Micro-Tech™ 3000
Model 3104 Loss-in-Weight Controller

REC 4185 Rev B, Part No. 074801
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<th>Revision Number</th>
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<th>Release Specifics</th>
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<td>Revision 4</td>
<td>July 2003</td>
<td>3484</td>
<td>Manual first released</td>
</tr>
<tr>
<td>Revision B</td>
<td>October 2006</td>
<td></td>
<td>Technical Specification Correction (fusint)</td>
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About this Manual

This manual provides the information you need to install, operate, and maintain the Micro-Tech 3104.

Read this manual before working with the product. For personal and system safety, and for the best product performance, make sure you thoroughly understand the manual before installing or using this product.

Who Should Use this Manual

The Micro-Tech 3104 manual is a learning resource and reference for anyone concerned with installing, operating, or maintaining Thermo Scientific Micro-Tech 3104.

Read this manual before working with the system. For personal and system safety, and for the best product performance, make sure you thoroughly understand the manual before installing, operating, or maintaining this machine.

Organization of the Manual

This manual is organized into five chapters and 7 Appendixes.

Chapter 1: Introduction gives an overview of the device’s capabilities, describes its functions, and lists its technical specifications.

Chapter 2: Installation provides information about installing the Loss-in-weight controller including procedures for mounting, wiring, and configuring the Micro-Tech 3104 system.

Chapter 3: Operations provides an overview of the Micro-Tech 3104 front panel, a description of how the menus operate, and information about setting up, calibrating, and operating the Loss-in-Weight Controller.

Chapter 4: Maintenance provides an overview of standard maintenance associated with the 3104.

Chapter 5: Replacement Parts- provides a list of replacement parts for the 3104 and part ordering information.

Appendix A: Micro-Tech 3104 Menu gives an overview of the menus.

Appendix B: System Design Information

Appendix C: Linearization

Appendix D: Digital and Analog Input/Output

Appendix E: Additional Documentation

Appendix F: Engineering Drawings

Appendix G: Available Analog I/O and A/D Configuration

Micro-Tech 3000 Series
Documentation Conventions

The following conventions are used in this manual to help easily identify certain types of information:

- *Italic* is used to introduce new terms and for emphasis.
- *Italic/blue* type is used for references to other sections of the manual and work as links on line and in pdf format.
- The names of setup, calibration displays, menu displays, and variables are shown in **FULL CAPITALS**.
- The names of keys on the front panel are shown in **BOLD CAPITALS**.

Safety Messages

Instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations. Please read the safety information before performing any operation preceded by this symbol.

There are two levels of safety messages: warnings and cautions. The distinction between the two is as follows:

<table>
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<tr>
<td>FAILURE TO OBSERVE COULD RESULT IN DEATH OR SERIOUS INJURY.</td>
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<th>CAUTION</th>
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<tr>
<td>FAILURE TO OBSERVE MAY CAUSE MINOR INJURY OR DAMAGE THE EQUIPMENT</td>
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General Precaution

Do not install, operate, or perform any maintenance procedures until you have read the safety precautions presented.

<table>
<thead>
<tr>
<th>WARNING</th>
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<tbody>
<tr>
<td>FAILURE TO FOLLOW SAFE INSTALLATION AND SERVICING PROCEDURES COULD RESULT IN DEATH OR SERIOUS INJURY.</td>
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- Make sure only qualified personnel perform installation and maintenance procedures in accordance with the instructions in this manual.
- Allow only qualified electricians to open and work in the electronics cabinet, power supply cabinet, control cabinet, or switch box.
- Covers over the electronics and rotating parts must always remain in place during normal operation. Remove only for maintenance, with the machine’s power off. Replace all covers before resuming operation.
- During maintenance, a safety tag (not supplied by the factory) is to be displayed in the ON/OFF switch areas instructing others not to operate the unit (ANSI: B157.1).

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH VOLTAGE THAT MAY BE PRESENT ON LEADS COULD CAUSE ELECTRICAL SHOCK.</td>
</tr>
</tbody>
</table>

- All switches must be OFF when checking input AC electrical connections, removing or inserting printed circuit boards, or attaching voltmeters to the system.
- Use extreme caution when testing in, on, or around the electronics cabinet, PC boards, or modules. There are voltages in excess of 115 V or 230 V in these areas.
<table>
<thead>
<tr>
<th><strong>WARNING</strong></th>
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<tbody>
<tr>
<td><strong>USE ONLY THE PROCEDURES AND NEW PARTS</strong></td>
</tr>
<tr>
<td><strong>SPECIFICALLY REFERENCED IN THIS MANUAL TO</strong></td>
</tr>
<tr>
<td><strong>ENSURE SPECIFICATION PERFORMANCE AND</strong></td>
</tr>
<tr>
<td><strong>CERTIFICATION COMPLIANCE. UNAUTHORIZED</strong></td>
</tr>
<tr>
<td><strong>PROCEDURES OR PARTS CAN RENDER THE</strong></td>
</tr>
<tr>
<td><strong>INSTRUMENT DANGEROUS TO LIFE, LIMB, OR</strong></td>
</tr>
<tr>
<td><strong>PROPERTY.</strong></td>
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<table>
<thead>
<tr>
<th><strong>WARNING</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>KEEP HANDS AND CLOTHING AWAY FROM ALL</strong></td>
</tr>
<tr>
<td><strong>MOVING OR ROTATING PARTS.</strong></td>
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<table>
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<tr>
<th><strong>WARNING</strong></th>
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<tbody>
<tr>
<td><strong>DO NOT PLACE OR STORE OBJECTS OF ANY KIND ON</strong></td>
</tr>
<tr>
<td><strong>THE MACHINE.</strong></td>
</tr>
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<table>
<thead>
<tr>
<th><strong>WARNING</strong></th>
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</thead>
<tbody>
<tr>
<td><strong>THIS MACHINE SHOULD NOT BE OPERATED AT MORE</strong></td>
</tr>
<tr>
<td>** THAN THE PRODUCTION RATE STATED ON YOUR**</td>
</tr>
<tr>
<td><strong>EQUIPMENT SPECIFICATION SHEET OR USED IN</strong></td>
</tr>
<tr>
<td><strong>APPLICATIONS OTHER THAN THOSE STATED IN THE</strong></td>
</tr>
<tr>
<td><strong>ORIGINAL ORDER.</strong></td>
</tr>
</tbody>
</table>
Chapter 1
Introduction

This instruction manual contains information on the installation, operation, calibration, and maintenance of the Micro-Tech™ 3000 Model 3104 Field Mount and Panel Mount Microprocessor based, digital loss-in-weight controller. This instrument is designed for application on loss-in-weight scales with loadcell measurement.

1.1 Unpacking and Inspection

The Micro-Tech 3104 has been properly packaged for shipment and storage, when necessary. Refer to the appropriate manual in the appendix section for unpacking procedures for optional equipment.

Inspect all packages for damage before opening; sometimes the carrier may be responsible for shipping damage. Refer to the appropriate manual in the appendix for inspection procedures for optional equipment.

1.2 Storage

The Micro-Tech 3104 can be safely stored, with cover, latches secured and hole plugs installed, between -40°C to +158°F (-40°C to +70°C). The units should be protected against moisture.

1.3 Application

The Micro-Tech 3104 Field Mount (Figure 1-1) or Panel Mount (Figure 1-2) is a microprocessor based menu driven controller designed to control the feed rate of the following machines:

- Loss-in-weight feeders
- Increase weight feeders

The Micro-Tech 3104 can also be configured to control the following systems:

- Feed rate control with extraction from a silo
- Ratio control of different loss-in-weight feeders
- Blending system
1.4 Micro-Tech 3104 Standard Features

The Model 3104 Loss-in-Weight Controller has many hardware and software features necessary for controlling the processes listed above. The following 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 load measurement, calculation of rate as load change per unit of time and integration of load differences to obtain totalized quantities
- Automatic zero and span calibration
- Several software options that can be turned on by keypad entry or by installing optional plug-in PC boards
- Three process control modes: Conventional PID (Proportional, Integral, Derivative), PID+S (same as PID except it quickly reacts to a set point change), and PEIC (Periodical Error Integral Control)
- Two independent scale weighing systems and control loops
- Dual channel analog output for control loop and rate. Dual channel voltage inputs for remote set point moisture compensation can be programmed for other uses.
- Optically coupled digital inputs and outputs
- Alarms and failure detection
- Communication standards: RS232C, RS485 networking multidrop, 20 mA current loop passive, Allen-Bradley DF1, Modbus RTU
1.5 **Configuration**

The standard configuration of the *Loss-in-Weight Controller* includes the following:

- Single channel loadcell input to a max of 6 loadcells
- Single current output on Mother Board
- Dual channel current output, analog input board (2 analog in 2 analog out).
- 5 programmable digital inputs
- 4 programmable outputs
Installation

- 1 fault output
- Serial communications
- Solid state output
- 2 circuit board expansion slots that can accommodate the following boards if needed.
  1. Single channel current output board
  2. 16 digital inputs/4 digital outputs
  3. 4 digital inputs/16 digital outputs
  4. Serial communication board
  5. Allen-Bradley remote I/O
  6. Profibus-DP board
  7. DeviceNet

1.6 Loss-in-Weight Controller General Description

The Micro-Tech 3104 Loss-in-Weight Controller has been designed for loss-in-weight feeder, and is capable of performing all of the necessary measuring and control functions. All of 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 keypad.

Setup of the Micro-Tech 3104 is easy and is performed from the keypad on the front of the device. The setup parameters may be divided into the following main groups.

- Measuring
- Automatic Control
- Monitoring
- Printing
- Communication

1.6.1 Measuring Functions

The Loss-in-Weight Controller can be directly connected up to six 350 ohm loadcells and convert the weight signal into a numeric value with very high accuracy and resolution.

Rate is calculated as decrease or increase of weight in time. Total is computed on three individual registers: total, reset total, and operator total. It is calculated as the difference of weight at given time intervals.

The Loss-in-Weight Controller can perform automatic zero and span calibrations. Analog (current) output signals can be generated to transmit rate, net and gross weight to other control devices. Displayed variables and analog outputs can be smoothed via damping filters, individually programmable.
The system fully handles the refill of the bin, by acting in volumetric mode during the refilling time and adjusting the volumetric constants according to the current net weight.

One single instrument can control one or two completely independent loss in weight feeders.

1.6.2 Automatic Control Functions

The Loss-in-Weight Controller provides two independent control loops, one for each loss in weight feeder. In both cases, the control loop can be either:

- PID = Proportional + Integral + Derivative
- PID + S = PID with cascade on set-point
- P.E.I.C. = Periodical Error Integral Control

The process variable under control can be feed rate. The set point can be entered via keyboard, or received through a serial communication channel or an analog input. Control output can be either current or pulses.

When the Loss-in-Weight Controller is not running, the control output is locked in position or forced to a preset value defined by the operator.

When the controller is switched from Manual or Automatic and vice versa, the integral term is adjusted so the change does not generate jumps of the control outputs (bump-less).

The Loss-in-Weight Controller can optionally operate the Load Out (Batch) software with full control or preset (high/low feed rate), pre-act and start delay to compensate for distance of feeding points when operating several feeders in ratio. For application in blending systems, where more feeders need to operate with one set point source, but different ratios, the ratio between the main set point and each feeder can be entered through the keyboard, analog input or serial link.

Two weight thresholds (High and Low weight) are entered to define when the refilling has to start and to stop. The system will turn on the “Refill Output” when the Low Level is reached, but will continue to operate in normal mode until the “Refill Input” is turned on. When this happens, the system will switch to volumetric mode, and continue to work while the bin is refilled. When the weight is over the High threshold, the “Refill Output” is turned off. The system will remain in volumetric mode until the “Refill Input” turns off and a delay time has elapsed.

1.6.3 Monitoring Functions

The Loss-in-Weight Controller includes internal diagnostics that generate alarms in case of hardware failures or programming errors. The following process alarms are also provided:

- High control deviation
- Alarms for high and low flow rate 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 ignored. Two LED’s indicate the cumulative status of alarms and shut down. Digital outputs are also provided for the following:
- Hardware failure
- High control deviation
- Alarm cumulative
- Shut down cumulative

1.6.4 Print Functions

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

1.6.5 Communication Functions

There are two types of standard communication functions. Each is discussed below:
- **Serial Communications** – The communication protocol allows a remote intelligent device to read the contents of the registers and write to some registers.
  
  During the communication activity, the Micro-Tech 3104 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 and accessed through one communication port. Up to three communication boards may be installed.

- **Field Bus I/O** – Allen-Bradley RIO or Profibus-DP I/O, or DeviceNet communication protocol board is typically used to transfer I/O images between a main PLC and the 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 3104 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.

1.7 Functional Description

This section describes technically, how the Micro-Tech 3104 performs each particular duty.

1.7.1 Measuring Functions

1.7.1.1 Flow Rate

In a loss-in-weight system, the flow rate measurement is done by taking the difference between two subsequent weight measurements. The time between the two measurements has to be
short enough to keep the response time of the system within an acceptable value.

Therefore, the difference between the two weights is a very low value and it is strongly affected by any noise on the weight signal, which may be produced by vibrations of the mechanical parts.

The accuracy and stability of the flow rate measurements improves under the following conditions:

- Increase of the speed variation of the weight signal by reducing the hopper discharge time and increasing the ratio between net weight and loadcell capacity.
- Reduction of the weight signal noise caused by mechanical vibrations by increasing the ruggedness of the mechanical structure supporting the weight hopper.

To handle the above problems, the Loss-in Weight Controller provides various averaging and damping of the signals.

Each of the two weight values used to calculate the weight difference is the average of a number of weight measurements; this number is called “WEIGHT CONSTANT” (W) and is adjustable from 2 to 16.

The time within two subsequent weight measurements is also adjustable and is called “RATE INTERVAL” (T) (values adjustable from 0.1 to 6.0 seconds).

The product of W times T is called “RATE FACTOR” (F) and defines the difference in time, within the two weight values, used to calculate the weight difference.

However, the program calculates and updates the flow rate value at each T time by using the values memorized on a number of memories equal to “W” shifted each one from the other of “T” time.

This means that after a step variation of actual flow rate the time required for the calculated flow rate to represent 100% of the variation is equal to F with linear change from old to new value. See Figure 1-3.
A damping action (asymptotic curve) can also be applied to the calculated flow rate value for additional filtering to compensate plant vibrations. On sizing a loss-in-weight system, extreme care should be taken to maintain the full-scale flow within the acceptable limits to avoid running into unstable operating conditions.

The minimum acceptable flow rate is determined by the resolution of the A/D converter and by the sizing of the loadcell with respect to the net weight. The A/D converter provides 262000 counts when the load is 100% on a 3.5 mV/V loadcell. Using loadcells with high output (3mV/V) and maintaining the ratio between the net weight and the size of the loadcells high, allows a better resolution in the rate reading. If, for example, a 2 mV/V loadcell is used, and ratio between net and loadcell capacity is 50%, the available number of A/D count reduced to 74857=(262000 x 2/3.5 x 50/100). If the system has two work at rate so low that it takes 3 hours to discharge the entire bin, the internal number representing the load will decrease at a rate of only 10 counts per seconds \([= 74857/(2 x 3600)]\). This means that the rate indication will be updated each 10 seconds if we want a resolution of 1%. To achieve this, we will enter values of W and T so that \(F = (T \times W)\) is at least equal to 10. The system will still work, but the indication of rate will react slowly.

The maximum rate is limited by the ratio between the discharge time and the refill time. Since the system works in volumetric mode during the refilling period, the system should be designed so that the ratio between the refilling time and the working time does not exceed 1%.
In addition, discharge times larger than 3 hours have to be considered critical, because the effect of little vibrations would become appreciable to an extent that may compromise the functionality of the system. In addition, the quality of the feeding machine must be taken in consideration. Low rates mean very small amounts of material to be moved, so the feeding machine must be able to modulate the flow of material in the smoothest way, avoiding to form blocks of material or temporary absence of it.

1.7.1.2 Totalization

During normal operation the totalization performed by taking the difference between the initial weight of the material in the bin and the actual weight; thus the totalization has the same accuracy of a static weighing.

During the silo refilling, the totalization is performed by integrating the set point (which is supposed to be equal to the flow rate as this one cannot be calculated); thus during the hopper refilling the totalization may be affected by additional errors.

The additional errors introduced into the totalization by the refilling period depend on the ratio between the refilling time and the discharge (or charge) time. The higher this ratio is, the higher the error is.

The totalization takes place each second by memorizing the difference between the actual and reference weight. Then, the actual weight is memorized and used as reference weight for subsequent totalization operation. In case of very low flow rates and plant vibrations, the result of a single totalization operation may be negative (due to the vibrations); in this case, the data is not considered and the reference weight is kept unchanged. At the end of the refilling of the silo, the program memorizes the new weight value as reference for the totalization.

1.7.1.3 Zero and Span Automatic Calibrations

The zero and span calibrations are normally performed by the instrument based on the data entered through the keypad.

The instrument compares the value measured during the calibration test with the theoretical one (zero for zero calibration; calibration constant for span calibration) and recalculates the instrument parameters necessary to obtain a measurement equal to the theoretical value.

1.7.1.4 Silo Refilling

Minimum and maximum levels, which are used to start and stop the refilling of the silo, can be entered through keypad. When the silo weight drops below a minimum level, the instrument closes the output signal REFILL HOPPER suitable to start the refilling machine (dumper, conveyor, etc.). However, the actual volumetric action is only started when the “FEEDBACK REFERENCE” input is set. The user can wire back the REFILL HOPPER output to the FEEDBACK REFERENCE input, or just ignore the REFILL
HOPPER output and activate the input when needed. In all cases, when the refilling is started, the Loss-in-Weight Controller automatically enters in a stand-by mode and locks the output signal to its last value (this value can be modulated by start-point changes if the PID + S control action has been chosen). When the high level value is reached, the REFILL HOPPER output will be set off, to stop the refilling device.

The volumetric phase, however, will only end when the FEEDBACK REFERENCE signal returns to normal. Then, a stabilization time will start, and at the end of the time the normal gravimetric phase will start again.

If the refilling does not end within a max adjustable time, an alarm occurs.

1.7.1.5 Density Compensation

In some applications, it may happen that an appreciable difference in density exists between empty and full bin. In normal conditions, the control output is locked to its value at start of refilling and rate is supposed to remain unchanged until the end. However, if density will increase during refilling, real rate will be appreciably higher at end of refilling, and the system will take some time to acquire the new rate, and some additional time to properly set the control output. The system reduces this effect by acting in one of the following ways:

SET CONTROL OUTPUT

The control output, at end of refilling, is set to a pre-defined value:

\[ \text{Control Out} = \text{Set Control Out} \]

CORRECT CONTROL OUT

The control out, at the end of refilling, is corrected by a predefined value:

\[ \text{Control Out} = \text{Control Out} + \text{Control Out} \times \text{Correction}/100 \]

RECORDING DENSITY VARIATION

In this case, the system will record, during the gravimetric phase, the relationship between the weight and the control output. During the following phase of refill, the control out will be set according to the recorder values, with reference to the increasing weight. This method also increases the accuracy of totalization during the refill phase. The number of recorder coefficients is 20.

\[ \text{Control Out} = \text{Control Out} \times \text{Coeff} (i) \]

Where “i” is selected between 1 and 20 according to the current load status.
1.7.1.6 Current Output Signals
The *Loss-in-Weight Controller* has two current output signals (0-20/4-20mA), upgradeable to three or four by adding one board. The choice of the signal type is made through the keypad. Each current output may be programmed by keypad to deliver one of the following signals:
- Flow rate
- Control signal
- Net and gross weight

Each output has its own adjustable damping and programmable delay.

1.7.2 Automatic Control Functions

1.7.2.1 Automatic Control of Instantaneous Value
The *Loss-in-Weight Controller* maintains the process variable equal to the set point by varying the control output signal.

The process variable is rate. The set point may be entered through the keypad (local set) or, as an external signal (remote set), which may be an analog or serial signal.

When the feeder is not running and the controller is on automatic, the control output may correspond to one of the following conditions selected through the keypad:
- Locked on the last value before the stop
- Locked on a value from 0-100% as entered through the keypad

When the feeder starts, the controller begins the control action from the value at which the output was locked when the feeder stopped.

Auto/manual switching is of bump-less type.

