operator to check inputs while outputs are still in the forced status.

```
-  TEST SCROLL 4   -
Dig output test
output # 1 :  ON/OFF
ENTER         ON/OFF
```

Password: SERVICE

To force an output, enter the desired number followed by **ENTER**. Then use the **ON/OFF** key to force it to the ON or OFF status. After the output has been forced, the **CLEAR** soft key appears in the middle position.

Slots are numbered 1 to 6, slot 0 is the mother board.

WARNING

FORCING THE DIGITAL OUTPUTS MAY CAUSE MACHINERY TO START. AFTER THE OPERATOR TRIES TO FORCE AN OUTPUT, THE FOLLOWING MESSAGE WILL BE DISPLAYED.

```
      WARNING
EQUIPMENT MAY START

CONTINUE       ABORT
```

IF THE OPERATOR PRESSES CONTINUE, BE AWARE THE ACTION MAY CAUSE DAMAGE OR INJURY. IF THE OPERATOR PRESSES ABORT, THE SYSTEM WILL RETURN TO THE PREVIOUS SCROLL.

5. Test Current Outputs

This section tests the current output board. The board has two current output channels. Current outputs can be PID loops, rate, load or speed out.

```
-  TEST SCROLL 5  -
Current output #1
should be 00.0 mA
ENTER  CLEAR   NEXT
```

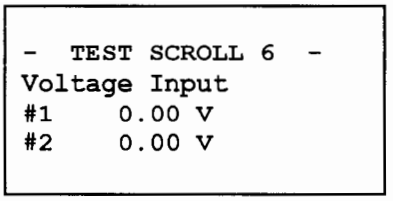
Password: SERVICE

Default:	0.0 mA
Min:	0.0 mA
Max:	20.0 m

To force the output, enter the desired number of milliamps and press **ENTER**. Press **CLEAR** to free the mA channel. Press **NEXT** key to pass to the next current output channel.

6. Test Voltage Inputs

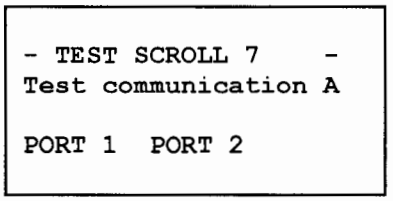
This screen shows the status of the analog inputs.



Password: SERVICE

7. Test Communication A

   If a Communication board is detected, the following screen is shown. The "**Port 2**" soft key is only shown if two boards are detected.



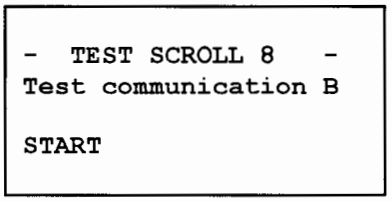
Password: SERVICE

   By pressing the **PORT 1** or the **PORT 2** soft key the test is initiated. A test pattern is sent out on the TX output and read on the RX input. If the test fails, the message **TEST FAILED** is shown. Otherwise, the message **TEST PASSED** is displayed.

   NOTE: This test requires a hardware jumper to be installed between TX and RX terminals of the communication board.

8. Test Communication B

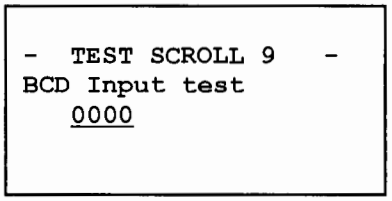
   This test is similar to the previous one but works for the field bus version of the communication board.



Password: SERVICE

9. Test BCD Input Board

   If an optional 16In/4Out load out board is detected, the following screen appears. The test is similar to the digital input test.



10. Test BCD Output Board

    The following test is displayed if an optional load out board is detected.

```
-  TEST SCROLL 10  -
BCD Output test
   0000
ENTER  CLEAR
```

Default: 0
Min: 0
Max: 9999 or 7999 if parity check enabled

To force the outputs, enter a number followed by **ENTER**. The **CLEAR** key appears indicating that the output is being forced to a value. By pressing **CLEAR**, the output is freed.

11. Weight Simulation Function

The following scrolls are inherent to the weight simulation function. This function allows the operator to simulate a weight trend during the batch phases. The first scroll allows enabling the function.

```
- TEST SCROLL 11  -
Weight simulation
      > no <
CHOICE  ENTER
```

Password: SERVICE

Default: NO
Selections: NO, YES

The second scroll defines the speed of increasing and decreasing of the weight during the charge and discharge phases at high speed. The weight variation during the low speed batch phases is automatically determined by the instrument at 50% of the entered value. This value is weight per second.

```
- TEST SCROLL 11A -
High speed sim rate
(W/SEC)   _____ W.U.
ENTER
```

Password: SERVICE

Default: 1.0
Min: Scale Division
Max: Scale Capacity / 100

12. Test the Keyboard and Switches

```
-  TEST SCROLL 13 -
Keyboard + switches
key              ----
switches   00000000
```

Use the RUN key to end the keyboard test. After RUN is pressed, all the keys are executed.

1.5 MAIN MENU 4

Main Menu 4 is dedicated to the definition of the input output (I/O), alarms and optional of load out (batch).

```
-    MAIN MENU 4    -
Press MENU for more
I/O            ALARMS
DEFINE    DEFINE
```

1.5.1 I/O Definition Scroll

The input output section of the system is fully configurable. All inputs and outputs are conventionally numbered and can be assigned to physical input and output terminals depending on the needs. The following section explains how to configure I/O. However, the standard configuration as provided by the factory is normally satisfactory.

1. Define Current Outputs

   The following menus are shown for configuring the current output(s). Use the **CHOICE** key to change the variable and the **ENTER** key to confirm. The **NEXT** key allows the operator to set up to four (4) current outputs if installed.

```
- I/O DEF SCROLL 1 -
Current out define
#1  > Net <
CHOICES   ENTER   NEXT
```

   Password: SERVICE

   Default: NONE
   Selections: NONE, NET, GROSS, DIFF

   Or, if more than one scale is defined:

   Selections: NONE,
   NET S1, GROSS S1, DIFF S1 (2 scales)
   NET S2, GROSS S2, DIFF S2 (2 scales)
   NET S3, GROSS S3, DIFF S3 (3 scales)
   NET S4, GROSS S4, DIFF S4 (4 scales)

   If the selection of the previous screen is not **NONE**, the operator can set up the range, delay and damping of the current output.

   The range is selectable between the standard 0 to 20 mA and 4 to 20 mA both in direct and reverse mode. Select 0-20 or 4-20 if you want to have an increase in current for any increase of the variable. Select 20-0 or 20-4 if you want to have a decrease of current for any increase of the variable.

```
- I/O DEF SCROLL 1A -
Current out range
#1  > 4-20 mA <
CHOICES  ENTER  NEXT
```

Password: SERVICE

Default: 4-20 mA
Selections: 0-20 mA, 4-20 mA, 20-0 mA, 20-4 mA

Each current output can be delayed.

```
- I/O DEF SCROLL 1B -
Current out delay
#1 __ sec
ENTER          NEXT
```

Password: SERVICE

Default: 4 sec
Min: 0 sec
Max: 300 sec

A damping factor can be also selected for each current channel. This damping only affects the current output, not the displayed variable, which has a separate damping factor, selectable in MAIN MENU 2, DISPLAY.

```
- I/O DEF SCROLL 1C -
Current out damping
#1 __ sec
ENTER          NEXT
```

Password: OPERATOR

Default: 2 sec
Min: 0 sec
Max: 16 sec

Up and Down arrows move between range, delay and damping. **NEXT** moves to the next current output.

2. Define Analog Inputs

The following menus are shown for configuring the analog inputs. Use the **CHOICE** key to change the variable and the **ENTER** key to confirm. The **NEXT** key allows the operator to set up to four (4) analog inputs if installed.

```
- I/O DEF SCROLL 2 -
Analog Input #1 def.
#1  > NONE <
CHOICES  ENTER CALIB
```

Password: SERVICE

Default: NONE
Selections: NONE, MOISTURE

Or, if more than one scale is defined:

Selections: NONE,
MOISTURE S1, (2 scales)
MOISTURE S2, (2 scales)
MOISTURE S3, (3 scales)
MOISTURE S4, (4 scales)

If an analog input has been programmed for reading the moisture signal and **CALIB** was pressed, the following screens appear. The user can calibrate the input signal by entering the equivalence between percent of moisture and voltage on inputs four points. Use the **%Moist** key to enter the percent of moisture, use the **VOLT** key to enter the corresponding number of volts, and confirm with **ENTER** key.

```
- I/O DEF SCROLL 2A -
Moisture input cal #1
0.0 %M = 1.0 V <
ENTER  %MOIST   VOLT
```

Password: SERVICE

Default:	0.0 %	0.0 V
Min:	0.0%	2.0 V
Max:	20.0%	2.5 V

Do the same for the second point shown below.

```
- I/O DEF SCROLL 2B -
Moisture input cal #1
20.0 %M = 5.0 V
ENTER   %MOIST  VOLT
```

Password: SERVICE

Default:	12.0%	5.0 V
Min:	1.0 %	1.0 V
Max:	20.0 %	5.0 V

3. Define Digital Inputs

Digital inputs can be programmed. The following screen shows one logical function per time, and allows the operator to assign it to a physical input. The **NEXT** key scrolls between the logical functions. The **NC/NO** key selects the Normally Open (NO) or Normally Closed (NC) status of the input. Normally Open means the input is inactive when disconnected. To program a function, scroll with the **NEXT** key until the function is displayed, then enter the number of the physical input and confirm with **ENTER.** Finally, scroll with **NC/NO** until the desired mode is displayed. By assigning a function to 0, the function is disabled.

```
- I/O DEF SCROLL 4 -
Dig. input def.
Ext Alarm 1 _ NC
ENTER   NC/NO   NEXT
```

Password: SERVICE

The following table shows the available logical selections that can be assigned to any available physical input. Typical field wiring drawings show inputs wired to the DEFAULT physical input as listed in the table below. Default selections can be reassigned to any physical input if desired. External alarms 1, 2 and 3 can be assigned to logical functions not on the selection list.

Logical selections should not be reassigned after the physical inputs have been wired.

CAUTION

LOGICAL SELECTIONS RETURN TO THE DEFAULT IF THE BATCH WEIGHT INDICATOR IS COLD STARTED.

SELECTIONS:	DEFAULT:
Ext alarm 1	0 NO
Ext alarm 2	0 NO
Ext alarm 3	0 NO
Print rtot	0 NO (only if COM installed)
Print ctot	0 NO (only if COM installed)
Start/Set tare	0 NO
Start/Set tare S1	0 NO (only if more than 1 scale installed)
Start/Set tare S2	0 NO (only if more than 2 scales installed)
Start/Set tare S3	0 NO (only if more than 3 scales installed)
Start/Set tare S4	0 NO (only if more than 4 scales installed)
Stop/Reset tare	0 NO
Stop/Reset tare S1	0 NO (only if more than 1 scale installed)
Stop/Reset tare S2	0 NO (only if more than 2 scales installed)
Stop/Reset tare S3	0 NO (only if more than 3 scales installed)
Stop/Reset tare S4	0 NO (only if more than 4 scales installed)
End cycle	0 NO
End cycle S1	0 NO (only if more than 1 scale installed)
End cycle S2	0 NO (only if more than 2 scales installed)
End cycle S3	0 NO (only if more than 3 scales installed)
End cycle S4	0 NO (only if more than 4 scales installed)
Abort	0 NO
Abort S1	0 NO (only if more than 1 scale installed)
Abort S2	0 NO (only if more than 2 scales installed)
Abort S3	0 NO (only if more than 3 scales installed)
Abort S4	0 NO (only if more than 4 scales installed)
Charge interl.	0 NO
Charge interl.S1	0 NO (only if more than 1 scale installed)
Charge interl.S2	0 NO (only if more than 2 scales installed)
Charge interl.S3	0 NO (only if more than 3 scales installed)
Charge interl.S4	0 NO (only if more than 4 scales installed)

SELECTIONS:	DEFAULT:
Disch. interl.	0 NO
Disch. interl.S1	0 NO (only if more than 1 scale installed)
Disch. interl.S2	0 NO (only if more than 2 scales installed)
Disch. interl.S3	0 NO (only if more than 3 scales installed)
Disch. interl.S4	0 NO (only if more than 4 scales installed)
Disch.dev.	0 NO
Disch.dev. S1	0 NO (only if more than 1 scale installed)
Disch.dev. S2	0 NO (only if more than 2 scales installed)
Disch.dev. S3	0 NO (only if more than 3 scales installed)
Disch.dev. S4	0 NO (only if more than 4 scales installed)
Auto / Man	0 NO
Auto / Man S1	0 NO (only if more than 1 scale installed)
Auto / Man S2	0 NO (only if more than 2 scales installed)
Auto / Man S3	0 NO (only if more than 3 scales installed)
Auto / Man S4	0 NO (only if more than 4 scales installed)
Go On	0 NO
Go On S1	0 NO (only if more than 1 scale installed)
Go On S2	0 NO (only if more than 2 scale installed)
Go On S3	0 NO (only if more than 3 scale installed)
Go On S4	0 NO (only if more than 4 scale installed)
Reset alarms	0 NO
Reset rtot	0 NO
Reset ctot	0 NO
Remote cntrl	0 NO (only if high level communication
Print Batch	0 NO
Print Batch S1	0 NO (only if more than 1 scale installed)
Print Batch S2	0 NO (only if more than 2 scale installed)
Print Batch S3	0 NO (only if more than 3 scale installed)
Print Batch S4	0 NO (only if more than 4 scale installed)
Pr Old Btc	0 NO
Pr Old Btc S1	0 NO (only if more than 1 scale installed)
Pr Old Btc S2	0 NO (only if more than 2 scale installed)
Pr Old Btc S3	0 NO (only if more than 3 scale installed)
Pr Old Btc S4	0 NO (only if more than 4 scale installed)

Four assignable inputs are standard on the mother board.

