OPERATING AND SERVICE MANUAL

FOR RAMSEY

MICRO-TECH™ 2000

MODEL 2101

INTEGRATOR

RAMSEY

A THGRMO SENTRON COMPANY

REC 3896 REV F

PART NO. 049064

REVISION HISTORY

REVISION	DATE	SOFTWARE VERSION
A	JUNE 1995	
B	FEBRUARY 1996	
C	FEBRUARY 1997	
D	APRIL 1998	
E	NOVEMBER 1998	
F	APRIL 2000	33.00.03.05

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 moderate personal injury or damage to the equipment.

RAMSEY PRODUCTS

MICRO-TECH 2000 MODEL 2101 INTEGRATOR

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* If option is supplied.

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 2101 Field Mount and Panel Mount conveyor belt scale Integrator.

1.2 APPLICATION

The Micro-Tech 2101 Field Mount Integrator (Figure 1-1) or Panel Mount Integrator (Figure 1-2) is a micro-computer driven instrument used for deriving rate and quantity of flowing material from signals representing the weight of a segment (pounds/foot) of moving material and its velocity (feet/minute).

By suitable processing of these two input signals, the Integrator delivers visible and electrical output representing the rate of material movement and visible and electrical output representing total amount of material which has passed the weighbridge.

For remote indicating, four options are available:

1. Remote totalization.
2. Remote flow rate, belt loading or belt speed.
3. Communications.
4. Field Bus

The Integrator has provisions for three programmable logical inputs, three programmable logical outputs, and one fault output. In addition to the standard inputs, optional digital input/output boards can be added.

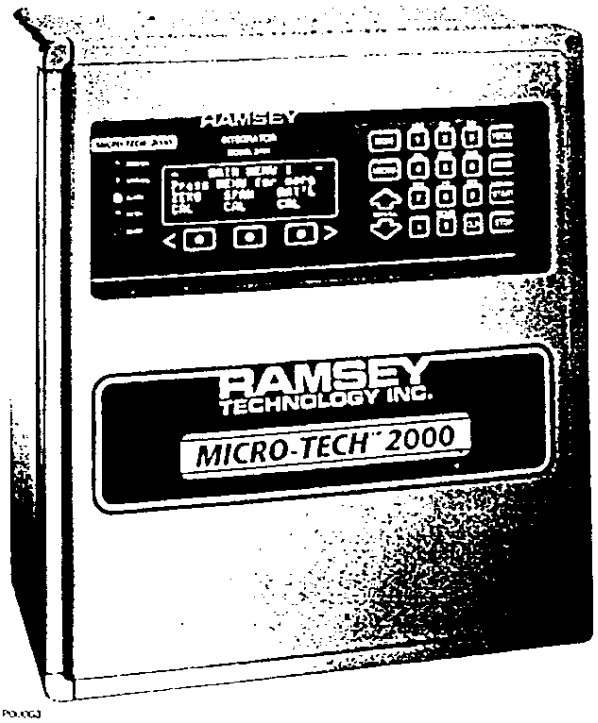
Many automatic and check functions are available to the operator for calibration and maintenance.

1.3 MAIN FEATURES

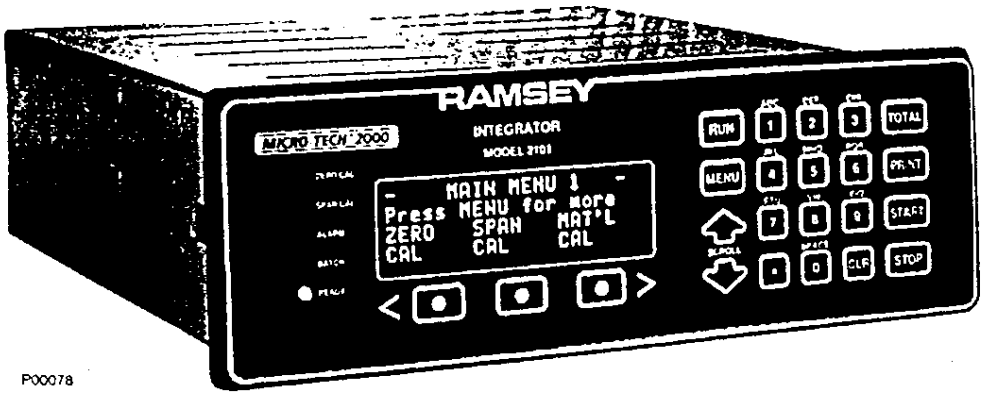
The Model 2101 integrator (Figure 1-1) or panel mount integrator (Figure 1-2) has many hardware and software features necessary for continuous weighing and outputting totalized weight and rate information. The main features are listed below. Other features are listed in specific sections of this manual.

- Menu driven scroll entries on a four line display
- Five LED status indicators
- Visible and electrical outputs representing rate or load of the material movement
- Visible and electrical output representing total amount of material that has passed the weighbridge
- Audit trail (option)
- Automatic zero and span calibration
- Auto zero tracking
- Several software options that may be turned on by keyboard entry or by installing optional plug-in PC boards
- Optically 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



MICRO-TECH 2000
MODEL 2101 FIELD MOUNT INTEGRATOR
FIGURE 1-1



MICRO-TECH 2000
MODEL 2101 PANEL MOUNT INTEGRATOR
FIGURE 1-2

1.3.1 Integrator Configuration

The standard configuration of the integrator includes one single channel plant scale A/D board, one single channel current output board and one remote total pulse output module.

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

- Single channel current output board
- Dual channel current output, analog input board
- 16 digital inputs / 4 digital outputs
- 4 digital inputs / 16 digital outputs
- Serial communication board
- Allen-Bradley remote I/O board
- PROFIBUS-DP board

1.4 INTEGRATOR GENERAL DESCRIPTION

The integrator has been designed for belt scales, and is capable of performing all the necessary measuring functions.

All the required functions are resident in the software of the microprocessor. Optional functions are automatically turned on when the relevant hardware is installed, or after the operator has selected them through the keyboard. In all cases, there is no need for special software to be created.

Although the program of the Micro-Tech 2101 is thus very large, the set up of the instrument is very easy, since it is performed by entering parameters through the keyboard following the guidelines of comprehensive messages appearing on the four line display.

The set up parameters may be divided into the following main groups:

- Measuring
- Monitoring
- Printing
- Communication

1.4.1 Measuring Functions

The integrator can be directly connected to up to six 350 ohm load cells and receives the signal of a speed sensor in order to calculate belt speed, belt loading and feed rate.

Rate is integrated in time to calculate the amount of material conveyed by the belt (total), and is displayed in three individual registers: total, reset total, operator total.

The integrator can perform automatic zero and span calibrations. When the belt is running and the rate is below a certain percentage, the integrator can perform auto zero tracking, to minimize the error of zero due to material and dust buildup.

Analog (current) output signals can be generated to transmit rate, speed or belt loading to other control devices.

Displayed variables and analog outputs can be smoothed via damping filters, individually programmable.

1.4.2 Monitoring Functions

The integrator includes internal diagnostic that will generate alarms in case of hardware failures or programming errors. The following process alarms are also provided:

- Belt slip
- Alarms for high and low flow rate, speed and weight

Alarms are visible on the display and can be acknowledged and reset through keyboard, digital input or serial line. Alarms can be delayed to avoid intervention in case of short time peaks. Each individual alarm can be programmed to operate as alarm, shut down or to be ignored. Two LEDs indicate the cumulative status of alarms and shut-down. Digital outputs are also provided for the following:

- Hardware failure
- Alarm cumulative
- Shut down cumulative

1.4.3 Print Functions

Periodical and under command prints can be obtained by connecting a serial printer to an optional communication board. Time and date are permanently stored in battery backed memory. The entire set up of the instrument can also be printed out.

1.4.4 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 2101 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 2101 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.

1.5 FUNCTIONAL DESCRIPTION

1.5.1 Measuring Functions

1. Instantaneous Flow Rate Calculation

   The signal delivered by the load cell(s), which represents the weight per unit length of the belt (lbs/ft), is multiplied by the signal delivered by the speed transmitter which represents the belt speed (ft/min). The result of this operation is the instantaneous flow rate (lbs/ft x ft/min = lbs/min) which is then multiplied by suitable constant to obtain the value in the required engineering units (kg/h, ton/h, etc.). An adjustable damping filter is provided separately for displayed rate and current outputs.

2. Flow Totalization

   The total is accumulated by multiplying mass per unit length by incremental length and totalizing the result in engineering units.

   Three totalizing memories are provided:

   - The first memory (Master total) is not resettable to guarantee that the data is not lost because of an unwanted reset.
   - The second and third memories (Reset and Operator total) are resettable by the operator and normally used for shift or daily totalization.

3. Zero and Span Automatic Calibrations

   Zero and span calibrations are based on belt length defined by a number of belt revolutions.

   To calculate the exact number of revolutions, the instrument counts the pulses delivered by the speed transmitter (one pulse represents a specific belt length); when the required number of pulses is reached, the instrument ends the calibration test, and compares the actual totalized value to the theoretical one (0 for zero calibration), and calculates the calibration constant.

   The calibration constant is a calculated value that can be factored based on an actual material test.

   - Electronic Calibration (R-Cal)

     Allows the operator to perform the calibration without the need of applying test weights or test chain on the weighbridge. The electronic calibration checks all the circuitry including the load cell, and is performed by unbalancing the load cell bridge using a precision resistor. The calibration constant is calculated on the basis of the load cell and the scale data.

   - Test Weight Calibration

     Requires the positioning of test weights on the weighbridge.

   - Chain Calibration

     Requires the application of calibrated chains on the belt. This method is the nearest to actual operating conditions.

- Material Test

  Is performed by running a known quantity of material on the scale and weighing that quantity on a static scale of known accuracy.

4. Multiple Calibration Points

   The instrument supports up to 10 different calibrations and linearizations for systems that use a reversing belt or have multiple feed points. The different calibration factors calculated compensate for variations in belt tension and effect on the conveyor belt scale due to the change in loading conditions.

   The operator can select which calibration to run by entering the calibration number on the keypad or by selecting it through input contacts. Internally, the instrument has 10 tables each for zero calibration, span calibration, and linearization. When one of them is selected, its values become active.

   Refer to Appendix A/6 for information about enabling multiple calibrations and selecting calibration points.

5. Zero Tracking (AZT)

   Under a preset minimum flow rate when enabled, the instrument makes subsequent automatic zero calibrations with the following sequence:

   - waits for one-half time of the test duration (a solid "Z" will be displayed);
   - execution of a zero test (the "Z" will flash);
   - performs automatic zero for one test duration;
   - continuously repeats above zero calibration as long as feed rate remains below AZT preset value.

   Zero Tracking function is limited to a maximum value of "ZERO LIMIT" that is set in % in the SET UP Scroll.

   If the new zero calculated by auto-zero tracking function exceeds that value, an alarm is generated and the new zero is not installed. The reference value for zero is set every time an Auto Zero or Manual Zero is performed.

6. Current Output Signals

   The standard instrument is equipped with one current output signal (0-20/4-20 mA). An optional dual channel current output/analog input board is available. The choice of the signal type is made through the keyboard. Each current output may be programmed via the keyboard to deliver one of the following signals:

   - flow rate
   - belt loading
   - belt speed

   Each output has its own adjustable damping and programmable time or length delay.

1.5.2 Load Out (Optional)

The load out option includes additional hardware designed to make the integrator control a batch sequence. Once the system has been set up, the operator enters

the load size and gives the start command. All functions are then controlled by the integrator.

Start and Stop keys on the front panel are operable if the load out option is installed.

The pre-feeder is stopped when the totalized value equals the batch set value minus the overflow correction value.

The START/STOP commands are provided by external signals (manual push-button or relay contact from an automatic system). The stop signal is used only in an emergency to abort the cycle before it ends.

Load sizing can be changed remotely via BCD input.

1.5.3 Monitoring Functions

The integrator is equipped with an indication system. Indication can be in the form of:

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

1.6 WARRANTY

RAMSEY TECHNOLOGY, INC.

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.

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

1.7 UNPACKING AND INSPECTION

The Micro-Tech 2101 Integrator 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.

1.8 STORAGE

The Micro-Tech 2101 Integrator 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.

1.9 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)

1.10 HARDWARE SPECIFICATIONS

1.10.1 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#E64358
   - 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

1.10.2 Environmental Conditions

1. Mounting

   - Indoor/Outdoor: Should be mounted as close to the load cells as possible without being exposed to excessive heat or moisture.
   - Temperature (Ambient)

     Storage: -40° to +158° F (-40° to +70° C)

     Operating: +14° to +122° F (-10° to +50° C)
   - Maximum relative humidity up to 95% non-condensing
   - Pollution degree (pollution degree 2)
   - Altitude up to 6,561 ft (2000 m)

1.10.3 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. Power Consumption: 50 VA max
6. Maximum non-destructive input voltage: 150/300 VAC for 1 minute
7. Power Switch: Field mount with field terminal board only: switches both L1 and L2

8. Transient overvoltage according to installation category (Overvoltage Category II)

1.10.4 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

1.10.5 DC Power Supplies

1. • Auxiliary Power Supply Output (Alarm Contacts, etc.)

   - Output voltage: +24 VDC +27/-21% (19.0/30.4) unregulated).
   - Isolation: Yes 500 volts
   - Output ripple: 1.0 V peak to peak typical.
   - Output current: 600 mA maximum.
   - Short-circuit protection

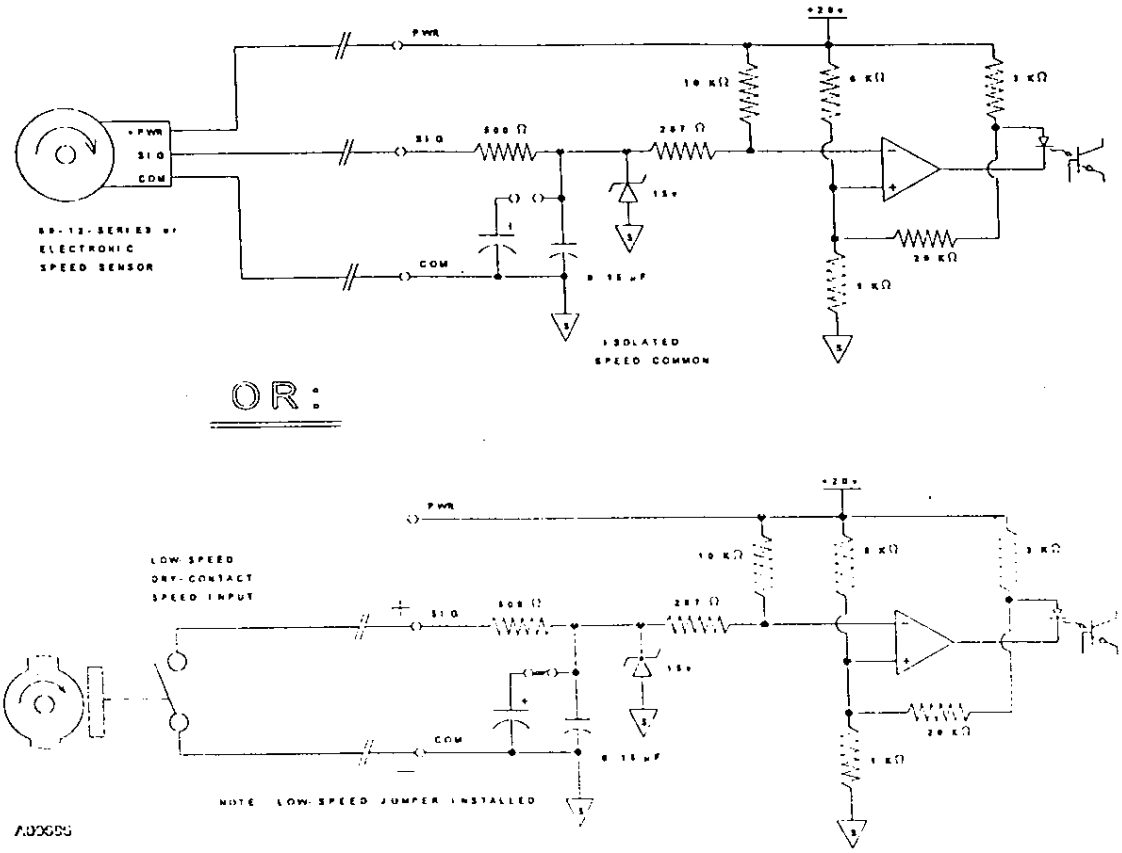
1.10.6 Load Cell (Weight)

1. • Load cell input circuits
   - 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 kΩ minimum.
   - Maximum usable signal: 114% of 3 mV/V.
   - Displayed A/D counts for 3 mV/V: 112368
   - 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
   - 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.

1.10.7 Speed Inputs

1. • High speed digital (DC) input

- speed sensor (Figure 1-3)
- comparator based input with hysteresis
- optically isolated
- built in current source for dry contact use
- powered by +24 V DIO supply or +20 V SPU supply
- Type: Jumper selectable:
  Voltage/current or contact closure type sensor.
  Compatible with all Ramsey speed sensors.
- Frequency range:
- Voltage/current type sensor: 0.25 to 2.0 kHz.
- Contact closure type sensor: 0.25 to 30 Hz.
- Low threshold: +1.0 VDC min
- High threshold: +3.2 VDC max
- Low or high pulse duration:
  - Voltage/current type sensor: 200 us minimum.
  - Contact closure type sensor: 15 ms minimum.
- Hysteresis: 0.5 VDC minimum.
- Input impedance: 10 kΩ typical,
  500 ohm minimum.
- Input source current: -2 mA nom. at 0 VDC.
- Maximum non-destructive input voltage:
  ±50 V peak, continuous.
- Cable Length: 1 mile, using 18 AWG shielded cable, Ramsey series "60" speed sensors.