1.7.2.2 PID Control Action
There are three main control actions (Proportional + Integral + Derivative). The control action is given by the following formula:
\[
OUT = Kp \times E + Ki \times \int E \, dt + Kd \frac{d}{dt} E
\]

Where:
- OUT = output control signal
- Kp = proportional band
- Ki = integration constant
- Kd = derivative constant
- E = control deviation (set-point minus process variable)

The three constants Kp, Ki, and Kd are entered through the keypad, by entering zero the corresponding control action is not performed.
1.7.2.3 PID + S Control Action

If this control action is selected, the control output will be changed proportionally to the set point variations.

This control action gives a greater response time to set point variations. It may only be used for those applications where the volumetric flow is linear with the control output (start feeder, screw feeders, variable speed conveyor, etc.). In addition, the flow rate is volumetrically updated as a function of set point during the refilling period.

\[ \text{OUT} = 0.5 \times \frac{\text{SET POINT}}{\text{MAX SET POINT}} \]

1.7.2.4 P.E.I.C. Control

In processes where a time exists between the regulation point and the measuring point, this control action is particularly useful. The control action is made by periodical adjustments of the control signal followed by a waiting time correspondent to the process dead time. During the waiting time, the output signal remains constant. At the end of the waiting time, the output signal changes for a time equal to the “Integral Time”. The total variation of the output signal within the two seconds is proportional to the deviation between set point and controlled variable. By reducing the proportional band and/or increasing the integral time, the control signal variation increases for the same deviation.

Figure 1-4: P.E.I.C Control

1.7.2.5 Analog Delay

In control system where several feeders operate in ratio, the transport time from each feeder to the mixing point can be different. To insure the correct ratio at the mixing point, an analog delay can be programmed on the remote set-point signal and or on the analog output. This delay provides a time shift for the variations of the variable.

The delay is performed using a table with 50 positions. The resolution (in seconds) is related to the present time, i.e.:
Delay time(s)                      resolution (s)
Up to 25                              0.5
From 26 to 50                         1
From 51 to 100                        2
From 101 to 250                      5
From 251 to 500                    10

1.7.2.6 **P.E.I.C. Increase Decrease Controls**

The control can either be an analog output or increase/decrease digital outputs (in this case the control is proportional).

The activation time of the output is given by the following formula:

\[
\text{act time} = \text{PEIC time} \times e \% / \text{Prop band} \% 
\]

If the error is positive (process variable > set point), the “decrease” output is activated. If negative, the “increase” output is being activated. If the P.E.I.C. time is defined, P.E.I.C. increase/decrease digital outputs become active.

1.7.2.7 **Automatic Manual**

The Loss-in-Weight Controller can have two possible states:

AUTOMATIC The Loss-in-weight controller’s automatic control performs as described in Step 1.7.2.1

MANUAL The value of the control output is set manually by the operator by using the keypad.

Automatic or Manual mode is selected using the AUTO/MAN key. Changing between the two states is seamless.

1.7.2.8 **Batch Control**

The Loss-in-Weight Controller, while performing the automatic control of the flow rate, may also perform a batch control.

In this case, the feeder operates under flow rate control and stops when the required quantity (quantity set) is reached. A preset value may be entered to switch to a lower feed rate. When the totalized value equals the value of the quantity set minus preset, the controller will switch to a lower rate set-point (low rate set) thus reducing the flow rate for a fine batching end. The unit also allows the pre-act correction (or compensation of material before the scale) whose value is entered manually. The feeder is stopped when the totalized value equals the batch set value minus the overflow correction value.

The batch STAR/STOP commands are provided by the external signals (manual pushbutton or relay contact from automatic system). The batch stop signal is used only as emergency to abort the batch cycle before its end. A delay time is provided between start command and actual start to compensate the difference in transport distance to the mixing point when several weigh feeders are installed.
1.7.3 Monitoring Functions

The Loss-in-Weight Controller is supplied with an alarm and indication system. Indication can be in the form of:

- Status Indicators
- Process Alarms
- Programming Errors
- Equipment Failures

If any of the controlled conditions takes place, it is signaled by the lighting of a LED on the front and by a digital output. Using the keypad, you can display all the existing alarms and acknowledge them.

1.7.3.1 Status Indications

- Controller in automatic: The “AUTO” LED is on.
- Controller is in remote set point: The “REM” LED is lighted; the relevant output is closed if the controller is also in automatic mode. This output is used to indicate to external equipment that the controller can be remotely controlled.
- Feeder ready: The “RUN” LED will flash and the relevant output will close when all the conditions listed below become true:

  FEEDER NOT RUNNING
  NO FAILURE ALARM
  NO SHUT DOWN CONDITION
  NO CALIBRATION MODE
  CONTROLLER ON AUTOMATIC MODE
- Feeder running: When the feeder running input contact is closed. The “RUN” LED is lighted.

1.7.3.2 Process Alarms

The following conditions are monitored and may produce alarms or shut the system down. A delay time before the abnormal condition is monitored may be set for each individual alarms.

- High control deviation (above or below set-point)
- High flow rate
- Low flow rate
- High weight
- Low weight
- High positive deviation of control loop 1
- High high positive deviation of control loop 1
- High negative deviation of control loop 1
- High high negative deviation of control loop 1
- High positive deviation of control loop 2
- High high positive deviation of control loop 2
- High negative deviation of control loop 2
- High high negative deviation of control loop 2

Each alarm condition may be set as:
- NONE: Neither alarm nor shut-down
- ALARM: Warning, the feeder continues to run
- SHUT-DOWN: The feeder stops

1.7.3.3 Programming Errors
They may occur only during programming or calibration because of entering data above or below the operating range of the instrument. If data above or below the limits are entered, the system will display a warning message and the minimum/maximum limits will be shown.

1.7.3.4 Equipment Failures
The unit has an internal diagnostic system, which detects the following instrument failures:
- Clock Calendar circuit failure
- Loadcell failure
- RAM failure
- ROM failure
- Power on
- Default constants installed at power on
- Power down during calibration
- Calibration time expired
- General purpose external alarms
- Overflow of Totalizer
- Auto Zero tracking limit
- Load Out deviation
- Communication error
- BCD error
- Mathematical error

1.7.4 Print Functions
Available print functions are:
- Print on command
- Print at pre-selected times of day (up to four)
- Print at pre-selected intervals of time
- Print Set-Up
- Print alarms

1.8 Symbol Identification

Table 1-1 describes the symbols used in this manual and associated drawings.

**Table 1-1: Symbol Identification**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Symbol" /></td>
<td>ALTERNATING CURRENT</td>
</tr>
<tr>
<td><img src="image2" alt="Symbol" /></td>
<td>EARTH (GROUND) TERMINAL</td>
</tr>
<tr>
<td><img src="image3" alt="Symbol" /></td>
<td>PROTECTIVE CONDUCTOR TERMINAL</td>
</tr>
<tr>
<td><img src="image4" alt="Symbol" /></td>
<td>CAUTION, RISK OF ELECTRIC SHOCK</td>
</tr>
<tr>
<td><img src="image5" alt="Symbol" /></td>
<td>CAUTION (REFER TO ACCOMPANYING DOCUMENTS)</td>
</tr>
</tbody>
</table>
1.9 Technical Specifications

**Enclosure**

**Field Mount**
NEMA 4X (IP65), dust and watertight
17 x 13 x 7 inches
Fiberglass reinforced polyester
2 position-mounting feet
Steel chassis providing EMI/RFI shielding

**Panel Mount**
Size: 12 x 4 x 7.5 inches
Material: Chromated mild steel

**Environmental Conditions**

**Mounting**
Should be mounted as close to the loadcells as possible without being exposed to excessive heat or moisture
Field Mount suitable for mounting outdoors

**Temperature (Ambient)**
Storage: -40° to +158° F (-40° to +70° C)
Operating: +14° to +122° F (-10° to +50° C)

**Relative Humidity**
Up to 95%, non-condensing

**Pollution Degree**
2

**Altitude**
Up to 6,561 ft (2000m)

**Power Requirements**

**Voltage Range**
Nominal voltage +10%, -15%

**Nominal Voltage**
115/230 VAC, selectable

**Nominal Frequency**
50/60 Hz

**Fusing**
400mA Slo-Blo, 110/120 VAC, Type T
200mA Slo-Blo 220/240 VAC, Type T

**Power Consumption**
50 VA max
Maximum Non-Destructive Input Voltage
150/300 VAC for 1 minute

Over voltage Category
Category II

DC Power Supply

Auxiliary Power Supply Output (Alarm Contacts, etc.)
Output voltage: 24 VDC
Isolation: Yes – 500 volts
Output ripple: 1.0 V peak to peak typical
Output current: 600 mA maximum
Short circuit protection

Loadcell (Weight)

Loadcell input circuits
Number: Up to six (6) 350-ohm loadcells in parallel
Cable distance 200 ft or less (3000 ft with sense)
Sensitivity: 0.5mV/V to 3.5 mV/V (keyboard selectable)
Input Impedance: 100 k-ohm minimum
Maximum Usable Signal: 114% of 3mV/V
Displayed A/D counts (3mV/V): 112368
Isolation: Non-isolated
Max non-destructive input voltage: ± 6 V relative to ground
Loadcell Cable Shield: Connected to earth ground

Loadcell Excitation Power Supply
10 VDC ±10%, 220 mA
Minimum load impedance (operating) 58 ohms
Output short circuit, 1.5 A maximum

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: 100 k-ohm minimum
Jumper selectable: Local or remote sense
**Current Output**

**1 current output on Motherboard**
Output range: User selectable 0 – 20 mA or 4-20 mA, representing 0 to 100% variable.
Resistive load: 800 ohm max. Loop
Capacitive load: No limit

**Analog I/O Board (B)**

(2) High level input
Type: Differential voltage input. (0-20mA or 4-20mA with internal resistor, jumper selectable)
Range: 0-5V, or ±V, programmable
Maximum usable input voltage: 106% of full scale
Non–isolated
Maximum non-destructive input voltage: 12V peak
(2) Current Outputs
Optically isolated
Isolated power source
Voltage output by adding an internal dropping resistor
Output range: User selectable 0-20mA or 4-20mA, representing 0 to 100% variable.
Resistive load: 800 ohms maximum
Capacitive load: no limit

**Standard Communication**

**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 232 C 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 max. (RS-232C)
4000 feet max (Rs-485 and 20 mA)
Chapter 2
Installation

This chapter describes the Loss-in-Weight Controller installation procedure, hardware configuration, and initial programming. Initial programming is a machine directed procedure prompting the operator to enter required conveyor and loss-in-weight parameters. After all parameters have been entered, the Loss-in-Weight Controller performs an unassisted zero and span calibration.

2.1 Safety Precautions

**CAUTION**

*Do not install, operate, or perform any maintenance procedures until you have read the safety precautions that follow.*

**CAUTION**

*Do not connect power to the electronics or turn on the unit until you have read and understand 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.*

**WARNING**

*The instrument door should always remain closed during operation, and only opened for maintenance procedures. Be sure to close the cover before resuming operation.*
Operations

**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 volt meters to the system. Incoming voltages must be checked with a voltmeter before being connected to the electronics.

**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.

**WARNING**

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

**WARNING**

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

**WARNING**

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

This equipment should not be operated or utilized in applications other than those stated in the original order. To adapt production rates or applications, consult Thermo Scientific products Customer Service for recommendations.

WARNING

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 Incoming Power

CAUTION

Verify that the input voltage is correct with an AC voltmeter before you connect it to the instrument.

CAUTION

Earth ground must be provided to the instrument. Do not use conduit to provide this ground.

CAUTION

A readily accessible disconnect device 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.
2.2.1 Critical Wiring Conditions

1. Ensure power is off at the mains
2. Do not route loadcell and signal cables in the same conduit with power cables or any large source of electrical noise.
3. Earth ground all enclosures and conduits. A ground connection between all conduits is required.
4. Connect the shields ONLY where shown.
5. Check that all wires are tight in their connections.
6. Never use a “megger” to check the wiring.
7. A readily accessible disconnect device 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.
8. All conduits should enter the bottom of the enclosure. Do not run conduit through the top or sides of the enclosure.

2.3 Field Mount Installation

The field mount Loss-in-Weight Controller should be mounted in a controlled environment not be exposed to excessive vibration, heat, or moisture, and protected from direct sunlight. The Loss-in-Weight Controller may be mounted up to 3,000 feet from the loadcells.

2.3.1 Mounting

Mount the Loss-in-Weight Controller to a rigid, flat, vertical surface using four mounting holes provided on the back of the enclosure. Care should be taken to ensure the mounting surface is flat so as not to twist or warp the fiberglass enclosure when tightening the mounting bolts.
Figure 2-1: Typical Micro-Tech 3104 Installation

![Typical Micro-Tech 3104 Installation Diagram]

Figure 2-2: Electrical and Mounting Guidelines of the Micro-Tech Model 3104 (Field Mount) Loss-in-Weight Controller

![Electrical and Mounting Guidelines Diagram]

**CAUTION**

REFER TO THE FIELD WIRING DIAGRAM AS A GUIDE IF YOU DO NOT HAVE A SPECIFIC WIRING DIAGRAM FOR YOUR SYSTEM. FOLLOW YOUR LOCAL...
ELECTRICAL CODES AND REGULATIONS FOR MINIMUM WIRE SIZE AND ROUTING.

2.3.2 Connecting Incoming Power - Field Mount

To connect the incoming power, use the following procedure.

Note: All units shipped from the factory are configured for 115 VAC. If you desired 230 VAC, make sure the power selector switch is set to 230 VAC (Section 2.5.1).

1. Loosen the screw latch mounted on the front chassis. Open the door (see Figure 2-3).
2. Route incoming power wiring through a conduit hole at the bottom right of the enclosure. Leave ample loose wiring (typically 8”) to facilitate removing the terminal connectors.
3. Wire safety ground terminal located on the side of the chassis.
4. Wire HOT to Terminal L on Power Input Terminal.
5. Wire NEUTRAL to Terminal N on Power Input Terminal.
6. If additional I/O is required at the line voltages, these wires should be routed through a conduit hole on the bottom right of the enclosure. Leave ample loose wiring (typically 8”) to facilitate removing the terminal connectors.
7. All additional field wiring operation at voltages less then 30 V must be located on the left bottom of the enclosure. Leave ample loose wiring (typically 8”) to facilitate removing the terminal connectors.
8. Close the inside panel and tighten the screw to secure the cover.

Figure 2-3: Field Mount Inside Front Panel

2.4 Panel Mount Installation
The panel mounted *Loss-in-Weight Controller* is suitable for mounting in a control panel. The control panel should not be exposed to excessive vibration, heat, or moisture. The front bezel, when properly seated, forms a dust seal.

A two (2) inch clearance around the top and bottom of the *Loss-in-Weight Controller* 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 *Loss-in-Weight Controller*.

### 2.4.1 Mounting

Provide a cutout in the panel and insert the *Loss-in-Weight Controller* after removing the holding brackets. From the back, insert the holding brackets on both sides of the instrument. Tighten the holding brackets to support the *Loss-in-Weight Controller* and form the dust seal.

**Figure 2-4: Electrical and Mounting Guidelines Micro-Tech 3104 (Panel Mount)**
See Figure 2-4 for panel cutout, outline, and mounting dimensions.
The large rubber band shipped with the unit can be used to hold clamp brackets in place during installation.

Remove clamp brackets and slide chassis assembly through front of cut-out. Re-install clamp brackets into chassis and tighten threaded rods against the back of the panel until the unit is secure.

2.4.2 Connecting Incoming Power – Panel Mount

To connect incoming power for panel mount installation, use the following procedure.

Note: All units shipped from the factory are configured for 115 VAC. If 230 VAC is desired, refer to Section 2.5.1, motherboard configuration Jumpers and Switches.

• For input power, use 14 AWG standard wire
• Wire the safety ground terminal located on the right backside of the enclosure.
• Wire the HOT to terminal labeled 1 of Terminal L on the Power Input Terminal.
• Wire the NEUTRAL to the terminal labeled 2 of Terminal N on the Power Input Terminal.

2.5 Loss-in-Weight Controller Configuration

The Micro-Tech 3104 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 shareware 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.
2.5.1 Mother Board Configuration Jumpers and Switches

TO BE PERFORMED BY QUALIFIED SERVICE PERSONNEL ONLY.

1. General Purpose Digital Inputs

Located on the motherboard are provisions for 5 programmable status inputs. The programmable inputs may be configured as normally open or normally closed. Inputs are designed for dry contacts.

Input 1 may also be used as a speed sensor input. Refer to Table 2-1 for configuration information.

Figure 2-6: Micro-Tech Motherboard
Table 2-1: Programmable Input Choices

<table>
<thead>
<tr>
<th>External Alarm 1</th>
<th>Refill S1</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Alarm 2</td>
<td>Refill S2</td>
</tr>
<tr>
<td>External Alarm 3</td>
<td>Loc/Rem Control</td>
</tr>
<tr>
<td>Reset Alarm</td>
<td>Loc/Rem Control S1</td>
</tr>
<tr>
<td>Print</td>
<td>Loc/Rem Control S2</td>
</tr>
<tr>
<td>Print S1</td>
<td>Auto/Man Control</td>
</tr>
<tr>
<td>Print S2</td>
<td>Auto/Man Control S1</td>
</tr>
<tr>
<td>Reset Tot</td>
<td>Auto/Man Control S2</td>
</tr>
<tr>
<td>Reset Tot S1</td>
<td>Running</td>
</tr>
<tr>
<td>Reset Tot S2</td>
<td>Running S1</td>
</tr>
<tr>
<td>Refill</td>
<td>Running S2</td>
</tr>
</tbody>
</table>

2. Digital Outputs

A relay output board (all dry contacts) and is plugged into slot 4 of the motherboard. One of the relay outputs is permanently assigned as the fault output and cannot be programmed to any other function. The other 3 relays can be programmed to one of the choices shown below in either a normally open or normally closed position.

There is an additional solid-state output (located on the motherboard), which can also be programmed to one of the functions shown below.

The programmable output choices are listed in Table 2-2.

Table 2-2: Programmable Output Choices

<table>
<thead>
<tr>
<th>Alarm Cumulative</th>
<th>High Deviation Positive S1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shutdown Cumulative</td>
<td>High Deviation Positive S2</td>
</tr>
<tr>
<td>Ready</td>
<td>High Deviation Negative</td>
</tr>
<tr>
<td>Refill</td>
<td>High Deviation Negative S1</td>
</tr>
<tr>
<td>Refill S1</td>
<td>High Deviation Negative S2</td>
</tr>
<tr>
<td>Refill S2</td>
<td>Loc/Rem</td>
</tr>
<tr>
<td>High Weight</td>
<td>Loc/Rem S1</td>
</tr>
<tr>
<td>High Weight S1</td>
<td>Loc/Rem S2</td>
</tr>
<tr>
<td>High Weight S2</td>
<td>Auto / Manual</td>
</tr>
<tr>
<td>Low Weight</td>
<td>Auto / Manual S1</td>
</tr>
<tr>
<td>Low Weight S1</td>
<td>Auto / Manual S2</td>
</tr>
<tr>
<td>Low Weight S2</td>
<td>Increase</td>
</tr>
<tr>
<td>High Rate</td>
<td>Increase S1</td>
</tr>
<tr>
<td>High Rate S1</td>
<td>Increase S2</td>
</tr>
<tr>
<td>High Rate S2</td>
<td>Decrease</td>
</tr>
<tr>
<td>Low Rate</td>
<td>Decrease S1</td>
</tr>
<tr>
<td>Low Rate S1</td>
<td>Decrease S2</td>
</tr>
<tr>
<td>Low Rate S2</td>
<td>Totalizer</td>
</tr>
<tr>
<td>High Deviation Positive</td>
<td>Totalizer S1</td>
</tr>
<tr>
<td></td>
<td>Totalizer S2</td>
</tr>
</tbody>
</table>

Additional outputs can be selected by adding additional DIO boards.
2.5.2 A/D Jumpers – Loadcell Sense

Loadcell sense is controlled by selectable jumpers OP6 and OP7 located on the motherboard (Figure 2-7). The jumpers should be in position “A” local sense if the distance is less than 200 feet between loadcell and Loss-in-Weight Controller.