MOTHER BOARD INPUTS

PHYSICAL INPUT NUMBER	ASSIGNED FUNCTION	FIELD MOUNT	PANEL MOUNT
1	_____	TB9 2 & 4	TB2 1 & 3
2	_____	TB8 13 & 14	TB2 5 & 7
3	_____	TB8 11 & 12	TB2 8 & 10
4	_____	TB8 9 & 10	TB2 9 & 10

Additional assignable logical inputs from the above table can be selected by adding optional I/O boards. Available options are 4in/16out, 16in/4out or 20in/20out by adding both boards.

DIGITAL INPUT/OUTPUT BOARD INPUTS

PHYSICAL INPUT NUMBER	ASSIGNED FUNCTION	INSTALLED OPTIONS 4IN/16OUT ONLY	16IN/4OUT ONLY	4IN/16OUT AND 16IN/4OUT
5	_____	J15 - 2	J16 - 17	J15 - 2
6	_____	J15 - 15	J16 - 5	J15 - 15
7	_____	J15 - 3	J16 - 18	J15 - 3
8	_____	J15 - 16	J16 - 6	J15 - 16
9	_____		J16 - 19	J16 - 17
10	_____		J16 - 7	J16 - 5
11	_____		J16 - 20	J16 - 18
12	_____		J16 - 8	J16 - 6
13	_____		J16 - 21	J16 - 19
14	_____		J16 - 9	J16 - 7
15	_____		J16 - 22	J16 - 20
16	_____		J16 - 10	J16 - 8
17	_____		J16 - 23	J16 - 21
18	_____		J16 - 11	J16 - 9
19	_____		J16 - 24	J16 - 22
20	_____		J16 - 12	J16 - 10
21	_____			J16 - 23
22	_____			J16 - 11
23	_____			J16 - 24
24	_____			J16 - 12

WARNING

CHANGING THE DEFINITION OF THE DIGITAL INPUTS MAY CAUSE MACHINERY TO START. AFTER THE OPERATOR TRIES TO CHANGE A DEFINITION, THE FOLLOWING MESSAGE IS DISPLAYED.

```
      WARNING
EQUIPMENT MAY START

CONTINUE       ABORT
```

IF THE OPERATOR PRESSES CONTINUE, BE AWARE THE ACTION MAY CAUSE DAMAGE OR INJURY. IF THE OPERATOR PRESSES ABORT, THE SYSTEM RETURNS TO THE PREVIOUS SCROLL.

4. Define Digital Outputs

Digital outputs can be programmed. The following screen shows one logical function per time, and allows the operator to assign it to a physical output. The **NEXT** key scrolls between the logical functions. The **NC/NO** key selects the Normally Open (NO) or Normally Closed (NC) status of the output.

Normally Open means the output is not energized in normal conditions. To program a function, scroll with **NEXT** until the function is displayed, then enter the number of the physical output and confirm with **ENTER**. Finally, scroll with **NC/NO** until the desired mode is displayed. Assigning a function to 0 disables the function.

```
- I/O DEF SCROLL 5 -
Dig. output def.
Alarms __ NC
ENTER NC/NO  NEXT
```

Password: SERVICE

The following table shows the available logical selections that can be assigned to any available physical output. Typical field wiring drawings show outputs wired to the DEFAULT physical output as listed in the table below. Default selections can be reassigned to any physical output if desired.

Logical selections should not be reassigned after the physical outputs have been wired.

CAUTION

LOGICAL SELECTIONS RETURN TO THE DEFAULT IF THE BATCH WEIGHT INDICATOR IS COLD STARTED.

SELECTIONS:	DEFAULT:
Comp. 1	9 NO (only if comp. 1 defined)
Comp. 2	10 NO (only if comp. 2 defined)
Comp. 3	11 NO (only if comp. 3 defined)
Comp. 4	12 NO (only if comp. 4 defined)
Comp. 5	13 NO (only if comp. 5 defined)
Comp. 6	14 NO (only if comp. 6 defined)
Comp. 7	15 NO (only if comp. 7 defined)
Comp. 8	16 NO (only if comp. 8 defined)
Comp. 9	17 NO (only if comp. 9 defined)
.....	.....
Comp. 40	0 NO (only if comp. 40 defined)
Alarm	1 NC
Shut down	2 NC
Ready	3 NO
High load	0 NO (only if high load option enabled)
High load S1	0 NO (only if more than 1 scale installed)
High load S2	0 NO (only if more than 1 scale installed)
High load S3	0 NO (only if more than 2 scales installed)
High load S4	0 NO (only if more than 3 scales installed)
Low load	0 NO (only if low load option installed)
Low load S1	0 NO (only if more than 1 scale installed)
Low load S2	0 NO (only if more than 1 scale installed)
Low load S3	0 NO (only if more than 2 scales installed)
Low load S4	0 NO (only if more than 3 scales installed)
H rate	4 NO
H rate S1	0 NO (only if more than 1 scale installed)

SELECTIONS:	DEFAULT:
H rate S2	0 NO (only if more than 1 scale installed)
H rate S3	0 NO (only if more than 2 scales installed)
H rate S4	0 NO (only if more than 3 scales installed)
L rate	5 NO
L rate S1	0 NO (only if more than 1 scale installed)
L rate S2	0 NO (only if more than 1 scale installed)
L rate S3	0 NO (only if more than 2 scales installed)
L rate S4	0 NO (only if more than 3 scales installed)
Charge end	6 NO
Charge end S1	0 NO (only if more than 1 scale installed)
Charge end S2	0 NO (only if more than 1 scale installed)
Charge end S3	0 NO (only if more than 2 scales installed)
Charge end S4	0 NO (only if more than 3 scales installed)
Disch. end	7 NO
Disch. end S1	0 NO (only if more than 1 scale installed)
Disch. end S2	0 NO (only if more than 1 scale installed)
Disch. end S3	0 NO (only if more than 2 scales installed)
Disch. end S4	0 NO (only if more than 3 scales installed)
Cycle end	8 NO
Cycle end S1	0 NO (only if more than 1 scale installed)
Cycle end S2	0 NO (only if more than 1 scale installed)
Cycle end S3	0 NO (only if more than 2 scales installed)
Cycle end S4	0 NO (only if more than 3 scales installed)
Need refill	0 NO
Need ref S1	0 NO (only if more than 1 scale installed)
Need ref S2	0 NO (only if more than 1 scale installed)
Need ref S3	0 NO (only if more than 2 scales installed)
Need ref S4	0 NO (only if more than 3 scales installed)

One non-assignable Fault output and three assignable outputs are standard on the mother board.

MOTHER BOARD OUTPUTS

PHYSICAL OUTPUT NUMBER	ASSIGNED FUNCTION	FIELD MOUNT	PANEL MOUNT
	Fault Output	TB8 1 & 2	TB2 15 & 16
1	_____	TB8 7 & 8	TB2 12 & 16
2	_____	TB8 5 & 6	TB2 13 & 16
3	_____	TB8 3 & 4	TB2 14 & 16

Additional assignable logical selections from the above table can be assigned by adding optional I/O boards. Available options are 4in/16out, 16in/4out or 20in/20out by adding both boards.

DIGITAL INPUT/OUTPUT BOARD OUTPUTS

PHYSICAL OUTPUT NUMBER	ASSIGNED FUNCTION	INSTALLED OPTIONS 4IN/16OUT ONLY	16IN/4OUT ONLY	4IN/16OUT AND 16IN/4OUT
4	_____	J15 - 17	J16 - 2	J16 - 2
5	_____	J15 - 5	J16 - 15	J16 - 15
6	_____	J15 - 18	J16 - 3	J16 - 3
7	_____	J15 - 6	J16 - 16	J16 - 16
8	_____	J15 - 19		J15 - 17
9	_____	J15 - 7		J15 - 5
10	_____	J15 - 20		J15 - 18
11	_____	J15 - 8		J15 - 6
12	_____	J15 - 21		J15 - 19
13	_____	J15 - 9		J15 - 7
14	_____	J15 - 22		J15 - 20
15	_____	J15 - 10		J15 - 8
16	_____	J15 - 23		J15 - 21
17	_____	J15 - 11		J15 - 9
18	_____	J15 - 24		J15 - 22
19	_____	J15 - 12		J15 - 10
20	_____			J15 - 23
21	_____			J15 - 11
22	_____			J15 - 24
23	_____			J15 - 12

WARNING

CHANGING THE DEFINITION OF THE DIGITAL OUTPUTS MAY CAUSE MACHINERY TO START. AFTER THE OPERATOR TRIES TO CHANGE A DEFINITION, THE FOLLOWING MESSAGE IS DISPLAYED.

```
      WARNING
EQUIPMENT MAY START

CONTINUE       ABORT
```

IF THE OPERATOR PRESSES CONTINUE, BE AWARE THE ACTION MAY CAUSE DAMAGE OR INJURY. IF THE OPERATOR PRESSES ABORT, THE SYSTEM RETURNS TO THE PREVIOUS SCROLL.

5. Define BCD Output Data

   If a optional load out output board is installed, the operator can select the related BCD variable.

```
-I/O DEF SCROLL 6 -
BCD output variable
   > Net <
CHOICES  ENTER
```

Password: SERVICE

Default: NONE
Selections: NONE, NET, GROSS, DIFF

Or, if more than one scale enabled:

Selections: NONE,
NET S1, GROSS S1, DIFF S1(2 scales)
NET S2, GROSS S2, DIFF S2 (2 scales)
NET S3, GROSS S3, DIFF S3 (3 scales)
NET S4, GROSS S4, DIFF S4 (4 scales)

If a selection other than **NONE** is made, the following screens allow the operator to define the polarity and the parity check of the BCD output. The polarity selection reverses the signals from NO to NC and vice versa. If a parity criterion is selected, the most significant bit of the BCD output is used for parity check.

```
-I/O DEF SCROLL  6A -
BCD output polarity
> Positive <
CHOICES  ENTER
```

Password: SERVICE

Default: NEGATIVE
Selections: POSITIVE, NEGATIVE

```
-I/O DEF SCROLL 6B -
BCD output parity
> Yes <
CHOICES  ENTER
```

Password: SERVICE

Default: NO
Selections: NO, YES

6. Define BCD Input Data

If an optional load out input board is installed, the operator can select the related variable.

```
-I/O DEF SCROLL 7 -
BCD input variable
 > Thresholds <
CHOICES  ENTER
```

Password: SERVICE

Default: NONE
Selections: NONE, RECIPE (R), CYCLE (C), SET POINT (S), R+C, R+C+S

If a selection other than **NONE** is made, the following screen allows the operator to define the polarity of the BCD input. The polarity selection reverses the signals from NO to NC and vice versa.

```
-I/O DEF SCROLL  7A -
BCD input polarity
> Positive <
CHOICES  ENTER
```

Password: SERVICE

Default: NEGATIVE
Selections: POSITIVE, NEGATIVE

1.5.2 Alarms Definition

The alarms of the batch weight indicator can be programmed. Process alarms such as low and high rate can be set to the desired range. In addition, all alarms can be defined to be:

ALARM When an alarm occurs, the front panel ALARM status indicator illuminates. An ALARM message flashes in the lower, right hand RUN display. Pressing ALARM displays the alarm. Time and date are also displayed if the optional COMM board is installed.

Pressing RESET clears the alarm message if the alarm parameter has cleared. If the alarm parameter has not cleared, the message "ACK" appears when RESET is pressed. When the alarm parameter clears, the alarm indication clears.

Pressing RUN at any time returns the operator to the RUN menu.

Alarms can be automatically printed if the print option is enabled.

SHUT DOWN The alarm handler operates as above except the READY status indicator goes off at the same time as the ALARM status indicator comes on.

In the I/O definition scroll, alarm and ready can be assigned to N/C or N/O physical outputs. The output activates and deactivates at the same time as the front panel status indicators.

NONE Alarm is deactivated.

1. Define High and Low Load Alarm

```
- ALARM  SCROLL 1 -
High load alarm
> no <
CHOICE ENTER SCALE#
```

Password: OPERATOR

Default: NO
Selections: YES, NO

If the selection in the previous screen was YES, enter the high load set points for the alarm.

The **UNITS** key allows the operator to specify the set points in engineering units. The **% key** selects set points in percent referenced to scale capacity.

```
- ALARM  SCROLL 1A -
High load set
              _____ %
ENTER  UNITS  SCALE#
```

Password: OPERATOR

Default: 100 %
Min: 0 %
Max: 105 %

Enter the desired delay time before the alarm is monitored.

```
- ALARM  SCROLL 1B -
High load delay
              _____ s
ENTER         SCALE#
```

Password: OPERATOR

Default: 2 s
Min: 0 s
Max: 90 s

Use the **CHOICE** key to turn on or off the low load alarm. Confirm with **ENTER**.