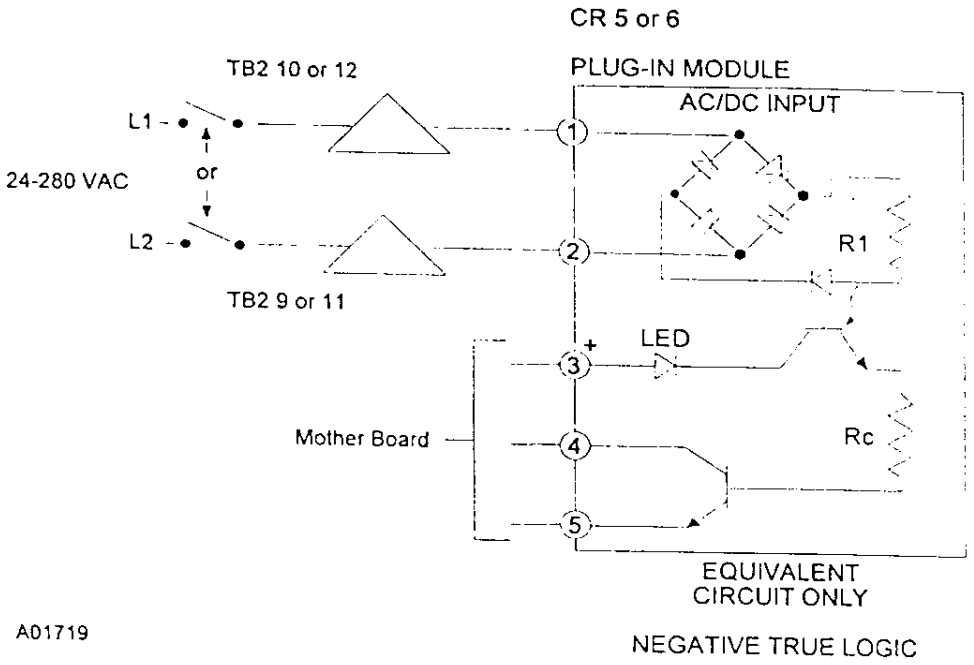


SPEED SENSOR INPUT
FIGURE 1-3

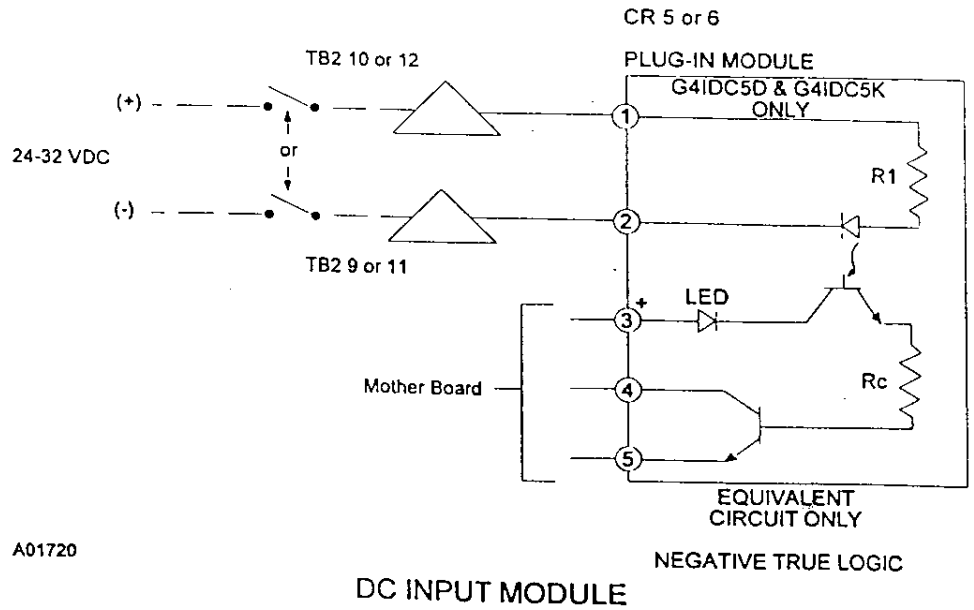
1.10.8 Mother Board Digital Inputs

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 (Figure 1-4 or 1-5).

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 1-4

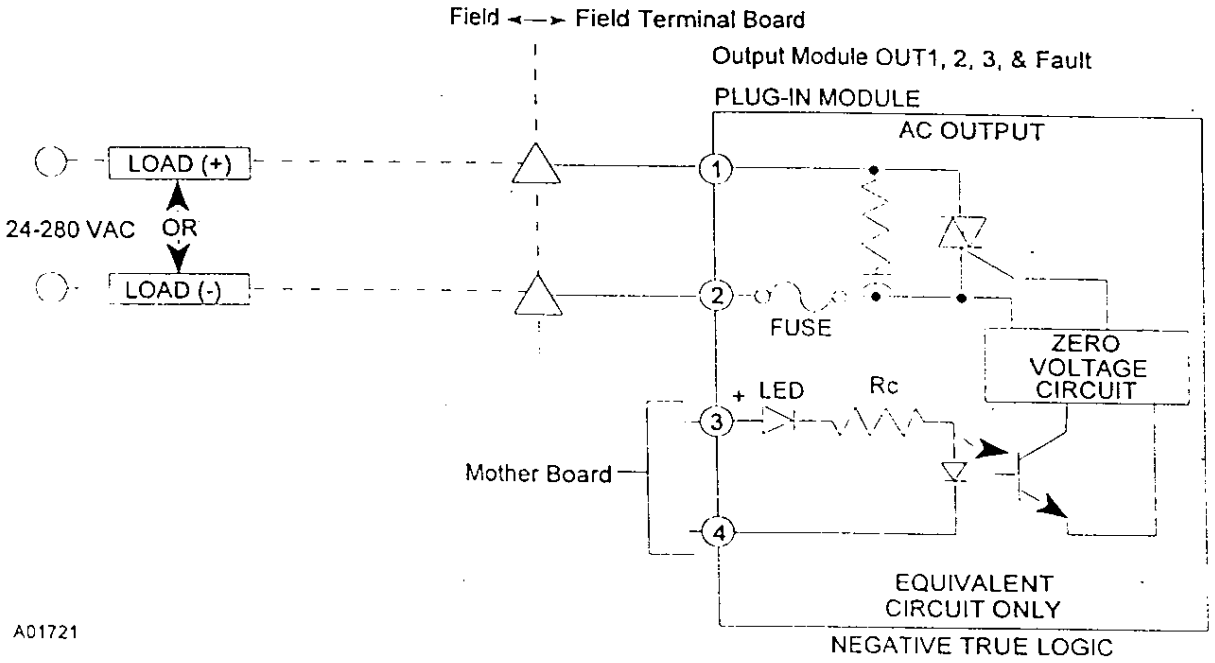


DC INPUT MODULE
FIGURE 1-5

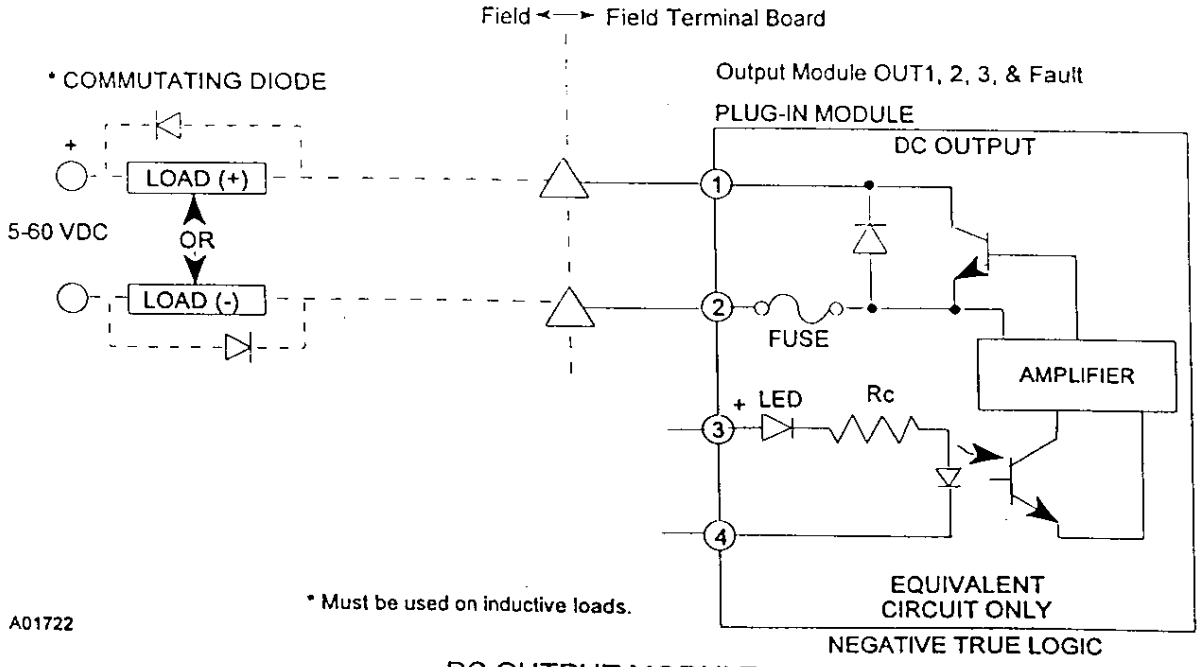
1.10.9 Mother Board Digital Outputs and Fault Output

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 (Figure 1-6 or 1-7).

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



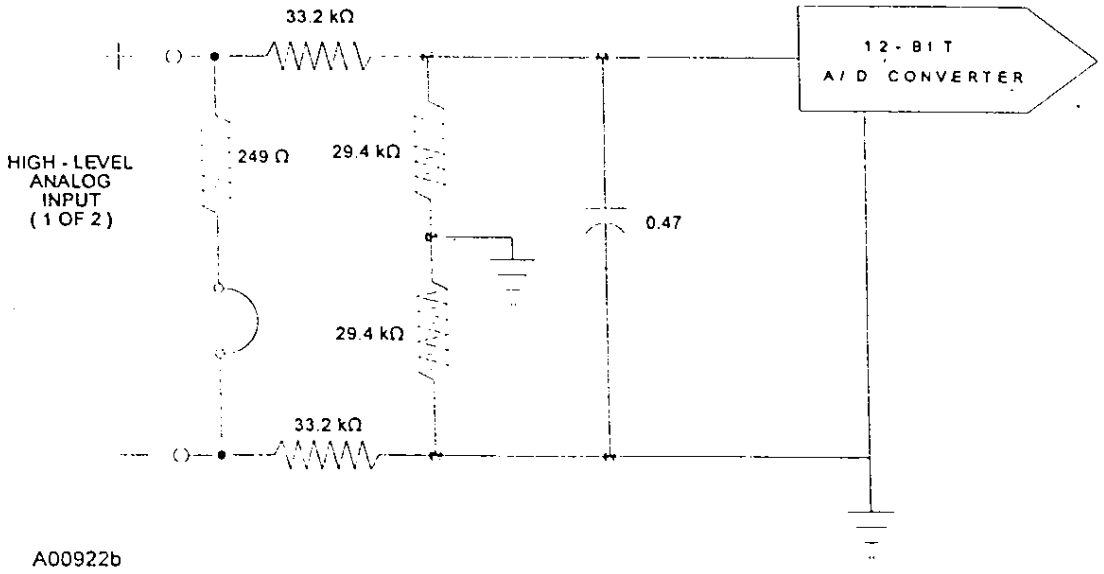
AC OUTPUT MODULE
FIGURE 1-6



DC OUTPUT MODULE
FIGURE 1-7

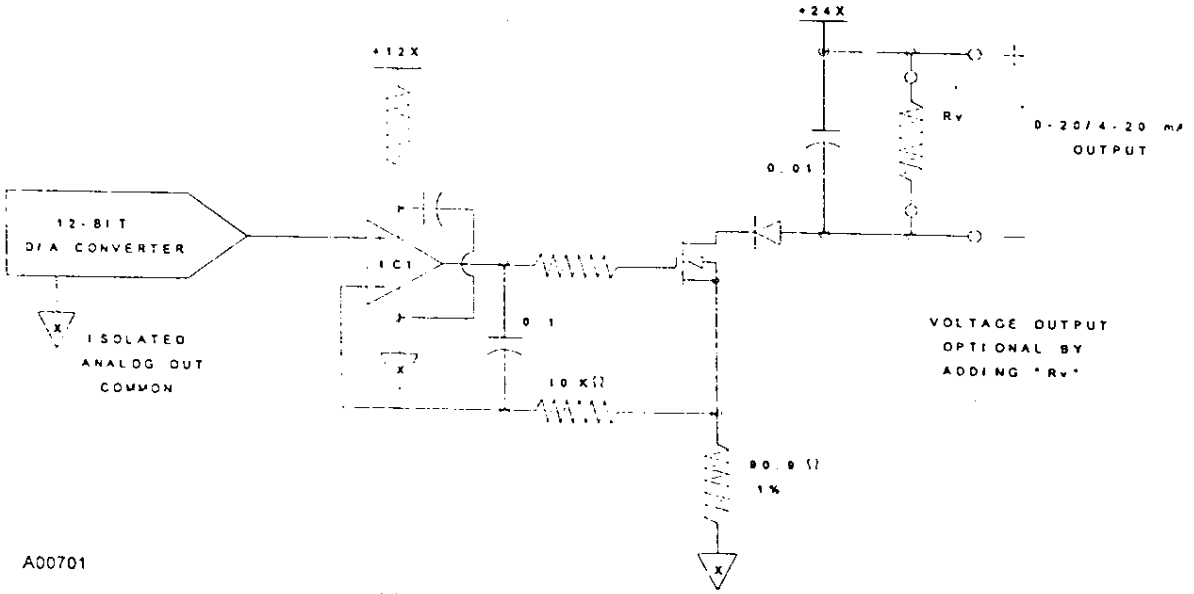
1.10.10 Analog I/O Board B (Optional)

1. (2) high level inputs (Figure 1-8)
   - Type: Differential voltage input.
     (0-20 mA or 4-20 mA with internal resistor, jumper selectable)
   - Range: 0-5 volt, or ±5 volt, programmable.
   - 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 1-8

2. (2) current outputs (Figure 1-9)
   - 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 1-9

1.10.11 Analog I/O Board A

Depopulated version of Analog I/O B:

1. (1) high level output - see 1.6.9 (2)
   - Resistive load: 800 ohm maximum loop
   - Capacitive load: no limit

1.10.12 Communication Board A

(See Field Wiring Diagram.)

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)
  +15/-10 Vdc max. (RS-485)
- Cable length: 50 feet maximum (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.
3. Refer to Serial Communications manual REC 3949 if this option is installed.

1.10.13 Allen-Bradley Remote I/O

Refer to Allen-Bradley Remote I/O manual REC 4012 if this option is installed.

1.10.14 PROFIBUS-DP

Refer to PROFIBUS-DP manual REC 4063 if this option is installed.

CHAPTER 2.0
INSTALLATION

2.1 GENERAL

This chapter describes the Integrator installation procedure, hardware configuration, and initial programming. Initial programming is a machine directed procedure prompting the operator to enter required conveyor and belt scale parameters. After all parameters have been entered, the integrator performs an unassisted zero and span calibration.

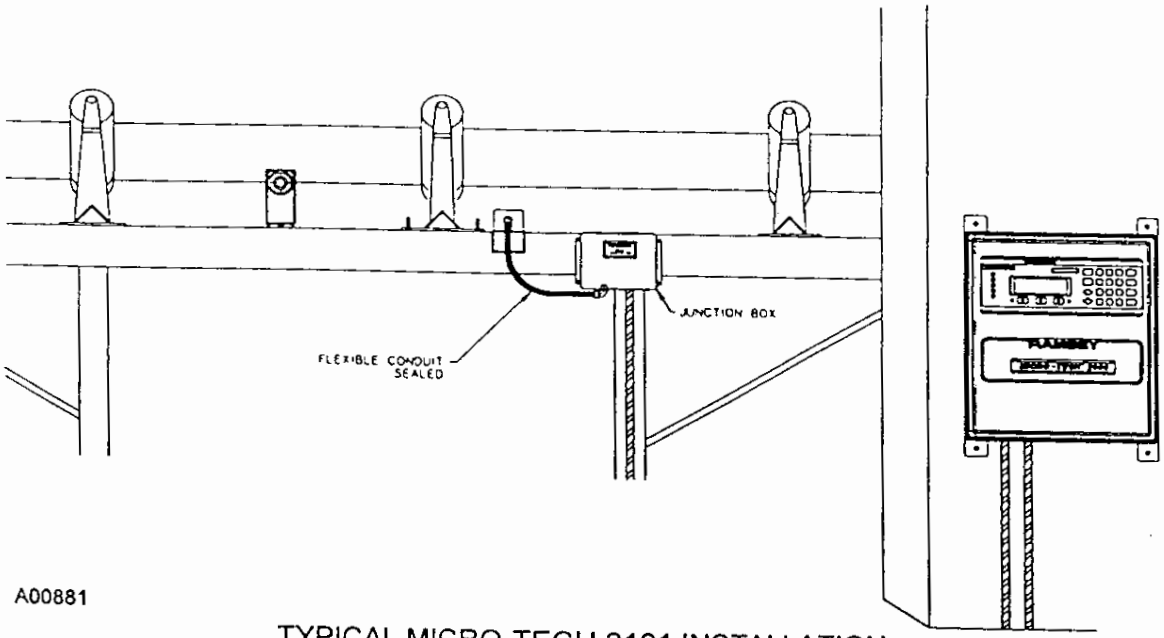
2.2 FIELD MOUNT INSTALLATION

The field mount Integrator should be mounted in a control room environment and not be exposed to excessive vibration, heat or moisture. The Integrator may be mounted up to 3,000 feet from the scale (Figure 2-1).

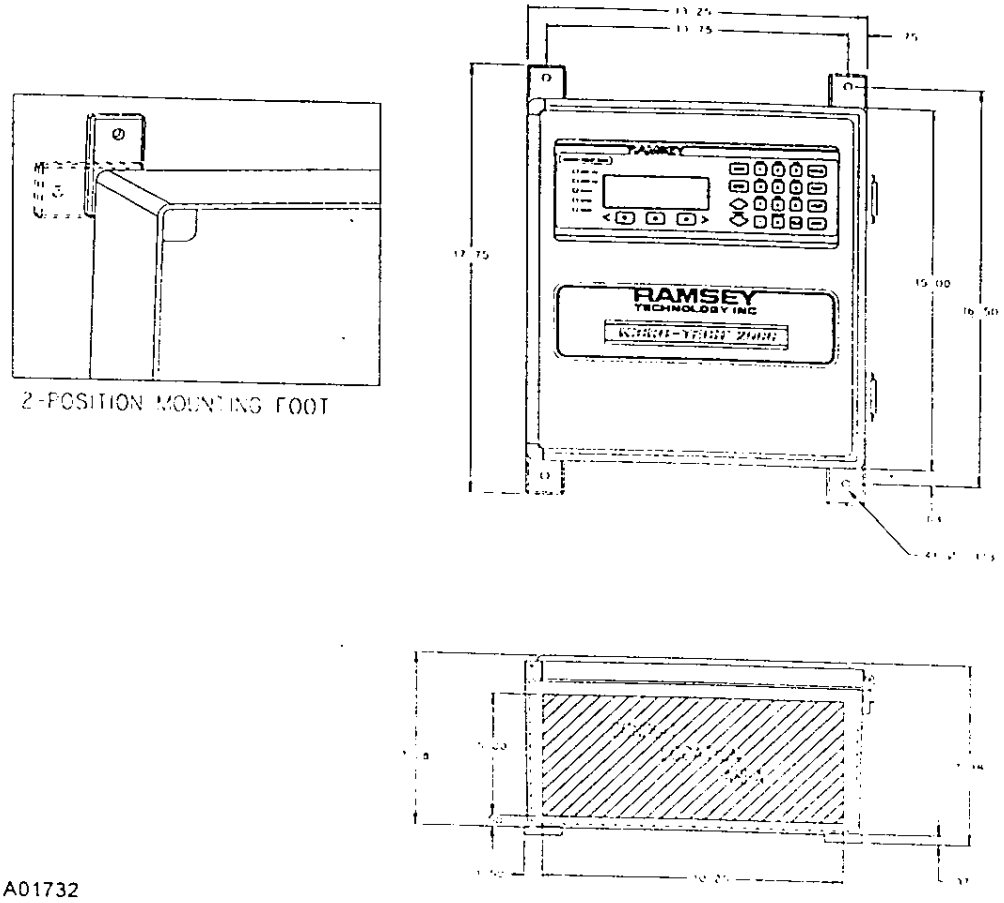
2.2.1 Mounting

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

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.