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

Table 2-3: Loadcell Jumper Settings

<table>
<thead>
<tr>
<th>Mode</th>
<th>OP6</th>
<th>OP7</th>
<th>DEFAULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 200 feet</td>
<td>“A”</td>
<td>“A”</td>
<td>„A“</td>
</tr>
<tr>
<td>Greater than 200 feet</td>
<td>“B”</td>
<td>“B”</td>
<td>„B“</td>
</tr>
</tbody>
</table>

Figure 2-7: Area of Detail
## Table 2-4: Micro-Tech 3104 Motherboard Jumpers

<table>
<thead>
<tr>
<th>Jumper Location</th>
<th>Foil/Jumper</th>
<th>Default Position</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP1</td>
<td>Jumper</td>
<td>A</td>
<td>Comm A=RS-485/20mA B=RS-232</td>
</tr>
<tr>
<td>OP2</td>
<td>Jumper</td>
<td>A</td>
<td>Comm A=RS-485/20mA B=RS-232</td>
</tr>
<tr>
<td>OP3</td>
<td>Jumper</td>
<td>A</td>
<td>Comm A=RS-485/20mA B=RS-232</td>
</tr>
<tr>
<td>OP5</td>
<td>Jumper</td>
<td>A</td>
<td>SPU Contact Closure Input (Slow Speed)</td>
</tr>
<tr>
<td>OP6</td>
<td>Jumper</td>
<td>A</td>
<td>Sense Jumper A = Less than 200 ft B= Greater than 200 ft</td>
</tr>
<tr>
<td>OP7</td>
<td>Jumper</td>
<td>A</td>
<td>Sense Jumper A = Less than 200 ft B= Greater than 200 ft</td>
</tr>
<tr>
<td>OP10</td>
<td>Jumper</td>
<td>A</td>
<td>Comm A = RS-485/232 B = 20 mA</td>
</tr>
<tr>
<td>OP11</td>
<td>Jumper</td>
<td>A</td>
<td>Comm A = Terminated B = Not Terminated C = 20 mA</td>
</tr>
<tr>
<td>OP13</td>
<td>Jumper</td>
<td>A</td>
<td>Comm A = Normal B = Multidrop</td>
</tr>
<tr>
<td>OP26</td>
<td>Jumper</td>
<td>A</td>
<td>OIML Calibration Jumper A = Allows Cal B = Restricts Cal</td>
</tr>
</tbody>
</table>

## Table 2-5: Terminal Wiring Configurations

<table>
<thead>
<tr>
<th>TB1 Digital Input/Out</th>
<th>TB2 Digital Input</th>
<th>TB3 COMM</th>
<th>TB4 Loadcells</th>
<th>TB5 Analog Out Motherboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input #1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig 2</td>
<td></td>
<td></td>
<td>37 Shield</td>
<td>38 +</td>
</tr>
<tr>
<td>Com 1</td>
<td></td>
<td></td>
<td>36</td>
<td>39 -</td>
</tr>
<tr>
<td>8 +24 V</td>
<td>9 +24 V</td>
<td></td>
<td>32 +Exc</td>
<td></td>
</tr>
<tr>
<td>10 Shield</td>
<td>11 Shield</td>
<td></td>
<td>33 -Exc</td>
<td></td>
</tr>
<tr>
<td>12 Sig</td>
<td>13 Com</td>
<td></td>
<td>34 +Sense</td>
<td>40 Shield</td>
</tr>
<tr>
<td>14 Sig</td>
<td>15 Com</td>
<td></td>
<td>35 -Sense</td>
<td></td>
</tr>
<tr>
<td>16 Sig</td>
<td>17 Com</td>
<td></td>
<td>30 +Sig</td>
<td></td>
</tr>
<tr>
<td>18 Sig</td>
<td>19 Com</td>
<td></td>
<td>31 -Sig</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5 + Out 2</td>
<td>6 -</td>
<td></td>
<td>1 Shield</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>9 + Out-3</td>
<td></td>
<td>4 + In-1</td>
<td></td>
</tr>
<tr>
<td>10 -</td>
<td>10 -</td>
<td></td>
<td>5 -</td>
<td></td>
</tr>
<tr>
<td>4 + In-1</td>
<td>5 -</td>
<td></td>
<td>8 Shield</td>
<td></td>
</tr>
<tr>
<td>6 + In-2</td>
<td>7 -</td>
<td></td>
<td>6 + In-2</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2-7**

**Table 2-9**

**Table 2-10**

**Analog (TB4) In/Out Board**

- 1 Shield
- 2 + Out 2
- 3 -
- 4 + In-1
- 5 -
- 6 + In-2
- 7 -
Table 2-6: Relay Output Board

<table>
<thead>
<tr>
<th>Micro-Tech 3000</th>
<th>Relay Output Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
</tr>
<tr>
<td>2</td>
<td>COM</td>
</tr>
<tr>
<td>3</td>
<td>NO</td>
</tr>
<tr>
<td>4</td>
<td>NC</td>
</tr>
<tr>
<td>5</td>
<td>COM</td>
</tr>
<tr>
<td>6</td>
<td>NO</td>
</tr>
<tr>
<td>7</td>
<td>COM</td>
</tr>
<tr>
<td>8</td>
<td>NO</td>
</tr>
<tr>
<td>9</td>
<td>COM</td>
</tr>
<tr>
<td>10</td>
<td>NO</td>
</tr>
</tbody>
</table>

*Relays Rated 33 VAC 0.5A, 70VDC 0.5A

2.5.3 Analog Output (Motherboard)

A current output signal is available for customer use on motherboard Terminal Block 5. The rate, speed, load parameters, control, level can be selected by the customer to be sent to a rate meter, recorder, or controller. The output range is adjustable from 0-20 mA, 4-20 mA, 20-0 mA, or 20-4 mA.

Table 2-7: Motherboard Current Output - TB 5

<table>
<thead>
<tr>
<th>Motherboard Current Output #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB5</td>
</tr>
<tr>
<td>38</td>
</tr>
<tr>
<td>39</td>
</tr>
<tr>
<td>40 Shield</td>
</tr>
</tbody>
</table>

2.5.4 Analog Input/Output Board

The analog input/output board is available in two configuration described below. (A option) has one current output only; whereas, (B) has two voltage inputs and two current outputs. No configuration switches or jumpers exist on the analog boards. The
Loss-in-Weight Controller is supplied with a type (B) two in / two out analog signal.

The Loss-in Weight Controller can support up to four current outputs.

Board type (A) One user definable 0-20/4-20 or 20-4/20-0 mA output.

The Weight, Rate, or Control can be selected by the customer to be sent to a rate meter, recorder, or controller.

Board type (B) Two +/- 5VDC differential inputs and two user definable 0-20/4-20 or 20-4/20-0 mA output

Inputs – The functions that can be selected for each input are: None, Set Point (SP), Moisture Compensation.

Outputs – The function selections for each output are: None, Weight, Rate, or Control.

<table>
<thead>
<tr>
<th>Analog (TB4) Input/Output Board</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
</tbody>
</table>

2.5.5 Communications Configuration (Motherboard) COMM

This section describes the setup procedure and hardware configuration for the communications from the motherboard. Use the following steps to configure the communications:

Select the jumper positions for the desired communication standard (see Table 2-4 and 2-11). Refer to Figure 2-7 for jumper locations.

1. Wire to the Terminal Block 3 on the motherboard for the communication standard selected, RS-485, RS-232c, 20 mA current loop.

2. Refer to REC 3949, Chapter 3 for the remainder of the communication setup.
Table 2-9: Motherboard COMM 1 Communications Wiring Configuration - TB3 – RS-485

<table>
<thead>
<tr>
<th>Motherboard RS-485 Communications TB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
</tr>
<tr>
<td>29</td>
</tr>
<tr>
<td>28</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>20</td>
</tr>
</tbody>
</table>

Maximum cable length 4000 ft
Use Beldon 9830 or equivalent

Figure 2-8: Motherboard Wiring Configuration TB 3 – RS-232 Communications

<table>
<thead>
<tr>
<th>Motherboard RS-232 Communications TB 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
</tr>
<tr>
<td>23</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>21</td>
</tr>
<tr>
<td>20</td>
</tr>
</tbody>
</table>

Maximum cable length 50 ft
Use Beldon 9538 or equivalent
Figure 2-9: Motherboard Wiring Configuration TB 3 – 20mA Serial Communications

| Motherboard | 20 mA Serial Communications |
| TB 3 | |
| 25 | Shield |
| 26 | +20 mA (out) |
| 27 | -20 mA (out) |
| 28 | +20 mA (in) |
| 24 | -20 mA (in) |

Maximum cable length 4000 ft
Use Beldon 9829 or equivalent

Figure 2-10: Mother Board Communication Jumper Settings

<table>
<thead>
<tr>
<th>Mode</th>
<th>OP1</th>
<th>OP2</th>
<th>OP3</th>
<th>OP10</th>
<th>OP13</th>
<th>OP11</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-485</td>
<td>“A”</td>
<td>“A”</td>
<td>“A”</td>
<td>“A”</td>
<td>“A” Normal</td>
<td>“A” Terminated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“B” Multi-drop</td>
<td>“B” Not Terminated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Default</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“A” Terminated</td>
<td>Default</td>
</tr>
<tr>
<td>20 mA</td>
<td>“A”</td>
<td>“A”</td>
<td>“A”</td>
<td>“B”</td>
<td>“A”</td>
<td>“C”</td>
</tr>
</tbody>
</table>

2.6 Determining Installation Parameters
Following mechanical and electrical installation, it is necessary to
record field data specific to your application into the Micro-Tech 3104 Loss-in-Weight Controller memory. The following setup procedure should be completed before programming your loss-in-weight controller. Refer to Chapter 3 of this manual for more details or assistance.

Before applying power to the system, it is necessary to complete the following statements. Refer to your System Data Sheet in the front of your manual.

2.6.1.1 Scale Capacity
Determine the scale’s capacity in tons per hour and record the capacity below. (Example: 400.0)

_________________ (Tons Per Hour) Scale #1

_________________ (Tons Per Hour) Scale #2

2.6.1.2 Number of Loadcells
Enter the number of loadcells.

_________________ (Number of Loadcells) Scale #1

_________________ (Number of Loadcells) Scale #2

2.6.1.3 Loadcell Capacity
From the scale data sheet located in the front of this manual, determine the loadcell size in pounds. Record the weight below. (Example: 250.0)

_________________ pounds (Loadcell Capacity) Scale #1

_________________ pounds (Loadcell Capacity) Scale #2

2.6.1.4 Loadcell Sensitivity
From the loadcell nameplate, determine the loadcell sensitivity in mV/V. Record the sensitivity below. (Example 3.000 mV/V)

_________________ mV/V (Loadcell Sensitivity) Scale #1

_________________ mV/V (Loadcell Sensitivity) Scale #2
2.6.1.5 Loadcell Resistance

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

__________ (Loadcell Resistance) Scale #1

__________ (Loadcell Resistance) Scale #2

2.7 Programming the Micro-Tech 3104 (Initial Setup)

When power is first applied to the Loss-in-Weight Controller, the system steps the operator through menus and options that bring the system to a weighing state. Soft keys, numeric keys, and the scroll control keys are used to select choices. The RUN and MENU control keys are inactive during this procedure. After successful initial programming and scale calibration, proceed to Main Menu 4, I/O Scroll, and Main Menu 7, Control Scroll, for PID or P.E.I.C. controller setup.

--- CAUTION ---

VERIFY 115/230-VOLT SELECTION IS CORRECT. IMPROPER CONNECTION MAY RESULT IN DAMAGE TO YOUR INSTRUMENT.

- 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 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 ---
Chose the language key to continue to

ESP USA
2.7.1 Language

The Micro-Tech 3104 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. MORE advances the system to the next screen.

Press MORE

Use down SCROLL key to advance through the menus
MORE    RETURN

Pressing MORE or RETURN reverts the screen back to previous screens in the series.

Press the DOWN SCROLL key.
2.7.2 Measure Units

Press SCROLL DOWN to accept the default unit, or CHOICES to scroll selections. Press ENTER to confirm your selection. Scroll down.

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

<table>
<thead>
<tr>
<th>-- DISPLAY SCROLL 1 --</th>
<th>Measure units</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; English &lt;</td>
<td></td>
</tr>
</tbody>
</table>

**Default:** ENGLISH

**Choices:** ENGLISH, METRIC, MIXED
- If English, all units in English
- If Metric, all units 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 changes but the calibration remains the same.

2.7.3 Rate Units

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.

<table>
<thead>
<tr>
<th>-- DISPLAY SCROLL 2 --</th>
<th>Rate Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Lb/h &lt;</td>
<td></td>
</tr>
</tbody>
</table>

**English/Mixed**
- Default: Lb/h
- Choice: Tph, Ltp, T/mn
- Lb/h, T/mn, LT/m, LTp, Lb/h
- Lb/mn, kg/h

**Metric**
- Default: kg/h
- Choice: t/h, kg/h
- t/mn, kg/mn

**If Mixed**
- Default: Lb/h
- Choice: T/h, kg/h
- kg/mn, Tph
- T/h, LT/mn, Lb/mn
2.7.4 Weight Units

The weights will be displayed according to the units selected here.

```
-- DISPLAY SCROLL 3 --
Weight Units
>  pounds  <
CHOICE   ENTER
```

<table>
<thead>
<tr>
<th>English/Mixed</th>
<th>Metric</th>
<th>If Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: Pounds</td>
<td>Default: kg</td>
<td>Default: Pounds</td>
</tr>
<tr>
<td>Choice: Perc %, Pounds</td>
<td>Choice: Perc %, kg</td>
<td>Choice: Perc %, kg, Tones, Tons, LTons, Tonnes</td>
</tr>
</tbody>
</table>

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

2.7.5 Total Units

The units to be used for Total 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 4 --
Total Units
>  Tons  <
CHOICE   ENTER
```

<table>
<thead>
<tr>
<th>English/Mixed</th>
<th>Metric</th>
<th>If Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: Tons</td>
<td>Default: Tonnes</td>
<td>Default: Tons</td>
</tr>
<tr>
<td>Choices: Tons, LTons, Pounds</td>
<td>Choices: Tonnes, kg</td>
<td></td>
</tr>
<tr>
<td>Choices: Tons, LTons, kg, Pounds, Tonnes, kg</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.7.6 Number of Scales

The Loss-in-Weight Controller can control two independent scales. The number of scales can be programmed according to the number of A/D are installed.

If is available only the A/D (on Motherboard) this scroll is not displayed

```
-- SC DATA SCROLL 1 --
Number of scales
1
ENTER
```
2.7.7 Max Scale Capacity

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

```
-- SC DATA SCROLL 2 --
Max. scale capacity
100.0
ENTER SCALE #
```

Default: 100.0
Min: 1
Max: 200000

2.7.8 Scale Divisions

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 3 --
Scale Divisions
> 0.1 <

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

### 2.7.9 Loadcells Number

Enter the number of loadcells of your scale.

--- SC DATA SCROLL 4 --
# of load cells
1

**Default:** 1  
**Min:** 1  
**Max:** 6

### 2.7.10 Defining Loadcell (s)

Enter the *loadcell capacity* as it appears on the label placed on the loadcell.

--- SC DATA SCROLL -5-
Load cell capacity
250.0 Lbs

**If English**  
**Default:** 250.0 Lbs  
**Min:** 10 Lbs  
**Max:** 15000 Lbs  

**If Metric**  
**Default:** 100 kg  
**Min:** 1 kg  
**Max:** 5000 kg
Enter the *loadcell sensitivity* in mV/V as marked on the label of the loadcell. *Thermo* loadcells are normally 2.000 or 3.000 mV/V.

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

Loadcell resistance is entered on this screen. The resistance for the loadcell has been recorded on the System Data Sheet in the front of your loss-in-weight controller manual. (It is also stamped on the loadcell cable.) Enter the ohms for the loadcell. The number of scrolls depends on the number of loadcells installed.

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

- If # of Loadcells is more than 2:
• If # of Loadcells is more than 3:

```
-- SC DATA SCROLL –7C-
Load cell # 3 res
Res  350.000 Ohms
ENTER   SCALE #
```

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

• If # of Loadcells is more than 4:

```
-- SC DATA SCROLL –7D-
Load cell # 4 res
Res  350.000 Ohms
ENTER   SCALE #
```

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

• If # of Loadcells is more than 5:

```
-- SC DATA SCROLL –7E-
Load cell # 5
Res  350.000 Ohms
ENTER   SCALE #
```

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

• If # of Loadcells is 6:

```
-- SC DATA SCROLL –7F-
Load cell #6
Res  350.000 Ohms
ENTER   SCALE #
```

Default: 350 Ohms  
Min: 10 Ohms  
Max: 2000 Ohms
2.7.11 Defining the Lever Ratio

\[
\begin{array}{|c|}
\hline
\text{SC DATA SCROLL –8–} \\
\text{Lever Ratio} \\
\text{1.000} \\
\cline{1-1}
\text{ENTER SCALE #} \\
\hline
\end{array}
\]

Default: 1.000  
Min: 0.100  
Max: 5.000

2.7.12 Quick Automatic Calibration of the Scale(s)

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

CALIBRATION IN PROGRESS

When calibration procedure is completed, the following message in displayed for 3 seconds:

S1 CALIBRATED  
S2 CALIBRATED

In case the loadcell is not connected or a failure is detected, the message is “S# NOT CALIBRATED”.

Then the following message is displayed

Press RUN to start or MENU for scrolls

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

NOTE:
The span number was calculated from the data that was entered during this initial calibration setup procedure. Verify this by performing a span calibration procedure.
Chapter 3 Operations

Your Thermo Scientific Loss-in-Weight Controller System is capable of accurate weighing, provided it is installed, calibrated, operated, and maintained in complete accordance with the instructions contained in this manual.

3.1 Overview

Micro-Tech 3104 Loss-in-Weight Controller is a microcomputer-based instrument that accepts and conditions weight signals from one or two scales, and provides visual and electrical outputs for total weight. A stable 10-volt DC excitation voltage capable of exciting up to six strain gauge loadcells is produced by the Loss-in-Weight Controller. Sense lead terminations are also provided for six wire loadcell cables.

The Loss-in-Weight Controller output can be PID, PID + S or PEIC control. PEIC control can be an analog output or time proportional “increase / decrease” digital.

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 is 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 system or improper operation.

3.2 Operator Interface

This section provides information about setting up and operating the Micro-Tech 3104. All operations are performed from the front panel of the electronic enclosure.

- The operator interface, including all keys, indicators, and displays.
- Procedures for initial setup and calibration are provided.
- Detailed operating procedures are also included. All operations are performed from the front panel of the electronic enclosure.

The Micro-Tech 3104 has been adjusted, configured, and inspected at the factory per the supplied customer data. Additional internal adjustments should not be necessary for satisfactory performance. If adjustments become necessary, refer to Chapter 4 Micro-Tech 3104 Maintenance.
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 Loss-in-Weight Controller has been configured (see Section 2.5 for configuration procedures).

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

The Loss-in-Weight Controller front panel display includes the following features:

- System status lights that show the status of the weighing process.
- LCD graphic display
- Keypad

3.3.1.1 System Status Lights

The five red status indicators show the status of the Loss-in-Weight Controller.

- Remote – (On) when the loss-in-weight controller (or displayed scale if two are defined) is in REMOTE.
- Auto – (On) when the loss-in-weight controller (or displayed scale if two are defined) is in AUTOMATIC
- Alarm – Alarm indication flashes if an alarm is pending, is NEW, or has been ACKNOWLEDGED.
- Batch See Appendix if the option is installed.
- Ready – Ready indication turn on if the scale is calibrated (zero and span calibration complete) and no SHUT DOWN conditions are active. If more than one scale is defined, the READY indication refers to the displayed scale.
3.3.1.2 LCD Graphic Display
The LCD graphic display indicates actual running information or displays menu entry information.

3.3.1.3 Keypad
The keypad is comprised of pad touch keys consisting of the following:
- **RUN** – gives access to the RUN menu and returns the Loss-in-Weight Controller to Run mode whenever pressed, see Section 3.6 for a detailed description of RUN menu.
- **MENU** – gives access to the Micro-Tech 3104 menus
- **UP/DOWN ARROW KEYS** – scrolls up or down in the selected menu.
- **SOFT KEYS** – selects the displayed function directly above the key. Also moves the cursor left and right during string editing.
- **ALPHL/NUMERIC KEYS 1 THROUGH 0** – used to enter letters and numerals when string editing. Similar to a telephone keypad.
- **DECIMAL POINT KEY** – enters a decimal point
- **CLEAR KEY** – removes incorrect entries prior to pressing ENTER.
- **LOCAL / REMOTE KEY** – used to change the status of the Loss-in-Weight Controller between LOCAL and REMOTE. If two scales are defined, it affects only the displayed scale. It is inhibited when digital function LOC/REM is assigned.
- **AUTO / MAN KEY** - used to change the status of the Loss-in-Weight Controller between AUTOMATIC and MANUAL. If two scales are defined, it affects only the displayed scale. It is inhibited when the digital function AUTO/MAN is assigned.
- **PRINT** – initiates a printout.
- **START** – Starts the load out to batch and restarts if interrupted.
- **STOP** – Interrupt the load out or batch and aborts load if already interrupted.

Note: **START/STOP** are only active with Load Out or Batch option.

3.4 General Navigation
Navigating the menus is the same throughout the setup and operation of the Micro-Tech 3104. To follow are a few general guidelines to help in menu navigation.
- Press the **DOWN SCROLL** key to advance through the menus,
- **UP SCROLL** key to return to the previous item displayed on the screen,
- **RETURN** to go back to the previous menu,
- **CHOICES** soft key to view the choices for a selected menu option, and
- **ENTER** to confirm you menu selection

3.5 Menu Displays
The Loss-in-Weight Controller is a menu driven machine that allows the operator to access all setup, test, and calibration parameters. Main menu screens 1 through 7 can be accessed at anytime by pressing MENU until the desired menu screen is displayed. Pressing the soft key directly below the desired scroll, and then using the UP/DOWN scroll key select menu scrolls.

If the Loss-in-Weight Controller 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 option has been installed. The MENU key activates the following screens. See Appendix A for detailed description of all menus.

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

-- MAIN MENU 2 --
Press MENU for more
SCALE    CALIB
DISPLAY  DATA   DATA

-- MAIN MENU 3 --
Press MENU for more
PROT     DIAG    TEST

-- MAIN MENU 4 --
Press MENU for more
I/O      ALARMS  LOAD
DEF.     DEFIN.  OUT
```
3.6 Normal Power On

When the *Loss-in-Weight Controller* is powered on after initial programming, the Run menu is displayed unless the hardware configuration has been changed.