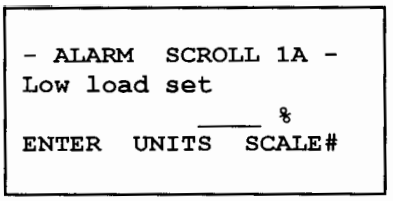
```
- ALARM  SCROLL 1 -
Low load alarm
> no <
CHOICE ENTER  SCALE#
```

Password: OPERATOR

Default: NO
Selections: YES, NO

If the selection in the previous screen was YES, enter the low load set points for the alarm.

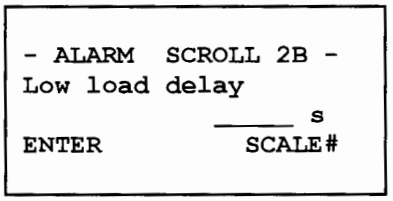
The **UNITS** key allows the operator to specify the set points in engineering units. The **% key** selects set points in percent referenced to scale capacity.



Password: OPERATOR

Default: 10 %
Min: 0 %
Max: 105 %

Enter the desired delay time before the alarm is monitored.

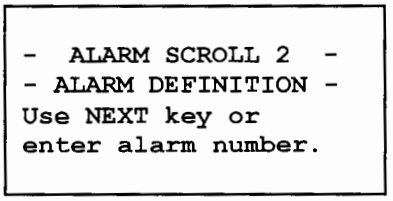


Password: OPERATOR

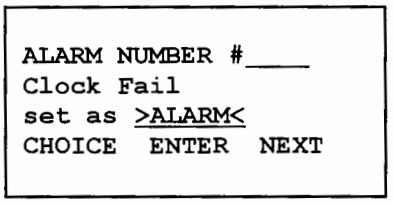
Default: 2 s
Min: 0 s
Max: 90 s

2. Setup Alarm Modes

The following message is displayed for 3 seconds:



After 3 seconds, the following screen is displayed. The user can use the **CHOICE** soft key to select the desired mode between ALARM (just a warning message), SHUT DOWN (Warning plus fault output) and NONE (no action). Confirm with **ENTER**. Use the **NEXT** key to scroll between alarms, or enter the alarm number.



Password: SERVICE

1.5.3 Alarms List

1	CLOCK FAIL
2-6	LOAD CELL FAIL S#
7	RAM FAIL
8	ROM FAIL
9-13	HIGH LOAD S#

14-18 LOW LOAD S#
19 WARM START
20 COLD START
21 POWER DOWN DURING CALIBRATION
22-26 CALIB TIME S#
27-29 EXTERN ALARM n
30-35 HW CONF. CHANGED
36 BCD OVERFLOW
37 MATH ERROR
38 PRINTER ERROR
39 COMMUNICATION ERROR

40-44 BAD START WEIGHT S#
45-49 STOP CYCLE S#
50-54 END CYCLE S#
55-59 ABORT CYCLE S#
60-64 COMP. TIME OUT
65-69 DEVIATION S#
70 ALLEN-BRADLEY RI/O ERROR
71 PROFIBUS-DP ERROR

1.6 MAIN MENU 5

Main Menu 5 is dedicated to the serial options. **COMM A** is used to set up the serial line of the optional board Communication A, **COMM B** is used for the optional Communication B (fieldbus) board, and **PRINT** is used for setting up the printer output.

All menus need an optional board to be installed.

```
-    MAIN MENU 5   -
Press MENU for more

COMM A COMM B  PRINT
```

1.6.1 Communication A

The communication board A has one serial channel, which can be configured using jumpers as an RS232, RS485 or C.L. channel. The serial channel can be used for printing or for a serial communication with an intelligent device such as a PLC or a PC.

Two boards can be installed and programmed, typically one for the printer and one for the supervisor.

The following screens define the communication parameters for the first and the second channel.

```
- COMM. A SCROLL 1 -
Baud rate port #1
  > 2400 <
CHOICE  ENTER
```

Password: SERVICE

Default: 9600
Selections: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200

```
- COMM. A SCROLL 2 -
Parity port #1
> No <
CHOICE   ENTER
```

Password: SERVICE

Default: NO
Selections: NO, EVEN, ODD

```
- COMM. A SCROLL 3 -
Stop bits port #1
  > 1 stop bit <
CHOICE   ENTER
```

Password: SERVICE

Default: 1 STOP BIT
Selections: 1 STOP BIT, 2 STOP BITS

```
- COMM. A SCROLL 4 -
Wordlength port #1
  > 8  bits <
CHOICE   ENTER
```

Password: SERVICE

Default: 8 BITS
Selections: 7 BITS, 8 BITS

Some commonly used protocols are implemented in the system. Possible selections are:

PC-MASTER	Ramsey proprietary protocol: Multi Drop, Master Slave.
SIEMENS 3964R	A proprietary protocol of Siemens. Point to point, Multi Master.
ALLEN BRADLEY DF1	A proprietary protocol of Allen Bradley. Multi Drop, Master Slave.
MODBUS	A proprietary protocol of AEG Modicon. Multi Drop, Master Slave.
PRINTER	Not a protocol, selects printer output.

```
-COMM. A SCROLL  5 -
Protocol port #1
  > MODBUS <
CHOICE   ENTER
```

Password: SERVICE

Default: MODBUS

Selections: PC MASTER, SIEMENS 3964R, ALLEN BRADLEY DF1, MODBUS, PRINTER

If a second communication A board is installed, the following screen appears. These screens operate exactly as the ones dedicated to the communication board 1.

```
- COMM. A SCROLL 6 -
Baud rate port #2
  >_2400_<
CHOICE   ENTER
```

Password: SERVICE

Default: 9600
Selections: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200

```
- COMM. A SCROLL 7 -
Parity port #2
>_No_<
CHOICE   ENTER
```

Password: SERVICE

Default: NO
Selections: NO, EVEN, ODD

```
- COMM. A SCROLL 8 -
Stop bits port #2
>_1 stop bit_<
CHOICE   ENTER
```

Password: SERVICE

Default: 1 STOP BIT
Selections: 1 STOP BIT, 2 STOP BITS

```
- COMM. A SCROLL 9 -
Wordlength port #2
>_8  bits_<
CHOICE   ENTER
```

Password: SERVICE

Default: 8 BITS
Selections: 7 BITS, 8 BITS

```
-COMM. A SCROLL 10 -
Protocol port #2
>_PC Master_<
CHOICE   ENTER
```

Password: SERVICE

Default: PRINTER
Selections: PC MASTER, SIEMENS 3964R, ALLEN BRADLEY DF1, MODBUS, PRINTER

If the selected protocol is not PRINTER on one of the two lines, the following screens define the use of the CTS handshake signal, the ADDRESS of the device in the multi drop line, and the access permission from the remote supervisor. If NONE is selected, the supervisor has full access to the device. If LIMITED is selected, the supervisor can only access those variables that are accessible with the OPERATOR password. If PROTECTED is selected, the unit can only be read by the supervisor.

```
- COMM. A SCROLL 11 -
Cts
  > disactive <
CHOICE   ENTER
```

Password: SERVICE

Default: DISACTIVE
Selections: DISACTIVE, ACTIVE

```
- COMM. A SCROLL 12 -
Address
  ____
ENTER          SCALE#
```

Password: SERVICE

Default: 1, 2 for scale 2 , 3 for scale 3 , 4 for scale 4
Min: 1
Max: 255

```
-COMM. A SCROLL 13 -
Access lev.
  > None <
CHOICE   ENTER
```

Password: SERVICE

Default: NONE
Selections: NONE, LIMITED, PROTECTED

1.6.2 Communication B (Field Bus)

Refer to the field bus manual if this option is installed.

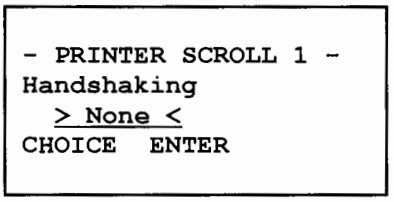
1.6.3 Print

The Micro-Tech 2000 has a fully programmable printer format. The following section explains how to program it according to the specific needs.

1. Define Handshaking

The system can be configured to operate without any handshake (NONE), or using the Clear To Send signal (CTS) or the XON-XOFF sequence. Refer to the instruction manual of the printer to define which selection is required. The selection NONE is only supplied for testing purposes, but is not recommended for normal use. If NONE is selected, the system is not able to recognize if the printer is on line or not, or if the paper is empty.

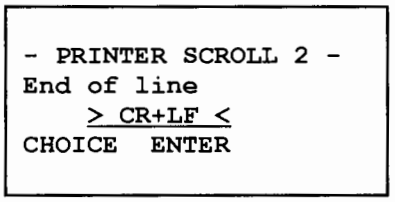
The most commonly used protocol is the CTS, which is a signal generated by the printer to indicate whether it is ready to receive data or not.



Password: SERVICE

Default: NONE
Selections: NONE, CTS, XON-XOFF

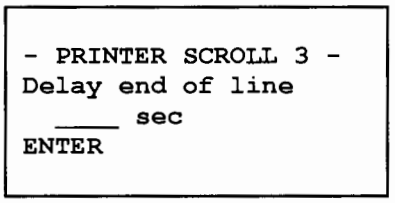
Different printers use different end of line patterns. Select the one you need according to the printer.



Password: SERVICE

Default: CR+LF
Selections: CR, LF, CR+LF

Some simple printers cannot accept characters while they are printing. In some cases, the handshake is not well controlled by the printer, so a delay at end of line is helpful.



Password: SERVICE

Default: 0 sec
Min: 0 sec
Max: 5 sec

It is possible to define if at the end of the report a FORM FEED character must be sent to the printer. This character is used by most printers to move paper at the end of the page. If NO is selected, a normal END OF LINE character(s) is(are) printed at the end of the report.

```
- PRINTER SCROLL 4 -
Form feed
  > No <
CHOICE   ENTER
```

Password: SERVICE

Default: NO
Selections YES, NO

2. Optional Reports

By selecting YES in the following screen, the system is instructed to print a batch report at the end of a recipe execution.

```
- PRINTER SCROLL 5 -
Print batch
  > No <
CHOICE   ENTER
```

Password: SERVICE

Default: NO
Selections: YES, NO

By selecting YES in the following screen, the system is instructed to print one line each time a new alarm condition occurs. The alarm is printed as follows:

xx-xx-xxxx yy:yyz
kkkkkkkkkkkkkkkkkkk

where:

xx-xx-xxxx Day, Month, Year, printed according to the local format as defined in Main Menu 2 - Display.

yy:yyz Hour, Minutes, am/pm printed according to the local format as defined in Main Menu 2 - Display

kkkkkkkkkkkkkkkkkkk Alarm message, same message appearing on the screen.

For example:

03-10-1998 8:14a
Clock fail

```
- PRINTER SCROLL 6 -
Print alarms
  > No <
CHOICE   ENTER
```

Password: SERVICE

Default: NO
Selections: YES, NO

Define if you want to add a heading string in your report. String can be used to add the Customer name as well as other information that you want to include in the print format.

```
- PRINTER SCROLL 7 -
Contents string #1
  > yes <
CHOICE   ENTER
```

Password: OPERATOR

Default: NO
Selections: YES, NO

If you selected YES, next scroll is displayed.

Use the alphanumeric keypad to enter the string (20 digits). Press the numeric key corresponding to the letter that you want to type. All the times you press a new key, cursor moves to the right one place. If you need to use two times the same key (example for double letters), move the cursor right using the arrow keys (left and right soft keys).

```
- PRINTER SCROLL 7A-
Contents string #1
_____________________
<       ENTER        >
```

Password: OPERATOR

Default: " "

Define if you want to add a second heading string in your report.

```
- PRINTER SCROLL 8 -
String #2
  > yes <
CHOICE   ENTER
```

Password: OPERATOR

Default: NO
Selections: YES, NO

If you selected YES, next scrolls are displayed.

```
- PRINTER SCROLL 8A-
Contents string #2
_____________________
 <       ENTER      >
```

Password: OPERATOR

Default: " "

There is a third string. If only one scale is defined, it is a third heading string exactly as the previous two. If more scale are defined, it may be used to define a scale identifier. String definition is different for each scale and it is used as scale heading.

```
- PRINTER SCROLL 11 -
String #3
  > yes <
CHOICE  ENTER
```

Password: OPERATOR

Default: NO
Selections: YES, NO

If you selected YES, the next scroll is displayed.

SCALE# key allows the operator to select the scale.

```
- PRINTER SCROLL 11A-
Contents string #3
_____________________
                SCALE#
```

Password: OPERATOR

Default: " "

If 1 scale is defined only or if more scales, when numeric or alphanumeric key is pressed, ENTER and ARROWS keys compare in the fourth line of the display.

1.7 MAIN MENU 6

Main Menu 6 is dedicated to Audit Trails and Linearization.

```
-    MAIN MENU 6   -
Press MENU for more
AUDIT
TRAIL    LINEAR
```

1.7.1 Audit Trails

This scroll is only displayed if the Audit Trails option is installed.