TYPICAL MICRO-TECH 2101 INSTALLATION
FIGURE 2-1



ELECTRICAL AND MOUNTING GUIDELINES MICRO-TECH 2000
MODEL 2101 (FIELD MOUNT) INTEGRATOR
FIGURE 2-2

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 integrator.

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 Technology, Inc. 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 Technology, Inc. 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 INTEGRATOR.

CAUTION

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

CAUTION

EARTH GROUND MUST BE PROVIDED TO THE INTEGRATOR. 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 2-3 AND 2-4) 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 2-2).

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 2-2). 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.

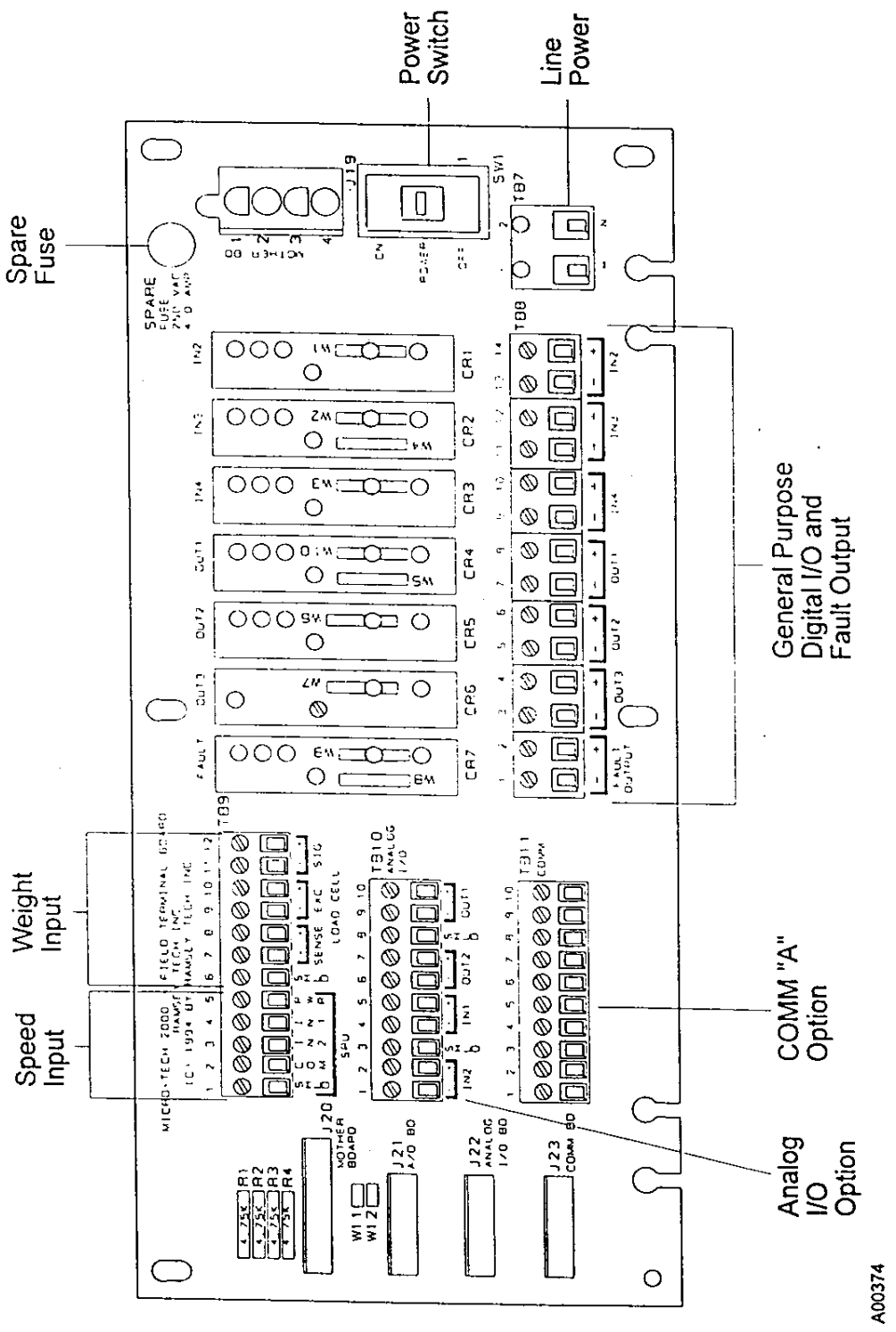
D. Wire HOT to H on TB7 (see Figure 2-3 and 2-4).

E. Wire NEUTRAL to N on TB7.

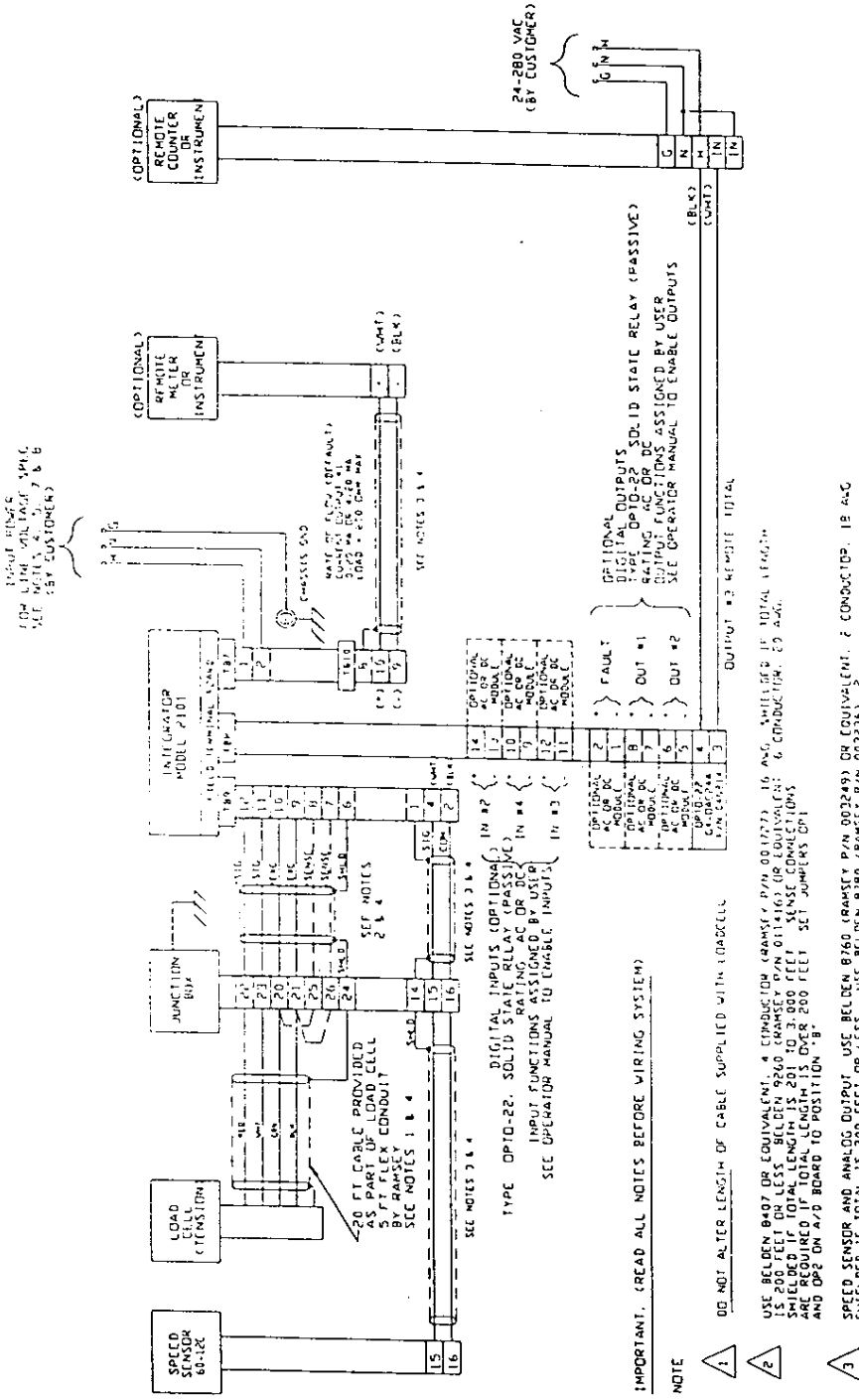
F. If additional I/O is required at line voltages, these wires should be routed through a conduit hole on the bottom right of the enclosure (see Figure 2-2). Leave ample loose wiring (typically 8") to facilitate any movement of the field terminal board.

G. All additional field wiring operation at voltages less than 30 V must be located on the left bottom of the enclosure (see Figure 2-2). 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 counterclockwise until locked. Verify the door is locked.



FIELD TERMINAL BOARD
FIGURE 2-3



FIELD WIRING DIAGRAM
FIELD MOUNT WITH TERMINAL BOARD
FIGURE 2-4

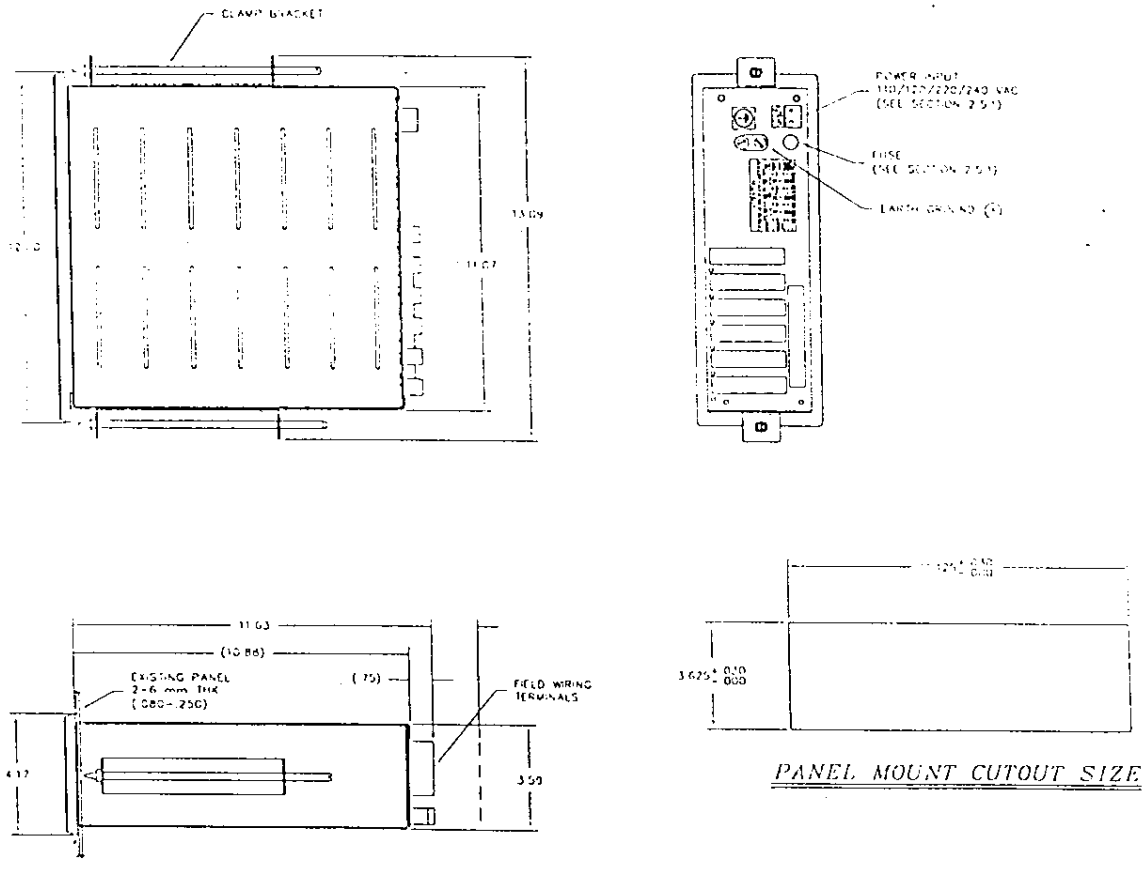
2.3 PANEL MOUNT INSTALLATION

The panel mounted Integrator 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.

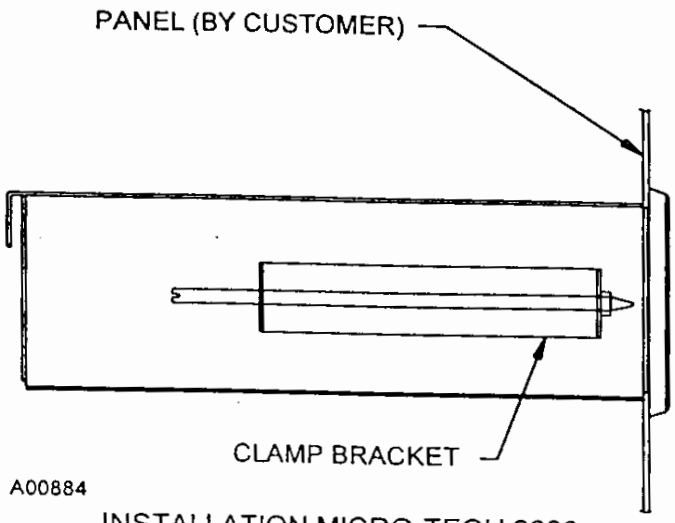
A two (2) inch clearance around the top and bottom of the Integrator is required for convection cooling. Additional clearances may be required if equipment mounted directly below generates excessive heat. Clearance in the back is necessary for wiring access and fuse replacement. Clearance on the side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

2.3.1 Mounting

Provide a cutout in the panel and insert the Integrator after removing the holding brackets (see Figures 2-5 and 2-6). From the back, insert the holding brackets on both sides of the Integrator. Tighten the holding brackets to support the Integrator and form the dust seal.



ELECTRICAL AND MOUNTING GUIDELINES MICRO-TECH 2000
MODEL 2101 (PANEL MOUNT) INTEGRATOR
FIGURE 2-5



INSTALLATION MICRO-TECH 2000
MODEL 2101 (PANEL MOUNT) INTEGRATOR
FIGURE 2-6

NOTES:

1. See Figure 2-5 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 integrator.

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 Technology, Inc. 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 Technology, Inc. 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 INTEGRATOR.

CAUTION

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

CAUTION

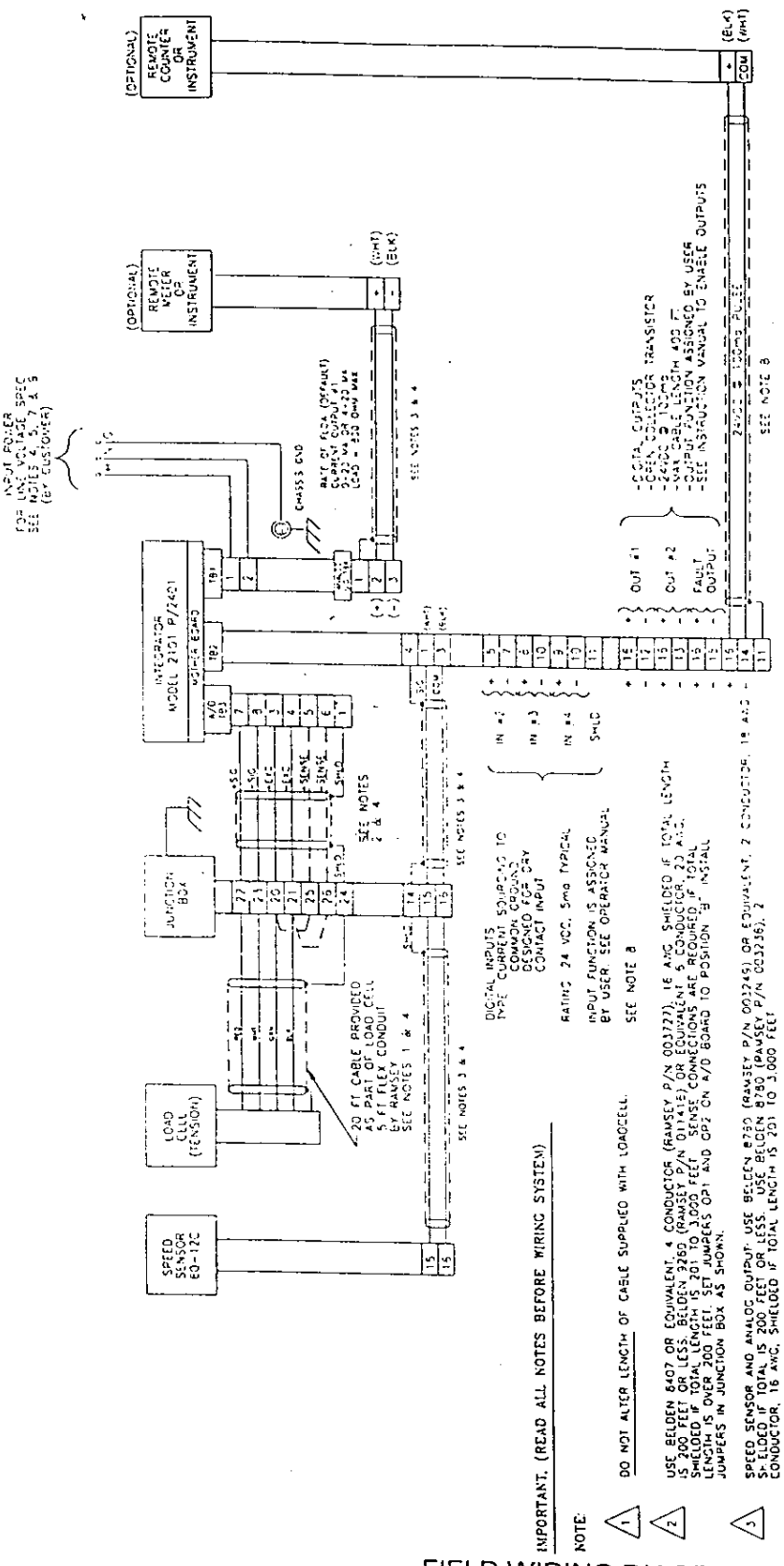
EARTH GROUND MUST BE PROVIDED TO THE INTEGRATOR. DO NOT USE CONDUIT TO PROVIDE THIS GROUND.