![Menu 5](image1)

![Menu 6](image2)

![Menu 7](image3)

3.6.1 Hardware Configuration

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

![Configuration Menu](image4)
This screen disappears after 10 seconds if the question is not answered. The Loss-in-Weight Controller 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 Loss-in-Weight Controller 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 Loss-in-Weight Controller 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. 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:
      2. The Loss-in-Weight Controller resumes operation, retaining setup data of the board that was removed. All other boards continue working normally. No change occurs in the I/O Definition.
      3. A board is added:
      4. The Loss-in-Weight Controller resumes normal operation without recognizing the new board.

      If NO is pressed, the “HW CONFIG CHANGED” alarm stays on.

### 3.7 Run Menu

When the Loss-in-Weight Controller is normally powered on after initial programming, the Run menu can always be accessed by pressing the RUN key on the front panel will always access the RUN menu.

The RUN menu is a multi screen menu consisting of two scrolls. The scroll UP or DOWN keys is used to move through the scrolls.

#### 3.7.1 Main Run

The first RUN scroll appears after initial programming.

```
R  0000.00 Lb/h

PRINT TOTALS
```

The first line always displays the RATE. An “R” appears on the left side during the REFILL. The “R” indication flashes during
refill and is steady during the stabilization time at the end of the refill while the system is waiting to restart regulation.

The second and third lines are by default blank, but can be programmed to show:
- The actual weight
- The reset total value
- The master total value
- Date and time
- A bar graph indicator

The fourth line displays the soft keys. The PRINT key is only displayed if the COMM 1 is configured as printer. When pressed, the PRINT key enters the print menu and allows printing. If a second scale is defined, the PRINT key is replaced by the SCALE # key. The Print Menu can be accessed through Main Menu 1.

The TOTALS key scroll between Master Total and Reset Total. Reset Total can be reset.

The message ALARM appears if an alarm is pending. The ALARM message flashes and the alarm status indicator also flashes.

The second RUN Menu appears as follows:

```
R  0000.0  Lb/h
Control  000.0%
I I I I I I I I >< I I I I I I I I
ADV
```

The fourth displays the soft keys. The PRINT key is only displayed if a COMM A is configured as printer. When pressed, the PRINT key enters the print menu and allows printing. If a second scale is defined, the PRINT key is replaced by the SCALE # key. The Print Menu can be accessed through Main Menu 1.

The TOTALS key scrolls between Master Total and Reset Total. Reset Total can be reset.

The message ALARM appears if an alarm is pending. The ALARM message flashes and the alarm status indicator also flashes.

Line one is the same as the first Run scroll.

In the second line, the following variables are displayed by pressing the ADVANCE key:
- Control output in percent
- Set point of regulation
- Actual regulation error in percent

Line three is the BAR GRAPH. The bar graph graphically displays the deviation. The bar’s range is +/- 10%.

The ALARM and SCALE # keys function the same as the first Run scroll.
3.7.2 Totals

The key below TOTALS allows scrolling between Master Total and Reset Total screens.

```
MASTER TOTAL
SINCE  00-00-0000
0000000.0 Tons
```

Master Total cannot be reset. The date is entered during initial programming.

```
RESET TOTAL
SINCE  00-00-0000
000000.0 Tons
RESET
```

RESET TOTAL can be reset at any time. No password is required for reset.

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

```
Do you wish to clear RESET total?
YES           NO
```

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

3.7.3 Print Key

The PRINT key is active if selected in COMM scroll.

The following screen is displayed:

```
000.00 Lb/h

PRINT TOTALS
```
When **PRINT** is pressed, the following screen displays:

```
- PRINTER SCROLL -
COM #1  no data
Start print  TOTALS
PRINT   RETURN  COM
```

The second line is the status of the printer:
- **NO DATA** – Indicates the printer is idle, no data is being sent to the printer.
- **IS RUNNING** – Indicates the system is sending data to the printer.

The third line indicates what kind of data is printed, if the PRINT key is pressed. The UP and DOWN keys select between:
- **TOTALS** – Print totals (all scales if more scales are defined)
- **TOTALS S1** – Print totals scale 1 (only if enable)
- **TOTALS S2** – Print totals scale 2 (only if enable)
- **SETUP** – Print the loss-in-weight controller setup data (not available in this version)
- **TRAILS** – If audit trails option is active print audit trails data.

Print starts after the PRINT key is pressed.

The COM key allows printer selection if more than one printer is installed.

Examples of data that can be printed:

Print **TOTALS**, default:

If one scale is defined:

**TOTALS REPORT**

| DATE:   | 11-10-2002 |
| TIME:   | 8:12a      |

| MASTER TOTAL: | 0.00 Tons |
| RESET TOTAL:  | 0.00 Tons |

If more scales are defined:

**TOTALS REPORT**

| DATE:   | 11-10-2002 |
| TIME:   | 8:12a      |
SCALE 1
MASTER TOTAL: 0.00 Tons
RESET TOTAL: 0.00 Tons

SCALE 2
MASTER TOTAL: 0.00 Tons
RESET TOTAL: 0.00 Tons

Print **ALARM**: 11-10-2002 8:14a
Clock fail and setup.

Print **AUDIT TRAILS**:

TRAIL RECORD NR. 1
DATE 11-10-2002 TIME 11:59p
VARIABLE scale cap
NEW 400.00
OLD 500.00

TRAIL RECORD NR. 2
DATE 11-11-2002 TIME 11:35p
VARIABLE span
NEW 250000
OLD 300000

TRAIL RECORD NR. 3
DATE 11-11-2002 TIME 11:54p
VARIABLE div (e)
NEW 0.05
OLD 0.1
3.7.4 Alarm Pending

The message **ALARM** displays in the right of the screen if an alarm is pending. The alarm LED also flashes.

The following menu displays after pressing **ALARM**:

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

- **NEW** indicates an alarm that has not yet been acknowledged. When the operator presses **RESET** to clear the alarm, the alarm disappears *only* if the alarm condition no longer exists.
- **ACK** displays if the alarm is still pending.
- **Next** is used to scroll between the pending alarms.
- The string XXXXXXXXXXXXX stands for one of the following alarm conditions:

**Table 3-1: Alarm Conditions**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock Fail</td>
<td>Loadcell Fail</td>
</tr>
<tr>
<td>RAM Fail</td>
<td>ROM Fail</td>
</tr>
<tr>
<td>High Weight S#</td>
<td>Low Weight S#</td>
</tr>
<tr>
<td>High Rate S#</td>
<td>Low Rate S#</td>
</tr>
<tr>
<td>Warm Start</td>
<td>Cold Start</td>
</tr>
<tr>
<td>P.D. Calibration</td>
<td>Calibrate Time S#</td>
</tr>
<tr>
<td>External Alarm 1</td>
<td>External Alarm 2</td>
</tr>
<tr>
<td>External Alarm 3</td>
<td>Hardware Configuration Changed</td>
</tr>
<tr>
<td>BCD Overflow</td>
<td>Math Error</td>
</tr>
<tr>
<td>Printer Error</td>
<td>Communication Error</td>
</tr>
<tr>
<td>High Pos. Dev. S#</td>
<td>High high Pos. Dev. S#</td>
</tr>
<tr>
<td>High Neg. Dev. S#</td>
<td>High high Neg. Dev S#</td>
</tr>
<tr>
<td>Refill Timeout S#</td>
<td>Overflow Totalizer S#</td>
</tr>
<tr>
<td>AB RI/O Error</td>
<td>PROFIBUS-DP Error</td>
</tr>
</tbody>
</table>

Refer to **Chapter 4** for more information.
3.8 LOAD OUT

The Load System Menu is visible if the Load Out option is installed. See Load Out, Appendix A, for detailed description of the Load Out option. Press the DOWN or UP scroll key for access.

<table>
<thead>
<tr>
<th>BATCH #</th>
<th>0 STOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>00000.0 Tons</td>
</tr>
<tr>
<td>SETPT</td>
<td>00000.0 Tons</td>
</tr>
<tr>
<td>ENTER</td>
<td>CLEAR</td>
</tr>
</tbody>
</table>

Password: Operator

BATCH # increments by one after each batch

The status can be: STOP, RUN H, RUN L, WAIT, STABLE

ENTER edits the setpoint

CLEAR zeros the batch counter

The symbol S is displayed if the batch is standing by.

3.9 Calibration

MAIN MENU 1 contains the CALIBRATION menu. MENU 1 is selected by pressing MENU until MAIN MENU 1 displays. Desired calibration scrolls are selected by pressing the soft keys directly below the desired scroll.

PRINT message is assigned to the right hand soft key only if more than one scale is defined.

3.9.1 Zero Calibration Scroll

The Zero Calibration is implemented as a machine directed procedure

1. Auto Zero

If only one scale defined:

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

Password: Operator

The scale must be kept empty during auto zero. A complete zeroing procedure requires 10 seconds.
Indication S# in the following scrolls will appear only if more than one scale is defined. # represents the active scale number.

When START is pressed, the following screen is displayed:

```
S#  AUTO ZEROING
Time remaining  0000
Gross:  000.0  W.U.
END  ABORT
```

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

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

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

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

If YES is pressed, the next screen is shown:

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

If NO is pressed, the next screen is shown:

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

Note that in this case old zero and new zero are shown equal. The zero constants are shown in A/D counts.
2. **Manual Zero**

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

   ![Manual Zero Screen](image)

   **Default:** 40000  
   **Min:** 0  
   **Max:** 120000

3.9.2 **Span Calibration Scroll**

   The span calibration can be done in two different ways: R-CAL or Test Weights. The system allows the operator to select which one of the two methods to be used for normal calibration and calibration’s check. The selection is made in MAIN MENU 2, CAL DATA SCROLL 1.

3.9.2.1 **Automatic Span Calibration with R-CAL**

   Use the following steps to begin an *R-Cal Calibration*:

1. **Starting an R-Cal Calibration**

   The following screen displays

   ![Automatic Span R CAL Screen](image)

   When **START** is pressed, the Rcal relay energizes. A half second delay occurs after **START** for the weight to stabilize.

   **NOTE:** The operator must ensure that the scale is empty before pressing start.

2. **Executing the Span Calibration**

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

   Whichever method has been used to start automatic span calibration, after **START** is pressed, the following screen is displayed:
Entry point when REPEAT is pressed.

<table>
<thead>
<tr>
<th>S#</th>
<th>AUTOSPANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time remaining 0000</td>
</tr>
<tr>
<td></td>
<td>Gross 000.0 W.U.</td>
</tr>
<tr>
<td></td>
<td>END ABORT</td>
</tr>
</tbody>
</table>

During Auto Span, the weight resolution is 10 times higher than normal. The entire function takes 10 seconds to be completed; remaining time is displayed in line 2. The END key can be used to conclude the function in less time.

3. Recording the New Span

The system calculates the new span.

<table>
<thead>
<tr>
<th>S#</th>
<th>AUTOSPAN COMPLETE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Error +/-0.00 %</td>
</tr>
<tr>
<td></td>
<td>Change span ?</td>
</tr>
<tr>
<td></td>
<td>YES NO FACTOR</td>
</tr>
</tbody>
</table>

The word “COMPLETE” is flashing.

FACTOR key is displayed only if an auto span with test weight has been previously executed.

If YES is pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>SPAN # CHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old span # 000000</td>
</tr>
<tr>
<td></td>
<td>New span # 000000</td>
</tr>
<tr>
<td></td>
<td>RUN REPEAT</td>
</tr>
</tbody>
</table>

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

If NO is pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>SPAN # UNCHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old span # 000000</td>
</tr>
<tr>
<td></td>
<td>New span # 000000</td>
</tr>
<tr>
<td></td>
<td>RUN REPEAT</td>
</tr>
</tbody>
</table>

Note: The Old span and the New span are shown equally because there has been no change to the span

If FACTOR is pressed, the Real factor is computed. The following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>FACTOR ACQUIRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New fact 000000 %</td>
</tr>
<tr>
<td></td>
<td>Change factor ?</td>
</tr>
<tr>
<td></td>
<td>YES NO</td>
</tr>
</tbody>
</table>

Operations 3-15
NO moves back to above.
YES acquires new factor. If pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>FACTOR CHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old fact: 000000 %</td>
<td></td>
</tr>
<tr>
<td>New fact: 000000 %</td>
<td></td>
</tr>
<tr>
<td>RUN</td>
<td>REPEAT</td>
</tr>
</tbody>
</table>

4. **Ending an Auto Span Procedure with R-CAL**
   - Press RUN
   The Real relay is de-energized and the display is locked for 3 seconds.

3.9.2.2 **Automatic Span Calibration with Test Weights**
   1. **Starting Span Calibration with Test Weights**

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

   2. **Executing the Span Calibration**
      - Indication S# in the following scrolls appear only if more than one scale is defined. # represents the active scale number
      - After START is pressed, the following screen is displayed:
      - Entry point when REPEAT is pressed (see below).

<table>
<thead>
<tr>
<th>S#</th>
<th>AUTOSPANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time remaining: 0000</td>
<td></td>
</tr>
<tr>
<td>Gross: 000.0 W.U.</td>
<td></td>
</tr>
<tr>
<td>END</td>
<td>ABORT</td>
</tr>
</tbody>
</table>

   During Auto Span, the weight resolution is 10 times higher than normal. The entire function takes 10 seconds to be completed; the remaining time is displayed in line 2. The END key can be used to conclude the function in less time.
Recording the New Span

The system calculates the new span based on the result of the test performed with the selected method:

<table>
<thead>
<tr>
<th>S#</th>
<th>AUTOSPAN COMPLETE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Error +/- 00.00 %</td>
</tr>
<tr>
<td></td>
<td>Change span ?</td>
</tr>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

The word “COMPLETE” is flashing.

If YES is pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>SPAN # CHANGED</th>
<th>SPAN  #</th>
<th>CHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old span</td>
<td>000000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New span</td>
<td>000000</td>
<td></td>
</tr>
<tr>
<td>RUN</td>
<td>REPEAT</td>
<td>FACTOR</td>
<td></td>
</tr>
</tbody>
</table>

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

REPEAT moves back to (B) above, and calibration restarts. If NO is pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>SPAN # UNCHANGED</th>
<th>SPAN  #</th>
<th>UNCHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old span</td>
<td>000000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New span</td>
<td>000000</td>
<td></td>
</tr>
<tr>
<td>RUN</td>
<td>REPEAT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The Old span and the New span are shown equally because the span has not been officially changed.

If FACTOR is pressed, the R-cal factor is computed. The following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>FACTOR ACQUIRING</th>
<th>FACTOR</th>
<th>ACQUIRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New fact</td>
<td>000000</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Change factor ?</td>
<td>YES</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NO</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NO moves back to above.

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

<table>
<thead>
<tr>
<th>S#</th>
<th>FACTOR CHANGED</th>
<th>FACTOR</th>
<th>CHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old fact</td>
<td>000000</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>New fact</td>
<td>000000</td>
<td>%</td>
</tr>
<tr>
<td>RUN</td>
<td>REPEAT</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.9.2.3 Manual Span

If the span constant is known, the manual span procedure allows the operator to manually change span.

**Note:** If the span is manually entered, the R-cal factor is set to INVALID.

```
MANUAL SPAN
Gross  000.0  W.U.
Span #  0000000

Password: Operator

Default: 1166667
Min: 500000
Max: 45000000
```

3.10 Permanent Scroll Record – Setup Scrolls

3.10.1 Main Menu 1 and Main Menu 2

**MAIN MENU 1**

- **ZERO SCROLL**
  
  Zero # ____________________________

- **SPAN SCROLL**
  
  Span # ____________________________

**MAIN MENU 2**

- **DISPLAY SCROLL**
  
  1 Measure Units ____________________________
  2 Rate Units ____________________________
  3 Weight Units ____________________________
  4 Total Units ____________________________
  5 Language ____________________________
  6 Run Display, Line 2 ____________________________
  9 Run Display, Line 3 ____________________________
  10 Display Rate Division ____________________________
  11 Display Rate Damping ____________________________
  12 Display Weight Damping ____________________________
13  Alternate Scales in RUN

### SCALE DATA SCROLL

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Scale # 1</th>
<th>Scale # 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Number of Scales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Max. Scale Capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Scale Divisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>No. of Loadcells</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>5</td>
<td>Loadcells Capacity</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>6</td>
<td>Loadcells Sensitivity</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>7A</td>
<td>Loadcell Resistance # 1</td>
<td>Scale # 1</td>
<td>Scale # 2  ohms</td>
</tr>
<tr>
<td>7B</td>
<td>Loadcell Resistance # 2</td>
<td>Scale # 1</td>
<td>Scale # 2  ohms</td>
</tr>
<tr>
<td>7C</td>
<td>Loadcell Resistance # 3</td>
<td>Scale # 1</td>
<td>Scale # 2  ohms</td>
</tr>
<tr>
<td>7D</td>
<td>Loadcell Resistance # 4</td>
<td>Scale # 1</td>
<td>Scale # 2  ohms</td>
</tr>
<tr>
<td>7E</td>
<td>Loadcell Resistance # 5</td>
<td>Scale # 1</td>
<td>Scale # 2  ohms</td>
</tr>
<tr>
<td>7F</td>
<td>Loadcell Resistance # 6</td>
<td>Scale # 1</td>
<td>Scale # 2  ohms</td>
</tr>
<tr>
<td>8</td>
<td>Defining Lever Ratio</td>
<td>Scale #1</td>
<td>Scale # 2</td>
</tr>
</tbody>
</table>

### 3.10.2 Calibration Data Scroll

#### CALIBRATION DATA SCROLL

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Scale # 1</th>
<th>Scale # 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Calibration Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Total Test Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R-Cal: Resistance</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>4</td>
<td>R-Cal Constant</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>5</td>
<td>R-Cal Factor</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>6</td>
<td>Calibration Interval</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>7</td>
<td>Calibration Date</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
</tbody>
</table>
### 3.10.3 Main Menu 3

**MAIN MENU 3**

#### PROTECTION SCROLL

<table>
<thead>
<tr>
<th></th>
<th>Protection Level</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prot</td>
<td>□ None</td>
<td>□ Ltd</td>
</tr>
</tbody>
</table>

#### DIAGNOSTICS SCROLL

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Scale # 1</th>
<th>Scale # 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A/D Gross</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td></td>
<td>A/D Net</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>2</td>
<td>Weight on Loadcell</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>2A</td>
<td>Loadcell Output Zero</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>2B</td>
<td>Loadcell Output Span</td>
<td>Scale # 1</td>
<td>Scale # 2</td>
</tr>
<tr>
<td>3</td>
<td>Service Password</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Operator Password</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Software Version</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Board Type Slot # 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Board Type Slot # 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Board Type Slot # 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Software Version</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Board Type Slot #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Board Type Slot #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Board Type Slot #3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.10.4 Main Menu 4

<table>
<thead>
<tr>
<th>MAIN MENU 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O DEFINE SCROLL</td>
</tr>
</tbody>
</table>