The Audit Trails function is a method for recording all changes in setup data for creating a permanent record of the history of the scale. This is a specific requirement of the W&M in USA for approved scales, and is an alternative to the European method, which is to seal the unit. Instead of preventing change of parameters, the Audit Trails method allows changes but keeps track of them. All the time the operator changes a value which affects weighing, the new parameter is recorded with time and date. Also, tracking of same functions or events is kept.

A list of recorded variables and functions is reported below.

All changes can be printed when required.

Entering in the menu, the following screen appears for a short time (3 seconds):

```
-  AUDIT TRAILS  -
Use scroll keys or
enter trail number
```

After 3 seconds, the next screen is shown:

```
TRAIL EVENT No. 0000
hh:mm       mm-dd-yyyy
ss nnnnnn = vvvvvvv/O(ld)
ss nnnnnn = vvvvvvv/N(ew)
```

hh:mm	Time of change
mm-dd-yyyy	Date of change, the format may vary depending on the Country.
ss	Identifies the scale (only if more scales are defined)
nnnnnn	Parameter's name
vvvvvv	Parameter's values, before change (old) and after change (new).

Time and date are only shown if an optional Communication board is installed.
The user can scroll between events which are displayed in order of date and time.
The user can also enter a number to display a specific event.

1. Audit Trails Variables and Functions List

Parameter's Name	**Meaning**
w unit	weight units
t unit	total units
damp w	damping weight
s cap	scale capacity
s div	scale division
lc sen	load cell sensitivity
lc cap	load cell capacity
lc nr	load cells number
lc r1	load cell 1 resistance
.....	.....
lc r6	load cell 6 resistance
test w	test weights for WTS span calibration
rcal r	Rcal resistance for RCAL span calibration
lin 1	linearization factor 1 (0-10 %)
....	.....
lin 10	linearization factor 1 (90-100 %)
span	span

Parameter's

Name	Meaning
zero	zero

Function's

Name	Meaning
Autozero	autozero function has been executed
Autospan Rcal	autospan with Rcal method has been executed.
Autospan WTS	autospan with test weights method has been executed
Cold Start	all instrument data has been lost

1.7.2 Linearization

Manual linearization can be accomplished by applying a known test weight(s) or loading the bin with preweighed material and calculating the scale error. Pressing the ACQuire soft key displays the scale weight for the applied known weight. The operator can ten enter in a correction factor. Up to five correction factors can be installed in any order and will be internally sorted by scale loading.

Linearization must first be enabled in Main Menu 6 before any menu screens will appear.

NOTE: Prior to performing a manual linearization, the scale should be properly zeroed. See Section 3.8 and 3.9.

1. Press the **MENU** key repeatedly until Main Menu 6 appears.

```
-   MAIN MENU 6   -
Press MENU for more

       LINEAR
```

Press **LINEAR** soft key to access the Linearization scroll. The following screen appears.

Press **CHOICE** for selections, **YES** to enable, or **NO** to disable linearization. Once enabled, no linearization is done until the operator manually enters the linearization factors.

```
- LINEARIZATION 1 -
Linearization
NO
CHOICE  ENTER
```

Password: SERVICE

Default: NO
Selections: YES, NO

NO turns off linearization and sets all factors to 1.00. **YES** turns on linearization.

2. Set linearization to **NO** and return to the **RUN** screen.

3. Apply bin loading at the points to be linearized. Record the indicated weight for each point.

4. Calculate the correction factor for each point using the following formula:

$$Correction\ Factor = \frac{Actual\ or\ reference\ weight}{Displayed\ weight}$$

5. Enter linearization factors.

   Once the factors have been computed, they must be entered. Press the **MENU** key repeatedly until the **LINEAR** soft key is displayed. Press this soft key and then **DOWN ARROW**. Set linearize to **YES**, press **ENTER**. Press the **DOWN ARROW** key to LINEARIZ #1.

   NOTE: Pressing the "WTS" softkey allows entry of Weight.

   Pressing "FACTOR" softkey allows entry of Factor.

   Type in the first weight recorded in Step 4 and press **ENTER**.

```
- LINEARIZ #1 -
Weight       0.0 lb.
Fact.        1.00000
ENTER    WTS
```

or

```
- LINEARIZ #1 -
Weight       0.0 lb.
Fact.        1.00000
ACQ.    FACTOR
```

   If ENGLISH or MIXED:

Default:	0.0 lbs
Min:	0.0 lbs
Max:	500.0 lbs

   If METRIC:

Default:	0.0 kg
Min:	0.0 kg
Max:	226.8 kg

   Type in the first factor calculated in Step 4 and press **ENTER**.

   If you enter 1.000 (default value), the load will not be corrected in that portion of the range. A number lower than 1.000 will reduce the span, while a number larger than 1.000 will increase the span.

Default:	1.000000
Min:	0.000000
Max:	1.500000

   Press the **DOWN ARROW**. Repeat Step 5 for all remaining calculated factors.

RAMSEY PRODUCTS

MICRO-TECH 2000 MODEL 2102/2202 BATCH CONTROLLER

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APPENDIX A/2
BATCH WEIGHER CYCLE SEQUENCE

2.0 OVERVIEW

Purpose of this document is to give to the user an overview of all the elements inherent to the batch and a guide to understand and solve all the situation that could happen during a cycle.

Moreover, this document can be useful also for who is doing the first initialization of the system. The order on which the arguments are explained is the logical order on which the user has to approach the configuration of the instrument.

The MT2102 is an instrument able to handle a whole till four scales. In its maximum configuration it can handle 4 scales and 40 components.

In the following sections will be considered the functioning with a single scale, for multiscale mode refers to section 7.

Interface with the system is done through programmable digital and analog inputs and outputs.

The instrument can be expanded, installing optional boards in order to fit in the best way the system characteristics.

The following table sums up the maximum dotation of the instrument:

Scales number	4
Components	40
Digital inputs	52
Digital outputs	52
Analog outputs	4
BCD inputs	16 multiplexed (4 digits)
BCD outputs	16 multiplexed (4 digits)
Recipes	100
Recipe lines	500

2.1 DEFINITION OF THE COMPONENTS

All the elements of the system, handled by the instrument by means of digital output, that determine, when activated, a variation of weight on the scale are considered components by the instrument.

That means that also discharge and refill devices are components.

Each component we want to use in our system should be previously defined, that means that a series of data should be entered to tell to the instrument how to handle them.

These data are briefly listed below:

Name

It is a 6 digit alphanumerical string of identification of the component.

Type

Is the main characteristic of the component, from this selection depends the sequence to start when the component is met in the running recipe.

The component types are: CHARGE BATCH, DISCHARGE BATCH, DISCHARGE, REFILL and TIME BASED, they are explained in detail in the next sections. By default the type selection is NOT USED, *a component is defined only when the component type has been selected.* All the following data are not displayed before this operation.

Next data are different in basis of the type of component selected:

CHARGE BATCH AND DISCHARGE BATCH COMPONENT

Setpoint source

In case the system is provided by a BCD input, it is possible to define if the component setpoints should be manually entered in the recipe (LOCAL) or read from an external preset (BCD INP).

Preset

Define the amount of material to be dosed at low rate.

Cut off mode

Define how to handle the queue of material after component deactivation. Choices are:

MANUAL, the amount of material is manually entered.

AUTO, the queue is computed by the instrument with subsequent approach method.

Cut off value

Is the amount of material of the queue.

Cut off max corr

If cut off mode is AUTO, is the maximum value that the queue can reach.

Start delay

It is a delay before the activation of the component.

Stabilization time

It is a delay at the end of the component batch before totals are updated.

Max component time

Is the maximum time for the component batch.

DISCHARGE COMPONENT

Automatic at recipe end ?

Defines if this component should be executed automatically at the end of each recipe. This has the same effect to define the component in all the recipes, but it is surely more practice.

Naturally, it is possible to define only one component, if you select YES here , this scroll will not appear in other component definitions.

Discharge interlock

Only if it is the end batch component (see above).

Defines if the instrument must wait for the discharge interlock input before to start the discharge and, in this case, if this input should stay fix for all the batch or not.

End discharge

Only if it is the end batch component (see above).

Defines if at the end of the batch the end discharge output must be activated and, in this case, if it should be steady or simply a pulse.

Start delay

it is a delay before the activation of the component.

Stabilization time

It is a delay at the end of the component batch.

Max component time

Is the maximum time for the component batch.

REFILL COMPONENT

Automatic at recipe end ?

Defines if this component should be executed automatically at the end of each recipe. This has the same effect to define the component in all the recipes, but it is surely more practice.

Naturally, it is possible to define only one component, if you select YES here, this scroll will not appear in other component definitions.

High refill setpoint

Only if it is the end batch component (see above).

Defines the amount of material to refill.

Charge interlock

Only if it is the end batch component (see above).

Defines if the instrument must wait for the charge interlock input before to start the refill and, in this case, if this input should stay fix for all the batch or not.

End charge

Only if it is the end batch component (see above).

Defines if at the end of the batch the end charge output must be activated and, in this case, if it should be steady or simply a pulse.

Start delay

It is a delay before the activation of the component.

Stabilization time

It is a delay at the end of the component batch.

Max component time

Is the maximum time for the component batch.

TIME BASED

Start delay

It is a delay before the activation of the component.

Stabilization time

It is a delay at the end of the component batch.

Max component time

Is the maximum time for the component batch.

The instrument is able to handle up to 40 components.

In SCALE DATA menu is possible to define the max number of components required by the system. Its purpose is to avoid to display and print data of never used components.

The last operation we have to do to complete the components definition is to assign them an output, this operation will be explained in section 3 'Definition of the I/O'.

2.1.1 Charge Batch Component

A CHARGE BATCH component is a component from which a defined amount of material is extract into the scale. The extraction procedure takes place in two phases, the first at high rate and a second at low rate. In the second phase the rate of extraction decreases to allow a best accuracy. The PRESET value defined in the component data determines when the low rate phase should start.

The accuracy is checked at the end of the batch, if the difference between the setpoint and the quantity of material extracted is higher then a defined value an alarm is generated.

2.1.2 Discharge Batch Component

A DISCHARGE BATCH component is a component that when active causes a loss of material from the scale. The amount of material to extract from the scale is defined in the recipe. Also in this case the extraction procedure takes place in two phases, the first at high rate and a second at low rate. In the second phase the rate of extraction decreases to allow a best accuracy. The PRESET value defined in the component data determines when the low rate phase should start.

The accuracy is checked at the end of the batch, if the difference between the setpoint and the quantity of material extracted is higher then a defined value an alarm is generated.

2.1.3 Discharge Component

A DISCHARGE component is used to empty the scale, the component will stay active until the weight on the scale reach the zero weight value. The discharge is all at the same rate and there is not deviation check at its end.

Zero weight value is defined in the SCALE DATA scroll.

2.1.4 Refill Component

A REFILL component is used to refill the scale. It is normally used in recipe in which there are DISCHARGE BATCH components. When a REFILL component is defined in a recipe, the instrument asks for its mode of operation. There are two possibilities:

FORCE, when encountered in the recipe, the component is activated if the weight in the scale is lower then a defined threshold of weight.

Material will drop into the scale until the threshold has been reached.

AUTO, before a discharge batch cycle the instrument checks if there is enough material into the scale. If not, the REFILL component is activated until the refill threshold has been reached. So the refill is automatically started only if necessary.

In any case the refill is done at a fixed rate and there is not deviation check at its end.

2.1.5 Time Based Component

The time based are components activated for a defined period. They do not have a weight set point to reach but only a time to be activate.

This kind of component can be used for example to have a mixer running in between two components.

2.2 DEFINITION OF THE RECIPE

When all the components you need have been defined, you can precede defining a recipe. Still pressing the RECIPE key we can accede to the RECIPE DEFINITION scroll.

A recipe is composed by a series of data, the first two are:

Recipe name

It is a 8 digit alphanumerical string of identification of the recipe.

The other data are organized in recipe lines. A line contains all the information regarding a single batch phase. When a recipe is started, the instrument reads and executes line per line all the recipe, each line should contain a component number and all the parameters that instrument needs for its handling. In detail the data for line are:

Component number

Enter the component to be activated in this phase of the recipe.

Then, in basis of the type of selected component:

CHARGE BATCH COMPONENT

Set point

Defines the amount of material to batch out. Only if set point source selection in component definition is LOCAL.

Max deviation

Defines the maximum deviation between the set point and the amount of material batch out.

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock - not used - 0

	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32
Restart batch if neg err.	- yes	-	40
	- no	-	0

Charge interlock

Defines if the instrument must wait for the charge interlock input before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End charge

Defines if at the end of the batch the end charge output must be activated and, in this case, if it should be steady or simply a pulse.

Restart batch if negative error

At the end of the batch, after stabilization time, if batched weight is less then the set point, the batch can be restarted until the set point is reached.

DISCHARGE BATCH COMPONENT

Set point

Defines the amount of material to batch out. Only if set point source selection in component definition is LOCAL.

Max deviation

Defines the maximum deviation between the set point and the amount of material batch out.

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32
Restart batch if neg err.	- yes	-	40
	- no	-	0

Discharge interlock

Defines if the instrument must wait for the discharge interlock input before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End discharge

Defines if at the end of the batch the end charge output must be activated and, in this case, if it should be steady or simply a pulse.

Restart batch if negative error

At the end of the batch, after stabilization time, if batched weight is less then the set point, the batch can be restarted until the set point is reached.