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 2-7) 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
FIELD MOUNT WITHOUT FIELD TERMINAL BOARD OR PANEL MOUNT
FIGURE 2-7

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 2-5).

   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 INTEGRATOR CONFIGURATION

The Micro-Tech 2101 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.

2.4.1 Mother Board Configuration Jumpers and Switches

CAUTION

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 2-8).

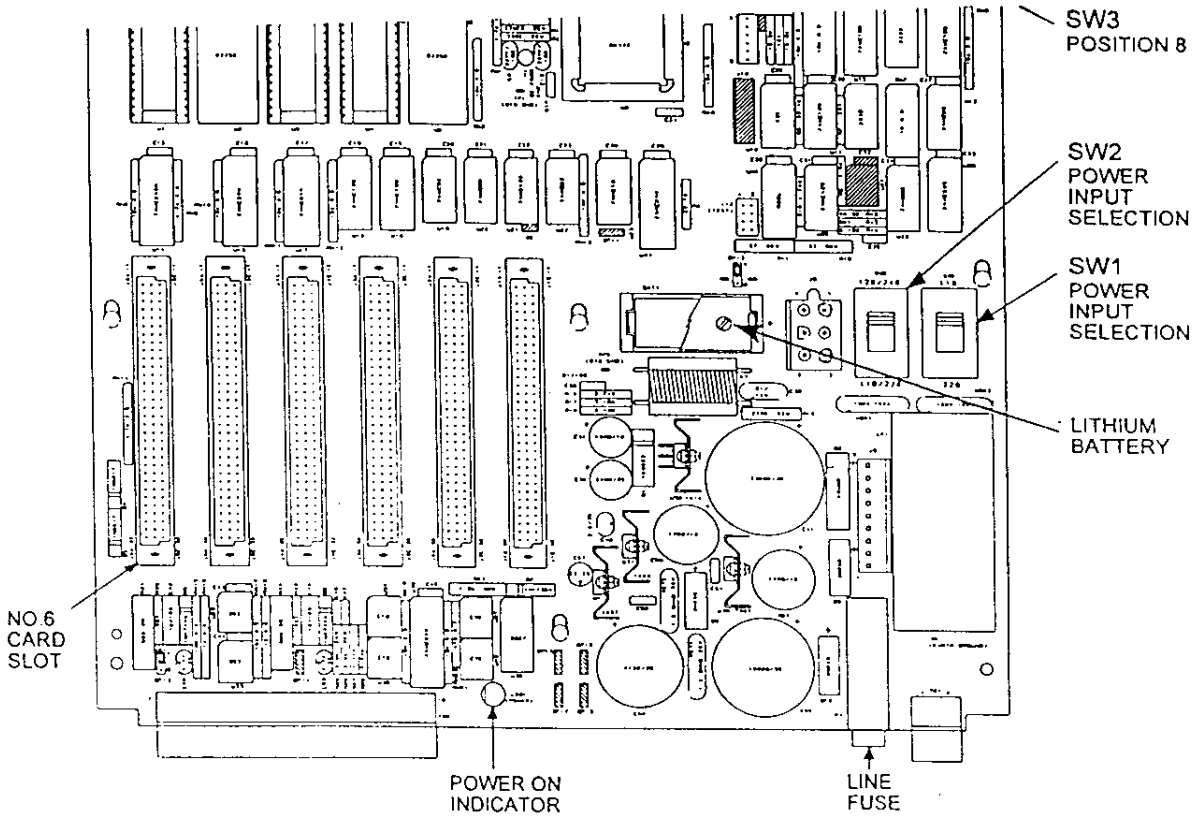
	AC INPUT VOLTAGE	FUSE F1 (SB)	SW1 SETTING	SW2 SETTING
	110	1.0 A	110	110/220
Default	120	1.0 A	110	120/240
	220	0.5 A	220	110/220
	240	0.5 A	220	120/240

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

2. General Purpose Digital Inputs

Located on the Field Terminal board are provisions for three programmable status input optional OPTO/22 plug-in modules. The programmable inputs may be configured as normally open or normally closed. External AC or DC power for input logic is required.



MODEL 2101 MOTHER BOARD
FIGURE 2-8

The programmable input choices are:

External Alarm 1
External Alarm 2
External Alarm 3
Print
Belt Running
Reset Total
Reset Alarm
Auto Zero
Clip Detector
Batch Start Command
Batch Stop Command
Batch Standby Command
Calibration Select 1...10

Any three inputs may be selected. An optional AC or DC OPTO/22 module is required for each input.

3. Digital Outputs

Located on the Mother board are provisions for four programmable output OPTO/22 plug-in modules. Three digital outputs are programmable and the fourth one is permanently assigned as integrator fault. The three programmable digital outputs may be configured as normally open or normally closed. The fault output is normally closed and cannot be reconfigured or used as a programmable output. External AC or DC power is required for all external devices wired to the output modules. One OPTO/22 AC output module is included for remote totalization.

The programmable output choices are:

Alarm Cumulative
Shutdown Cumulative
Ready
High Load
Low Load
High Rate
Low Rate
High Speed
Low Speed
Totalization Pulse (Remote Counter)
Batch Preset Reach
Batch End
Print Ready
Load WTS (Weights)
Out of Range
Deviation Alarms

2.4.2 Field Terminal Board (Field Mount Only)

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 (see Figure 2-10).

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.

2.4.3 A/D Board Jumpers

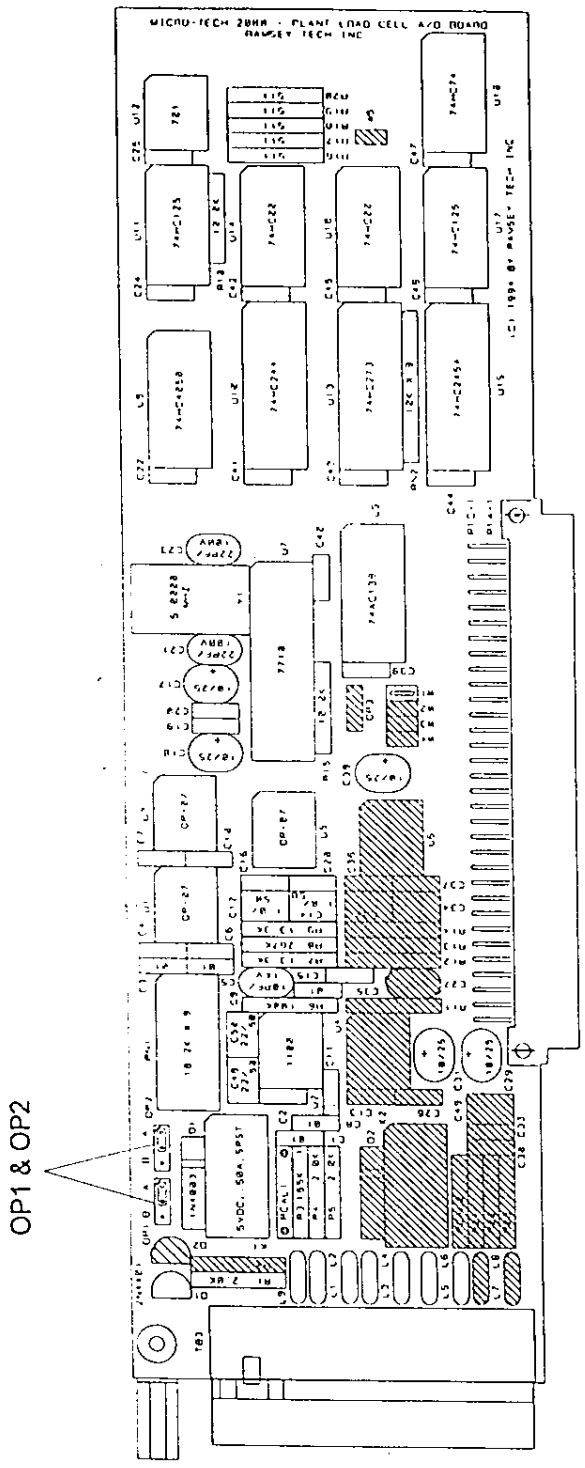
1. Load Cell Sense

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

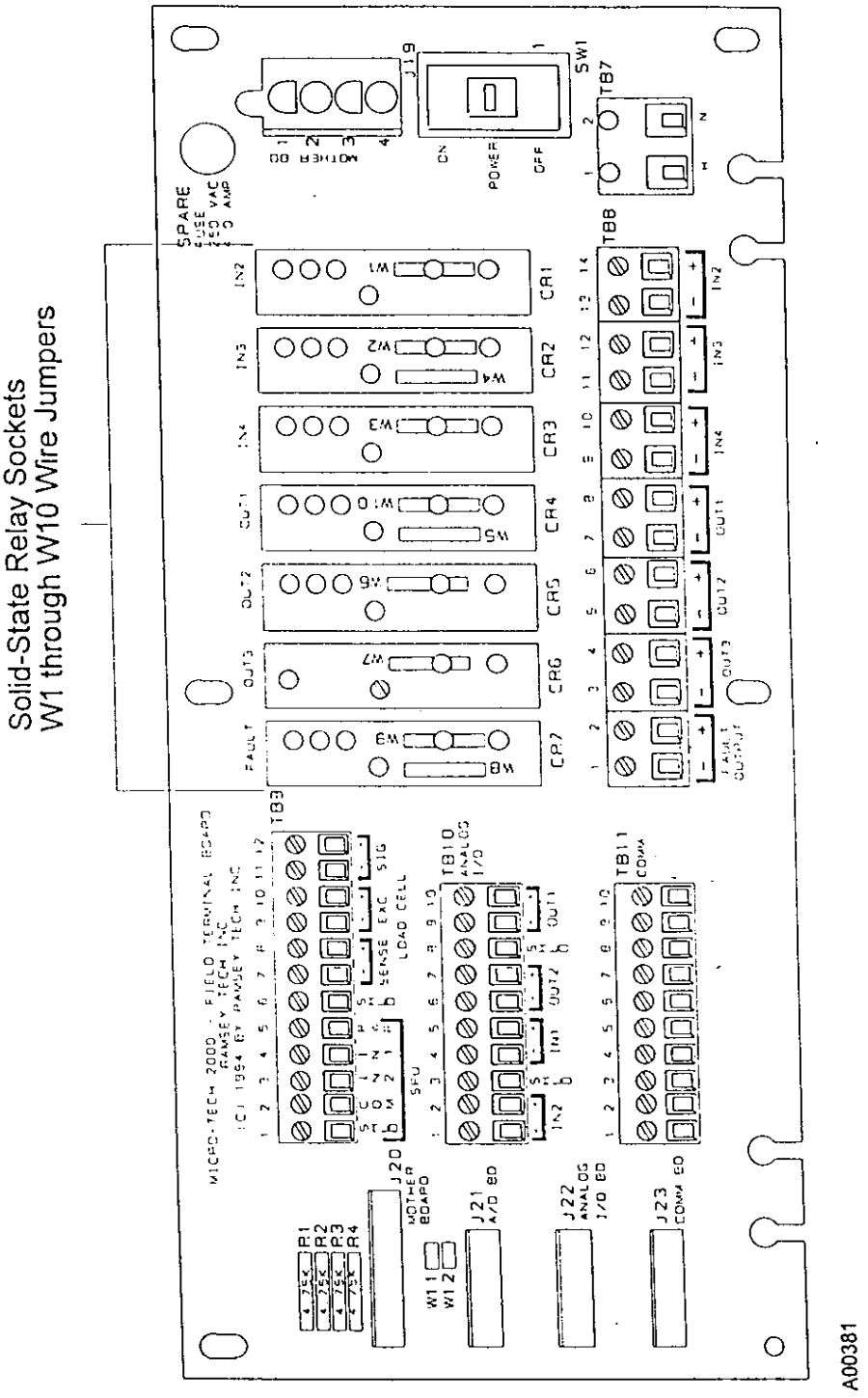
For distances greater than 200 feet and less than 3,000 feet, the jumper should be in position "B". A special 6 wire cable is required. Refer to the field wiring drawing for jumper requirement in the scale junction box.

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

[Default]



LOAD CELL A/D BOARD
FIGURE 2-9



FIELD TERMINAL BOARD
FIGURE 2-10

2.4.4 Analog Input/Output Board

The optional analog input/output board is available in two configurations described below. (A) has one current output only; whereas, (B) has two voltage inputs and two current outputs (Figure 2-11). The Micro-Tech 2101 can support up to four current outputs. Four outputs require two (B) analog boards.

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

The integrator is supplied with a type (A) one current output only board located in Mother board slot #5. An additional Type A or Type B board can be added at any time.

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

Rate
Speed, or
Load

Type B. Two +/- 5 VDC differential inputs and two user definable 0-20/4-20 or 20-4/20-0 mA outputs (optional).

Inputs
- Incline Compensation
- Moisture Compensation

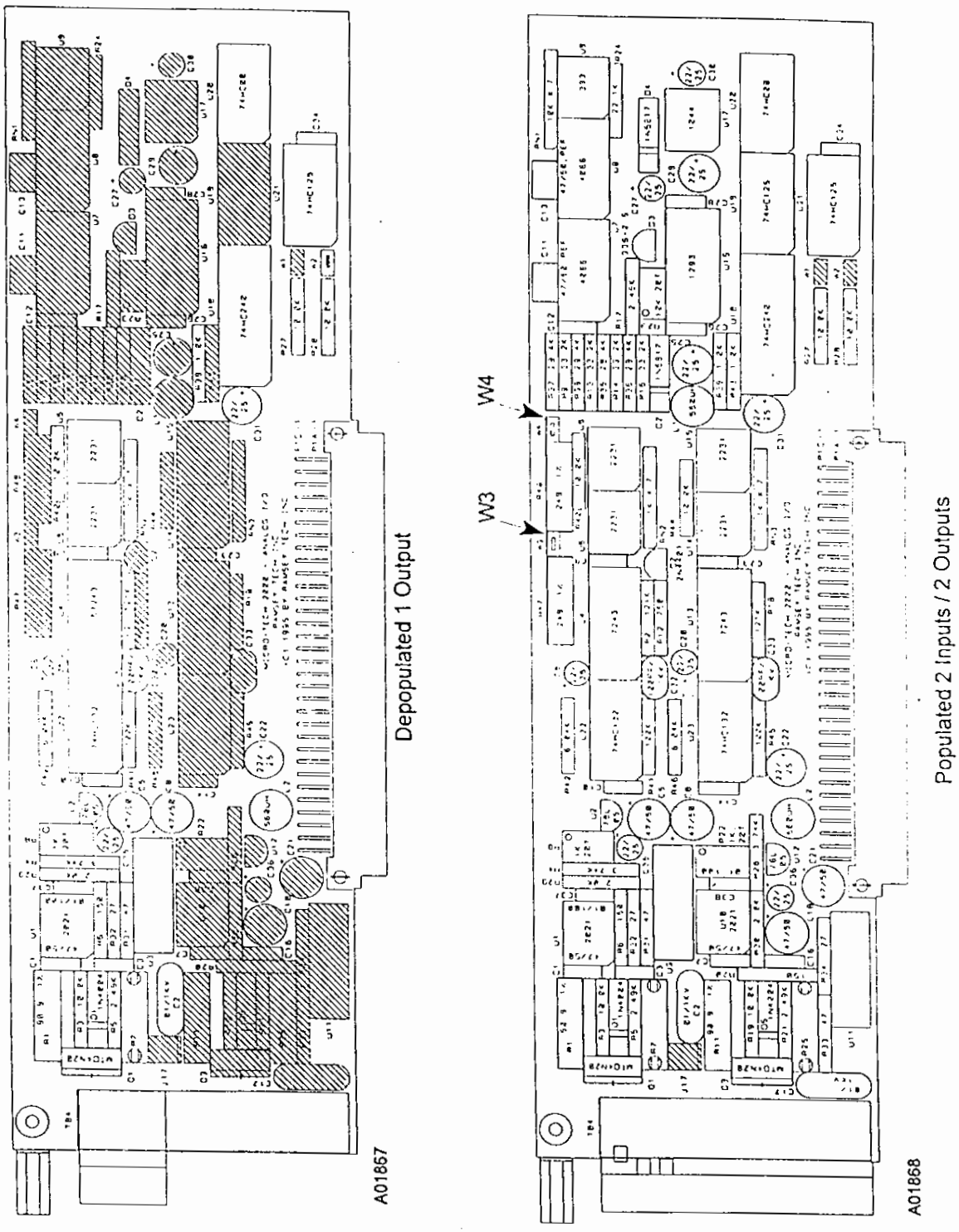
Outputs
- Rate
- Speed, or
- Load

2.4.5 Communications Board Configuration

See REC 3949 Serial Communications manual if Communication Board A is installed.

2.4.6 Load Out Option

See Appendix A/5 if the load out board is installed.



ANALOG I/O BOARD
FIGURE 2-11

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 2101 Integrator memory. The following setup procedure should be completed before calibration of your belt scale system is attempted. Refer to Chapter 3 of this manual if more details or assistance is necessary.

2.5.1 Determining Installation Parameters

Before turning on the conveyor belt or applying power to the belt scale system, it is necessary to complete the following statements. Refer to your System Data Sheet in the front of your belt scale manual (see Figure 2-12).