1  Current Output #1 Define 
   Current Output #2 Define 
   Current Output #3 Define 
   Current Output #4 Define 

1A Current Output #1 Range mA 
   Current Output #2 Range mA 
   Current Output #3 Range mA 
   Current Output #4 Range mA 

1B Current Output #1 Delay sec L 
   Current Output #2 Delay sec L 
   Current Output #3 Delay sec L 
   Current Output #4 Delay sec L 

1C Current Output #1 Damping sec 
   Current Output #2 Damping sec 
   Current Output #3 Damping sec 
   Current Output #4 Damping sec 

2  Analog Input #1 Definition 

2A Moisture Input Calibrate % mA 
   Moisture Input Calibrate % mA 

2A Remote Setpoint Low % mA 
   Remote Setpoint High % mA 

3  Analog Input #2 Definition 

3A Moisture Input Calibrate % mA 
   Moisture Input Calibrate % mA 

3A Remote Setpoint Low % mA 
   Remote Setpoint High % mA 

4  Analog Input Damping sec 

5  Digital Input Define Physical Input/Status
MAIN MENU 4

- External Alarm #1
- External Alarm #2
- External Alarm #3
- Reset Alarms
- Print
- Print S1
- Print S2
- Reset Tot
- Reset Tot S1
- Reset Tot S2
- Refill
- Refill S1
- Refill S2
- Loc/ Rem Control
- Loc/ Rem Control S1
- Loc/ Rem Control S2
- Auto/Man Control
- Auto/Man Control S1
- Auto/Man Control S2
- Running
- Running S1
- Running S2

6 Digital Output Define

Physical Output/Status

- Alarm
- Shutdown
- Ready
- Refill
- Refill S1
- Refill S2
- High Weight
<table>
<thead>
<tr>
<th>MAIN MENU 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Weight S1</td>
</tr>
<tr>
<td>High Weight S2</td>
</tr>
<tr>
<td>Low Weight</td>
</tr>
<tr>
<td>Low Weight S1</td>
</tr>
<tr>
<td>Low Weight S2</td>
</tr>
<tr>
<td>High Rate</td>
</tr>
<tr>
<td>High Rate S1</td>
</tr>
<tr>
<td>High Rate S2</td>
</tr>
<tr>
<td>Low Rate</td>
</tr>
<tr>
<td>Low Rate S1</td>
</tr>
<tr>
<td>Low Rate S2</td>
</tr>
<tr>
<td>High Deviation Positive</td>
</tr>
<tr>
<td>High Deviation Positive S1</td>
</tr>
<tr>
<td>High Deviation Positive S2</td>
</tr>
<tr>
<td>High Deviation Negative</td>
</tr>
<tr>
<td>High Deviation Negative S1</td>
</tr>
<tr>
<td>High Deviation Negative S2</td>
</tr>
<tr>
<td>Loc/Rem</td>
</tr>
<tr>
<td>Loc/Rem S1</td>
</tr>
<tr>
<td>Loc/Rem S2</td>
</tr>
<tr>
<td>Auto/Man</td>
</tr>
<tr>
<td>Auto/Man S1</td>
</tr>
<tr>
<td>Auto/Man S2</td>
</tr>
<tr>
<td>Increase</td>
</tr>
<tr>
<td>Increase S1</td>
</tr>
<tr>
<td>Increase S2</td>
</tr>
<tr>
<td>Decrease</td>
</tr>
</tbody>
</table>
### MAIN MENU 4

- Decrease S1
- Decrease S2
- Totalizer
- Totalizer S1
- Totalizer S2
- 7 BCD Input Variable
- 7A BCD Input Polarity
- 7B BCD Input Parity
- 9 Remote Counter Division
- 10 Remote Counter Pulse

### 3.10.5 Alarms Scroll

<table>
<thead>
<tr>
<th>ALARMS SCROLL</th>
<th>1 High Weight</th>
<th>1A High Weight Set</th>
<th>1B High Weight Delay</th>
<th>2 Low Weight</th>
<th>2A Low Weight Set</th>
<th>2B Low Weight Delay</th>
<th>3 High Rate</th>
<th>3A High Rate Set</th>
<th>3B High Rate Delay</th>
<th>4 Low Rate</th>
<th>4A Low Rate Set</th>
<th>4B Low Weight Delay</th>
<th>5 High Positive Deviation Alarm</th>
<th>5A High Positive Deviation Set</th>
<th>6 HHHigh Positive Deviation Alarm</th>
<th>6A HHHigh Positive Deviation Set</th>
<th>7 High Negative Deviation Alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>%</td>
<td>Yes</td>
<td>No</td>
<td>sec</td>
<td>Yes</td>
<td>No</td>
<td>sec</td>
<td>Yes</td>
<td>No</td>
<td>sec</td>
<td>Yes</td>
<td>sec</td>
<td>Yes</td>
<td>sec</td>
<td>Yes</td>
</tr>
</tbody>
</table>
## ALARMS SCROLL

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Alarm</th>
<th>Shutdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>7A</td>
<td>High Negative Deviation Set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>High Negative Deviation Alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8A</td>
<td>High Negative Deviation Set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Alarm Set As</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#1</td>
<td>Clock Fail</td>
<td>Alarm</td>
<td>Shutdown</td>
</tr>
<tr>
<td>#2/4</td>
<td>Loadcell Fail</td>
<td>Alarm</td>
<td>Shutdown</td>
</tr>
<tr>
<td>#5</td>
<td>RAM Fail</td>
<td>Alarm</td>
<td>Shutdown</td>
</tr>
<tr>
<td>#6</td>
<td>ROM Fail</td>
<td>Alarm</td>
<td>Shutdown</td>
</tr>
<tr>
<td>#7/9</td>
<td>High Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#7/9</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#10/12</td>
<td>Low Weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#10/12</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#13/15</td>
<td>High Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#13/15</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#16/18</td>
<td>Low Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#16/18</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#19</td>
<td>Warm Start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#19</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#20</td>
<td>Cold Start</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#20</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#21</td>
<td>P.D. Calibrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#21</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#22/24</td>
<td>Calibrate Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#22/24</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#25</td>
<td>Ext. Alarm #1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#25</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#26</td>
<td>Ext. Alarm #2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#26</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#27</td>
<td>Ext. Alarm #3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#27</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#28/33</td>
<td>Hdw.Cnfg.Chg. Chg. None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#34</td>
<td>BCD Overflow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#34</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#35</td>
<td>Math Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#35</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#36</td>
<td>Printer Error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#36</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>Description</td>
<td>Alarm</td>
<td>Shutdown</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------------------</td>
<td>-------</td>
<td>----------</td>
</tr>
<tr>
<td>#37</td>
<td>COMM Error</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#38/40</td>
<td>High Pos Deviation S#</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#41/43</td>
<td>High Pos Deviation S#</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#44/46</td>
<td>High Neg Deviation S#</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#47/49</td>
<td>High Neg Deviation S#</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#50</td>
<td>Refill Timeout S#</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#51/53</td>
<td>Overflow Totalizer S#</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#59</td>
<td>AB RI/O</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>#60</td>
<td>PROFIBUS-DP</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### 3.10.6 Main Menu 5 and Main Menu 6

#### 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  
6. Clear to Send #1  
7. Address Port #1  
8. Access Prot Port #1  
9. Baud Rate Port #2  
10. Set Parity Port #2  
11. Stop Bits Port #2  
12. Word Length Port #2  
13. Protocol Port #2  
14. Clear to Send #2  
15. Address Port #2  
16. 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  
9. String #1  
9A. Contents String #1
### MAIN MENU 5

<table>
<thead>
<tr>
<th>9B</th>
<th>Position String Number #1</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>String #2</td>
</tr>
<tr>
<td>10A</td>
<td>Contents String #2</td>
</tr>
<tr>
<td>10B</td>
<td>Position String #2</td>
</tr>
<tr>
<td>11</td>
<td>String #3</td>
</tr>
<tr>
<td>11A</td>
<td>Contents String #3</td>
</tr>
<tr>
<td>11B</td>
<td>Position String #3</td>
</tr>
<tr>
<td>12</td>
<td>Position Date</td>
</tr>
<tr>
<td>13</td>
<td>Position Time</td>
</tr>
<tr>
<td>14</td>
<td>Position Reset Total</td>
</tr>
<tr>
<td>15</td>
<td>Position Master Total</td>
</tr>
<tr>
<td>16</td>
<td>Position Weight</td>
</tr>
<tr>
<td>17</td>
<td>Position Rate</td>
</tr>
</tbody>
</table>

### MAIN MENU 6

**AUDIT TRAIL SCROLL**

Audit Trails

- ☐ Yes
- ☐ No

**LINEARIZATION SCROLL**

<table>
<thead>
<tr>
<th>Linearization Scroll</th>
<th>Scale #1</th>
<th>Scale #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIN Factor #1</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>LIN Factor #2</td>
<td>Weight</td>
<td>Factor</td>
</tr>
<tr>
<td>LIN Factor #3</td>
<td>Weight</td>
<td>Factor</td>
</tr>
<tr>
<td>LIN Factor #4</td>
<td>Weight</td>
<td>Factor</td>
</tr>
<tr>
<td>LIN Factor #5</td>
<td>Weight</td>
<td>Factor</td>
</tr>
</tbody>
</table>
### 3.10.7 Main Menu 7

#### MAIN MENU 7

<table>
<thead>
<tr>
<th>CONTROL SCROLL</th>
<th>Scale #1</th>
<th>Scale #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Start Out</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>2 Set Control Value</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>3 High Control Limit</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>4 Low Control Limit</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>5 Proportional Band</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>6 Integral Time</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>7 Derivative Time</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>8 PEIC Time</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>9 Setpoint Source</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>10 Setpoint Unit</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>11 Setpoint Delay</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>12 Percent of Ingredient</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>13 Process Variable Damping</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>14 PID+S Function</td>
<td>☐ Yes ☐ No</td>
<td>☐ Yes ☐ No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYSTEM SCROLL</th>
<th>Scale #1</th>
<th>Scale #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Max Rate Capacity</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>2 Min Rate Capacity</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>3 Autotuning</td>
<td>☐ Yes ☐ No</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>4 Start Refill Set</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>5 End Refill Set</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>6 Refill on Manual</td>
<td>☐ Yes ☐ No</td>
<td>☐ Yes ☐ No</td>
</tr>
<tr>
<td>7 End Refill Time</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>8 Refill Time-Out</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>9 Density Compensation</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>9A Control Out Correct</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>9B Control Out Value</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>10 Rate Interval</td>
<td>_________</td>
<td>_________</td>
</tr>
<tr>
<td>11 Weight Constant</td>
<td>_________</td>
<td>_________</td>
</tr>
</tbody>
</table>
## 3.11 Permanent Field Record

<table>
<thead>
<tr>
<th>Scale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td></td>
</tr>
<tr>
<td>Scale Capacity</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Calib. Constant</th>
<th>R-Cal</th>
<th>Static</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero – As Found</td>
<td>- As Left</td>
<td></td>
</tr>
<tr>
<td>Span – As Found</td>
<td>- As Left</td>
<td></td>
</tr>
<tr>
<td>By</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 4
Maintenance

The maintenance information in this manual should meet your service needs. If problems occur requiring technical assistance, please call (763) 783-2500.

Thermo Scientific has a repair center located at our plant in Minneapolis, Minnesota. Contact our Repair Representative at (763) 783-2774 for assistance. To expedite your service request, please have your machine model and serial number available.

4.1 Frequent Checkpoints

The Micro-Tech 3104 Loss-in-Weight Controller is a solid-state device and requires very little maintenance. The front panel can be wiped clean with a damp cloth, and if necessary, a mild detergent (never use abrasive cleaners, especially on the display window).

As a preventative measure, check to ensure all wires, plugs, and integrated circuits are tight in their connectors. Also, keep the enclosure door tightly closed to prevent dirt infiltration.

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

- Check Power
  1. Check the Line Voltage Selector Switches are set to the correct line voltage
  2. Check the fuse
  3. Check that the power switch is ON and that power is supplied to the unit.

- Check Connections
  1. Check that all terminations are secure.
  2. Check to ensure the Display Module and Keyboard connectors are firmly seated in their connectors.
  3. Check that all Jumpers are in their correct position.

4.2 Troubleshooting

This unit has built-in troubleshooting capabilities. A number of possible problems are automatically detected and screen messages are displayed. Also, refer to the Diagnostics Test Scrolls in MAIN MENU 3.
4.3 Alarm Messages

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

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

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

- **NEW** indicates an alarm that has not yet been acknowledged. When the operator presses **RESET** to clear the alarm, the alarm disappears only if the trigger for the alarm does not exist any longer. If the alarm is still pending, **ACK** is displayed instead of **NEW**.
- **NEXT** is used to scroll between the pending alarms.
- **XXXXXXXXXXXXXXXXX** represents one of the conditions listed in Section 4.3.1.

4.3.1 Alarms List

1 - Clock Fail

The system has detected a failure on the clock calendar circuit.

- Go to the **DIAGNOSTICS** screen and re-enter the date and time.
- Check the battery
- Replace the motherboard.

2/4 - Loadcell Fail S#

S# identifies the scale if more than one is defined. The system has detected an error on the loadcell signal.

- Check the loadcell connections.
- Check the loadcell(s).

5 - RAM Fail

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

- Replace the motherboard.
6 - ROM Fail

The system has detected a failure on the ROM (Read Only Memory) checksum during the internal periodic test. The ROM is used to store the program.

- Replace the mother board

7/9 - High Weight S#

S# identifies the scale if more than one scale is defined. Actual weight is higher than high weight threshold.

10/12 - Low Weight S#

S# identifies the scale if more than one scale is defined. Actual weight is lower than low weight threshold.

13/15 - High Rate S#

S# identifies the scale if more than one scale is defined. Actual rate is higher than high rate threshold.

16/18 - Low Rate S#

S# identifies the scale if more than one scale is defined. Actual rate is lower than low rate threshold.

19 - Warm Start

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

20 - Cold Start

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

Note: The message COLD START never appears on the screen. This is because a Cold Start forces a start up procedure to be executed, and the alarm itself is cleared after the set up is completed. However, the alarm LED and the digital output will be showing an alarm during the initial set up procedure.

21 – Power Down During Calibration

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

- Check calibration

22/24 - Calib Time S#

S# identifies the scale if more than one scale is defined. If a calibration check time is entered and the time expires, this alarm occurs. The purpose is to remind the operator that the calibration has not been checked for a considerably long period.

- Check Calibration

25 - Ext. Alarm 1
Digital inputs can be programmed to detect external alarm conditions such as emergency switches, max level switches or other. This alarm is associated to the external alarm #1.

- Check External alarm #1.

26 - Ext. Alarm 2
- Check external alarm #2.

27 - Ext. Alarm 3
- Check external alarm #3

28/33 - HW Conf. Changed
When a new board is installed or an old board removed, this message displays.

34 – BCD Overflow
This message is only displayed if the optional BCD output board is installed. If the variable to be converted in the BCD format has more than 4 digits, the alarm is generated.
- Check the size of variable and the BCD data setup.

35 - Math Error
A divide by zero or overflow error is encountered during internal calculations. This message indicates some abnormal dimensional parameter is entered in setup.
- Check setup data

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

37 - Communication Error
Indicates a time out or handshake error is detected during a data transfer on the COMM line.
- Check the COMM line connections.
- Check the COMM line setup data.

38/40 - High Positive Deviation S#
S# identifies the scale if more scale are defined. Control error (*) is higher than High positive deviation set.
(*) Control error is defined as the difference between the process variable and the setpoint.

41/43 – High High Positive Deviation S#
S# identifies the scale if more scale are defined. Control error is higher than High high positive deviation set.

44/46 - High Negative Deviation S#
S# identifies the scale if more scale are defined. Control error is higher than High negative deviation set.
47/49 – High High Negative Deviation S#

S# identifies the scale if more scale are defined. Control error is higher than High high negative deviation set.

50 – Refill Timeout S#

S# identifies the scale if more scale are defined. Refill is taking a time higher than maximum refill time.

51/53 – Overflow Totalizer S#

S# identifies the scale if more scales are defined. This message indicates that the output pulse generator for the remote mechanical Totalizer has reached an overflow condition.

The rate may be too high or the remote pulse divider has been set too small

- Check the rate.
- Check and eventually increase the pulse driver.

This message is also displayed if the MASTER TOTAL rolls over.

59 – Allen-Bradley Remote I/O COMM Error

This message is displayed if communication is interrupted. The green LED on the A_B R I/O board will be flashing. The alarm does not come on if communication has never started.

60 – PROFIBUS-DP COMM Error

This messages in only displayed if the optional Profibus board is installed. The following two conditions activate the alarm.

The Siemens SPC3 Controller installed on the Profibus interface board does not recognize any successful data transfer within the watchdog timer interval.

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

4.4 Micro-Tech 3104 Cold Start

It may be necessary to cold start the Loss-in-Weight Controller in the event memory becomes corrupted. In the event of a cold start, there are two options, installing the factory default constants or returning the Micro-Tech to its previous running state.

There are two methods of forcing a cold start through the front panel:

- In RUN mode
- From the DIAGNOSITCS SCROLL
4.4.1 Force a Cold Start from Run Mode

Use the following steps to force a cold start from RUN mode.

1. Press and hold at the same time the LEFT HAND ARROW and the CLEAR keys until the following screen displays.

<table>
<thead>
<tr>
<th>Install Factory Defaults?</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
</tr>
</tbody>
</table>

No, Returns to Run Mode
Yes, the following screen displays:

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

2. When this screen displays, all field entry data has been replaced by the factory default constants. Precede to Section 2.7 and follow the Initial Setup procedures.

Note: If the software corruption was catastrophic and the memory will not erase do the following:

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

4.4.2 Force a Cold Start from the Diagnostic Scroll

Use the following steps to force a cold start from the DIAGNOSTICS SCROLL:

1. Press MENU until MAIN MENU 3 appears
2. Press the DIAG soft key
3. Press the DOWN ARROW until the following screen is displayed:

-- DIAGNOST.SCROLL 15 --
Force cold start
ENTER
Press ENTER, the following screen displays:

```
ATTENTION
ARE YOU SURE?
YES RETURN
```

RETURN returns to the DIAGNOSTIC SCROLL 15

YES, the following screen displays:

```
Install Factory Defaults
YES RETURN
```

RETURN returns to the DIAGNOSTIC SCROLL 15

YES, clears all field entry data, and installs the factory default constants. The following screen displays:

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

4. Select a language and proceed to Section 2.7 and follow the Initial Setup procedures.

### 4.5 Internal Test Procedure

Pressing START on the screen (located in MAIN MENU 3) initiates a self-test of the internal processor. The following screen displays:

```
-- TEST SCROLL 2 --
Internal test of microprocessor. START
Password: Service
```

Press START, the following screens display in sequence:

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

```
-- TEST SCROLL 2B --
Testing RAM Test PASSED
```
The message “Test PASSED” is displayed if the test runs correctly. If something wrong is detected, the message “Test FAILED” is displayed and the soft key CONTINUE is shown. Press CONTINUE and move to the next test.

If the internal test has failed, call Thermo Scientific Customer Service.

4.6 Loadcell Excitation and Signal Voltage

1. Measure excitation voltage across terminal 21 negative and 20 positive in the loadcell junction box. This should be 10 VDC ± 5%.

2. If the excitation voltage is incorrect then measure the excitation voltage in the Loss-in-Weight Controller across terminal TB4-33 negative and the TB4-32 positive. This should be 10 VDC ± 5%.

3. Measure DC millivolt signal voltage across terminal 22 positive and 23 negative in the scale junction box. This should be within 0-30 millivolts DC (3 mV/V loadcell).

4. Measure DC millivolt signal voltage across terminal TB4-30 positive and TB4-31 negative in the Loss-in-Weight Controller. This should be the same as Step 3 above.

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

4.7 Resetting Master Total

Use the following steps to reset the Master Total or the Remote Counter Overflow.

4.7.1 No Password Installed

1. If there is no password installed, select MAIN MENU 3

2. Press DIAG soft key and scroll down to the SERVICE PASSWORD screen.

3. Type in a password (example: 123) and press ENTER

4. Re-enter the password and press ENTER

5. Select MAIN MENU 3

6. Select PROT scroll, press PROT

7. Press NONE

8. Enter the password 7832500 and press ENTER. The protection level should be RAMSEY.

9. Press TOTAL; scroll up or down if needed to reach the MASTER TOTAL screen.

10. Press RESET and select YES to “Reset Master Total?”
11. Select **MAIN MENU 3**. Press **DIAG** and scroll to **SERVICE PASSWORD**.
12. Press **ENTER** twice, erasing the password installed in Step 3.
13. Press **RUN** to return to normal operation.