DISCHARGE COMPONENT

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32

Discharge interlock

Defines if the instrument must wait for the discharge interlock input before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End discharge

Defines if at the end of the batch the end charge output must be activated and, in this case, if it should be steady or simply a pulse.

REFILL COMPONENT

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Refill mode	- auto	-	0
	- forced	-	2
Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32

Refill mode

Define if the refill should be executed at this point of the recipe (FORCED) or if the instrument should check the weight into the scale before start a batch discharge component and only in this case, if necessary, to execute the refill (AUTO).

High refill setpoint

Defines the amount of material to refill.

Charge interlock

Defines if the instrument must wait for the charge interlock input before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End charge

Defines if at the end of the batch the end charge output must be activated and, in this case, if it should be steady or simply a pulse.

TIME BASED COMPONENT

Activation time

Defines the time of activation of the component.

Label

Gives to the instrument information about how to handle this phase of the batch. The operator has to enter a number, this number is obtained adding a constant number for each option he want to activate. The table below resumes the available options and the corresponding number:

Discharge interlock	- not used	-	0
	- pulse	-	4
	- steady	-	8
End discharge	- not used	-	0
	- pulse	-	16
	- steady	-	32

Comp. interlock

Defines if the instrument must wait for the component interlock input (charge interlock is used in this case) before to start the batch and, in this case, if this input should stay fix for all the batch or not.

End comp.

Defines if at the end of the batch the end component output (charge interlock is used in this case) must be activated and, in this case, if it should be steady or simply a pulse.

A recipe can be composed by the number of line you need, the recipe end is identified by inputting 0 as component number, message 'RECIPE END' will be displayed in this case.

The instrument is able to store till 100 recipes for a total of 500 lines.

In SCALE DATA menu is possible to define the max number of recipe required by the system. Its purpose is to avoid to display and print data of never used recipes.

2.2.1 RECIPE VERIFY

Once a recipe has been written, it can be verified using a function implemented in the software of the instrument.

This function can be manually activated by keyboard but it is also automatically executed by the instrument when it receives a start command. While in the first case the instrument gives indication to the user about the problem encountered and the recipe line where the problem has been detected, in the second the user will get only a BAD RECIPE message and the cycle will be aborted.

Detected anomalies are:

Total over max

The sum of the set point (for discharge batch component set point is considered negative) of the components in the recipe overlaps the scale capacity.

Suggested action.

Check component set points in the recipe lines and scale data value in SCALE DATA scroll.

Check 'Zero-start batch set' in SCALE DATA scroll.

Total under zero

The sum of the set points (for discharge batch component set point is considered negative) of the component is negative.

Suggested action.

Check component set points in the recipe lines.

Check 'Zero-start batch set' in SCALE DATA scroll.

Recipe empty

The recipe is empty. Component number 0 has been defined in the first line of the recipe.

Suggested action.

Check recipe number.

2.3 DEFINITION OF THE I/O

Through the inputs and outputs the instrument commands and controls the different phases of the cycle.

In the next sections, all the digital and analog inputs and outputs available on the instrument and inherent to the batch sequence will be summarized.

2.3.1 DIGITAL INPUTS

External Alarm 1, 2, 3

This input is used to generate an alarm on the instrument caused by an external event.

Start/Set tare

Start command, see Section 5.2, 'START COMMAND'.

Stop/Reset tare

Stop command, see Section 5.3, 'STOP COMMAND'.

Abort

Abort command, see Section 5.4, 'ABORT COMMAND'.

End cycle

Start command, see Section 5.5, 'END CYCLE COMMAND'.

Charge interlock

This input enables the instrument to begin a charge phase. How the instrument should check this input is defined in recipe for each line.

Discharge interlock

This signal enables the instrument to start a discharge phase. How the instrument must check this input is defined in recipe for each line.

Discharge device

This input indicates to the instrument that the discharge device is off or discharge gate is closed. It is tested continuously during the charge phases, if it becomes open the batch will be stopped. It is not tested during discharge phases.

If the instrument finds it open when the charge interlock signal comes, the batch is stopped. At the restart both the signal must be present.

Auto/Man

Switch the instrument from automatic to manual and back. Pass in manual during a cycle will cause an abort.

Reset Comp. tot

Clear the total register for all the components.

Reset Rec. tot

Clear the total register for all the recipes.

Print Comp. tot

Print the total register for all the components.

Print Rec. tot

Print the total register for all the recipes.

Remote cntrl

When close, it disables the keyboard and the command digital inputs (start, stop, end cycle and abort). It could be used when the instrument is connected to a supervisor or PLC that takes control above it.

Print Batch

This input enables the instrument to print the batch data for the the last batch (even if it was aborted).

Print Old Bt

This input enables the instrument to print the batch data previous to last batch (even if it was aborted).

NOTE: It is possible to assign the same physical input to two different logical functions. So, for example, the charge interlock and discharge interlock can be assigned to the same input.

2.3.2 DIGITAL OUTPUTS

Component 1 - Component 40

It is the component activation, for charge and discharge batch components it works together with the high rate and low rate outputs. In these cases it uses also as common signal to read the external setpoint of the component if the BCD input option is installed and in the recipe has been defined that the setpoint should be read from BCD input.

High rate

It is activated during the high rate phase of a charge or discharge batch.

Low rate

It is activated during the low rate phase of a charge or discharge batch. If specified in the recipe, it is activated also during the high rate phase.

Charge end

End charge signal. In the recipe for each line it is specified how the instrument should handle this output at the end of a charge batch or refill phase.

Discharge end

End discharge signal. In the recipe for each line it is specified how the instrument should handle this output at the end of a discharge or discharge batch phase.

Cycles end

The output is activated at the end of the last cycle, it will be deactivated at the next start.

End recipe

The output is activated at the end of the recipe, it will be deactivated when a new cycle start or a new start command is given.

Ready

It is on when all the following conditions are true:

- Instrument has been calibrated
- No calibration function is running
- No shut down conditions is present

- Instrument is in AUTO
- Cycle is not running

Alarms

On when an alarm is active, becomes off when the alarm is acknowledged.

Shutdown

On when an alarm is active, becomes off when the alarm is acknowledged and the cause of the shutdown returns normal.

Need refill

It is activated during execution of a refill phase if time out component alarm is generated. It indicates that the bin from which the material is token to refill is empty. The output can be connected to the STOP input to generate a stop condition in order to give the time to change the bin. The output is turned off at the restart or at the end of the refill.

NOTE: It is possible to assign the same physical output to two different logical functions. So, for example, the charge end and discharge end can be assigned to the same output.

2.3.3 CURRENT OUTPUTS

Current outputs are generally used to transfer weight values to remote indicators. The transferred value can be: the net weight, the gross weight and the difference between the setpoint and the net weight that is the amount of material needing to complete the batch.

This last possibility has meaning only during a batch, it will stay to 0 if the cycle is not running.

2.3.4 BCD INPUT

Optionally the expansion board Digital inputs 16in/4out can be used to read data from external presets in BCD format.

The BCD input can be used to read the recipe to execute, the number of cycles and the set point of the component.

The value is read as an integer value on 4 digits and the multiplied for the scale division to obtain the same format of the scale.

The polarity can be selected between POSITIVE and NEGATIVE.

The 4 outputs present on the board are used to select the value to read, see the following table:

out#1	out#2	out#3	out#4	variable
OFF	OFF	OFF	OFF	not reading
ON	OFF	OFF	OFF	reading cycles and recipe
OFF	ON	OFF	OFF	reading component set point
OFF	OFF	ON	OFF	not used

The code stay active for 0.5 seconds then the BCD input is read.

2.3.5 BCD OUTPUT

Optionally the expansion board Digital output 16out/4in can be used to transmit data in BCD format.

The BCD output can be used to transmit the net (NET) or gross (GROSS) weight and the remaining weight to complete the batch (DIFF).

The value is transmitted as an integer value on 4 digits, obtained dividing the value for the scale division. If the result overcomes the maximum value, an alarm is generated.

The polarity can be selected between POSITIVE and NEGATIVE.

The parity bit can be enabled, in this case the output data will be on 3 digits and half, the range will change from 9999/0 to 7999/0.

The variable to be transmit can be selected by keyboard, selecting AUTO it is possible to use the 4 inputs present on the board for this purpose, see the following table:

in#1	in#2	in#3	in#4	variable to send
OPEN	OPEN	OPEN	OPEN	not used
CLOSE	OPEN	OPEN	OPEN	net weight
OPEN	CLOSE	OPEN	OPEN	gross weight
CLOSE	CLOSE	OPEN	OPEN	diff weight

The refresh time for the BCD output is 200 mSec, the selection code must stay active at least for the same time.

2.4 THE RUN SCROLL

In the RUN scroll it is possible to define the recipe to be executed, the number of cycles and to get all the information about the running cycle.

2.4.1 SELECT THE RECIPE

In the second RUN scroll the number and name of the selected recipe is displayed. If the cycle is not running it is also possible to change this selection. When the cycle is running it is not allows.

2.4.2 DEFINE THE CYCLES NUMBER

In the third RUN scroll it is possible to define the number of cycles to be executed from the next start that is the number of time the selected recipe should be repeated. This value can be changed also if a cycle is running. Entering 0 enables the AUTOREPEAT mode, the 0 value will be substitute by the 'AUTO' message. In this way, when a start is given, the selected recipe will be executed until an END CYCLE or ABORT command, see section 5 'THE COMMANDS'. The END CYCLE command can be give in this scroll by pressing the END C. key (F3).

2.4.3 STATUS OF THE CYCLE

In the first RUN scroll the user has the possibility to see the actual state of the cycle while the cycle is running. Available information are:

line 1:

```
C10 cccccc 0000.0 kg
--- ------ ---------
 ^    ^        ^
 |    |        +--- actual weight on the scale
 |    +------------ component's name
 +----------------- component's number
```

The weight on the right will be the net weight during a batch charge or a batch discharge and the gross weight during a refill, a discharge and at the end of the batch.

line 2:

```
Setpoint   0000.0 kg
           ---------
              ^
              +--- the component's setpoint
```

This line will be empty at the end of the batch.

If a time based component is active, following message will be displayed:

Time 0.0 s

The remaining time to complete the different phases of the component (start delay, activation and stabilization) will be displayed.

Line 3

In this line is displayed a message that indicates the actual status of the batch or the action that the instrument is executing.

Follows a complete list of the message that can appear on line 3:

End cycle

Last cycle has been completed, now it is not running.

Start cycle

Received a START command.

CB - Wait ch. interl.

Charge Batch - waiting for the charge interlock.

CB - Start delay

Charge Batch - waiting for the delay at the start.

CB - High rate charge

Charge Batch - charging at high rate.

CB - Low rate charge

Charge Batch - charging at low rate.

CB - End batch delay

Charge Batch - charge ended, waiting for stabilization delay.

R - Wait ch. interl.

Refill - waiting for charge interlock.

R - Start delay

Refill - waiting for the delay at the start.

R - Refilling

Refill - refilling.

R - End refill delay

Refill - refill ended, waiting for stabilization time.

AR - Wait ch. interl.

AutoRefill - waiting for charge interlock.

AR - Start delay

AutoRefill - waiting for the delay at the start.

AR - Refilling

AutoRefill - refilling.

AR - End refill delay

AutoRefill - refill ended, waiting for stabilization time.

DB - Wait dch. interl.

Discharge Batch - waiting for discharge interlock.

DB - Start delay

Discharge Batch - waiting for start delay.

DB - High rate disch.

Discharge Batch - high rate discharging.

DB - Low rate disch.

Discharge Batch - low rate discharging.

DB - End disch. delay

Discharge Batch - discharge end, waiting for stabilization time.

D - Wait dch. interl.

Discharge - waiting for discharge interlock.

D - Start delay

Discharge - waiting for start delay.

D - Discharging

Discharge - discharging.

D - End disch. delay

Discharge - discharge end, waiting for stabilization time.

T - Wait interl.

Time based - waiting for component interlock.

T - Start delay

Time based - waiting for start delay.

T - Activation

Time based - component activation.

T - End delay

Time based - activation end, waiting for stabilization time.

End recipe line

recipe line execution end

Next recipe line

go to the next recipe line

The following messages appear when the cycle is stopped, they give information about the cause. In this case the second part of the message (after '-') will flash.

STOP - Stop command

A stop command has been received.

STOP - Disch. device

The discharge device opened during a charge cycle.

STOP - Charge interlock

The charge interlock opened during a charge cycle while in recipe it was defined as STABLE.

STOP - Disch. interlock

The discharge interlock opened during a discharge cycle while in recipe it was defined as STABLE.

STOP - Shut down active

A shut down condition has became active.

STOP - Power down

The power supply turned off while the cycle was running.

The following messages appear when the cycle is aborted, they give information about the cause. In this case the second part of the message (after '-') will flash also.

The ABORT messages will stay on the display until the next start. In this way it is always possible to see for which reason the last cycle has been interrupted.

ABORT - Abort command

An abort command has been received.

ABORT - Bad recipe

A start has been received but the selected recipe is not correct.

ABORT - Bad cycles

The number of cycles read from the external device is not valid.

ABORT - Bad setpoint

The set point read from the external device is not valid.

ABORT - Manual

The instrument has been switched in manual while the cycle was running.