1. Scale Capacity

   Determine the scale's capacity in tons per hour and record the capacity below. (Example: 400.0)

   _____ (Tons Per Hour)

2. Belt Scale Code Number

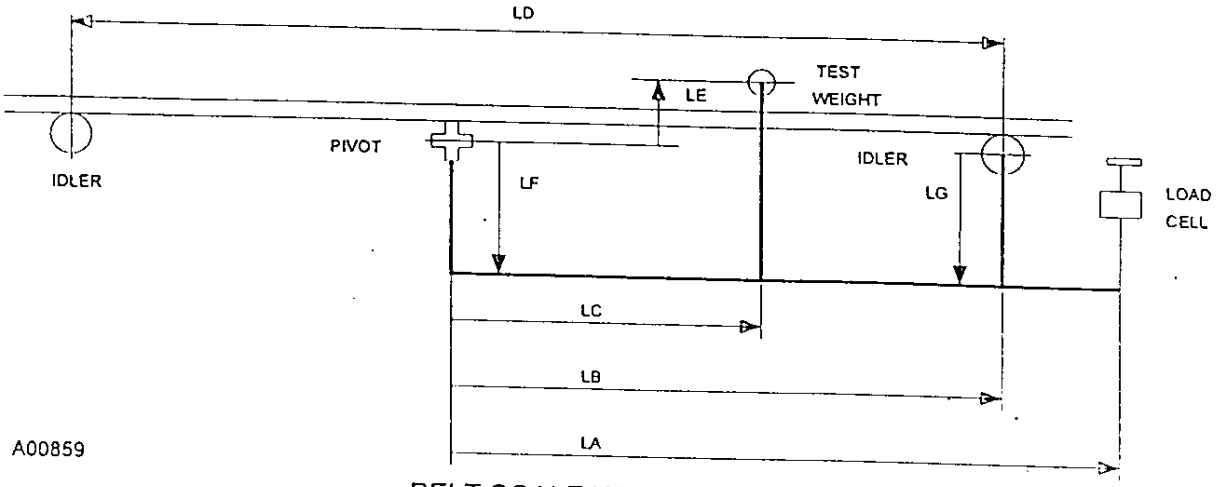
   Determine the belt scale's code number from the System Data Sheet located in front of the scale manual or see Appendix A/1, Weighbridge Parameters. Record the code number below. (Example: code number one is a belt scale model 10-20-1 for conveyor width 18 through 36 inches.) Enter 0 for any weighbridge not found in the table.

   _____ (Belt Scale Code Number)

   Entering the code number enters a list of default parameters for the weighbridge selected. During initial programming, the Integrator calculates a calibration constant for R-Cal based on the default values. If test weights or test chains are used, their weight values are entered in the Cal Data Scroll after initial programming is completed.

   During initial programming, DETAIL can be selected after entering the belt scale code number. All weighbridge default values can be viewed by scrolling down. A parameter can be changed at this time if necessary.

NOTE: Entering code 0 or selecting DETAIL requires all measurements in Steps 3 through 14 below to be made and entered during initial programming.



BELT SCALE WEIGHBRIDGE
FIGURE 2-12

3a.	PIVOT TO LOAD CELL	(LA)
3c.	PIVOT TO 1° IDLER	(LB1)
3d.	PIVOT TO 2° IDLER	(LB2)
3e.	PIVOT TO 3° IDLER	(LB3)
3f.	PIVOT TO 4° IDLER	(LB4)
3g.	PIVOT TO 5° IDLER	(LB5)
3h.	PIVOT TO 6° IDLER	(LB6)
4.	PIVOT TO TEST WEIGHT LENGTH	(LC)
5.	PIVOT TO TEST WEIGHT HEIGHT	(LE)
8.	IDLER SPACING	(LD)
6.	PIVOT TO CARRIAGE HEIGHT	(LF)
7.	CARRY ROLL TO CARRIAGE HEIGHT	(LG)
9.	CONVEYOR'S ANGLE	(θ)
3b.	IDLERS NUMBER	(IDN)

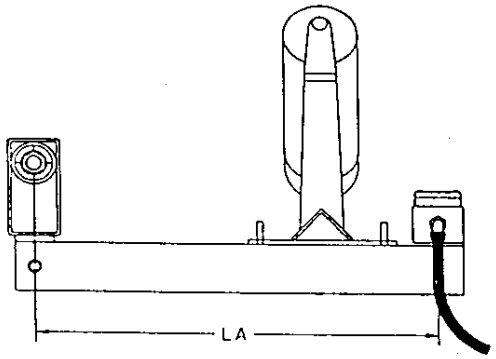
3. Belt Scale Weighbridge Dimensions

Refer to Figure 2-12 and the sketches below for measurements.

a. Pivot to Load Cell - LA

As indicated on Figure 2-13, measure the distance from the pivot center line to the load cell center line to the nearest 0.032 (1/32)". Record the distance below. (Example: 32.00)

_____" (Pivot to Load Cell Distance)



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PIVOT TO LOAD CELL
FIGURE 2-13

b. Number of Weigh Idlers on Scale Weighbridge(s) - IDN

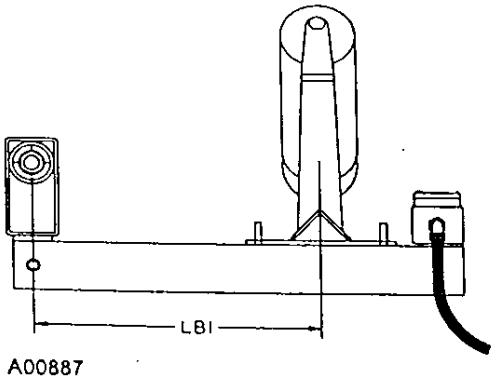
_____ (Number of Weigh Idlers)

c. Pivot to 1st Idler (Weigh Idler) - LB1

As indicated on Figure 2-14, measure the distance from the pivot center line to the weigh idler's center line to the nearest 0.032 (1/32)". Record the distance below. (Example: 24.00)

_____" (Pivot to Weigh Idler Distance)

(Model 10-20 belt scale shown.)



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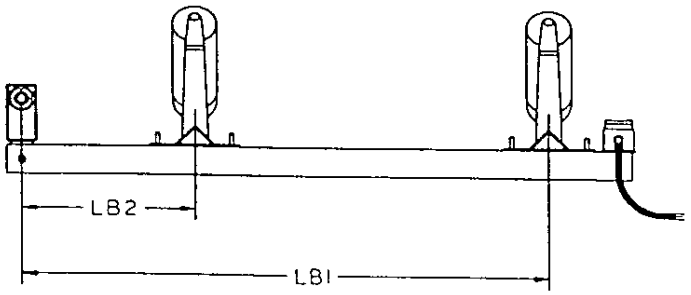
PIVOT TO 1ST IDLER
FIGURE 2-14

d. Pivot to 2nd Weigh Idler (Optional)

As indicated on Figure 2-15, measure the distance from the pivot center line to the second weigh idler's center line to the nearest 0.032 (1/32)". Record the distance below. (Example: 24.00)

_____" (Pivot to 2nd Weigh Idler Distance)

(Model 10-22 belt scale, 10-17-2 similar.)



PIVOT TO 2ND WEIGH IDLER
FIGURE 2-15

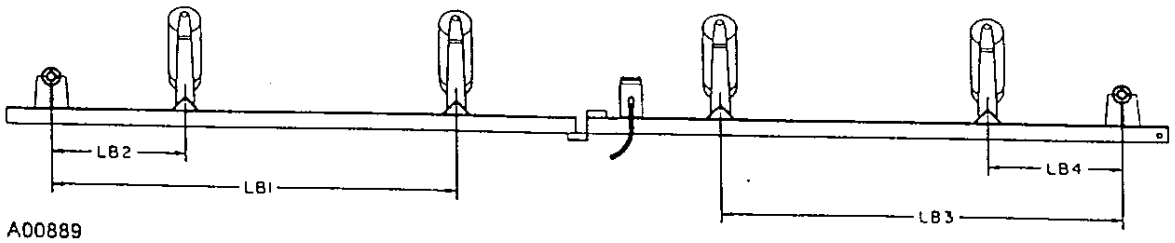
NOTE: Up to six (6) weigh idlers on a single weighbridge may be entered during programming. Measure and record the same as step d above for each additional weigh idler.

e. Pivot to 1st, 2nd, 3rd and 4th Idler (Weigh Idler)

As indicated on Figure 2-16, measure the distance from the pivot center line to the weigh idler's center line to the nearest 0.032 (1/32)". Record the distance below. (Example: 24.00)

_____" (Pivot to Weigh Idler Distance)

(Model 10-17-4 belt scale shown.)



PIVOT TO 1ST, 2ND, 3RD AND 4TH IDLER
FIGURE 2-16

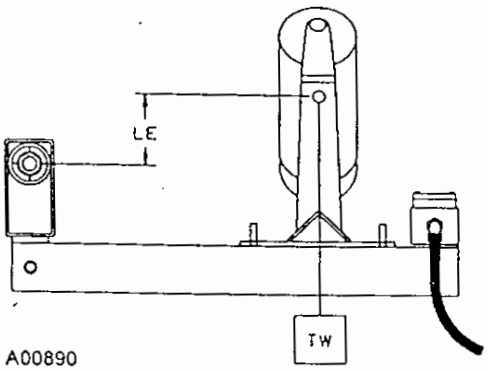
NOTE: Complete Steps 4, 5, 6, and 7 below only if test weights are used for calibration.

4. Pivot to Test Weight Height - LE

   Measure the distance from the centerline of the pivot to the actual point of test weight contact to the nearest 0.032 (1/32) inch (Figure 2-17). Record the distance below. If contact point is below pivot, value is negative (-).

   (Example: 0.00) If test weights are not used, disregard this measurement.

   _____" (Pivot to Test Weight Height Distance)



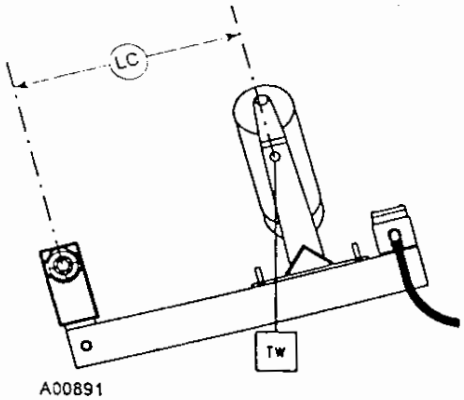
PIVOT TO TEST WEIGHT HEIGHT
FIGURE 2-17

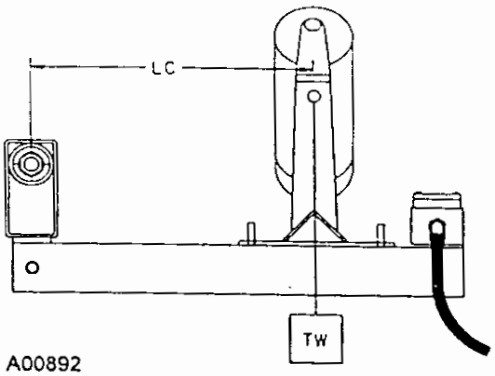
5. Pivot to Test Weight Length - LC

   Measure the distance from the centerline of the pivot to the actual point of test weight contact to the nearest 0.032 (1/32) inch (Figure 2-18). Record the distance below.

   (Example: 4.75) If test weights are not used, disregard this measurement.

   _____" (Pivot to Test Weight Length Distance)



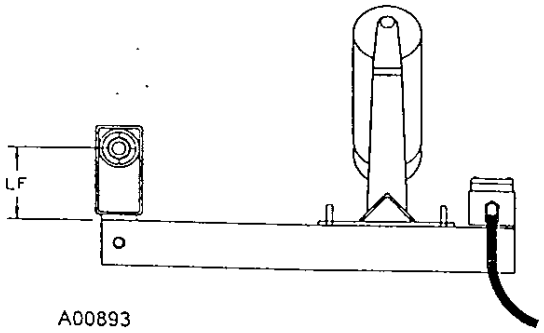


PIVOT TO TEST WEIGHT LENGTH
FIGURE 2-18

6. Pivot to Carriage Height - LF

Measure the distance from the centerline of the pivot to the top of the carriage rails to the nearest 0.032 (1/32) inch (Figure 2-19). Record the distance below. (Example: 6.50)

_____" (Pivot to Carriage Height Distance)

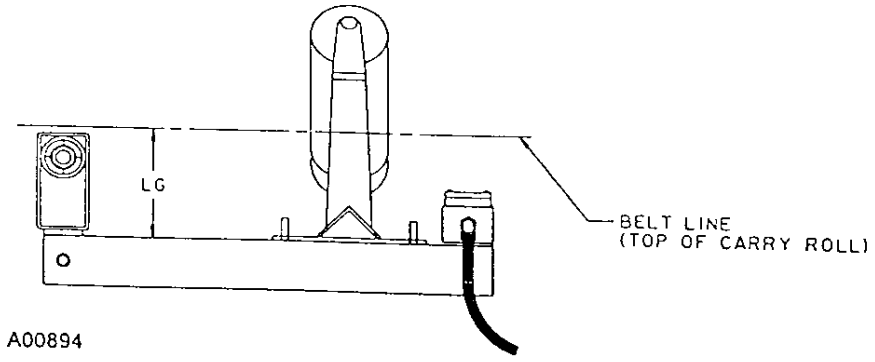


PIVOT TO CARRIAGE HEIGHT
FIGURE 2-19

7. Roll to Carriage Height - LG

Measure the distance from the top of the carriage rails to the top of the weigh idler carry roll where the belt makes contact on trough idlers (Figure 2-20). Flat idlers measure to the centerline of the grease fitting to the nearest 0.032 (1/32) inch. Record the distance below. (Example: 6.50)

_____" (Roll to Carriage Height Distance)



ROLL TO CARRIAGE HEIGHT
FIGURE 2-20

8. Number of Load Cells

Enter the number of load cells. (Example: 1)

_____ (Number of Load Cells)

9. Idler Spacing Scale Area - LD

   Measure the distances between the center lines of all idlers from the plus 1 (+1) to the minus 1 (-1) idler on both sides of the conveyor (left and right). Add all the measurements together and divide by the number of measurements to determine the average distance.

NOTE: If the distances measured is not all equal within 0.032 (1/32)" the scale is not properly installed. Refer to the belt scale installation manual provided.

_____" (Idler Spacing)

10. Conveyor's Angle of Incline

    Measure the conveyor's angle of incline to the nearest 0.1 degrees. Record the degree of angle below. (Example: 16.0) Refer to Figure 2-21 for more information on how to measure angle of incline.

_____ degrees (Angle of Conveyor Incline)

11. Load Cell Capacity

    From the belt scale data sheet located in the front of its manual, determine the load cell size in pounds. Record the weight below. (Example: 250.0)

_____ pounds (Load Cell Weight)

12. Load Cell Sensitivity

    From the load cell name plate, determine the load cell sensitivity in mV/V. Record the sensitivity below. (Example 3.000 mV/V)

_____ (Load Cell Sensitivity)

13. Load Cell Resistance

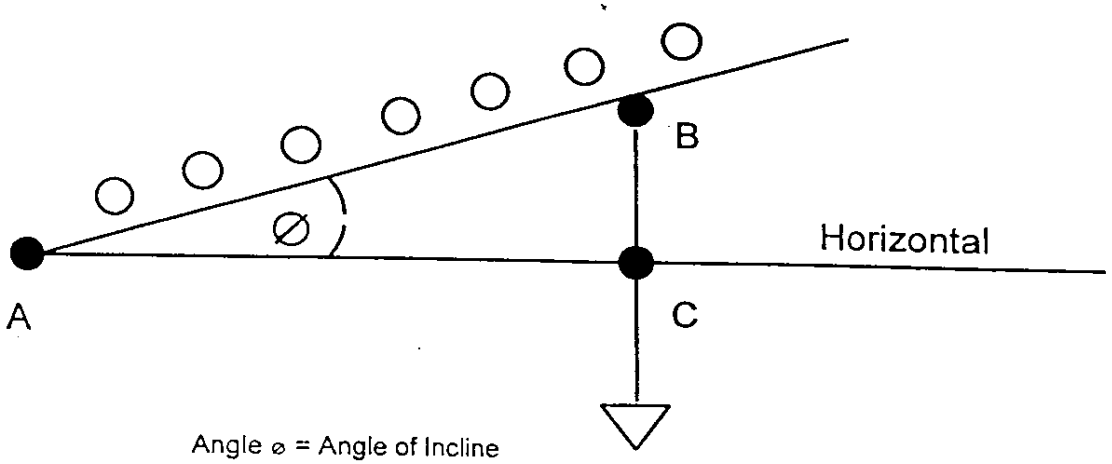
    Measure the signal (output) resistance of each load cell with a digital VOM. Record the resistance below. (Example: 350.000)

_____ (Load Cell Resistance)

14. Conveyor Belt Length

    Using a long tape measure, measure the length of one complete belt revolution. Measure to the nearest 0.1 foot. Record the length below. (Example: 1000.0)

_____ feet (Conveyor Belt Length)



MEASURING ANGLE OF INCLINE
FIGURE 2-21

Choose a convenient distance 'AB' and measure it in inches.

Hang a plumb line from 'B'.

Measure the horizontal distance from 'A' to plumb line in inches ('AC'). Divide 'AC' by 'AB' to get COS⌀.

If angle of incline in degrees is known, use the following table.

Angle ⌀	Cos ⌀
0	1.0000
1	.9998
2	.9994
3	.9986
4	.9976
5	.9962

Angle ⌀	Cos ⌀
6	.9945
7	.9925
8	.9903
9	.9877
10	.9848
11	.9816

Angle ⌀	Cos ⌀
12	.9781
13	.9744
14	.9703
15	.9659
16	.9613
17	.9563

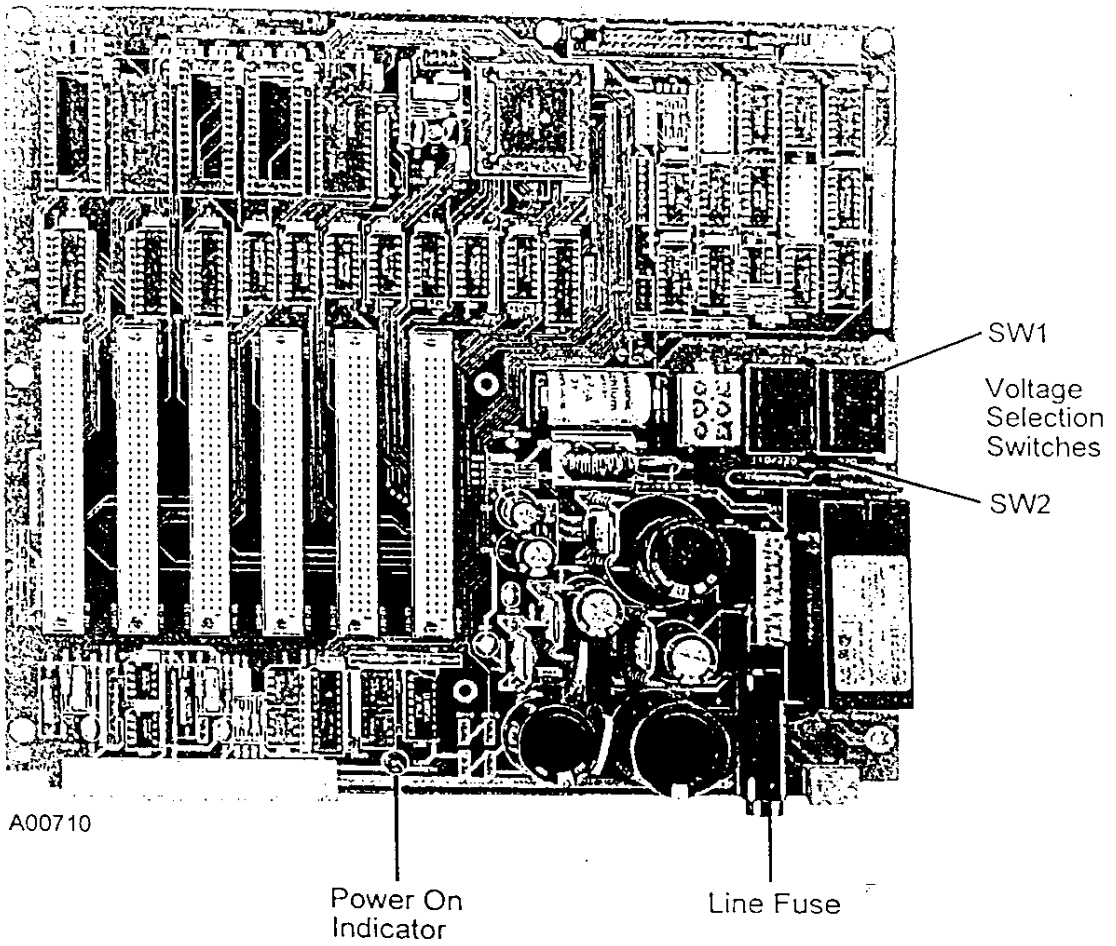
2.5.2 Programming the Micro-Tech 2101 Integrator

When power is first applied to the Integrator, 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.