### 4.7.2 Active Password

1. Select **MAIN MENU 3**
2. Select **PROT** scroll, press **PROT**
3. Press **NONE**
4. Enter the password 7832500 and press **ENTER**. The protection level should be RAMSEY.
5. Press **TOTAL**; scroll up or down if needed to reach the **MASTER TOTAL** screen.
6. Press **RESET** and select **YES** to “Reset Master Total?”
7. Select **MAIN MENU 3**
8. Press **PROT** and choose the password level desired.

### 4.8 Removing a Forgotten Password

Use the following steps to remove a forgotten password from *Integrator* memory.

1. Select **MAIN MENU 3**
2. Select the **PROTECT** scroll and press **PROT**
3. Press **NONE**
4. Enter the password 7832500 and press **ENTER**. The protection level should be RAMSEY.
5. Press **NONE**
6. Select **MAIN MENU 3**
7. Press **DIAG** and scroll to **SERVICE PASSWORD**
8. Press **ENTER** twice. The display should respond with **NEW PASSWORD ACQUIRED**.
9. Scroll down to **OPERATOR PASSWORD**. Press **ENTER** twice. The display should respond with **NEW PASSWORD ACQUIRED**.
10. Select **MAIN MENU 3**. The **PROT** soft key should not appear, indicating all passwords have been erased. If **PROT** does appear, repeat Steps 1 through 9.
11. See Section for entering new passwords.
4.9 Lithium Battery Replacement

The Micro-Tech volatile memory backup battery can be replaced without any special tools.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED.</td>
</tr>
</tbody>
</table>

Replace only with same or equivalent type recommended by Thermo Scientific. Dispose of used battery according to manufacture instruction on battery or return to Thermo Scientific. (Refer to Section 4.10.)

1. Record all configuration, setup, and calibration data before removing battery. All information is lost when the battery is removed.
2. Turn the Micro-Tech power off at the mains.
3. Remove the battery from its compression socket.
4. Observe the polarity markings on the battery socket base before inserting the new battery. The lithium battery is 3V, 1.2 AH, 2/3 A, Thermo Scientific part number 037188.
5. Insert battery
6. Restore power to the Micro-Tech.
7. Cold start the Micro-Tech. See Section 4.4 for cold start procedures.
8. Re-enter all data recorded in Step 1.

4.10 Disposal of Hazardous Waste

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

As an alternative, you may return product supplied by Thermo Scientific, freight prepaid for disposal. Contact Thermo Scientific Repair Department for a Return Authorization Number before shipping any product for disposal.

4.11 Cleaning Instructions

The Micro-Tech 3104 is a solid-state device requiring very little maintenance. The front panel can be wiped clean with a damp cloth, and if necessary, a mild detergent (never use abrasive cleaners, especially on the display window). As a preventative measure, check all wires, plugs, and integrated circuits are tight in their connectors. Keep the enclosure door tightly closed to prevent dirt infiltration.
Chapter 5
Replacement Parts

This section gives information on how to order replaceable parts for your *Loss-in-Weight Controller* and includes drawings with corresponding parts lists to enable you to identify parts quickly and accurately.

5.1 Order Information

For faster service when ordering parts, fax or telephone Products Parts Department. Your regional field service representative will also be happy to assist you with parts orders, but his normal scheduling time may delay shipment of your parts order.

The recommended procedure for order parts is as follows:

1. Determine the broken or faulty part(s).
2. Locate the part(s) in the parts list given.
3. Find the part number(s) for the item(s) needed and determine the quantity you require.
4. Fax or telephone:
   Thermo Scientific
   Customer Service Department
   501 90th Ave. NW
   Minneapolis, MN 55433

   **Customers A through M** - (763) 783-2775
   **Customers N through Z** - (763) 783-2773
   **Repair and Returns** - (763) 783-2774
   **Fax:** - (763) 783-2525

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

5. With your order, list the following information:
   - Machine model and serial number
   - Purchase order number
   - Date required
   - Method of shipment preferred
   - List of parts, including part number, description and quantity

   Your parts order will be handled as expeditiously as possible.
5.1.1 RMA Form

Thermo Fisher Scientific

501 90th Avenue N.W. Minneapolis MN 55433

Return Material Authorization

RMA No.: -

(This RMA Number Must Be Marked On All Paperwork And On Outside Of Package)

Req'd By: ___________________________ Return, Freight Prepaid To: Thermo Fisher Scientific

Date: ___________________________ 501 90th Avenue N.W.

Customer: ___________________________ Minneapolis, MN 55433

Contact: ___________________________

Phone: ___________________________

Area Code: ___________________________

Bill To Customer #: ___________________________ Ship To #: ___________________________

Returned From: ___________________________

Return To: ___________________________

Description Of Material Being Returned:

____________________________________________________________________________________

____________________________________________________________________________________

Describe Equipment Malfunction Or Defect, If Any: Symptoms:

____________________________________________________________________________________

____________________________________________________________________________________

Minimum Charge

☐ Informed Customer of Inspection Charge Per Item

Service Requested:

☐ Repair & Return ☐ Estimate Required P.O. No.: ___________________________

☐ Return for Credit ☐ Original P.O. or Thermo Order No.: ___________________________

☐ Warranty Repair or Replacement Serial No: ___________________________

Original P.O. #: ___________________________ Original Order/Job #: ___________________________

☐ Return Warranty/Exchange Unit Shipped on Thermo Order No.: ___________________________

☐ Other:

Disposition/Comments: (Thermo Fisher Scientific Internal Use Only)

____________________________________________________________________________________

____________________________________________________________________________________

REC-G-118 Rev. C
## 5.1.2 Parts List

### Table 5-1: Parts List

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chassis Assembly, Panel Mount</td>
<td>073285</td>
</tr>
<tr>
<td>Chassis Assembly, Field Mount</td>
<td>073279</td>
</tr>
<tr>
<td>PCBA, MOTHERBOARD</td>
<td>073283</td>
</tr>
<tr>
<td>PCBA, Display Assembly</td>
<td>073281</td>
</tr>
<tr>
<td>Touch Panel</td>
<td>073244</td>
</tr>
<tr>
<td>Bezel Assembly</td>
<td>073289</td>
</tr>
<tr>
<td>Fuse, Slo-Blo, 200mA (F1 230V) (Type T)</td>
<td>001366</td>
</tr>
<tr>
<td>Fuse, Slo-Blo, 400mA (F1 115V) (Type T)</td>
<td>002443</td>
</tr>
<tr>
<td>Prom, U54, MT-3000 Audit Trail</td>
<td>073300</td>
</tr>
<tr>
<td>Battery, Lithium, 3.0 V, 1.2 AH, 2/3 A.</td>
<td>037188</td>
</tr>
<tr>
<td>Program Disk</td>
<td>068137</td>
</tr>
<tr>
<td>Power Module</td>
<td>073280</td>
</tr>
</tbody>
</table>

### Table 5-2: Optional Plugin Boards

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>PART NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCBA, Analog Output (1 out)</td>
<td>071637</td>
</tr>
<tr>
<td>PCBA Analog Output (2 in/2 out)</td>
<td>071636</td>
</tr>
<tr>
<td>PCBA, DIO (4 in/16 out)</td>
<td>046841</td>
</tr>
<tr>
<td>PCBA, DIO (16 in/4 out)</td>
<td>046844</td>
</tr>
<tr>
<td>PCBA, COMM &quot;A&quot; Select one only</td>
<td>068053</td>
</tr>
<tr>
<td>RS-232C</td>
<td></td>
</tr>
<tr>
<td>RS-485, std. (point to point)</td>
<td></td>
</tr>
<tr>
<td>RS-485, multi-drop</td>
<td></td>
</tr>
<tr>
<td>20 mA (digital) current loop</td>
<td></td>
</tr>
<tr>
<td>PCBA, Load Out DIO (4 in/16 out)</td>
<td>049475</td>
</tr>
<tr>
<td>PCBA, Load Out DIO (16 in/4 out)</td>
<td>049476</td>
</tr>
<tr>
<td>PCBA, Allen-Bradley RI/O</td>
<td>055517</td>
</tr>
<tr>
<td>PCBA, PROFIBUS-DP</td>
<td>056713</td>
</tr>
<tr>
<td>PCBA DeviceNet</td>
<td>068147</td>
</tr>
<tr>
<td>Field Marshall PCA</td>
<td>058842</td>
</tr>
<tr>
<td>DeviceNet PCBA</td>
<td>067097</td>
</tr>
<tr>
<td>Relay Output Board</td>
<td>073284</td>
</tr>
</tbody>
</table>
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Appendix A
Menus

The *Loss-in-Weight Controller* is a menu driven machine that allows the operator to access all setup, test, and calibration parameters. MAIN MENU screens 1 through 7 can be accessed at any time by pressing MENU until the desired screen is displayed.

Pressing the SOFT KEY directly below the desired scroll and then using the UP/DOWN, arrow scroll key selects the MENU scrolls.

If the *Loss-in-Weight Controller* 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.

A.1. Menu Displays

Optional menu scrolls are only available if the option has been installed. Pressing menu activates the following screens:

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

-- MAIN MENU 2 --
Press MENU for more
SCALE CALIB
DISPLAY DATA DATA

-- MAIN MENU 3 --
Press MENU for more
PROT DIAG TEST

-- MAIN MENU 4 --
Press MENU for more
I/O ALAMS LOAD
DEF DEFIN. OUT
```
A.2. Common Key Functions

The following functions are common from all scrolls at all times and the use of these keys is not repeated for each procedure:

- **Run** – pressing **RUN** return the *Loss-in-Weight Controller* to the **RUN** menu
- **Exit** – exit appears at the bottom of some screens as a soft key option. Pressing exit moves you back a menu.

A.3. MAIN Menu 1 – Calibration Menu

MAIN MENU 1 contains the *CALIBRATION MENU*. **MENU 1** is selected by pressing **MENU** until **MAIN MENU 1** displays. Desired **CALIBRATION** scrolls are selected by pressing the **SOFT** keys directly below the desired scroll. Calibration scrolls consist of the following:

- **Zero Calibration**
- **Span Calibration**

PRINT message is assigned to the right hand soft key only if more than one scale is defined.
A.3.1. **Zero Calibration Scroll**

The Zero Calibration is implemented as a machine directed procedure.

**Auto Zero**

If only one scale defined:

```
-- ZERO CAL --
p  press START
  START   SCALE #
MANUAL
```

The scale must be kept empty during auto zero. A complete zeroing procedure requires 10 seconds.

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

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

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

During *Auto Zero*, weight resolution is ten times higher than normal. The number of seconds in Line 2 corresponds to the time remaining for completing the test.

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

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

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

If **YES** is pressed, the next screen is shown:

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

Password: Operator
If NO is pressed, the next screen is shown:

<table>
<thead>
<tr>
<th>S#</th>
<th>ZERO # UNCHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old zero #00000</td>
</tr>
<tr>
<td></td>
<td>New zero #00000</td>
</tr>
<tr>
<td>RUN</td>
<td>MENU</td>
</tr>
</tbody>
</table>

Note that in this case old zero and new zero are shown equal.

The zero constants are shown in A/D counts.

**A.3.1.1 Manual Zero**

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

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

Default: 40000
Min: 0
Max: 120000

**A.3.2 Span Calibration**

The span calibration can be done in two different ways: R-Cal or Test Weights. The system allows the operator to select which one of the two methods to be used for normal calibration and calibration’s check. The selection is made in **CAL DATA SCROLL 1**

**A.3.2.1 Automatic Span Calibration With R-Cal**

Use the following steps to begin an *R-Cal Calibration*:

1. Starting an R-Cal Calibration

```
AUTO SPAN R CAL
Empty scale, then press START
START SCALE # MANUAL
```

Password: Operator
When **START** is pressed, the Rcal relay energizes. A half second delay occurs after **START** for the weight to stabilize.

Note: The operator must insure that the scale is empty before pressing **START**.

2. Executing the Span Calibration

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

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

Entry point when **REPEAT** is pressed.

During Auto Span, the weight resolution is 10 times higher than normal. The entire function takes 60 seconds to be completed; remaining time is displayed in line 2. The END key can be used to conclude the function in less time.

3. Recording the New Span

The system calculates the new span.

The word COMPLETE is flashing.

FACTOR key is displayed only if an auto span with test weight has been previously executed.

If **YES** is pressed, the following screen is displayed:
REPEAT moves back to (2) above, and calibration restarts.

<table>
<thead>
<tr>
<th>S#</th>
<th>SPAN# UNCHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old span # 000000</td>
</tr>
<tr>
<td></td>
<td>New span 000000</td>
</tr>
<tr>
<td></td>
<td>RUN REPEAT</td>
</tr>
</tbody>
</table>

Note: the Old span and the New span are shown equally. This is because no change to the span has been done.

If FACTOR is pressed, the R-Cal factor is computed. The following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>FACTOR ACQUIRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New fact 000000 %</td>
</tr>
<tr>
<td></td>
<td>Change factor?</td>
</tr>
<tr>
<td></td>
<td>YES NO</td>
</tr>
</tbody>
</table>

NO moves back to (3) above.
YES acquires the new factor. If pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S#</th>
<th>FACTOR CHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Old fact # 000000 %</td>
</tr>
<tr>
<td></td>
<td>New fact 000000 %</td>
</tr>
<tr>
<td></td>
<td>RUN REPEAT</td>
</tr>
</tbody>
</table>

4. Ending an Auto Span Procedure with R-CAL

Press RUN, the R-Cal relay is de-energized and the display is locked for 3 seconds.

A.3.2.2 Automatic Span Calibration With Test Weights

1. Starting Span Calibration With Test Weights

   | AUTOSPAN Weights |
   | Apply Weights, then press START |
   | START SCALE # MANUAL |

Password: Operator

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

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

After START is pressed, the following screen is displayed:

Entry point when REPEAT is pressed (see below)

<table>
<thead>
<tr>
<th>S# AUTOSPANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time remaining</td>
</tr>
<tr>
<td>Gross</td>
</tr>
<tr>
<td>END</td>
</tr>
</tbody>
</table>

During Auto Span, the weight resolution is 10 times higher than normal. The entire function takes 10 seconds to be completed; remaining time is displayed in line 2. The END key can be used to conclude the function in less time.

3. Recording the New Span

The system calculates the new span based on the result of the test performed with the selected method:

The word COMPLETE is flashing.

If YES is pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S# AUTOSPAN COMPLETE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error</td>
</tr>
<tr>
<td>Change span?</td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>NO</td>
</tr>
</tbody>
</table>

FACTOR key is displayed only if an auto span with R-Cal has been previously executed.

REPEAT moves back (2) above, and calibration restarts.

If NO is pressed, the following screen is displayed:

<table>
<thead>
<tr>
<th>S# SPAN # CHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old span #</td>
</tr>
<tr>
<td>New span</td>
</tr>
<tr>
<td>RUN REPEAT FACTOR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S# SPAN # UNCHANGED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old span #</td>
</tr>
<tr>
<td>New span</td>
</tr>
<tr>
<td>RUN REPEAT</td>
</tr>
</tbody>
</table>

**Note:** The Old span and the New span are shown equally because there has been no change to the Old span.
If **FACTOR** is pressed, the RCAL factor is computed. The following screen is displayed:

```
S#  FACTOR ACQUIRING
New fact  0000000 %
Change factor ?
YES  NO
```

**NO** moves back to (3) above.

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

```
S#  FACTOR CHANGED
Old fact #  000000 %
New fact  0000000 %
RUN     REPEAT
```

### A.3.2.3 Manual Span

If the span constant is known, the manual span procedure allows the operator to manually change span.

**NOTE:** If the span is manually entered, the RCAL factor is set to **INVALID**.

```
-- MANUAL SPAN --
Gross  000.0 W.U.
Span   #  000000
ENTER  SCALE #  EXIT
```

Default:  1166667  
Min:      5000000  
Max:      45000000  

The RUN key returns you to Run Menu.

### A.4. Main Menu 2 – Setup and Configuration Menus

**MAIN MENU 2** contains the SETUP AND CONFIGURATION MENUS. **MENU 2** is selected by pressing **MENU** until **MAIN MENU 2** displays. Desired **SETUP AND CONFIGURATION** scrolls are selected by pressing the **SOFT** keys directly below the desired scroll. Scrolls for **MAIN MENU 2** consist of the following:

- **Display**
- **Scale Data**
- ** Calibration Data**
A.4.1. Display

The Display scroll sets up the parameters for how the information at the *Loss-in-Weight Controller* interface will display.

A.4.1.1 Measure Units

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

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

--- DISPLAY SCROLL 1 ---
Measure units
>ENGLISH<
CHOICE ENTER

**Default:** ENGLISH In other language

**Choices:** ENGLISH, METRIC, MIXED

English - all units in English
Metric - all units in Metric
Mixed – units may be a combination of English and Metric.

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.

--- DISPLAY SCROLL 2 ---
Rate units
>Lb/h<
CHOICE ENTER

**Default:** English = LB/H

**Choices:** TPH, LTPH, LB/H, T/M, LT/M, LB/M

**Default:** Metric = KG/H

**Choices:** T/H, KG/H, T/M, KG/M

**Default:** Mixed = POUNDS

**Choices:** T/H, KG/H, T/M, KG/M, TP/H, LTPH, LB/H, T/M, LT/M, LB/M

The weights are displayed according to the units selected here.
Press **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.

| Default: | English = POUNDS |
| Choices: | **PERC%**, **POUNDS**, **TONS**, **LTONS** |

| Default: | Metric = KG |
| Choices: | **PERC%**, **KG**, **TONNES** |

| Default: | Mixed = POUNDS |
| Choices: | **PERC%**, **KG**, **TONNES**, **POUNDS**, **TONS**, **LTONS** |

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

| Default: | English = TONS |
| Choices: | **PERC%**, **TONS**, **LTONS**, **POUNDS** |

| Default: | Metric = TONNES |
| Choices: | **TONNES**, **KG** |

| Default: | Mixed = TONS |
| Choices: | **TONS**, **LTONS**, **POUNDS**, **TONNES**, **KG** |

Press **ENTER** soft key to accept the default unit, or **CHOICES** soft key to scroll selections. Press **ENTER** to confirm your selection. Scroll down.
A.4.1.2 Language

The Mod.3104 is a dual language instrument. English (ENG or USA) is always the first language; the second can be one from the following list.

Press DOWN SCROLL key.

--- DISPLAY SCROLL 6 ---
Language
>USA<
CHOICE ENTER

Default: USA
Choices: USA, ENG, ESP, FRA, GER, DUT, ITA

A.4.1.3 Time and Data Mode

The operator defines the format for displaying and printing time and date.

--- DISPLAY SCROLL 7 ---
Time
>am/pm h<
CHOICE ENTER

If USA or English: Default: am/pm
If other language: Default: 24 h
Selection: am/pm, 24 h

--- DISPLAY SCROLL 8 ---
Date
>MM-DD-YYYY<
CHOICE ENTER

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

A.4.1.4 Line 2 and 3 of the RUN Menu

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

--- DISPLAY SCROLL 8 ---
Run display line 2
>Weight<
CHOICE ENTER SCALE#

Default: WEIGHT
Choices: NO DISPLAY, WEIGHT, RESET TOT, MASTER TOT,
DATE/TIME, BARGRAPH

-- DISPLAY SCROLL 9 --
Run display line 3
>No Display<
CHOICE ENTER SCALE#

Default: NO DISPLAY
Choices: NO DISPLAY, WEIGHT, RESET TOT, MASTER TOT,
DATE/TIME, BARGRAPH

A.4.1.5 Division for Rate Display
Define the division used to display the rate value.

-- DISPLAY SCROLL 10 --
Display rate
divis. > 0.1 <
CHOICE ENTER SCALE#

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

A.4.1.6 Damping Factors for the Display
The process variable when displayed on the screen can be damped
by a programmable factor, to filter out variations that can be
introduced by mechanical vibrations. To tune a damping filter,
enter the number of seconds corresponding to the desired time
constant. If, for example, 10 seconds is entered, the process
variable reaches the stability after a step change in 10 seconds.

-- DISPLAY SCROLL 11 --
Display rate
Damping 10 sec
ENTER SCALE#

Default: 10sec
Min: 0sec
Max: 400sec

-- DISPLAY SCROLL 12 --
Display weight
Damping 4 sec
ENTER SCALE#

Default: 4sec
Min: 0sec
Max: 400sec
A.4.1.7 Enable ALTERNATE Function on RUN Scroll

When two scales are enabled, the operator can display one scale or another by means of the SCALE# key.

The ALTERNATE function allows the operator to automatically change scales without pressing the SCALE # key at predefined interval of time.

A number of seconds greater than zero enables the function. If only scale is enabled, this scroll is not displayed.

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

A.4.2 Scale Data Scroll

Scale data defines the specific parameters of the scale.

A.4.2.1 Number of Scales

The Loss-in-Weight Controller can control two independent scales. The number of scales that can be programmed depends on the number A/D input installed.

Default: 1
Min: 1
Max: 2
A.4.2.2 Scale Capacity and Divisions

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

Default: 100.0
Min: 1
Max: 200000

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

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

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

A.4.2.3 Number of Loadcells of Your Scale

Enter the number of loadcells of your scale.

Default: 1
Min: 1
Max: 6
A.4.2.4 Defining the Loadcell(s)

Enter the loadcell capacity as it appears on the label placed on the loadcell.

<table>
<thead>
<tr>
<th>English/Mixed</th>
<th>Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: 250.0 Lbs</td>
<td>Default: 100 kg</td>
</tr>
<tr>
<td>Min: 10 Lbs</td>
<td>Min: 1 kg</td>
</tr>
<tr>
<td>Max: 15000 Lbs</td>
<td>Max: 15000 kg</td>
</tr>
</tbody>
</table>

Enter the loadcell sensitivity in mV/V as marked on the label of the loadcell. *Thermo* loadcells are normally 2.000 or 3.000 mV/V.

| Default: 3.0 mV/V |
| Min: 0.500 mV/V |
| Max: 3.500 mV/V |

The resistance of the bridge of each loadcell has to be entered here. The number of scroll depends on the number of loadcells specified per each scale.

If # of Loadcells is 2 or more:

Same default and limits of loadcell #1

If # of Loadcells is 3 or more:
Same default and limits of loadcell #1
If # of Loadcells is 4 or more:

Same default and limits of loadcell #1
If # of Loadcells is 5 or more:

Same default and limits of loadcell #1
If # of Loadcells is 6:

Enter the lever ratio of the scale

Default: 1
Min: 0.1
Max: 5
A.4.3. Calibration Data Scroll

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

A.4.3.1 Calibration Mode

Select which simulated method of automatic calibration is normally used. The select method is the only one displayed in the calibration section MENU 1.