Line 4

During the batch, F1 key is assigned to the ABORT function, pressing it will interrupt the cycle.

F2 key is assigned to AUTO/MANUAL function, it allows to switch the instrument from MANUAL to AUTO and back. If you try to set the instrument in MANUAL during a batch, a confirmation scroll will be displayed because of this operation will cause the abort of the running cycle.

2.4.4 THE WEIGHT INDICATOR

The fourth RUN scroll can be useful when the scale is used as weight indicator. In the first line the NET or GROSS weight is displayed. In the second and third line can be displayed one of the following: tare weight, a bargraph indicator, date and time if a COMA board is installed.

In fourth line the PRINT key allows to active the print outs while the ALARM key, it appears flashing if an alarm is pending, allows to acknowledge and reset the active alarms.

2.5 THE COMMANDS

The commands can be give to the instrument in three ways: by keyboard, by contact and by serial line. The action engaged by the instrument when it receives one of this commands depends by the situation.

2.5.1 START COMMAND

It is the command used to start a cycle but depends from the instrument condition.

If instrument is in manual:

Execute a set tare.

If cycle is not running:

Start the execution of the selected recipe for the selected number of cycles.

If cycle is running but has been suspended (stop condition):

Restart the cycle from the point at which it had been suspended.

The command is ignore if the instrument is in automatic but one of the following condition is not true:

- The ABORT contact or STOP contact are on.
- A shut down condition is present.
- The scale has not been calibrated.
- A calibration is running.

2.5.2 STOP COMMAND

The STOP command suspends temporarily the execution of a cycle. The cycle can be restarted later or definitively aborted.

When a cycle is suspended, all the digital outputs inherent the cycle (components, charge end ...) are turned off, the STOP CYCLE alarm is asserted when the command is executed.

The STOP command is ignored if a cycle is not running while a RESET TARE is executed if the instrument is in manual.

A STOP command can be indirectly activated if during a cycle one of the following circumstances happens:

- Charge/discharge interlocks opens during the batch when it was selected as STABLE.
- Discharge device input opens during a charge phase.
- A generic SHUT DOWN occurs. Note that all the alarms can be selected as SHUT DOWN, so all the alarm conditions are able to suspend the cycle.
- The instrument turns off during a cycle.

During the stop, the timer used to check the component max time and the running time (for the end recipe report) continue to be updated.

2.5.3 ABORT COMMAND

The ABORT command interrupts definitively the running cycle, all the digital outputs inherent the cycle (components, charge end ...) are turned off and the ABORT CYCLE alarm is asserted.

The ABORT command is ignored if a cycle is not running.

An ABORT command can be indirectly activated if during a cycle one of the following circumstances happens:

- The instrument has been forced in MANUAL.
- The selected recipe is not correct.
- The values read from the external presets (recipe, cycles or set point) are not valid.

An ABORT command can be manually given through the keyboard. In this case a confirmation message will be displayed.

```
Do you really want
to abort the batch ?

YES      NO
```

YES should be pressed to confirm the command.

2.5.4 END CYCLE COMMAND

The END CYCLE command interrupts the sequence of cycles, the current cycle is completed but after it no other cycle are executed independently by the number of cycle to execute. The END CYCLE alarm is asserted.

The END CYCLE command has no effect if the running cycle is already the last of the series and it is ignored if a cycle is not running.

2.5.5 AUTO / MANUAL

Auto/Manual is not properly a command but it is important because switching in manual during a cycle it acts as an ABORT, and when in manual it changes function to the START and STOP commands.

A key on the front panel allows to switch from AUTO to MANUAL. If this key is pressed during a cycle, a warning message is displayed

```
-     WARNING      -
It will abort the
running cycle.
Press YES to confirm.
YES          NO
```

Pressing YES the cycle is aborted and the instrument turns in manual, NO cancels the action. If the MANUAL command is given in the same conditions through input contact, the commutation, thus the abort of the cycle, is immediate.

When the instrument is in MANUAL, the ready led stays OFF to indicate that cycle can not be started.

A led in the front panel is lights when the instrument is in AUTO.

2.6 THE SEQUENCE

Are here briefly resumed all the operations executed by the instrument from the start to the end of the cycle.

All the sequence is then automatically repeated if more cycles are set.

2.6.1 AFTER THE START

1. Clear end cycle output.
2. Increase cycle number.
3. If recipe number from external device
   A. Read external recipe number
   B. Check recipe number is valid, if not -> **ABORT - BAD RECIPE**
4. Verify recipe, if error -> **ABORT - BAD RECIPE**
5. If cycles number from external device
   A. Read cycles number
   B. Check cycles number is valid, if not -> **ABORT - BAD CYCLES**
6. Clear component totals, 'last' registers.

2.6.2 EXECUTE THE RECIPE LINE

1. Set max time timer for component execution.
2. Read the recipe line to be executed and check the component type to see what kind of action to execute.

   The Charge Batch

   1. Deactivate outputs: END CHARGE and END CYCLE.
   2. Wait for charge interlock, in this phase interlock led will be on.
   3. Check discharge device, if it is open -> **STOP - DISCH. DEVICE**
   4. If setpoint should be read from external device
      A. Read set point
      B. Check if setpoint is valid, if it is less then zero or higher then scale capacity -> **ABORT - BAD SET POINT**
   5. Check weigh on the scale if higher then zero weight **NOT ZERO** alarm.
   6. Wait component start delay.

      In this phase, charge interlock must stay on if selected as STABLE, otherwise -> **STOP - CHARGE INTERLOCK** and check discharge device input, it also must stay closed during this period, otherwise -> **STOP - DISCH. DEVICE**
   7. Set tare

8. Activate high rate charge. High rate output and component output are activated. Low rate output is also activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge device and charge interlock (if selected as stable) are tested.
9. When preset threshold (set - preset) is reached active low rate batch, only low rate output and component output are active. Same as above for charge interlock and discharge device.
10. When end threshold (set - queue) is reached, end batch.
    A. Deactivate low rate output and component output.
11. Wait for stabilization time.
12. Activate end charge output.
13. Update component total registers.
14 Correct cut off weight.
15. Check component deviation, if higher then max, **MAX DEVIATION** alarm
16. End recipe line, go to Section 6.4.

The Discharge Batch

1. Deactivate outputs: END DISCHARGE and END CYCLE.
2. If a refill component has been encountered in the previous lines of the recipe and it was set as AUTO, check weight on the scale. If it is below the component setpoint, execute an auto refill function.
3. Wait for discharge interlock, in this phase interlock led will be on.
4. If setpoint should be read from external device
    A. Read set point
    B. Check if setpoint is valid, if it is less then zero or higher then scale capacity -> **ABORT - BAD SET POINT**
5. Wait component start delay.

    In this phase, discharge interlock must stay on if selected as STABLE, otherwise -> **STOP - DISCH. INTERLOCK**
6. Set tare.
7. Activate high rate discharge. High rate output and component output are activated. Low rate output is also activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge interlock (if selected as stable) is tested.
8. When preset threshold (set - preset) is reached active low rate batch, only low rate output and component output are active. Same as above for discharge interlock.
9. When end threshold (set - queue) is reached, end batch.

    Deactivate low rate output and component output.

10. Wait for stabilization time.
11. Activate end discharge output.
12. Update component total registers.
13. Correct cut off weight.
14. Check component deviation, if higher then max, **MAX DEVIATION** alarm.
15. End recipe line, go to Section 6.4.

The Refill and Autorefill

1. Deactivate outputs: END CHARGE and END CYCLE.
2. Wait for charge interlock, in this phase interlock led will be on.
3. Check discharge device, if it is open -> **STOP - DISCH. DEVICE**
4. If setpoint should be read from external device.
   A. Read set point
   B. Check if setpoint is valid, if it is less then zero or higher then scale capacity -> **ABORT - BAD SET POINT**
5. Check weigh on the scale if higher then zero weight **NOT ZERO** alarm.
6. Wait component start delay.

   In this phase, charge interlock must stay on if selected as STABLE, otherwise -> **STOP - CHARGE INTERLOCK** and check discharge device input, it also must stay closed during this period, otherwise -> **STOP - DISCH. DEVICE**
7. Reset tare
8. Activate high rate charge. High rate output and component output are activated. Low rate output is also activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge device and charge interlock (if selected as stable) are tested.
9. When end threshold (set) is reached, end charge.

   Deactivate high rate, low rate and component outputs.
10. Wait for stabilization time.
11. Update component total registers.
12. Activate end charge output.
13 End recipe line, go to Section 6.4. If it was an autorefill, repeat recipe line.

The Discharge

1. Deactivate outputs: END DISCHARGE and END CYCLE.
2. Wait for discharge interlock, in this phase interlock led will be on.
3. Wait component start delay.

   In this phase, discharge interlock must stay on if selected as STABLE, otherwise -> **STOP - CHARGE INTERLOCK**

4. Reset tare
5. Activate high rate discharge. High rate output and component output are activated. Low rate output is also activated if HIGH+LOW is selected as high rate mode in the component data. During all this phase discharge interlock (if selected as stable) is tested.
6. When the zero weight value is reached, end discharge.

   Deactivate high rate, low rate and component outputs.
7. Wait for stabilization time.
8. Update component total registers.
9. Activate end discharge output.
10. End recipe line, go to Sectjon 6.4.

The Time Based Batch

1. Deactivate outputs: END CHARGE and END CYCLE.
2. Wait for component (charge) interlock, in this phase interlock led will be on.
3. Wait component start delay.

   In this phase, charge interlock must stay on if selected as STABLE, otherwise -> **STOP - CHARGE INTERLOCK**
4. Set tare
5. Activate component output
6. After the activation time defined in the recipe, component outputs is deactivated.
7. Wait for stabilization time.
8. Update component total registers.
9. Activate end charge output.
10. End recipe line, go to Section 6.4.

2.6.3 END RECIPE LINE AND RECIPE END

1. Reset tare
2. Check if there are other lines in recipe or there are no more lines but a component has been defined as end batch component. In these case repeat all the procedure from Section 6.3, otherwise go ahead.
3. Check
4. Update recipe total registers.
5. Print recipe if automatic batch print enabled.
6. Check if there are other cycles to be executed, if yes repeat all the procedure from Section 6.2, otherwise go ahead.
7. Set end cycles output, the sequence is finished, waits for another start command.

2.7 MULTISCALES

How already said in the overview, the MT2102 is able to handle till 4 scales. When more then 1 scale is active, it can handle these scale in two different ways.

In the first, called SCALE MODE, it considers to have four independent scales, each one with an own set of commands (start, stop, auto/man ...), a recipe to be executed, a number of cycles etc... In few word is the same as to have four single scale instruments in one hardware.

In the second way, called GROUP MODE, it considers each scale as a part of a group. Each scale will have a set of inputs and outputs to interacts with own portion of the system but the set of commands, recipe, the number of cycles etc... will be unique for all the scales.

The main difference is that in SCALE MODE you will create recipes containing only components of the scale on which the recipe will be executed and it is possible to run simultaneously the four scales with four different recipes.

In GROUP mode the recipe can contain all the component, independently by the scale and only one recipe can be executed at time.

In the next two sections the differences in the setup instrument when it operates in multiscale mode will be listed separately for the two modes.

2.7.1 MULTISCALES - SCALE MODE

Definition of the component.

In the component definition should selected the membership scale. This independently by the component type.

Definition of the recipe

Also for the recipe should be specified the membership scale.

Recipe verify

A new anomaly can be detected executing the recipe verify function if the component in the recipe do not belong to the same scale at which belongs the recipe. The message will be: 'Scale error'.

Definition of the I/O - Digital inputs and outputs

Digital inputs and outputs listed below must be defined for each scale active, the message will be completed by the S# indication to indicate the scale number:

Inputs:

Start/Set tare s#
Stop/Reset tare s#
Abort s#
End cycle s#
Charge interlock s#
Discharge interlock s#
Discharge device s#
Auto/Man s#
Go on s#

Outputs:

High rate s#
Low rate s#
Charge end s#
Discharge end s#
Cycles end s#
Need ref s#

Ready, Alarm and Shutdown outputs are cumulative. So, for example, the ready output will turn on only if all the scales are ready.

Definition of the I/O - Current outputs

Same selections are available for all the scales.