CAUTION

Inside the Integrator's front panel are two voltage selection slide switches (see Figure 2-22). 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.

1. Turn the belt scale conveyor belt on. Run the conveyor empty during setup and calibration.



MICRO-TECH 2101 CPU BOARD
FIGURE 2-22

2. Programming the Integrator

The programming mode begins the first time power is applied. Information requested by the instructional screens should be entered before moving to the next screen. The belt scale is calibrated at the end of this procedure provided the correct information is entered. The alarm light flashes during the programming procedure and clears when calibration is complete.

The programming mode begins with the following instructional screens.

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

The Micro-Tech 2000 is a dual language instrument. USA is always the first language. The standard configuration provides Spanish (ESP) as the second language. Other languages, such as German (GER), are available upon request (consult factory). Press the desired language.

```
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 user 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.

Press the **DOWN** scroll key.

3. Press **SCROLL DOWN** 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
```

Default: ENGLISH
Selections: ENGLISH, METRIC, MIXED
If English, all units in English
If Metric, all units in Metric
If Mixed, units may be a combination of English and Metric

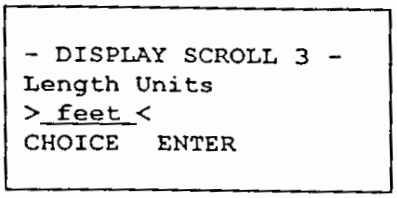
NOTE: If the Measure units are changed from English to Metric (or vice versa) after the scale is calibrated, the span number will change but the calibration will remain the same.

4. The units to be used for totalization are 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 -
Totalization Units
> Tons <
CHOICE   ENTER
```

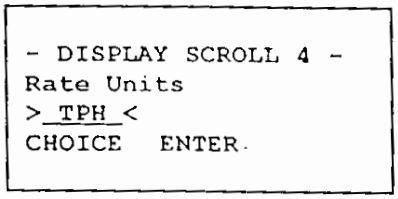
If ENGLISH: Default: Tons
Selections: Tons, LTons, Pounds
If METRIC: Default: tonnes
Selections: tonnes, kg
If MIXED: Default: Tons
Selections: Tons, LTons, kg, Pounds, tonnes

5. Units used for parameters expressed in length are selected here. Selections are only available if **MIXED** units are in use. Press **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.



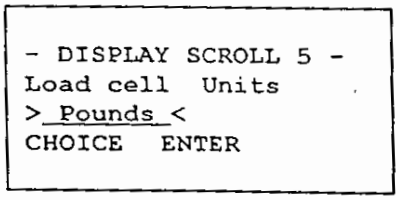
If ENGLISH: Default: Feet
If METRIC: Default: meters
If MIXED: Default: Feet
Selections: Feet, meters

6. The rate is 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.



If ENGLISH: Default: Tph
Selections: Tph, LTph, Lb/mn, T/mn, LT/mn, Percent %, Lb/h
If METRIC: Default: kg/h
Selections: t/h, kg/m, t/m, Percent %, kg/h
If MIXED: Default: Tph
Selections: Tph, LTph, kg/m, t/m, Lb/m, t/mn, Lt/mn, Percent %, kg/h, t/h, Lb/h

7. The units used for entering the load cell capacity are specified here. In this particular case, the use of English or Metric units is always allowed, even if **MIXED** is not specified. Press **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.



If ENGLISH or MIXED: Default: Pounds
If METRIC: Default: kilograms
Selections: Lbs, kg

8. The next entry is the scale capacity, which is the maximum rate at which the scale is allowed to work. This entry also defines the default number of decimal places that are used for displaying rate. Use numeric keys for entering the number, confirm with **ENTER**. Scroll down.

```
- SC DATA SCROLL 1 -
Max. scale capacity
500.0    Tph
ENTER
```

Default: 500.0
Min: 1
Max: 200000

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

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

```
- SC DATA SCROLL 2 -
Scale divisions
>_0.1_<
CHOICE   ENTER
```

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

10. Selecting the Weighbridge Model

    By entering the code number of your Ramsey scale on the next screen, the Integrator automatically calculates parameters of the system such as number of load cells and number of weigh idlers. This entry is also used for internal calibration calculations. The default model number is 1, which corresponds to belt scale model 10-20-1.

```
- SC DATA SCROLL 3 -
Belt scale code #
>_1_<
ENTER          DETAIL
```

Default: 1
Min: 0
Max: 500

Press **ENTER** to accept the displayed selection from the database listed in Appendix A/1, Weighbridge Parameters. If **ENTER** is used, the scrolls from 3A to 3J are not displayed. Skip to Step 12.

Press **DETAIL** if you want to force the following scrolls #3A to 3O to be displayed even if **ENTER** was used.

Enter **0** if you want to define the weighbridge not using the database. This should only be done for special weighbridges that are not part of the standard set of Ramsey scales. Entering **0** forces the following scrolls 3A to 3O to be displayed.

11. Detailing the Mechanical Parameters of the Frame

The following screens are only displayed if **OTHER** or **DETAIL** were pressed. Refer to Figure 2-12.

Parameter LA: pivot to Load cell distance: The distance from pivot to load cell should be measured to within 0.032 (1/32) inch (1 mm).

Using the numeric keys, enter the distance recorded in Section 2.5.1 and press **ENTER**. For weighbridges which do not have a pivot, enter zero.

```
- SC DATA SCROLL 3A-
Pivot to load cell
distance: 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	32 in	Default:	1000 mm
Min:	0.00 in	Min:	0 mm
Max:	150.00 in	Max:	3800 mm

This is the number of weigh idlers affixed to the scale weighbridge.

```
- SC DATA SCROLL 3B-
# of weigh idlers
 1
ENTER
```

Default:	1
Min:	1
Max:	6

Parameter LB1: Pivot to first weigh idler distance. Measure the distance between the pivot centerline and first weigh idler center line. Enter the distance (within 0.032 inch or 1 mm) recorded in Section 2.5.1. For weighbridges which do not have a pivot, enter zero.

```
- SC DATA SCROLL 3C-
Pivot to 1st idler
distance 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	24 in	Default:	800 mm
Min:	0.00 in	Min:	0 mm
Max:	100.00 in	Max:	2500 mm

If the number of weigh idlers entered in scroll 3B is more than one, the following screens are displayed. Measure the distance between the pivot centerline and second weigh idler center line. Enter the distance (within 0.032 inch or 1 mm) recorded in Section 2.5.1. For weighbridges which do not have a pivot, enter zero.

Only if # of weigh idlers >=2:

```
- SC DATA SCROLL 3D-
Pivot to 2nd idler
distance 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	0.00 in	Default:	0 mm
Min:	0.00 in	Min:	0 mm
Max:	100.00 in	Max:	2500 mm

Only if # of weigh idlers >=3:

```
- SC DATA SCROLL 3E-
Pivot to 3rd idler
distance 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	0.00 in	Default:	0 mm
Min:	0,00 in	Min:	0 mm
Max:	100.00 in	Max:	2500 mm

Only if # of weigh idlers >=4:

```
- SC DATA SCROLL 3F-
Pivot to 4th idler
distance 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	0.00 in	Default:	0 mm
Min:	0.00 in	Min:	0 mm
Max:	100.00 in	Max:	2500 mm

Only if # of weigh idlers >=5:

```
- SC DATA SCROLL 3G-
Pivot to 5th idler
distance 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	0.00 in	Default:	0 mm
Min:	0.00 in	Min:	0 mm
Max:	100.00 in	Max:	2500 mm

Only if # of weigh idlers =6:

```
- SC DATA SCROLL 3H-
Pivot to 6th idler
distance 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	0.00 in	Default:	0 mm
Min:	0.00 in	Min:	0 mm
Max:	100.00 in	Max:	2500 mm

NOTE: All measurements must be (within 0.032 inch or 1 mm) recorded in Section 2.5.1. Enter the distance with the numeric keys and press ENTER.

Parameter LE: Pivot to test-weight height. For weighbridges which do not have a pivot, enter zero. 3I, L, M and N only apply if test weights are provided for calibration.

```
- SC DATA SCROLL 3I-
Pivot to test-weight
height 000.00 In
ENTER     +/-
```

If ENGLISH or MIXED:		If METRIC:	
Default:	0.00 in	Default:	0.0 mm
Min:	- 20.00 in	Min:	- 500.0 mm
Max:	+ 20.00 in	Max:	+ 500.0 mm

Parameter LC: Pivot to test-weight length. For weighbridges which do not have a pivot, enter zero.

```
- SC DATA SCROLL 3L-
Pivot to test-weight
length 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	24.00 in	Default:	0 mm
Min:	0.00 in	Min:	0 mm
Max:	200.00 in	Max:	5000 mm

Parameter LF: Pivot to carriage height. For weighbridges which do not have a pivot, enter zero.

```
- SC DATA SCROLL 3M-
Pivot to carriage
height 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	6.50 in	Default:	0 mm
Min:	0.00 in	Min:	0 mm
Max:	10.00 in	Max:	250 mm

Parameter LG: Carry roll to carriage height. Measure to the center line of the weigh idler carry roll on troughing idlers, and to the top of the carry roll on flat belts. For weighbridges which do not have a pivot, enter zero.

```
- SC DATA SCROLL 3N-
Roll to carriage
height 000.00 In
ENTER
```

If ENGLISH or MIXED:		If METRIC:	
Default:	6.50 in	Default:	0 mm
Min:	0.00 in	Min:	0 mm
Max:	20.00 in	Max:	250 mm

Enter the **number of load cells** of your weighbridge.

```
- SC DATA SCROLL 3O-
# of load cells
        1
ENTER
```

Default: 1
Min: 1
Max: 6

12. Defining Dimensional Parameters of the Application

Parameter LD: Idler spacing in scale area. For better accuracy, average the distance between the idlers across the scale on both sides. Measure to within 0.032 inch or 1 mm with the numeric keys and press ENTER.

```
- SC DATA SCROLL 4-
Idler spacing
 36.00 In
ENTER
```

If ENGLISH or MIXED:
Default: 36.00 in
Min: 2.00 in
Max: 120.00 in.

If METRIC:
Default: 1000 mm
Min: 50 mm
Max: 2500 mm

Enter the **angle of inclination** of the belt conveyor. If an inclination compensator is connected to the scale, after this preliminary set up has been completed, enable the automatic angle detection in I/O definition (Main Menu 4) and calibrate the incline compensator.

```
- SC DATA SCROLL 5 -
Conveyor's angle
0.0 Degrees
ENTER     +/-
```

Default: 0.0
Min: - 25.00°
Max: + 25.00°

13. Defining the Load Cell(s)

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

```
- SC DATA SCROLL 6 -
Load cell capacity
250 Lbs
ENTER
```

If ENGLISH or MIXED:
Default: 250.0 Lbs
Min: 1 Lb
Max: 15000 Lbs

If METRIC:
Default: 100 kg
Min: 1 kg
Max: 5000 kg

The sensitivity was entered when the belt scale code was entered. If other (0) was selected, enter the load cell sensitivity in mV/V as marked on the label of the load cell. Ramsey load cells are normally 1.800 or 3.000 mV/V.

```
- SC DATA SCROLL 7 -
Load cell sens.
3.000 mV/V
ENTER
```

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

Load cell resistance is entered on this screen. The resistance for the load cell has been recorded on the System Data Sheet in the front of your belt scale manual. (It is also stamped on the load cell cable.) Enter the ohms for the load cell. The number of scrolls depends on the number of load cells specified in scroll 3O.

```
- SC DATA SCROLL 8A -
Load cell #1 res
350.000 Ohms
ENTER
```

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
350.000 Ohms
ENTER
```

Same default and limits of load cell #1.

If # of Load Cells is 3 or more:

```
- SC DATA SCROLL 8C -
Load cell #3 res
350.000 Ohms
ENTER
```

Same default and limits of load cell #1.

If # of Load Cells is 4 or more:

```
- SC DATA SCROLL 8D -
Load cell #4 res
350.000 Ohms
ENTER
```

Same default and limits of load cell #1.

If # of Load Cells is 5 or more:

```
- SC DATA SCROLL 8E -
Load cell #5 res
350.000 Ohms
ENTER
```

Same default and limits of load cell #1.

If # of Load Cells is 6:

```
- SC DATA SCROLL 8F -
Load cell #6 res
350.000 Ohms
ENTER
```

Same default and limits of load cell #1.

14. Defining the Speed Input

The speed input screen allows the operator to select either the single speed sensor input (default value), the double speed input (to provide extra safety against speed sensor failure) or a simulated value using an internal timer.

Simulation allows operation without a speed sensor. When simulated speed is selected, a conveyor running input is required (refer to the field wiring diagram).

NOTE: If speed is selected as the third line display, the line will be blank in RUN mode when simulated speed is selected.

```
- SC DATA SCROLL 9 -
Speed input
>_single_<
CHOICE   ENTER
```

Default: SINGLE
Selections: SINGLE, DUAL, SIMULATED

15. Defining the Calibration Test Duration

Zero and Span calibrations are more accurate if executed on an entire belt revolution or multiple of it. Press either ACQUIRE or MANUAL, ACQUIRE is the recommended selection. For MANUAL, see Step 18.

```
-CAL DATA SCROLL 11 -
Establish test
duration
ACQUIRE MANUAL
```

Select **ACQUIRE**. Acquire is the recommended selection.

a. Acquiring the Test Duration

When selecting FULL, use a 100 foot tape to measure the belt length to the nearest 0.1 foot. Reference a fixed point (an idler) on the conveyor when counting belt revolutions. See Section 2.5.1 for the recorded conveyor belt length.

The PARTIAL (belt length measurement) selection enables the operator to acquire test duration without the entire belt length measurement.

CAUTION

THIS OPTION SHOULD ONLY BE USED WHEN BELT LENGTH EXCEEDS 1000 FEET.

```
ACQUIRE TEST DUR
Choose belt length
measurement method.
FULL    PARTIAL
```

FULL is the recommended selection.

If **FULL** is selected, continue with Step 16 below. If **PARTIAL** is selected, skip to Step 17.

16. Full Test Duration Acquisition

If **FULL** is pressed, the operator is asked to enter the length of one belt revolution. Enter the length recorded in Section 2.5.1. Measure belt length to the nearest 0.1 feet.

```
Enter length of one
belt revolution.
length  1000.0 Ft
ENTER    ABORT
```

If ENGLISH or MIXED:		If METRIC:	
Default:	1000.0 Ft	Default:	200.0 m
Min:	1.0 Ft	Min:	0.5 m
Max:	10000.0 Ft	Max:	3000 m

After the length of the belt has been entered, the system automatically moves to the following screen which prompts the operator to press **START** when the mark passes the reference point. Pressing **ABORT** returns the screen to Cal Data Scroll 11.

The belt must be running at the maximum speed before executing this function. If not, the prescaler will be improperly calculated.

```
Start belt. Press
START when 1st mark
passes reference.
START    ABORT
```

When **START** is pressed above, the system automatically moves to the next instructional screen. The operator presses **COUNT** each time the mark passes the reference point until minimum test load conditions are met (refer to belt scale installation manual for minimum test load requirements). When the last revolution passes the mark, the operator must press **COUNT** followed by pressing **DONE**.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

Zero Cal light illuminates indicating zero calibration is in progress.

```
Press COUNT each
time a mark passes.
00000 secs 000 revs
COUNT   ABORT    DONE
```

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

When duration test is finished, the new values for length of belt and time are displayed. Press **CONTINUE.**

During the Acquire Test Duration, the Integrator performed an unassisted zero calibration and installed the new zero. Skip to Step 19.

```
TEST DURATION
Length = 0000.0 Ft
Time =    000 sec
       CONTINUE
```

17. Partial Test Duration Acquisition

If **PARTIAL** is pressed, the operator is asked to enter the length between two marks on the belt.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

```
Enter length between
two marks on belt.
Length:  200.0 Ft
ENTER    ABORT
```

If ENGLISH or MIXED:		If METRIC:	
Default:	200.0 Ft	Default:	50.0 m
Min:	1.0 Ft	Min:	0.5 m
Max:	10000.0 Ft	Max:	3000.0 m

After the length of the belt has been entered, the system automatically moves to the following screen which prompts the operator to press **START** when the mark passes the reference point.

The belt must be running at the maximum speed before executing this function. If not, the prescaler is improperly calculated.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

```
Start belt. Press
START when 1st mark
passes reference.
START    ABORT
```

When **START** is pressed above, the system automatically moves to the next instructional screen. The operator presses **COUNT** each time a mark passes the reference point until both marks have passed. Then press **DONE**.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

Zero Cal light illuminates indicating zero calibration in progress.

```
Press COUNT each
time a mark passes.
00000 secs 000 revs
COUNT  ABORT  DONE
```

When duration test is finished, the new values for length of belt and time are displayed. Press **CONTINUE**.