Definition of the I/O - BCD input

Same selections are available for all the scales. If in AUTO mode, this is the table of selection:

out#1	out#2	out#3	out#4	variable
OFF	OFF	OFF	OFF	not reading
ON	OFF	OFF	OFF	cycles and recipe scale #1
OFF	ON	OFF	OFF	component set point scale #1
ON	ON	OFF	OFF	not used
OFF	OFF	ON	OFF	not reading
ON	OFF	ON	OFF	cycles and recipe scale #2
OFF	ON	ON	OFF	component set point scale #2
ON	ON	ON	OFF	not used
OFF	OFF	OFF	ON	not reading
ON	OFF	OFF	ON	cycles and recipe scale #3
OFF	ON	OFF	ON	component set point scale #3
ON	ON	OFF	ON	not used
OFF	OFF	ON	ON	not reading
ON	OFF	ON	ON	cycles and recipe scale #4
OFF	ON	ON	ON	component set point scale #4
ON	ON	ON	ON	not used

Definition of the I/O - BCD output

Same selections are available for all the scales. If in AUTO mode, this is the table of selection:

in#1	in#2	in#3	in#4	variable to send
OPEN	OPEN	OPEN	OPEN	not used
CLOSE	OPEN	OPEN	OPEN	net scale #1
OPEN	CLOSE	OPEN	OPEN	gross scale #1
CLOSE	CLOSE	OPEN	OPEN	diff scale #1
OPEN	OPEN	CLOSE	OPEN	not used
CLOSE	OPEN	CLOSE	OPEN	net scale #2

in#1	in#2	in#3	in#4	variable to send
OPEN	CLOSE	CLOSE	OPEN	gross scale #2
CLOSE	CLOSE	CLOSE	OPEN	diff scale #2
OPEN	OPEN	OPEN	CLOSE	not used
CLOSE	OPEN	OPEN	CLOSE	net scale #3
OPEN	CLOSE	OPEN	CLOSE	gross scale #3
CLOSE	CLOSE	OPEN	CLOSE	diff scale #3
OPEN	OPEN	CLOSE	CLOSE	not used
CLOSE	OPEN	CLOSE	CLOSE	net scale #4
OPEN	CLOSE	CLOSE	CLOSE	gross scale #4
CLOSE	CLOSE	CLOSE	CLOSE	diff scale #4

The RUN scroll

The SCALE# key (it allows to switch the displayed scale) will compare in all the RUN scrolls. Using it will be possible to define recipe and cycles number and control the batching phases of all the active scales.

The commands

Each scale has an own series of digital input commands.

If the commands are given by keyboard, they will be executed only by the scale actually displayed, the other scale will not be affected.

Same for the LEDS, they refers only to the displayed scale.

2.7.2 MULTISCALES - GROUP MODE

Definition of the component.

In the component definition should selected the membership scale. This independently by the component type.

Definition of the recipe

No differences.

Recipe verify

No differences.

Definition of the I/O - Digital inputs and outputs

Digital inputs and outputs listed below must be defined for each active scale, the message will be completed by the S# indication to indicate the scale number:

Inputs:

Charge interlock s#
Discharge interlock s#
Discharge device s#

Outputs:

High rate s#
Low rate s#

Charge end s#
Discharge end s#

Ready, Alarm and Shutdown outputs are cumulative. So, for example, the ready output will turn on only if all the scales are ready.

Definition of the I/O - Current outputs

Same selections are available for all the scales.

Definition of the I/O - BCD input and output

Same selections are available for all the scales. If in AUTO mode, this is the table of selection:

out#1	out#2	out#3	out#4	variable
OFF	OFF	OFF	OFF	not reading
ON	OFF	OFF	OFF	cycles and recipe scale #1
OFF	ON	OFF	OFF	component set point scale #1
ON	ON	OFF	OFF	not used
OFF	OFF	ON	OFF	not reading
ON	OFF	ON	OFF	cycles and recipe scale #2
OFF	ON	ON	OFF	component set point scale #2
ON	ON	ON	OFF	not used
OFF	OFF	OFF	ON	not reading
ON	OFF	OFF	ON	cycles and recipe scale #3
OFF	ON	OFF	ON	component set point scale #3
ON	ON	OFF	ON	not used
OFF	OFF	ON	ON	not reading
ON	OFF	ON	ON	cycles and recipe scale #4
OFF	ON	ON	ON	component set point scale #4
ON	ON	ON	ON	not used

Definition of the I/O - BCD input and output

Same selections are available for all the scales. If in AUTO mode, this is the table of selection:

in#1	in#2	in#3	in#4	variable to send
OPEN	OPEN	OPEN	OPEN	not used
CLOSE	OPEN	OPEN	OPEN	net scale #1
OPEN	CLOSE	OPEN	OPEN	gross scale #1
CLOSE	CLOSE	OPEN	OPEN	diff scale #1
OPEN	OPEN	CLOSE	OPEN	not used
CLOSE	OPEN	CLOSE	OPEN	net scale #2
OPEN	CLOSE	CLOSE	OPEN	gross scale #2
CLOSE	CLOSE	CLOSE	OPEN	diff scale #2
OPEN	OPEN	OPEN	CLOSE	not used
CLOSE	OPEN	OPEN	CLOSE	net scale #3
OPEN	CLOSE	OPEN	CLOSE	gross scale #3

in#1	in#2	in#3	in#4	variable to send
CLOSE	CLOSE	OPEN	CLOSE	diff scale #3
OPEN	OPEN	CLOSE	CLOSE	not used
CLOSE	OPEN	CLOSE	CLOSE	net scale #4
OPEN	CLOSE	CLOSE	CLOSE	gross scale #4
CLOSE	CLOSE	CLOSE	CLOSE	diff scale #4

The RUN scroll

The SCALE# key (it allows to switch the displayed scale) will compare in the first RUN scroll, where the batch phases are displayed.

A new message can compare in the third line : 'Batch completed'.

It is displayed when a scale has completed its batch and it is waiting for the others finish theirs before to give the end cycle.

The commands

The set of commands is unique. When a start is given, all the scales will start.

Same for set tare, reset tare, abort, stop, end cycle and auto/man commands. Also if the stop comes from an external condition on one of the scales (ex. discharge device open), all the scales will go in stop.

The sequence.

When a cycle is started, each scale scrolls the recipe looking for an own component. When a scale finds an own component it executes that recipe line and then restart to looking for until all the recipe lines containing its components have been executed.

During recipe execution each scale works independently be the others. Each sort of synchronism should be obtained by using the inputs and outputs that each scale has got (charge and discharge interlocks, charge and discharge end outputs).

Only when a recipe has completed its batch, it locks to the other and it waits until they complete their batch. At this point the cycle will end.

2.8 TROUBLESHOOTING

Anomalies and problems during a cycle can be signaled by the instrument by means of messages displayed in the RUN scroll menu or alarms.

2.8.1 STATUS MESSAGES (RUN SCROLL)

Message	Cause	Suggested action
STOP - Stop command	A stop command has been received.	Check stop input if used. If in 'multiscale - group mode' the stop command can arrive for an other scale that has gone in stop for un external condition, check the other scales.
STOP - Disch. device	The discharge device opened during a charge cycle.	Check disc. device input.
STOP - Charge interlock	The charge interlock opened during a charge cycle while in recipe it was defined as STABLE.	Check charge int.input Check if charge interl. mode defined correctly in recipe
STOP - Disch. interlock	The discharge interlock opened during a discharge cycle while in recipe it was defined as STABLE.	Check discharge int.input Check if discharge interl. mode defined correctly in recipe
STOP - Shut down active	A shut down condition has became active.	Check in alarm scroll what alarm has generated the stop condition.
STOP - Power down	The power supply turned off while the cycle was running.	Check power supply connection
ABORT - Abort command	An abort command has been received.	Check abort input if used. If in 'multiscale - group mode' the abort command can arrive for an other scale that has aborted for un external condition, check the other scales.
ABORT - Bad recipe	A start has been received but the selected recipe is not correct.	Check recipe number in run scroll. Check recipe data.
ABORT - Bad cycles	The number of cycles read from the external device is not valid.	Check ext. preset value connections and setup, polarity can be wrong.

Message	Cause	Suggested action
ABORT - Bad setpoint	The setpoint read from the external device is not valid.	Check ext. preset value connections and setup, polarity can be wrong.
ABORT - Manual	The instrument has been switched in manual while the cycle was running.	Check manual input if used.

2.8.2 ALARMS

Alarm	Cause	Suggested action
Not zero	At the start of a recipe, the weight in the scale was over the 'zero weight' value entered in setup.	Check zero weight value in scale data scroll.
Stop cycle	A stop command or a stop condition has been detected.	Check all the stop conditions (see Section 7.2) Verify stop input if used
Abort cycle	An abort alarm or an abort condition has been detected.	Check all the abort conditions (see Section 7.2). Verify abort input is used
End cycles	An end cycle command has been given.	Verify end cycle input if used.
Deviation	The max deviation limit for the component has been overcome	Check max deviation limit in recipe. Check queue value in component definition.
Comp. time out	The active component is taking more then the max time to complete the batch.	Check max component time in component's table. The batch can be suspended or waiting for an external input.

RAMSEY PRODUCTS

DIGITAL INPUT/OUTPUT

TABLE OF CONTENTS

APPENDIX A/3
DIGITAL INPUT/OUTPUT

3.0 GENERAL

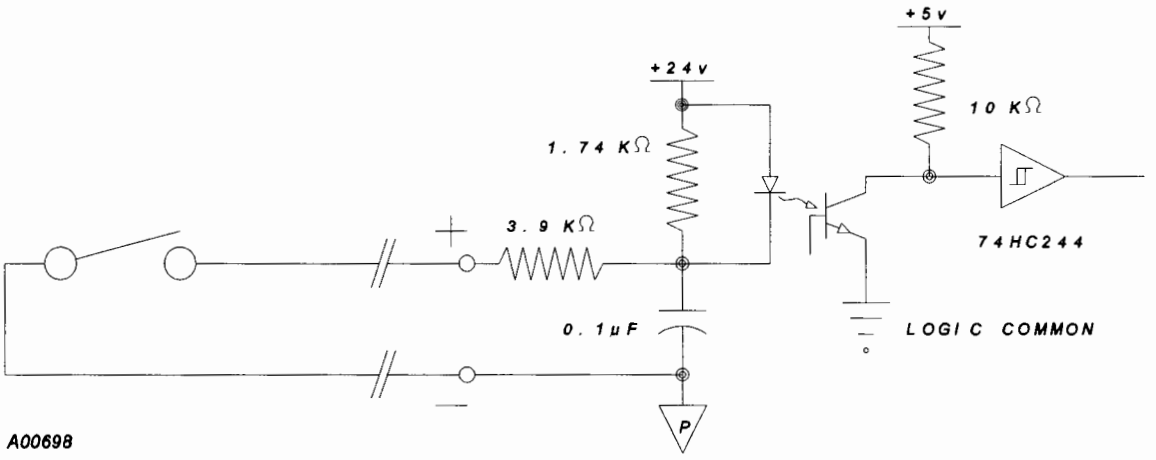
The integrator has provision for up to 24 programmable digital inputs and 24 programmable digital outputs. Located on the Mother Board are two speed inputs, two programmable inputs, three programmable outputs, and one non-programmable Micro-Tech hardware fault output. One speed input is defaulted to a programmable input unless the belt slip option is installed.

Optional DIO boards can be added if additional I/O is required.

3.1 MOTHER BOARD DIGITAL I/O

3.1.1 Digital Inputs

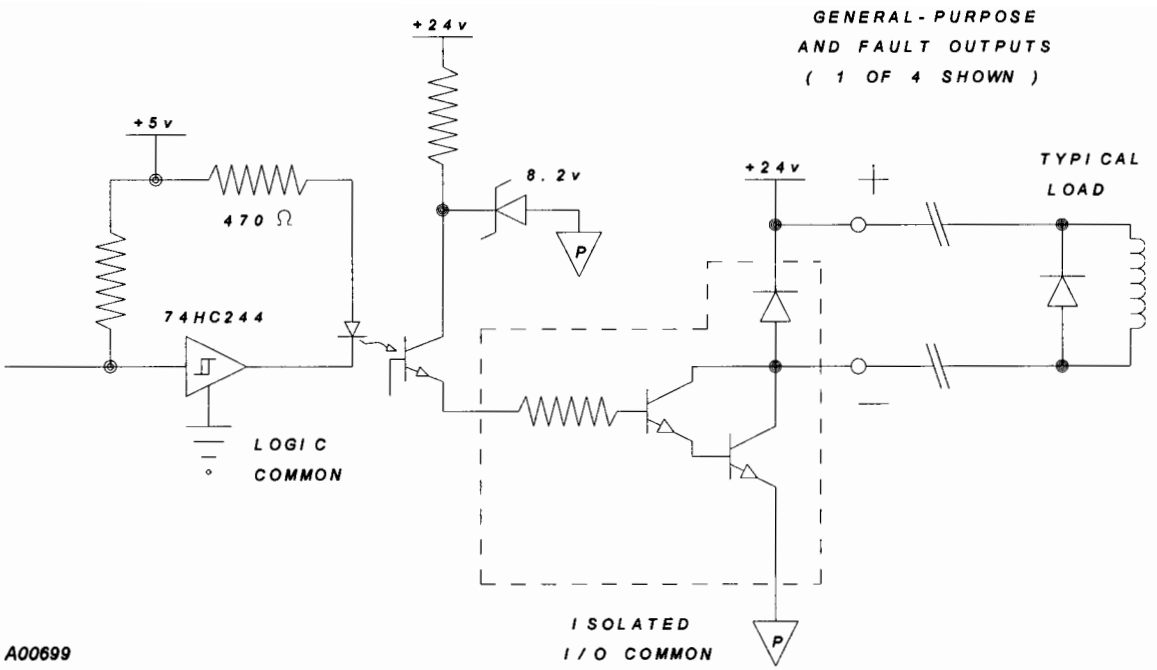
1. • (2) speed and (2) programmable digital (DC) inputs (Figure A/3-1)
   - optically isolated
   - powered by internal +24 V DIO supply, 6 mA maximum
   - Cable Length: 150 ohm maximum. (7500 ft of 20 AWG)



GENERAL PURPOSE DIGITAL INPUTS
FIGURE A/3-1

3.1.2 Digital Outputs

1. • (3) programmable and (1) non-programmable failure digital open collector outputs (Figure A/3-2)
   - able to drive TTL, CMOS, or relay solenoids
   - current sinking socketed drivers
   - +24 VDC internal supply, 100 mA DC maximum per output
   - failure output is "fail safe", turns off under fault condition



GENERAL PURPOSE FAULT OUTPUT
FIGURE A/3-2

3.2 DIGITAL INPUT/OUTPUT BOARD CONFIGURATION

In addition to the programmable digital inputs and outputs on the Mother board, optional Digital I/O (DIO) expansion boards can be added. Available boards are DIO input board 16 inputs/4 outputs, output board 16 outputs/4 inputs or 20 inputs/20 outputs by adding both boards.