```
TEST DURATION
Length = 0000.0 Ft
Time =    000 sec
       CONTINUE
```

During the Acquire Test Duration, the Integrator performed an unassisted zero calibration and installed the new zero. Skip to Step 19.

18. Manual Entry of Test Duration

This procedure allows direct entry of parameters that would otherwise be generated by the acquire Test Duration modes. This menu is generally used when the operator cannot see the belt while standing at the front panel.

If **MANUAL** is pressed, the system prompts the operator for running the belt at its maximum speed. Then press **CONTINUE**.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

```
Start belt. Press
CONTINUE when belt
is at maximum speed.
ABORT  CONTINUE
```

The operator is prompted to enter the length of one belt revolution.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

```
ENTER length of one
belt revolution.
Length  000.0 FT
ENTER    ABORT
```

If ENGLISH or MIXED:		If METRIC:	
Default:	200.0 Ft	Default:	200.0 m
Min:	1.0 Ft	Min:	1.0 m
Max:	10000.0 Ft	Max:	10000.0 m

The number of belt revolutions to be timed is than entered.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

```
ENTER the number of
belt revolutions to
be timed  000 revs
ENTER    ABORT
```

Default: 1
Min: 1
Max: 100

The next entry is the time per revolution.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

```
ENTER the time for
revolutions to pass
reference  000 sec
ENTER  ABORT
```

Default: 30 sec
Min: 1 sec
Max: 16200 sec

When **ENTER** is pressed, the system times the belt travel according to the above entered parameters.

Pressing **ABORT** returns the screen to Cal Data Scroll 11.

Zero Cal light illuminates indicating zero calibration in progress.

```
Timing belt travel
000 sec

        ABORT
```

When test duration test is finished, the new values for length of belt and time are displayed. Press **CONTINUE**.

```
TEST DURATION
Length = 000.0 Ft
Time =   000 sec
      CONTINUE
```

During Acquire Test Duration the integrator performed an unassisted zero calibration and installed the new zero.

19. Automatic Calibration of the Scale

    After Test Duration has been determined, and the scale zeroed, the integrator performs an unassisted calibration of the scale. The scale is calibrated using the parameters just entered. After this, the R-CAL (electronic calibration resistor) is used to check the integrity of the load cell. During this time, the following screen is displayed:

CHAPTER 3.0
OPERATION

3.1 GENERAL

Your Ramsey Belt Scale 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 scale frame installation manual.

3.2 OVERVIEW

Model 2101 Integrator is a micro-computer based instrument that accepts and conditions speed and weight signals and provides visual and electrical outputs for total weight and rate of flow. A stable 10 volt DC excitation voltage capable of exciting up to six strain gauge load cells is produced by the Integrator. Sense lead terminations are also provided for six wire load cell cable.

Auto Zero Track enables the belt scale system to automatically zero itself during extended periods when the conveyor belt is running empty. Auto Zero Track is menu selectable because some installations may not desire this option. A "Z" will appear on the second line of the display to indicate the selection of this option.

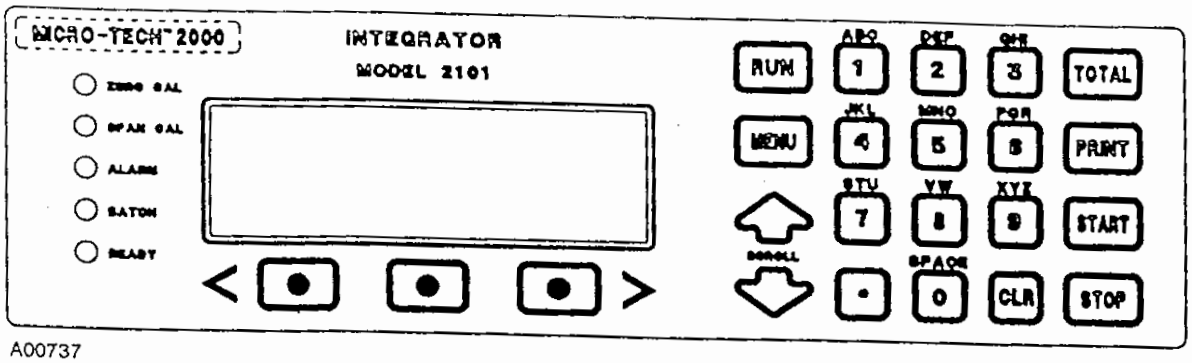
Life expectancy of the RAM support battery is approximately ten years, if power is not applied. Under normal operation where power is on continuously, life expectancy will be much longer.

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 integrator has been configured in Section 2.4.

Front panel operation, zero calibration and span calibration are described in this chapter. A detailed description of all menus and their contents can be found in Appendix A/4.



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MODEL 2101 INTEGRATOR FRONT PANEL
FIGURE 3-1

3.3.1 LED Status Indicators

The five red status indicators show the status of the integrator.

1. Zero Calibration in progress.
2. Span Calibration in progress.
3. Alarm pending.
4. Batch or Load Out running.
5. Ready (powered on, no alarm, no calibration running).

3.3.2 Keyboard

1. **Run** - Access the Run Menu. Returns integrator 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** - Displays Master total, Reset total and Operator total. Operator and Reset total may be reset, see Section 3.6 for detailed description.
9. **Print** - Starts printout. COMM option is required, see Section 4.5.3 in Appendix A/4 for detailed description.
10. **Start** - Starts load out. Restart if interrupted.
11. **Stop** - Interrupts load out. Aborts load out if already interrupted.

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

3.3.3 Display

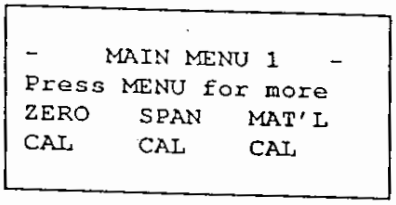
The four line display indicates actual running information or displays menu entry information.

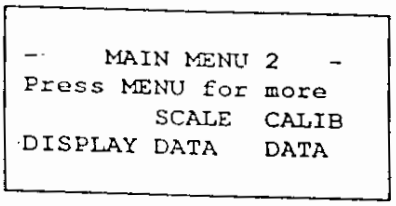
3.4 MENU DISPLAYS

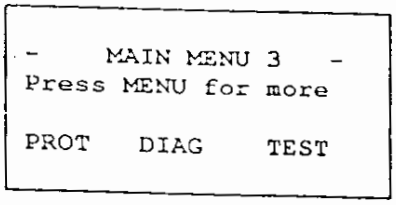
The integrator is a menu driven machine that allows the operator to access all setup, test and calibration parameters. Main Menu screens 1 through 6 can be accessed at anytime by pressing the **MENU** key until the desired menu screen is displayed. Menu scrolls may be selected by pressing the soft key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

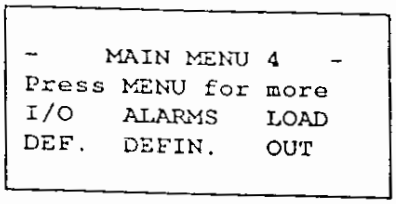
If the integrator is password protected, the appropriate password must be entered prior to making changes or performing routine calibration. Menus may be viewed without entering a password, but no entries are allowed unless the password is entered.

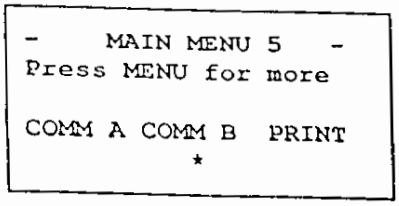
Optional menu scrolls are only available if the available option has been installed. The following screens are activated by the **MENU** key. See Appendix A/4 for detailed description of all menus.



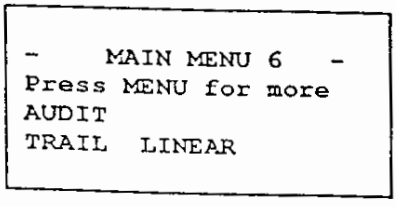






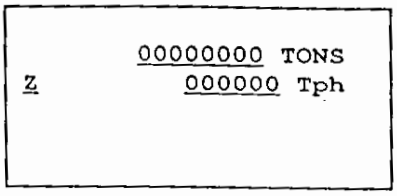


* Can be AB RIO or PRO DP



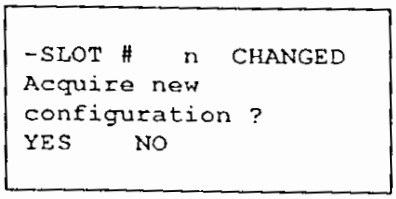
3.5 NORMAL POWER ON

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



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.



The screen disappears after 10 seconds if the question is not answered. The Integrator 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 Integrator 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 Integrator 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 A/4).

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 Integrator 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 Integrator resumes normal operation without recognizing the new board.

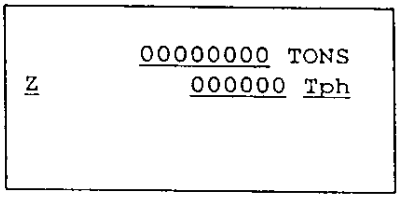
If **NO** is pressed, the "HW CONFIG. CHANGED" alarm stays on.

3.6 RUN MENU

When the integrator 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 at any time.

3.6.1 Main Run

The Run Menu consists of two operations, main Run Menu and Reset Total Menu. They can be scrolled using the scroll **UP** or **DOWN** keys.

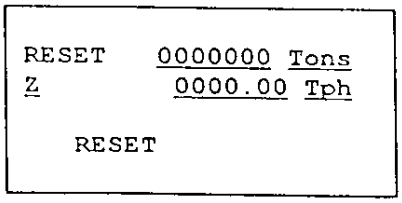


The first line always displays the MASTER TOTAL, which is the number of tons totalized by the scale since installation. This number cannot be cleared.

The second line always displays the rate. A "Z" appears on the left side if the "Auto Zero Tracking" optional function is enabled in Main Menu 2 (Calibration Data Scroll) and the scale is unloaded. The "Z" is not flashing during the first half test duration, while the integrator is checking that the belt is really unloaded. Then, during a full test duration, the "Z" is flashing, indicating the integrator is averaging the signal from the load cell to accurately rezero the scale. The load must stay below the AZT max deviation setpoint during the cycle, otherwise auto zero is aborted.

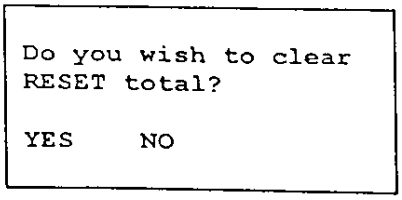
The third line is by default blank, but can be programmed to show either the belt speed, the belt loading or the date and time (if the optional COMM board is installed). The selection is made in the Main Menu 2 (Display Scroll).

3.6.2 Reset Total



The Reset Total Menu is similar to the main Run Menu except Master Total has been replaced by Reset Total. Press the **DOWN** scroll key for access.

When the **RESET** key is pressed, the following screen is displayed:



Press "YES" to clear the total. Press "NO" to skip clearing.

3.6.3 Material Calibration

The word MAT'L flashes in the left soft key position after a material calibration if the static scale reference weight is not known. When the reference weight is known, press the **MAT'L** soft key to resume and complete the material calibration procedure.

3.6.4 Alarm Pending

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

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

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

The keyword "NEW" indicates 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 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" stands for one of the following alarm conditions.

1. Clock Fail
2. Load Cell Fail
3. Ram Fail
4. Rom Fail
5. Speed Sensor
6. High Load
7. Low Load
8. High Rate
9. Low Rate
10. High Speed
11. Low Speed
12. Warm Start
13. Cold Start
14. Power Down Calibrate
15. Calibrate Time
16. External Alarm 1
17. External Alarm 2
18. External Alarm 3
19. Overflow Totalizer
20. AZT Limited
21. Batch Deviation
22. BCD Error

23 through 28. Hardware Configuration Changed
29. Math Error
30. Printer Error
31. Communication Error
32. RIO COMM Error
33. PROFIBUS-DP COMM Error
34 through 39. Not Assigned

Refer to Chapter 4.0, Maintenance, for more information.

7 TOTAL KEY

The **TOTAL** key accesses menus that contain detailed information for Master Reset and Operator total tons counters.

Master cannot be reset. Reset can be reset at will without password, and Operator can be reset at will with password.

Press the **TOTAL** key for access and scroll up or down. Pressing **RUN** returns to the Run Menu.

```
RESET TOTAL
SINCE      00-00-0000
        00000000 Tons
RESET
```

Password: Not Required

The second line (1) is only displayed if the optional COMM board is installed, and indicates the last date when the Reset Total was cleared.

The **RESET** key allows the operator to clear the Reset Total. No password is required for this action.

The next screen is very similar to the previous one, only the Master Total is displayed instead of the Reset Total. The **RESET** key is not displayed here since the Master Total cannot be cleared.

```
MASTER TOTAL
SINCE      00-00-0000
       00000000  Tons
RESET
```

A load out total can also be displayed if the Load Out optional board is installed (see Load Out in Appendix A/5 if option is installed).

When the **RESET** key is pressed, the following screen is displayed:

```
Do you wish to clear
xxxxxx total?

YES     NO
```

xxxxxx can be RESET or OPERATOR. Press "YES" to clear the total. Press "NO" to skip clearing.

3.8 START-STOP KEYS

Enabled only if loadout option is installed.

3.9 CALIBRATION

Main Menu 1 contains the Calibration Menu. 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 desired scroll.

```
-    MAIN MENU 1    -
Press MENU for more
ZERO     SPAN    MAT'L
CAL      CAL     CAL
```

3.9.1 Zero Calibrate Scroll

The zeroing process is implemented as a machine directed procedure.

1. Auto Zero

```
-      ZERO CAL      -
Run belt empty, then
press START.
START    EXIT   MANUAL
```

Pressing the **EXIT** soft key returns the operator to Main Menu 1. Pressing **MANUAL** advances to Step 2 below. Pressing **RUN** at any time returns to the Run Menu.

The belt must be running during Auto Zero, since a complete zeroing procedure requires at least one full revolution of the belt to be averaged.

When START is pressed, the following screen is displayed.

```
AUTO ZEROING
Time remaining 0000
Rate:    000.0 Tph
Tot      000000 Tons
```

During Auto Zero, resolution of the total is ten times higher than normal. The number of seconds in Line 2 is calculated based on the current speed, and corresponds to the time remaining for completing the test. If the belt is not running at the moment the test is started or it is stopped during the test, a message is displayed, indicating the procedure has been aborted.

```
WARNING Belt stopped
Calibration aborted.

EXIT
```

EXIT returns to Main Menu 1. When zero is reached, the system automatically displays the following screen.

```
AUTO ZERO COMPLETE
Error ±000.00%
Change zero?
YES    NO    ADV
```

The word "COMPLETE" is flashing. Pressing ADV changes from Error % to Accumulated Weight. The percentage of error is related to full scale capacity.

Pressing NO returns the screen to Main Menu 1 without changing the zero number.

When YES is pressed, the zero number is changed and the next screen appears.

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

ADV changes from "Old zero" to "Rate", to "Accumulated Weight", and to "Error %".

Press MENU to repeat Auto Zero calibration. Press RUN to return to the Run Menu.

2. Manual Zero

The Manual Zero procedure shows the zero constant and allows direct entry if known. Use the ENTER key to confirm the new number.

```
-   MANUAL ZERO   -
Rate     000.0 Tph
Zero # 00000
ENTER  EXIT    ADV
```

Password: Operator

Default:	40000
Min:	0
Max:	120000

The ADV key is only displayed if Auto Zero Tracking option is enabled. The AZT function accurately tracks the zero of the scale by calculating an additional zero constant. The portion of zero due to AZT is not incorporated in the zero constant, but is shown separately.

When ADV is pressed, the system scrolls between Zero and AZT:

```
-   MANUAL ZERO    -
AZT # ±000000
AZT % ±000000
ENTER  EXIT     ADV
```

Password: Operator

When the AZT is displayed, the ENTER key incorporates the AZT number into the Zero constant, so the displayed AZT number and percentage changes to zero.

3.9.2 Span Calibration Scroll

Three simulated load calibration options are available: R-Cal, Test Weights and Test Chains. Test Weights or Test Chains require additional hardware and handling equipment.

The system allows the operator to select which one of the three methods is to be used for routine calibration. The selection is made in Main Menu 2, CAL DATA Scroll 1.

1. Auto Span

   A. Starting an R-Cal Calibration

   Press the SPAN CAL soft key. The following screen appears.

```
- AUTO SPAN R Cal  -
Run belt empty, then
press START.
START   EXIT  MANUAL
```

   Pressing the EXIT soft key or MENU control key returns the screen to Main Menu 1.

   Press START to initiate R-Cal span calibration. There is no totalization for three seconds until the weight signal has stabilized. Go to Step D below.

   B. Starting a Chain Calibration

   Stop the conveyor belt.

   Apply chains on conveyor belt.

   Press SPAN CAL soft key. The following screen appears.

```
- AUTO SPAN Chain -
Press START to begin
chain calibration.
START   EXIT  MANUAL
```

Password: Operator

Press **START** to disengage the Master Tons counter. The following screen appears.

```
- AUTO SPAN Chain -
Apply chain, then
press START.
START   EXIT  MANUAL
```

Password: Operator

Pressing the EXIT soft key or MENU control key returns the screen to Main Menu 1.

When START is pressed, the following screen appears.

```
- AUTO SPAN Chain -
Run belt, then
press START.
START   EXIT
```

Restart conveyor belt and insure chain placement is proper.

Press START.

Go to Step D below.

C. Starting a Test Weights Calibration

Stop the conveyor belt if necessary to apply test weights.

Press the SPAN CAL soft key. The following screen appears.

```
- AUTO SPAN Weights-
Press START to begin
weight calibration.
START   EXIT  MANUAL
```

Password: Operator

Press **START** to disengage the Master Tons counter. The following screen appears.

```
- AUTO SPAN Weights-
Apply weights, then
press START.
START   EXIT  MANUAL
```

Password: Operator

If the "LOAD WTS" output has been selected in the I/O Definition Scroll, test weights are automatically loaded after START is pressed. Wait for test weights to be loaded before proceeding. The message displayed will be "Press START to load test weights".

Pressing EXIT returns the screen to Main Menu 1.

Apply test weights.

When START is pressed, the following screen appears.

```
- AUTO SPAN Weights-
Run belt, then
press START.
START   EXIT
```

Password: Operator

Restart the conveyor belt if it is not running and press START.

Go to Step D below.

D. Executing the Span Calibration

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

NOTE: Entry point when REPEAT is pressed (see below).