Both DIO boards provide isolated contact closure inputs and 24 volt current sinking (default) or current sourcing (consult Factory) isolated outputs. The DIO input board connector J16 is a male 25 pin sub-miniature D connector and the DIO output board connector J15 is a female connector.

Internal or external 24 VDC power for the DIO boards is controlled by selectable jumpers OP1 and OP2 located on the lower right hand side of the DIO boards (Figure A/3-3). All inputs and outputs use the same selected power supply. See table below for jumper positions.

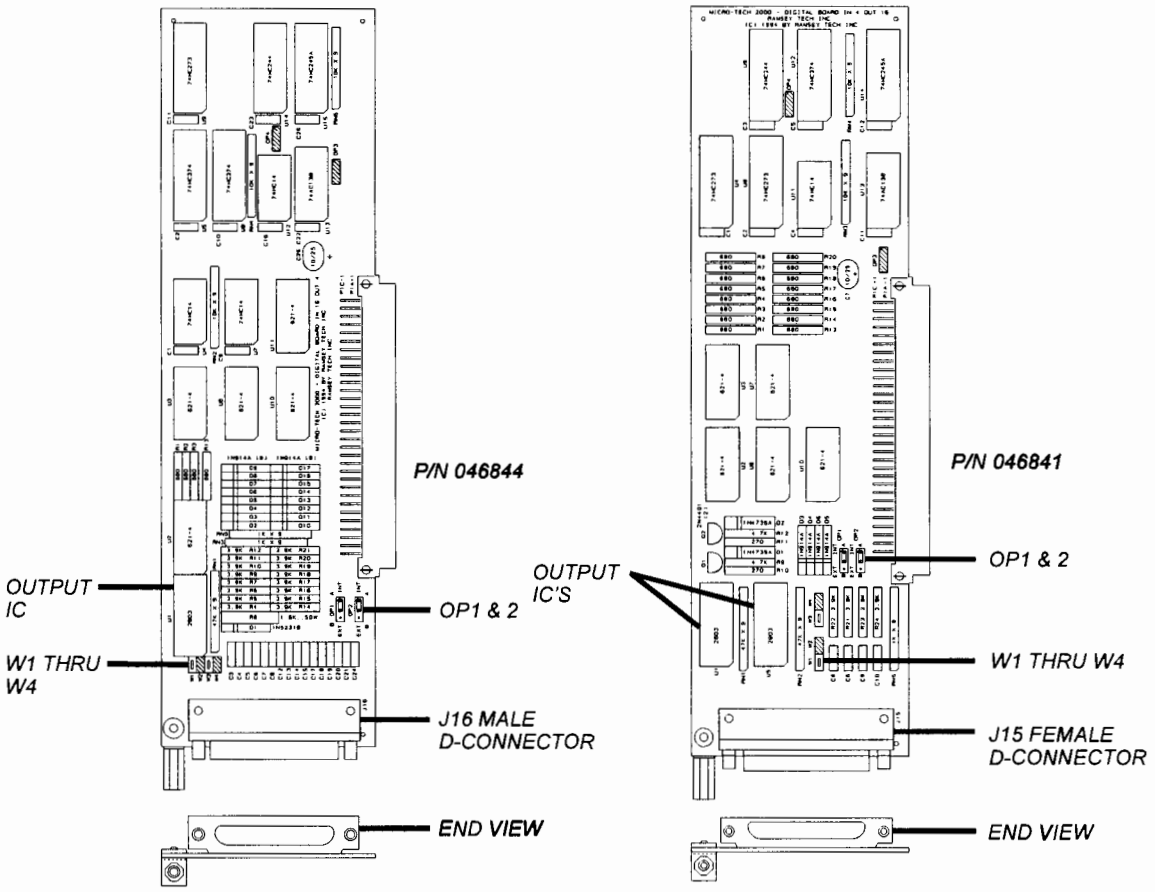
JUMPERS			
POWER SOURCE	OP1	OP2	
Internal	"A"	"A"	[Default]
External	"B"	"B"	

The isolated contact closure inputs are activated by completing the circuit from the input to the negative side of the 24 VDC supply. Approximately 6 mA of current flows out of each input during contact closure.

The outputs of the DIO boards use 2803 current sinking (default) type IC's. The output IC's are installed in sockets to allow replacing the output IC only, rather than the board if the IC is damaged.

The output IC's can be replaced with 2981 type IC's for current sourcing applications. Wire jumpers W1 thru W4 must be relocated for current sourcing (see Figure A/3-3). In most cases, it is recommended that the boards be returned to the factory for converting from current sinking (default) to current sourcing. See table below for jumper positions.

JUMPERS					
CURRENT	W1	W2	W3	W4	
Sinking	"Yes"	"No"	"Yes"	"No"	[Default]
Sourcing	"No"	"Yes"	"No"	"Yes"	



DIGITAL INPUT/OUTPUT BOARDS
FIGURE A/3-3

3.2.1 16 In\4 Out DIO Board Specification (Figure A/3-4)

1. (16) programmable inputs

   See Section 3.1.1 specifications.

2. (4) programmable outputs

   See Section 3.1.2 specifications.

3. Connector

   25 pin D connector (male). Connector is intermateable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.

3.2.2 4 In/16 Out DIO Board Specification (Figure A/3-4)

1. (4) programmable inputs

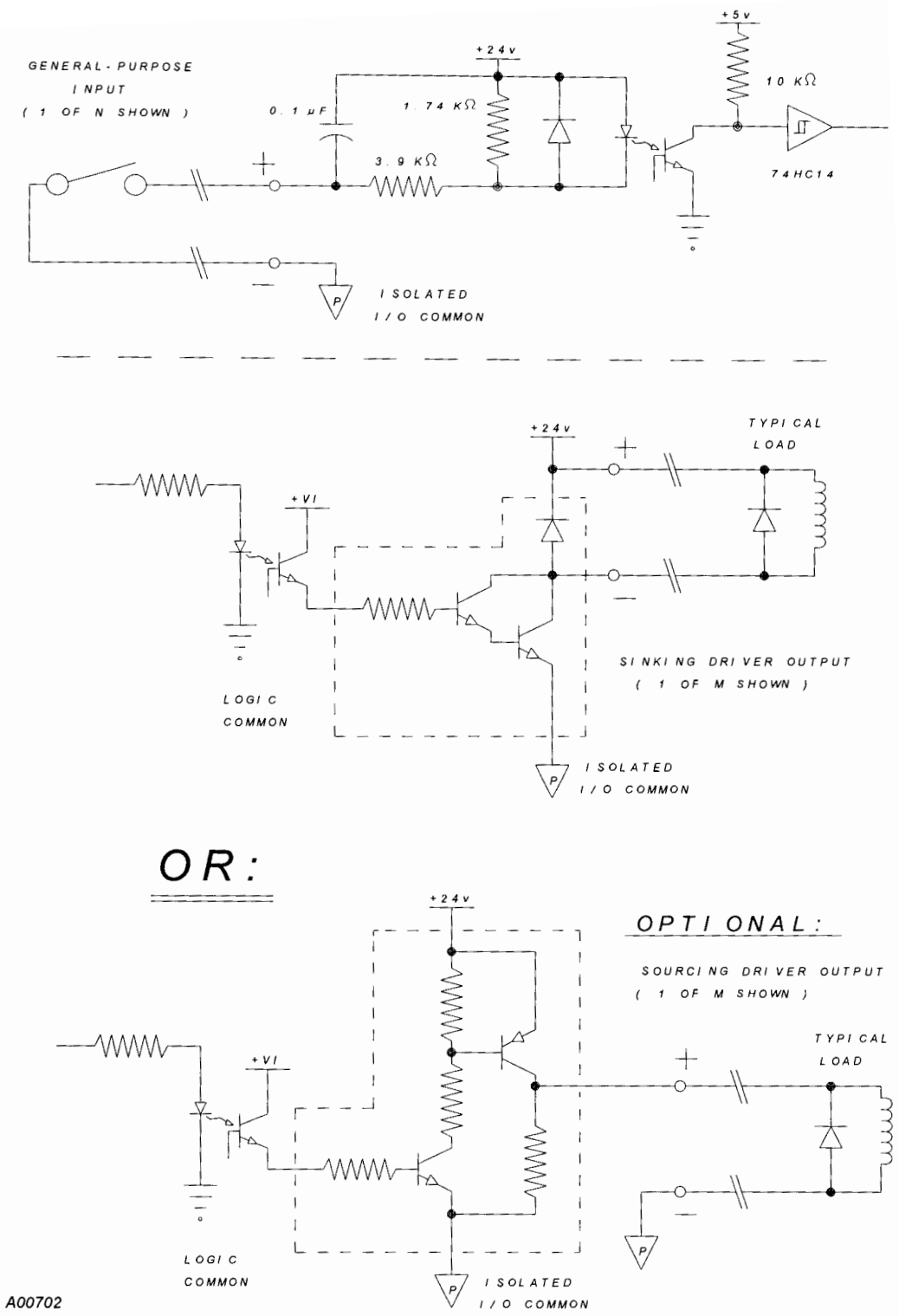
   See Section 3.1.1 specifications.

2. (16) programmable outputs

   See Section 3.1.2 specifications.

3. Connector

   25 pin D connector (female). Connector is intermateable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.

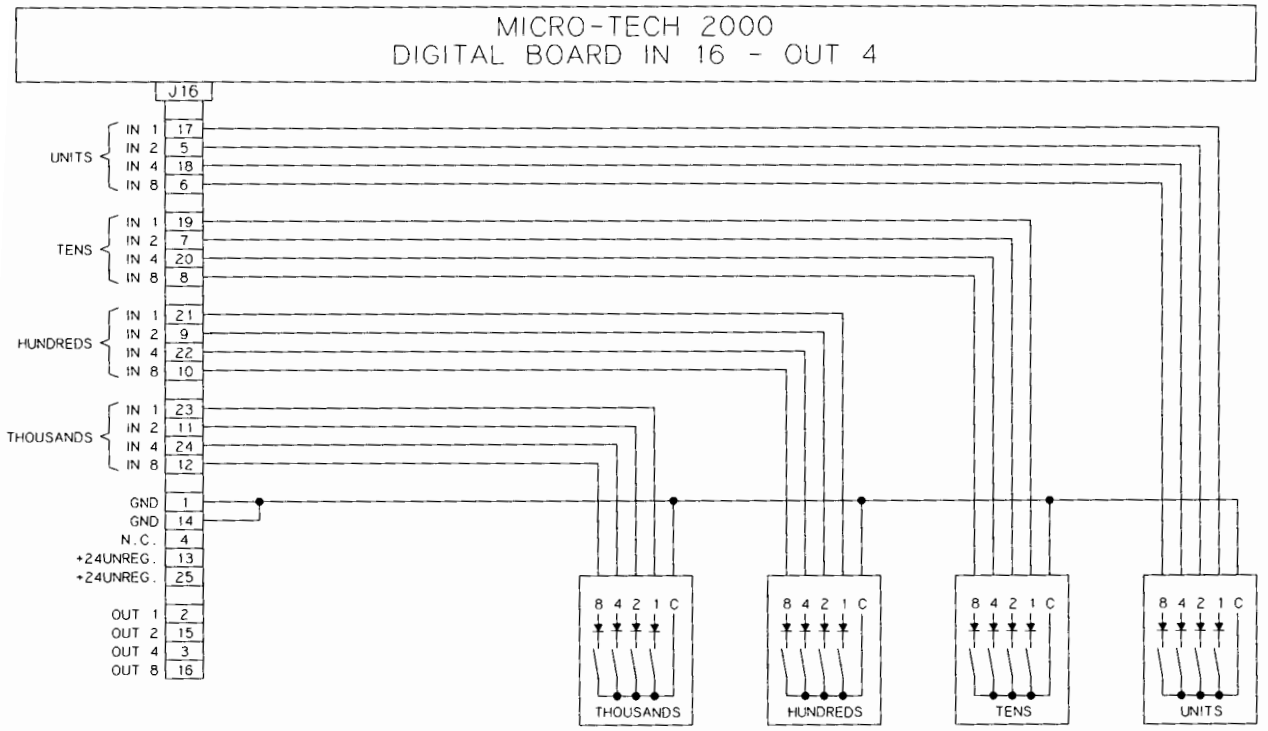


DIGITAL INPUT/OUTPUTS
FIGURE A/3-4

INPUT OPTION

d sizes for load out or batching applications can be remotely entered by BCD. An ional Load Out input output board is required.

e Figure A/3-5 for wiring.



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BCD INPUT
FIGURE A/3-5