```
AUTO SPANNING
Time remaining 0000
Rate     000.0 Tph
Tot      000000 Tons
```

During Auto Span, the resolution of the total is ten times higher than normal. The time remaining shown in Line 2 is calculated upon the current speed, and it is based on the test duration. If the belt is stopped during the test, a message is displayed indicating the procedure has been suspended. No action is required from the operator at this stage, just wait until the test is completed.

E. Material Factor

This part of the procedure is only executed if a material calibration is done before, and the current simulated load method has no material factor installed.

NOTE: If a calibration with material has not been run before, or a manual span entry is done, or this is not the first time the current simulated method is used, this section does not apply. Go to Step F below.

It is very important to understand that when this procedure is executed, the system does not alter the span. The span is assumed to be correct because it was obtained from a test with material. The system acquires the Material Factor for the current calibration method instead. This means the integrator knows in the future how to use this method for correctly changing the system's span.

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

The word "COMPLETE" is flashing. If EXIT is pressed, the system acknowledges the Material Factor is not used. The effect of this is the system does not ask for a material factor any more for this calibration method until a manual span entry is done. By pressing EXIT the operator tells the system that material factors is not desired, but wants to use the test results for changing the span number. After EXIT is pressed, go to Step F below. If REPEAT is pressed go to Step D above.

If FACTOR is pressed, the following screen is displayed.

```
R-CAL Matl FACTOR
New factor: 000.00 %
Change factor?
YES      NO      ADV
```

Can be R-CAL or WTS or CHAINS

ADV advances to Old factor and again to New factor. If NO is pressed, the Material Factor is set to 1.00 (see above), then go to Step F below.

If YES is pressed, the following screen is displayed.

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

Can be R-CAL or WTS or CHAINS

The REPEAT key returns the operator to Step D above. RUN and MENU can be used for ending the procedure. After this point is reached, the system does not proceed to the next section.

F. Recording New Span

The system calculates the new span based on the result of the test performed with the simulated method.

```
AUTO SPAN COMPLETE
Error +/-00.00 %
Change span?
YES      NO    ADV
```

The word "COMPLETE" is flashing. Pressing ADV advances to Accumulated Weight, Cal Con, Material Factor and back to Error %. If the Material Factor is INVALID (never acquired before), it is not displayed.

If YES is pressed, the following screen is displayed.

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

ADV changes from Error % to Accumulated Weight, Calcon, Old Span, Material Factor (only if not INVALID). REPEAT moves back to Step D above and calibration restarts.

If NO is pressed, the following screen is displayed.

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

ADV changes from Error % to Accumulated Weight, Calcon, Old.Span, and Material Factor.

REPEAT moves back to Step D above and calibration restarts. Please note the Old span and New span are shown equally. This is because no change to the span has been done.

G. Ending an Auto Span Procedure with Chains or Test Weights

In case of auto-span with chains or weights, after RUN is pressed, the following screen is displayed.

```
Remove chains (or weights)
before returning to
normal operation!!
RUN    MENU
```

Pressing RUN resumes totalization and moves to the RUN Scroll.

H. Ending an Auto Span Procedure with R-Cal

In case of auto-span with R-Cal, after RUN is pressed, the R-Cal relay is deenergized and the display is locked for three seconds.

2. Manual Span

If the span constant is known, the manual span procedure allows the operator to make a direct a change of span.

```
-   MANUAL SPAN     -
Rate     000.0 Tph
Span # 0000000
ENTER EXIT  RUN
```

Password: Operator

Default: 300000
Min: 222223
Max: 20000002

The EXIT key returns the operator to Main Menu 1.

It is very important to note that entering the Manual Span sets the material factors to INVALID (if any). This means that the automatic span tests need to be run again after a manual span entry has been performed, in order to acquire the material factors again.

3.9.3 Material Span Calibration

Material span calibration is a machine directed procedure for calibrating the belt scale using actual material.

Preweighed or postweighed material, having been weighed to a known accuracy on a static scale, passes across the belt scale. This procedure automatically adjusts the integrator span and factors all simulated load test Cal Cons if the operator prefers they be factored.

1. Material Calibration Procedure

   A. Starting the Test

   Press MAT'L CAL soft key and DOWN ARROW. The following screen appears.

```
MAT'L CALIBRATION
Run belt empty, then
press START.
START    MENU
```

   The operator must run the belt for at least one minute or one belt revolution before proceeding. After START is pressed, the master weight totalizer is disengaged.

   When START is pressed, the following screen appears.

```
Run quantity of
material over scale.

CONTINUE
```

   Press CONTINUE to go to the next scroll and follow the test procedure.

   B. Running the Test with Material

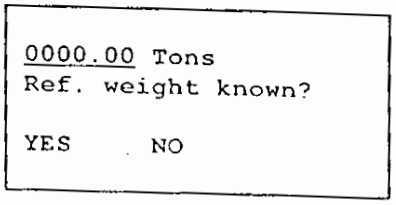
```
00000.0 Tons
0000.0 Tph
Press DONE to end
DONE    ABORT
```

During the material calibrate procedure, the resolution of total tons counted is ten times higher than normal.

Wait until all material has passed over the scale, then press DONE. Pressing ABORT forces the program back to the top of the MAT'L CAL Scroll.

C. Entering the Reference Weight

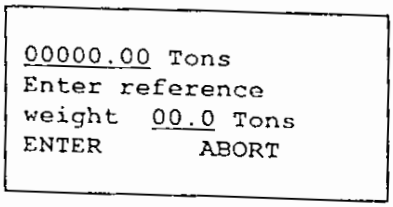
At the end of the test, the system asks the operator whether the (actual) weight of the material is already known.



Press NO if the reference (actual) weight will not be known for some time and the conveying systems need to be returned to run. If NO is pressed, the RUN screen appears. MAT'L will be flashing to remind the operator that the material test is incomplete.

Press MAT'L when the reference weight is known and enter in the following screen.

If YES was answered before, or if the MAT'L key had been pressed after NO, the following screen appears.



The operator has to enter the actual material weight in the same weight units as the integrator is setup for. Example: Convert pounds to the nearest hundredth (0.01) of a ton and enter if the integrator is set up for tenths (0.1) of a ton increments. Material calibration is running at ten times normal.

After the material weight is entered, press ENTER to confirm.

If ABORT is pressed, the information acquired during the test is lost and the system returns to Main Menu 1 screen.

D. Updating the Span Constant

After the amount of material has been entered, the following screen is displayed.

```
MAT'L CAL. COMPLETE
Error 000.00 %
Change span?
YES        NO        ADV
```

The word "COMPLETE" is flashing. Pressing ADV changes from Error % to Actual Difference of Total. Pressing NO moves to "Add reference weight to total".

E. Acquiring the Material Factors

If YES was pressed, the following screen is displayed confirming the new span constant was installed. At this point, the scale is calibrated to the actual material test.

```
SPAN # CHANGED
New span # 000000
Old span # 000000
RUN     MENU    FACTOR
```

If FACTOR is pressed, the following screen is displayed.

```
MAT'L CALIBRATION
Automatic correction
to Material Factors
R-CAL    WTS    CHAIN
```

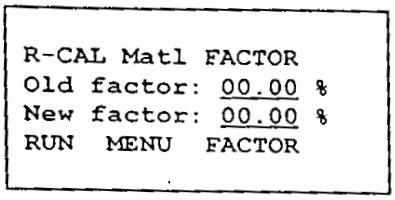
Of the three simulated load calibration methods, only the ones that have been already used are shown. It is not possible to calculate a material factor if a simulated test was not run before the material test. If none of the three was done, the FACTOR soft key in the previous scroll is not displayed.

If R-CAL or WTS or CHAIN is pressed:

```
R-CAL Matl FACTOR
New factor 000.00 %
Change factor?
YES        NO        ADV
```

Can be R-CAL or WTS or CHAINS

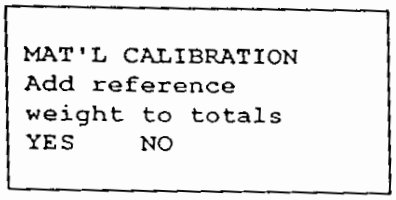
Pressing ADV advances to the Old factor and again to the New factor. YES goes to the next scroll. NO goes back to Step E above. Press YES if this specific simulated method of calibration has already been used and the related material factor will be recorded. By doing this, the system is able to execute accurate calibrations in the future with this simulated method. Press NO if the acquired material factor is not desired. If YES is pressed, the following screen is displayed.



Can be R-CAL or WTS or CHAINS

The FACTOR key repeats for all simulated test previously run. If RUN or MENU is pressed, the following screen is displayed.

F. Adding the Reference Weight to Total



If YES is pressed, the amount of material used for the test is added to the master, reset and operator's totals. If the answer NO is selected, the information is lost.

NOTE: Moisture compensation is inhibited during material calibration. This is done to make the check of the totalized quantity easier. The static scale provides the weight of the material including moisture. The weight of the water is removed immediately before adding to total at the end of the procedure, so that the Master, Reset and Operator's totals are still correct.

3.10 PERMANENT SCROLL RECORD - SETUP SCROLLS

MAIN MENU 1

ZERO SCROLL

Zero # _____

SPAN SCROLL

Span # _____

MAIN MENU 2

DISPLAY SCROLL

1. Measure Units _____
2. Totalization Units _____
3. Length Units _____
4. Rate Units _____
5. Loadcell Units _____
6. Language _____
9. Run Display, Line 3 _____
10. Damping Display Rate _____
11. Damping Display Load _____
12. Damping Display Speed _____

SCALE DATA SCROLL

1. Max. Scale Capacity _____
2. Scale Divisions _____
3. Belt Scale Code # _____

3A. Pivot to Load Cell _____

3B. Number of Weigh Idlers _____

3C. Pivot to 1st Idler _____

3D. Pivot to 2nd Idler _____

3E. Pivot to 3rd Idler _____

3F. Pivot to 4th Idler _____

3G.	Pivot to 5th Idler	_____
3H.	Pivot to 6th Idler	_____
3I.	Pivot to Test Weight Height	_____
3L.	Pivot to Test Weight Length	_____
3M.	Pivot to Carriage Height	_____
3N.	Roll to Carriage Height	_____
3O.	Number of Load Cells	_____
4.	Idler Spacing	_____
5.	Conveyor's Angle Degrees	_____
6.	Load Cell Capacity	_____
7.	Load Cell Sensitivity	_____
8A.	Load Cell #1 Resistance	_____
8B.	Load Cell #2 Resistance	_____
8C.	Load Cell #3 Resistance	_____
8D.	Load Cell #4 Resistance	_____
8E.	Load Cell #5 Resistance	_____
8F.	Load Cell #6 Resistance	_____
9.	Speed Input	_____
10.	Zero Dead Band Range	_____
11.	Weights & Measures Mode	_____

CALIBRATION DATA SCROLL

1.	Calibration Mode	_____
2.	R-Cal: Resistance (Ohms)	_____
3.	R-Cal: Cal-Constant	_____
4.	Chain: Weight (Lbs/Ft)	_____
5.	Chain: Cal Constant	_____
6.	Total Test Weights (Lbs)	_____
7.	Weight: Cal-Constant	_____

8.	Calibration Interval	Days		
9.	Calibration Date			
10.	R-Cal: Mat'l Factor			
	Chain: Mat'l Factor			
	Weight: Mat'l Factor			
11.	Test Duration	☐ Full	☐ Partial	☐ Manual
	Belt Length			
	Number of Revolutions			
	Test Time			
12.	Auto Zero Tracking	☐ Yes	☐ No	
12A.	Auto Zero Tracking Range	%		
12B.	Auto Zero Tracking Max. Dev.	%		
13.	Max. Speed Capacity			
14.	Number of Calib.			

MAIN MENU 3

PROTECTION SCROLL

1.	Protection Level	☐ None	☐ Ltd	☐ Prot

DIAGNOSTICS SCROLL

1.	A/D Gross	
	A/D Net	
2.	Weight on Load Cell	
2A.	Load Cell Output Zero	
2B.	Load Cell Output Span	
3.	Prescale	
	Pulses/Minute	
3A.	Test Duration Total Pulses	
3B.	Test Duration Total Length	
4.	Service Password	
5.	Operator Password	

6.	Software Version	
9.	Board Type Slot #1	
10.	Board Type Slot #2	
11.	Board Type Slot #3	
12.	Board Type Slot #4	
13.	Board Type Slot #5	
14.	Board Type Slot #6	

MAIN MENU 4

I/O DEFINE SCROLL

1.	Current Output #1 Define			
	Current Output #2 Define			
1A.	Current Output #1 Range		mA	
	Current Output #2 Range		mA	
1B.	Current Output #1 Delay	sec	L	
	Current Output #2 Delay	sec	L	
1C.	Current Output #1 Damping		sec	
	Current Output #2 Damping		sec	
2.	Analog Input #1 Definition			
2A.	Moisture Input Calibrate		%	V
2B.	Moisture Input Calibrate		%	V
3.	Analog Input #2 Definition			
3A.	Conveyor Low Position		Degrees	
3B.	Conveyor High Position		Degrees	

		Physical Input	Status
4.	Digital Input Define		
	External Alarm #1		/
	External Alarm #2		/
	External Alarm #3		/
	Print		/

	Belt Running	/
	Reset Total	/
	Reset Alarm	/
	Auto Zero	/
	Clip Detector	/
	Calibration Select 1	/
	Calibration Select 2	/
	Calibration Select 3	/
	Calibration Select 4	/
	Calibration Select 5	/
	Calibration Select 6	/
	Calibration Select 7	/
	Calibration Select 8	/
	Calibration Select 9	/
	Calibration Select 10	/
5.	Digital Output Define	Physical Output Status
	Alarm	/
	Shutdown	/
	Ready	/
	High Load	/
	Low Load	/
	High Rate	/
	Low Rate	/
	High Speed	/
	Low Speed	/
	Print Ready	/
	Totalizer	/
	Batch Preset	/

1. Type, Limits and Format of Registers

register	type	low limit	high limit	refresh time [ms]	protection	format
success_flag	RO	-	-	-	none	integer
display	RO	-	-	100	-	char
leds	RO	-	-	100	-	integer
status	RO	-	-	100	-	integer
alarms	RO	-	-	100	-	integer
i_o	RO	-	-	100	-	integer
commands	WO	0	32767	100	none	integer
rate	RO	-	-	100	-	float
load	RO	-	-	100	-	float
speed	RO	-	-	100	-	float
master_total	RO	-	-	100	-	float
reset_total	RW	0 (1)	0 (1)	100	none	float
operator_total	RW	0 (1)	0 (1)	100	limited	float
batch_total	RO	-	-	100	-	float
batch_number	RW	0	999	100	limited	integer
batch_set	RW	0	10000	-	limited	float
batch_pre_set	RW	0	10000	-	limited	float
batch_pre_act	RW	0	10000	-	limited	float
batch_deviation	RW	0	100	-	limited	integer
cale_capacity	RW	1	200000	-	service	float
peed_capacity	RW	0.1 m/s or 1 fpm	10 m/s or 2000 fpm	-	service	float
id_cell_cap	RW	5 kg or 10 Lbs	5000 kg or 15000 Lbs	-	service	float

#9 Low Rate _____

#10 High Speed _____

#11 Low Speed _____

#12 Warm Start _____

#13 Cold Start _____

#14 P.D. Calibrate _____

#15 Calibrate Time _____

#16 Ext. Alarm #1 _____

#17 Ext. Alarm #2 _____

#18 Ext. Alarm #3 _____

#19 Overflow Totalizer _____

#20 AZT Limit _____

#21 Batch Deviation _____

#22 BCD Error _____

#23 thru 28 HW Conf. Change _____

#29 Math Error _____

#30 Printer Error _____

#31 COMM Error _____

#32 Allen-Bradley RIO Error _____

#33 PROFIBUS-DP Error _____

LOAD OUT SCROLL

1. Preset Weight _____
2. Pre Act Correction _____
2A. Pre Act Value _____
2B. Pre Act Range _____
2C. Pre Act Length _____
3. Start Delay _____
4. Coasting Time _____
5. Batch Deviation _____

6.	Print Batch	
7.	Position Batch Num.	X = Y =
8.	Position Batch Quant.	X = Y =
9.	Position Batch Total	X = Y =

MAIN MENU 5

COMM A SCROLL

1.	Baud Rate Port #1	
2.	Set Parity Port #1	
3.	Stop Bits Port #1	
4.	Word Length Port #1	
5.	Protocol Port #1	
5A.	Clear to Send #1	
6.	Address Port #1	
7.	Access Prot Port #1	
8.	Baud Rate Port #2	
9.	Set Parity Port #2	
10.	Stop Bits Port #2	
11.	Word Length Port #2	
12.	Protocol Port #2	
12A.	Clear to Send #2	
13.	Address Port #2	
14.	Access Prot Port #2	

PRINT SCROLL

1.	Handshaking	
2.	End of Line	
3.	Delay End of Line	
4.	Form Feed	
5.	Print Interval	
6.	Print Time #1	

7.	Print Alarms	_____
8.	Totals Report Format	_____
9A.	Number of Strings	_____
9B.	Contents String #1	_____
9C.	Position String Number #1	_____
9D.	Contents String #2	_____
9E.	Position String #2	_____
9F.	Contents String #3	_____
9G.	Position String #3	_____
9H.	Position Oper. Total	_____
9I.	Position Reset Total	_____
9J.	Position Master Total	_____
9K.	Position Date	_____
9L.	Position Time	_____
9M.	Position Rate	_____
9N.	Position Avg. Rate	_____
9P.	Position Running	_____

MAIN MENU 6

LINEARIZATION SCROLL

Linearization ☐ Yes ☐ No

	LOAD	FACTOR
LIN Factor #1		
LIN Factor #2		
LIN Factor #3		
LIN Factor #4		
LIN Factor #5		

PERMANENT FIELD RECORD

Conveyor Number _____

Date _____

1. Scale Capacity _____ (Tons Per Hour)
2. Belt Scale Code Number _____
3. Belt Scale Weighbridge Dimensions
   a. Pivot to Load Cell Distance _____ (Inches)
   b. Number of Weigh Idlers _____
   c. Pivot to Weight Idler Distance (Inches)

      1st _____ 4th _____

      2nd _____ 5th _____

      3rd _____ 6th _____

   d. Pivot to Test Weight Height _____ (Inches)
   e. Pivot to Test Weight Length _____ (Inches)
   f. Pivot to Carriage Height _____ (Inches)
   g. Carry Roll to Carriage Height _____ (Inches)
4. Number of Load Cells _____
5. Idler Spacing _____ (Inches)
6. Conveyor's Angle of Incline _____ (Degrees)
7. Load Cell Capacity _____ (Pounds)
8. Conveyor Belt Length _____ (Feet)

3.12 CALIBRATION REPORT

CALIBRATION REPORT - PERMANENT RECORD Conveyor _____

Date				
By				
Scale Capacity				
Belt Length				
Test Length				
Test Time				
Calib. Constant				
R-Cal				
Static				
Chain				
Calibration Mode				
Zero - As Found				
- As Left				
Span - As Found				
- As Left				