```
-- CAL DATA SCROLL 1 --
Calibration mode:
< R-CAL<
CHOICE ENTER
```

**Default:** R-CAL  
**Choice:** R-CAL, WEIGHTS

**DETAILING THE TEST WEIGHT PARAMETERS**

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

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

**English/Mixed**  |  **Metric**  
-----------------|------------------  
**Default:** 000.0 Lbs  |  **Default:** 0.000 kg  
**Min:** 0.000  |  **Min:** 0.000  
**Max:** 5000.000  |  **Max:** 5000.000

**DETAILING THE R-CAL PARAMETERS**

This section only applies if R-CAL mode was selected as the preferred method. Enter the resistance in Ohms of the electronic resistance installed in the instrument. If no changes have been made after the Loss-in-Weight Controller has left Thermo, the default value applies.

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

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

The system calculates the CALCON (Calibration Constant) based on the mechanical and electrical parameters entered in the Scale.
Data Scroll.

This menu is for reference only.

The R-Cal factor can be computed during the auto span function and used to correct the error between the two span methods.

Default: INVALID (0)
Min: -99.99 %
Max: +99.99 %

A.4.3.2 Calibration Interval

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

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

This scroll displays the date of the last calibration and the expected date of the next one, based on the entry in the previous screen.
A.5. Main Menu 3

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

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

A.5.1. Changing the Protection Level

The Micro-Tech 3104 has three protection levels to which specific passwords are related.

Appendix Table A-1: Password Protection Levels

<table>
<thead>
<tr>
<th>Protection</th>
<th>Password</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>SERVICE</td>
<td>The system is completely unprotected; all data can be read or changed.</td>
</tr>
<tr>
<td>LIMITED</td>
<td>OPERATOR</td>
<td>Operator functions and data are unprotected. All setup and calibration data are protected except zero calibrate.</td>
</tr>
<tr>
<td>PROTECTED</td>
<td></td>
<td>The system is totally protected, process data can be read, no change allowed.</td>
</tr>
</tbody>
</table>

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

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

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

![PROTECTION LEVEL]

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

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

**A.5.1.1 Online Procedure for Changing Protection Level**

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

![SYSTEM PROTECTED]

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

![SYSTEM PROTECTED SERVICE]

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

![SYSTEM PROTECTED INVALID PASSWORD]
Pressing **RETURN** returns the program to the previous function. If the operator enters the correct password, the previous screen appears and access is allowed.

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

### A.5.2. Diagnostics

#### A.5.2.1 A/D Raw Data

Diagnostic Scroll 1 shows the raw data from the A/D converter of the *Loss-in-Weight Controller* (A/D gross) and the net value after the zero constant has been subtracted. The range of the A/D converter is from 0 to 262140 numbers.

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

#### A.5.2.2 Readout Loadcell mV

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

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

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

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

**Default:** 15  
**Min:** 0  
**Max:** 10000

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

**Default:** 3497  
**Min:** 0  
**Max:** 30000
A.5.2.3 Change Passwords

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

Default: No password

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

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

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

Default: No password
The OPERATOR password is double checked similarly to the service one.

It is strongly suggested to write down the password and preserve a copy in a safe place. If the password is forgotten, refer to Section 4.8 to remove a forgotten password.

A.5.2.4 Display Software Version

The software version is displayed for reference only.

```
-DIAGNOST. SCROLL 5-
Main software
version:
46.XX.XX.XX
```

A.5.2.5 Setup Date and Time

The user can set the current date and time. A battery operated clock calendar then maintains time and date even if power is removed. Day, Month, and Year are entered in sequence.

```
-DIAGNOST. SCROLL 6-
Password:

SERVICE

Password:

Default:

00-00-0000
Min:

01-01-0000
Max:

31-12-2096

-DIAGNOST. SCROLL 7-

Time: HH:MM
HOURS: ________
ENTER AM/PM

24-hour am/pm

Default:

00.00  01.00
Min:

00.00  01.00
Max:

23:59  12:59
```
A.5.2.6 Check Hardware Configuration

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

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

- DIAGNOST. SCROLL 8 -
  Board type slot #1
  BOARD TYPE

- DIAGNOST. SCROLL 9
  Board type slot #2
  BOARD TYPE

- DIAGNOST. SCROLL 10
  Board type slot #3
  BOARD TYPE
Appendix Table A-2: List of Optional Plugin Board Types

- Dig I/O 16in/4out  Optional digital input output board.
  - #16 Optocoupled digital Inputs
  - #4 Optocoupled digital outputs

- Dig I/O 16out/4in  Optional digital input output board.
  - #4 Optocoupled digital Inputs
  - #16 Optocoupled digital outputs

- Load Out 16in/4in  Optional digital input output board dedicated to the Load Out.
  - #16 Optocoupled digital inputs
  - #4 Optocoupled digital inputs

- Load Out 16out/4in  Optional digital input output board dedicated to the Load Out.
  - #4 Optocoupled digital inputs
  - #16 Optocoupled digital inputs

- Current Out  Optional current output board.
  - #1 Current output

- Communication A  Serial communication board (RS232, RS485)

- Communication B  Allen-Bradley Remote I/O
  PROFIBUS-DP

A.5.3. Tests

A.5.3.1 Lamp Test

Press START to begin a Lamp Test of the Loss-in-Weight Controller. All LED's and digits of the display blink for a number of seconds.

A.5.3.2 Self Test of the Unit

The system can perform some internal test functions, which can be used to detect malfunctions to the hardware devices.

Service

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

<table>
<thead>
<tr>
<th>TEST SCROLL 2A -</th>
<th>Testing ROM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test PASSED</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST SCROLL 2B -</th>
<th>Testing RAM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test PASSED</td>
</tr>
</tbody>
</table>

Audit Trail option

<table>
<thead>
<tr>
<th>TEST SCROLL 2C -</th>
<th>Testing E2Prom</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test PASSED</td>
</tr>
</tbody>
</table>

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

### A.5.3.3 Test Digital Inputs

The next screen is used to check the digital input circuitry. The display shows a 1 if the specific input is closed, 0 if open. If more digital I/O boards are installed, the **NEXT** soft key appears, allowing the operator to scroll between boards. Slots are numbered 1-3; slot 0 is the motherboard.

<table>
<thead>
<tr>
<th>TEST SCROLL 3 -</th>
<th>Dig input test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot#0</td>
<td>----00--</td>
</tr>
<tr>
<td>NEXT</td>
<td></td>
</tr>
</tbody>
</table>

‘Digit’ (displayed instead of ‘slot#’) identifies the four Digitizer’s inputs. Inputs are shown from left to right. If a board has 16 inputs, two screens are used to show the first and the second half, the lower half is shown first.
A.5.3.4 Test Digital Outputs

This test shows the status of each digital output and allows the operator to force the output for testing purposes. The output, when forced, stays on until the CLEAR soft key is pressed or the Run Menu is entered. If an output is forced and the scroll key is used for reaching some other menu, the output stays in the forced status until RUN is pressed. This allows the operator to check inputs while outputs are still in the forced status.

To force an output, enter the desired number followed by ENTER. Then use the SET/RESET key to force it to the ON or OFF status. After the output has been forced, the CLEAR soft key appears in the middle position.

Slots are numbered 1-3; slot 0 is the motherboard.

A.5.3.5 Test Current Outputs

Password: Service
To force the output, enter the desired number of milliamps and press ENTER. Press CLEAR to free the mA channel.

Then, the following screen is shown (two or more current output are detected).

If a second current output is installed:

```
- TEST SCROLL 6 -
Current output #2
should be 00.0 mA
ENTER CLEAR
```

Default: 0.0 mA
Min: 0.0 mA
Max: 20.0 mA

If a third current output is installed:

```
- TEST SCROLL 7 -
Current output #3
should be 00.0 mA
ENTER CLEAR
```

Default: 0.0 mA
Min: 0.0 mA
Max: 20.0 mA

If the (max) fourth current output is installed:

```
- TEST SCROLL 8 -
Current output #4
should be 00.0 mA
ENTER CLEAR
```

Default: 0.0 mA
Min: 0.0 mA
Max: 20.0 mA

A.5.3.6 Test Current Inputs

The following screen is displayed when an analog input board is detected, and shows the status of each analog input channel.

```
- TEST SCROLL 9 -
Current input
#1 00.0 V
#2 00.0 V
```

Password: Service
A.5.3.7 Test Communication A

The following screen allows checking the installed serial lines using a loop back type test. The maximum line number is 2; Transmit must be tied to receive for this test. "Port 1" is standard and "Port 2" is shown only if optional Comm boards are detected.

By pressing the PORT 1 or the PORT 2 soft key, the test is initiated. A test pattern is sent out on the TX output and read on the RX input. If the test fails, the message "Test Failed" is shown; otherwise, the message "Test Passed" is displayed.

A.5.3.8 Test RS232

To test RS232 the test requires a hardware jumper to be installed between terminals TB3-22 (RX) and TB3-21 (TX).

A.5.3.9 Test RS485

To test the RS485 the test requires a hardware jumper to be installed between terminals TB3-21 and TB3-28 to TB3-20 and TB3-29.

A.5.3.10 Test Communication B

This test is similar to the previous one but works for the field bus version of the communication board.

A.5.3.11 Test BCD Output Board

If an optional 16 Out/4 In load out board is detected, the following screen appears.

```
Default: 0
Min: 0
```
Max: 9999 or 7999 if parity check enable

The force the outputs, enter a number followed by ENTER. The CLEAR key appears indicating the output is being forced to a value. Pressing CLEAR frees the output.

A.5.3.12 Test BCD Input Board

The following test is displayed if a 16 In/4 Out load out board is detected.

<table>
<thead>
<tr>
<th>- TEST SCROLL 13 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCD Input test</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

The value read on the BCD input is displayed dynamically.

A.5.3.13 Simulated Control

<table>
<thead>
<tr>
<th>- TEST SCROLL 14 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulated control</td>
</tr>
<tr>
<td>NO</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>PASSWORD: Service</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>DEFAULT: NO</td>
</tr>
<tr>
<td>MIN: YES, NO</td>
</tr>
</tbody>
</table>

When enabled, the weight is internally simulated, ignoring the loadcell signal.

A.5.3.14 Test the Keyboard and Switches

<table>
<thead>
<tr>
<th>- TEST SCROLL 16 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keyboard + switches</td>
</tr>
<tr>
<td>Key: _____</td>
</tr>
</tbody>
</table>

Press the RUN key twice to exit. All other keys, including MENU, are displayed but not executed.

A.6. Main Menu 4

The following section defines the input output (I/O), alarms and optionally of the load out batch.

<table>
<thead>
<tr>
<th>- MAIN MENU 4 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press MENU for more</td>
</tr>
<tr>
<td>I/O ALARMS</td>
</tr>
<tr>
<td>DEFINE DEFINE</td>
</tr>
</tbody>
</table>
A.6.1. I/O Definition

The input output section of the system is fully configurable. All inputs and outputs are conventionally numbered and can be assigned to physical input and output terminals depending on the needs. The following section explains how to configure I/O. However, the standard configuration as provided by the factory is normally satisfactory.

A.6.1.1 Define Current Outputs

The following menus are shown for configuring the current output(s). Use the CHOICE key to change the variable and the ENTER key to confirm. The NEXT key allows the operator to set up to four (4) current outputs if installed.

 Default: CONTROL, NONE, NONE, NONE
 Selections: NONE, WEIGHT, RATE, CONTROL

Alternatively, if more than one scale is defined.

 Selections: NONE, WEIGHT S1, WEIGHT S2, RATE S1, RATE S2, CONTROL S1, CONTROL S2.

If the selection of the previous screen is not NONE, the operator can set up the range, delay and damping of the current output. The range is selectable between the standard 0 to 20 mA and 4 to 20 mA both in direct and reverse mode. Select 0-20 or 4-20 if an increase in current is desired for any increase of the variable. Select 20-0 or 20-4 if a decrease of current is desired for any increase of the variable.

 Default: 4-20 mA,
 Selections: 0-20 mA, 4-20 mA, 20-0 mA, 20-4 mA
Each current output can be delayed.

```
I/O DEF SCROLL 1B-
Current out delay
#1 0 sec
ENTER NEXT
```

**Default:** 0 sec  
**Min:** 0 sec  
**Max:** 300 sec

A damping factor can also be selected for each current channel. The damping factor is the time for the output to stabilize after a step change. This damping only affects the current output, not the displayed variable, which has a separate damping factor, selectable in Main Menu 2, Display.

```
- I/O DEF SCROLL 1C-
Current out damping
#1 0 sec
ENTER NEXT
```

**Default:** 0 sec,  
**Min:** 0 sec  
**Max:** 400 sec

UP and DOWN arrows move between range, delay, and damping. NEXT moves to the next current output.

### A.6.1.2 Define Analog Inputs

Analog input board is installed and the following screens are displayed. Analog inputs can be used for measuring the moisture or as remote setpoint input.

```
- I/O DEF SCROLL 2 -
Analog Input #1 def.
> None <
CHOICES ENTER CALIB
```

**Default:** NONE  
**Selections:** NONE, SETPOINT, MOISTURE  
If more than one scale is defined:

```
- I/O DEF SCROLL 3 -
Analog Input #2 def.
> None <
CHOICES ENTER CALIB
```

**Default:** NONE  
**Selections:** NONE, SETPOINT S1, SETPOINT S2, MOISTURE S1, MOISTURE S2
Default: NONE
Selections: NONE, SETPOINT, MOISTURE

If more than one scale is defined:

Selections: NONE, SETPOINT S1, SETPOINT S2, MOISTURE S1, MOISTURE S2

Pressing the CALIB key displays the next scrolls.

A.6.1.3 Setup Moisture Compensation Input

If an analog input has been programmed for reading the moisture signal and CALIB was pressed, the following screens appear. The user can calibrate the input signal by entering the equivalence between percent of moisture and voltage on two points. Use the %Moist key to enter the percent of moisture, use the volt key to enter the corresponding number of volts, and confirm with ENTER.

Only if ANALOG INPUT (moisture) option is enable and CALB is pressed

- I/O DEF SCROLL 2A -
  Moisture input calibr. #1
  0.0 %M = 2.0 V
  ENTER %Moist Volt

Default: 0.0 % 0.0 V
Min: 0.0 % 0.0 V
Max: 20.0 % 2.5 V

Do the same with the second point shown below.

- I/O DEF SCROLL 2B -
  Moisture input calibr. #2
  5.0 %M = 5.0 V
  ENTER %Moist Volt

Default: 5.0 % 5.0 V
Min: 1.0 % 1.0 V
Max: 100.0 % 5.0 V

A.6.1.4 Setup Remote Setpoint

Only if ANALOG INPUT (remote setpoint) option is enabled and CALIB is pressed

- I/O DEF SCROLL 2C -
  Rem setpoint cal #1
  0.0 %S = 0.0 V
  ENTER % SET VOLTS

Default: 0.0% 0.0V
Min: 0.0% 0.0V
Max: 20.0% 2.5V
A damping factor can also be selected for each analog input channel.

A.6.1.5 Define Digital Inputs

Digital inputs can be programmed. The following screen shows one logical function per time, and allows the user to assign it to a physical input. The NEXT key scrolls between the logical functions. The NC/NO key selects the Normally Open (NO) or Normally Closed (NC) status of the input. Normally Open means the input is inactive when disconnected. To program a function, scroll with NEXT until the function is displayed, then enter the physical input number and confirm with ENTER; finally scroll with NC/NO until the desired mode is displayed. By assigning a function to 0, the function is disabled.

The following table shows the available logical selections that can be assigned to any available physical input. Typical field wiring drawings and customer specific field wiring drawings show Reset alarms defaulted to #1 NO, Refill defaulted to #2 NO and Running defaulted to #3 NC. Default inputs can be reassigned to any physical input if desired. External alarms 1, 2, and 3 can be assigned to logical functions not on the list. Logical selections should not be reassigned after the physical inputs have been wired.

CAUTION

Logical inputs return to the default if the Instrument is cold started.
### Appendix Table A-3: Available Logical Selections

<table>
<thead>
<tr>
<th>Selections:</th>
<th>Default:</th>
</tr>
</thead>
<tbody>
<tr>
<td>External alarm 1</td>
<td>0 NO</td>
</tr>
<tr>
<td>External alarm 2</td>
<td>0 NO</td>
</tr>
<tr>
<td>External alarm 3</td>
<td>0 NO</td>
</tr>
<tr>
<td>Reset alarms</td>
<td>1 NO</td>
</tr>
<tr>
<td>Print</td>
<td>0 NC</td>
</tr>
<tr>
<td>Print S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Print S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Reset tot</td>
<td>0 NO</td>
</tr>
<tr>
<td>Reset tot S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Reset tot S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Refill</td>
<td>2 NO</td>
</tr>
<tr>
<td>Refill S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Refill S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Local/Remote Control</td>
<td>0 NO</td>
</tr>
<tr>
<td>Local/Remote Control S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Local/Remote Control S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Auto/Man Control</td>
<td>0 NO</td>
</tr>
<tr>
<td>Auto/Man Control S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Auto/Man Control S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Running</td>
<td>3 NC</td>
</tr>
<tr>
<td>Running S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Running S2</td>
<td>0 NO</td>
</tr>
</tbody>
</table>
Appendix Table A-4: Mother Board Inputs

<table>
<thead>
<tr>
<th>PHYSICAL INPUT NUMBER</th>
<th>ASSIGNED FUNCTION</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RESET ALARMS</td>
<td>TB1-2</td>
<td>TB1-3</td>
</tr>
<tr>
<td>2</td>
<td>REFILL</td>
<td>TB2-12</td>
<td>TB2-13</td>
</tr>
<tr>
<td>3</td>
<td>RUN</td>
<td>TB2-14</td>
<td>TB2-15</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>TB2-16</td>
<td>TB2-17</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>TB2-18</td>
<td>TB2-19</td>
</tr>
</tbody>
</table>

Additional assignable logical inputs from the above table can be selected by adding optional I/O boards. Available options are 4in/16out, 16in/4out, or 20in/20out by adding both boards.

Appendix Table A-5: Digital Input/Output Board Inputs

<table>
<thead>
<tr>
<th>PHYSICAL INPUT NUMBER</th>
<th>ASSIGNED FUNCTION</th>
<th>4IN/16OUT ONLY</th>
<th>16IN/4OUT ONLY</th>
<th>4IN/16OUT AND 16IN/4OUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>J15 - 2</td>
<td>J16 - 17</td>
<td>J15 - 2</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>J15 - 15</td>
<td>J16 - 5</td>
<td>J15 - 15</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>J15 - 3</td>
<td>J16 - 18</td>
<td>J15 - 3</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>J15 - 16</td>
<td>J16 - 6</td>
<td>J15 - 16</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>J16 - 19</td>
<td>J16 - 17</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>J16 - 7</td>
<td>J16 - 5</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>J16 - 20</td>
<td>J16 - 18</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>J16 - 8</td>
<td>J16 - 6</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>J16 - 21</td>
<td>J16 - 19</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>J16 - 9</td>
<td>J16 - 7</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>J16 - 22</td>
<td>J16 - 20</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>J16 - 10</td>
<td>J16 - 8</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>J16 - 23</td>
<td>J16 - 21</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>J16 - 11</td>
<td>J16 - 9</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>J16 - 24</td>
<td>J16 - 22</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>J16 - 12</td>
<td>J16 - 10</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td>J16 - 23</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td>J16 - 11</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td>J16 - 24</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td>J16 - 12</td>
<td></td>
</tr>
</tbody>
</table>
A.6.1.6 Define Digital Outputs

Digital outputs can be programmed. The following screen shows one logical function per time, and allows the user to assign it to a physical output. The NEXT key scrolls between the logical functions. The NC/NO key selects the Normally Open (NO) or Normally Closed (NC) status of the output. Normally Open means the output is not energized. To program a function, scroll with NEXT until the function is displayed, then enter the number of the physical output and confirm with ENTER; finally scroll with NC/NO until the desired mode is displayed. By assigning a function to 0, the function is disabled.

The following table shows the available logical selections that can be assigned to any available physical output. Typical field wiring drawings and customer specific field wiring drawings show Ready defaulted to #1 NC, Alarm defaulted to #2 NC and Refill defaulted to #3 NO. Default selections can be reassigned to any physical output if desired.

Logical selections should not be reassigned after the physical outputs have been wired.

Digital output name S1 or S2 is only displayed if more scales are defined.
Appendix Table A-6: Available Logical Assignment

<table>
<thead>
<tr>
<th>Selections</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alarm</td>
<td>2 NC</td>
</tr>
<tr>
<td>Shut down</td>
<td>0 NC</td>
</tr>
<tr>
<td>Ready</td>
<td>1 NO</td>
</tr>
<tr>
<td>Refill</td>
<td>3 NO</td>
</tr>
<tr>
<td>Refill S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Refill S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>High weight</td>
<td>0 NO</td>
</tr>
<tr>
<td>High weight S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>High weight S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Low weight</td>
<td>0 NO</td>
</tr>
<tr>
<td>Low weight S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Low weight S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>High rate</td>
<td>0 NO</td>
</tr>
<tr>
<td>High rate S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>High rate S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Low rate</td>
<td>0 NO</td>
</tr>
<tr>
<td>Low rate S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>Low rate S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>H Dev Pos</td>
<td>0 NO</td>
</tr>
<tr>
<td>H Dev Pos S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>H Dev Pos S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>H Dev Neg</td>
<td>0 NO</td>
</tr>
<tr>
<td>H Dev Neg S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>H Dev Neg S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>HH Dev Neg</td>
<td>0 NO</td>
</tr>
<tr>
<td>HH Dev Neg S1</td>
<td>0 NO</td>
</tr>
<tr>
<td>HH Dev Neg S2</td>
<td>0 NO</td>
</tr>
<tr>
<td>Loc/Rem</td>
<td>0 NO</td>
</tr>
<tr>
<td>PHYSICAL OUTPUT NUMBER</td>
<td>RELAY ASSIGNED FUNCTION</td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>FAULT</td>
<td>FAULT</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL OUTPUT NUMBER</th>
<th>SOLID STATE ASSIGNED FUNCTION</th>
<th>Mother Board Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TB1-5</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>TB1-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TB1-7</td>
</tr>
</tbody>
</table>

There are 5 outputs, 4 assignable, and 1 non-assignable Fault output standard on the motherboard.

Appendix Table A-7: Relay Board and Motherboard Outputs

Additional assignable logical selections from the above table can be selected by adding optional I/O boards. Available options are 4in/16out, 16in/4out, or 20in/20out by adding both boards.
## Appendix Table A-8: Digital Input/Output Board Outputs

<table>
<thead>
<tr>
<th>PHYSICAL OUTPUT NUMBER</th>
<th>ASSIGNED FUNCTION</th>
<th>4IN/16OUT ONLY</th>
<th>16IN/4OUT ONLY</th>
<th>4IN/16OUT AND 16IN/4OUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>J15-17</td>
<td>J16 - 2</td>
<td>J16 - 2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>J15 - 5</td>
<td>J16 - 15</td>
<td>J16 - 15</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>J15 - 18</td>
<td>J16 - 3</td>
<td>J16 - 3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>J15 - 6</td>
<td>J16 - 16</td>
<td>J16 - 16</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>J15 - 19</td>
<td></td>
<td></td>
<td>J15 - 17</td>
</tr>
<tr>
<td>10</td>
<td>J15 - 7</td>
<td></td>
<td></td>
<td>J15 - 5</td>
</tr>
<tr>
<td>11</td>
<td>J15 - 20</td>
<td></td>
<td></td>
<td>J15 - 18</td>
</tr>
<tr>
<td>12</td>
<td>J15 - 8</td>
<td></td>
<td></td>
<td>J15 - 6</td>
</tr>
<tr>
<td>13</td>
<td>J15 - 21</td>
<td></td>
<td></td>
<td>J15 – 19</td>
</tr>
<tr>
<td>14</td>
<td>J15 - 9</td>
<td></td>
<td></td>
<td>J15 – 7</td>
</tr>
<tr>
<td>15</td>
<td>J15 - 22</td>
<td></td>
<td></td>
<td>J15 – 20</td>
</tr>
<tr>
<td>16</td>
<td>J15 - 10</td>
<td></td>
<td></td>
<td>J15 – 8</td>
</tr>
<tr>
<td>17</td>
<td>J15 - 23</td>
<td></td>
<td></td>
<td>J15 – 21</td>
</tr>
<tr>
<td>18</td>
<td>J15 - 11</td>
<td></td>
<td></td>
<td>J15 – 9</td>
</tr>
<tr>
<td>19</td>
<td>J15 - 24</td>
<td></td>
<td></td>
<td>J15 – 22</td>
</tr>
<tr>
<td>20</td>
<td>J15 - 12</td>
<td></td>
<td></td>
<td>J15 – 10</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td>J15 – 23</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td>J15 – 11</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td>J15 – 24</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td>J15 – 12</td>
</tr>
</tbody>
</table>

### WARNING

Changing the definition of the digital outputs may cause machinery to start after the user tries to change a definition. The following message is displayed.

**WARNING**

**EQUIPMENT MAY START**

**CONTINUE**    **ABORT**

If the user presses continue, be aware the action may cause damage or injury. If the user presses abort, the system returns to the previous scroll.

### A.6.1.7 Define BCD Output Data
If an optional load out board is installed, the user can select the related variable.

- I/O DEF SCROLL 7 -
  BCD Output variable
  > Weight <
  CHOICES ENTER

Default: NONE
Selections: NONE, WEIGHT, RATE

Or, if two scales enabled:

Selections: NONE, WEIGHT S1, RATE S1, WEIGHT S2, RATE S2

If a selection other than NONE is made, the following screens allow the user to define the polarity and the parity check of the BCD output. The polarity selection reverses the signals from NO to NC and vice versa. If a parity criterion is selected, the most significant bit of the BCD output is used for parity check.

- I/O DEF SCROLL 7A -
  BCD Output polarity
  > Positive <
  CHOICES ENTER

Default: NEGATIVE
Selections: POSITIVE, NEGATIVE

- I/O DEF SCROLL 7B -
  BCD Output parity
  > Yes <
  CHOICES ENTER

Default: NO
Selections: NO, YES
A.6.1.8 Define Remote Totalizer Output

If a digital output has been assigned to TOTALIZER function, the following two scrolls are displayed.

Set the divider according to the maximum rate the scale will run. The divider is entered in totalization unit (T.U.). The pulse frequency generated in normal conditions cannot exceed 50 Hz.

- I/O DEF SCROLL 9 -
Remove counter div.

Default: 0.1
Min: 0.01
Max: 100

Enter the pulse width in seconds for the totalizer. A higher pulse width limits the maximum frequency. The default 0.1 sec is recommended for frequencies lower than 5 Hz.

- I/O DEF SCROLL 10-
Remote counter pulse

Default: 0.1 sec
Min: 0.01 sec
Max: 1.00 sec

A.6.2. Alarms Definition

The alarms of the Micro-Tech 3104 can be programmed. Process alarms such as low and high rate can be set to the desired range. In addition, all alarms can be defined to be:

- ALARM-When an alarm occurs, the front panel ALARM status indicator illuminates. An ALARM message flashes in the lower, right hand RUN display. Pressing ALARM displays the alarm.
- Pressing RESET clears the alarm message if the alarm parameter has cleared. If the alarm parameter has not cleared, the message "ACK" appears when RESET is pressed. When the alarm parameter clears, the alarm indication clears.
- Pressing RUN at any time returns the operator to the RUN menu.

Alarms can be automatically printed if the print option is enabled.
• **SHUT DOWN**  The alarm handler operates as above except the READY status indicator goes off and the SHUTDOWN physical output changes state at the same time as the ALARM status indicator comes on.

  In the I/O definition scroll, alarm and ready can be assigned to N/C or N/O physical outputs. The output activates and deactivates at the same time as the front panel status indicators.

• **NONE** Alarm is deactivated.

**A.6.2.1 Define High Weight Alarm**

Use the **CHOICE** key to turn on or off the threshold #1 alarm. Confirm with **ENTER**.

![Password: Operator]

- **ALARM SCROLL 1 -**
  - High weight alarm
  - >NO<
  - CHOICE ENTER SCALE #

**Default:** NO  
**Selections:** YES, NO

If the selection in the previous screen was YES, enter the threshold set points for the alarm.

The **UNITS** key allows the operator to specify the set points in engineering units. The **%** key selects set points in percent referring to scale capacity.

![Password: Operator]

- **ALARM SCROLL 1A -**
  - High weight,
  - set 90 %
  - ENTER UNITS SCALE #

**Default:** 90%  
**Min:** 0 %  
**Max:** 105 %

Enter the desired delay time before the alarm is monitored.

![Password: Operator]

- **ALARM SCROLL 1B -**
  - High weight,
  - delay 2 sec
  - ENTER SCALE #

**Default:** 2 sec  
**Min:** 0 sec  
**Max:** 90 sec
A.6.2.2 Define Low Weight Alarm

Use the **CHOICE** key to turn on or off the low weight alarm. Confirm with **ENTER**.

- **ALARM SCROLL 2 -**
  - Low weight alarm
  - > NO <
  - CHOICE ENTER SCALE #

Default: **NO**
Selections: **YES, NO**

If the selection in the previous screen was **YES**, enter the threshold set points for the alarm.

The **UNITS** key allows the operator to specify the set points in engineering units. The **%** key selects set points in percent referring to scale capacity.

- **ALARM SCROLL 2A -**
  - Low weight,
  - set 10.0 %
  - ENTER UNITS SCALE #

Default: **10%**
Min: **0 %**
Max: **105 %**

Enter the desired delay time before the alarm is monitored.

- **ALARM SCROLL 2B -**
  - Low weight,
  - delay 2 sec
  - ENTER SCALE #

Default: **2 sec**
Min: **0 sec**
Max: **90 sec**

A.6.2.3 Define High Rate Alarm

Use the **CHOICE** key to turn on or off the high rate alarm. Confirm with **ENTER**.

- **ALARM SCROLL 3 -**
  - High rate alarm
  - > NO <
  - CHOICE ENTER SCALE #

Default: **NO**
Selections: **YES, NO**
If the selection in the previous screen was YES, enter the threshold set points for the alarm.

The **UNITS** key allows the operator to specify the set points in engineering units. The **%** key selects set points in percent referring to scale capacity.

<table>
<thead>
<tr>
<th>- ALARM SCROLL 3A -</th>
<th>Password: Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>High rate,</td>
<td></td>
</tr>
<tr>
<td>set 90 %</td>
<td></td>
</tr>
<tr>
<td>ENTER UNITS SCALE #</td>
<td></td>
</tr>
</tbody>
</table>

**Default:** 90%

**Min:** 0 %

**Max:** 105 %

Enter the desired delay time before the alarm is monitored.

<table>
<thead>
<tr>
<th>- ALARM SCROLL 3B -</th>
<th>Password: Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>High rate,</td>
<td></td>
</tr>
<tr>
<td>delay 2 sec</td>
<td></td>
</tr>
<tr>
<td>ENTER SCALE #</td>
<td></td>
</tr>
</tbody>
</table>

**Default:** 2 sec

**Min:** 0 sec

**Max:** 90 sec

**A.6.2.4 Define Low Rate Alarm**

Use the **CHOICE** key to turn on or off the high rate alarm. Confirm with **ENTER**.

<table>
<thead>
<tr>
<th>- ALARM SCROLL 4 -</th>
<th>Password: Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low rate alarm</td>
<td></td>
</tr>
<tr>
<td>&gt; NO &lt;</td>
<td></td>
</tr>
<tr>
<td>CHOICE ENTER SCALE #</td>
<td></td>
</tr>
</tbody>
</table>

**Default:** NO

**Selections:** YES, NO

If the selection in the previous screen was YES, enter the threshold set points for the alarm.

The **UNITS** key allows the operator to specify the set points in engineering units. The **%** key selects set points in percent referring to scale capacity.

<table>
<thead>
<tr>
<th>- ALARM SCROLL 4A -</th>
<th>Password: Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low rate,</td>
<td></td>
</tr>
<tr>
<td>set __ %</td>
<td></td>
</tr>
<tr>
<td>ENTER UNITS SCALE #</td>
<td></td>
</tr>
</tbody>
</table>

**Default:** 10%

**Min:** 0 %

**Max:** 105 %
Enter the desired delay time before the alarm is monitored.

```
- ALARM SCROLL 4B -
Low rate,
delay ___ sec
ENTER SCALE #
```

Default: 2 sec
Min: 0 sec
Max: 90 sec

**A.6.2.5 Define High Positive Deviation Alarm**

```
- ALARM SCROLL 5 -
H Pos. Dev Alarm
> NO <
CHOICE ENTER SCALE #
```

Default: NO
Selections: YES, NO
Only if High Positive Deviation Alarm selected.

Enter the Set Point in % and the activation delay

```
- ALARM SCROLL 5A -
H Pos. Dev. set
___10 % ___10 sec
ENTER SET/Delay SCALE #
```

Default: 10% 10 sec
Min: 0 % 0 sec
Max: 105 % 90 sec

**A.6.2.6 Define High High Positive Deviation Alarm**

```
- ALARM SCROLL 6 -
HH Pos. Dev Alarm
> NO <
CHOICE ENTER SCALE #
```

Default: NO
Selections: YES, NO
Only if High High Positive Deviation Alarm selected.
Enter the Set Point in % and the activation delay

A.6.2.7 Define High Negative Deviation Alarm

Default: NO
Selections: YES, NO
Only if High Negative Deviation Alarm selected.

Enter the Set Point in % and the activation delay

A.6.2.8 Define High High Negative Deviation Alarm

Default: NO
Selections: YES, NO
Only if High High Negative Deviation Alarm selected.
Enter the Set Point in % and the activation delay

<table>
<thead>
<tr>
<th>Default:</th>
<th>Min:</th>
<th>Max:</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%</td>
<td>0 %</td>
<td>105 %</td>
</tr>
<tr>
<td>10 sec</td>
<td>0 sec</td>
<td>90 sec</td>
</tr>
</tbody>
</table>

A.6.2.9 Setup Alarm Modes

The following message is displayed for three seconds.

After three seconds, the ALARM screen is displayed. The user can use the CHOICE soft key to select the desired mode between ALARM (just a warning message), SHUT DOWN, (warning plus fault output) and NONE (no action). Confirm with ENTER. Use the NEXT key to scroll between alarms, or enter the alarm number.

A.7. MAIN MENU 5

Main Menu 5 is dedicated to the serial option. COMM A is used to set up the serial line and PRINT is used for setting up the printer output. Main Menu 5 does not appear unless an optional COMM A is installed.
A.7.1. Communication A Scroll

The MT 3104 has one serial channel, which can be configured using jumpers as an RS232 or an RS485 channel. The serial channel can be used for printing or for a serial communication with an intelligent device such as a PLC or a PC. An additional COMM A board can be installed and programmed, typically one for the printer and one for networking.

The following screens define the communication parameters for the first and the second channel.

**Default:** 9600  
**Selections:** 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200

**Password:** Service

**COM A SCROLL 1**
Baud Rate port #1

> 2400 <

CHOICE ENTER

**COM A SCROLL 2**
Set parity port #1

> No parity <

CHOICE ENTER

**COM A SCROLL 3**
Stop bits port #1

> 1 stop bit <

CHOICE ENTER

**COM A SCROLL 4**
Wordlength port #1

> 8 bits <

CHOICE ENTER

**Default:** 8 BITS  
**Selections:** 7 BITS, 8 BITS
Some commonly used protocols are implemented in the system. See Communication Protocols, REC 3949, for the details. Possible selections are:

- **PC-MASTER** - Thermo proprietary protocol: Multi Drop, Master Slave.
- **SIEMENS 3964R** - A proprietary protocol of Siemens. Point to point, Multi Master.
- **ALLEN BRADLEY DF1** - A proprietary protocol of Allen Bradley. Multi Drop, Master Slave.
- **MODBUS** - A proprietary protocol of AEG. Multi Drop, Master Slave.
- **PRINTER** - Not a protocol, selects printer output.

**Default:** MODBUS  
**Selections:** PC-MASTER, SIEMENS 3964R, ALLEN BRADLEY DF1, MODBUS, PRINTER

If the selected protocol is not PRINTER, the following screens define the ADDRESS of the device in the multi drop line, and the access permission from the remote supervisor. If NONE is selected, the supervisor has full access to the device. If LIMITED is selected; there is supervisor only access to those variables. If PROTECTED is selected, the unit is write protected.

**Default:** DISABLED  
**Selections:** DISABLED, ENABLED

**Default:** 1  
**Min:** 1  
**Max:** 255
Menus

- COMM. A SCROLL 7 -
  Access lev. prot. port #1
  > None <
  CHOICE ENTER

Default: NONE
Selections: NONE, LIMITED, PROTECTED

If an optional communication board is installed, the following screen appears. These screens operate exactly as the ones dedicated to Port 1.

- COMM. A SCROLL 8 -
  Baud rate port #2
  > 2400 <
  CHOICE ENTER

Default: 9600
Selections: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200

- COMM. A SCROLL 9 -
  Set parity port #2
  > No parity <
  CHOICE ENTER

Default: NO PARITY
Selections: NO PARITY, EVEN PARITY, ODD PARITY

- COMM. A SCROLL 10 -
  Stop bits port #2
  > 1 stop bit <
  CHOICE ENTER

Default: 1 STOP BIT
Selections: 1 STOP BIT, 2 STOP BITS

- COMM. A SCROLL 11 -
  Wordlength port #2
  > 8 bits <
  CHOICE ENTER

Default: 8 BITS
Selections: 7 BITS, 8 BITS

- COMM. A SCROLL 12 -
  Protocol port #2
  > PC MASTER <
  CHOICE ENTER

Password: Service
Default: MODBUS
Selections: PC MASTER, SIEMENS 3964R, ALLEN BRADLEY DF1, MODBUS, PRINTER

Only if protocol of port #2 is not PRINTER:

- COMM. A SCROLL 12A
  Clear to send #2
  > Disabled <
  CHOICE ENTER
  
  Default: DISABLED
  Selections: DISABLED, ENABLED

- COMM. A SCROLL 13-
  Address port #2
  1
  ENTER
  
  Default: 1
  Min: 1
  Max: 255

- COMM. A SCROLL 14-
  Access port. port #2
  > None <
  CHOICE ENTER
  
  Default: NONE
  Selections: NONE, LIMITED, PROTECTED

A.7.2. Communication B (Field Bus)

Refer to the Field Bus manual if this option is installed.
A.7.3. Print

The Micro-Tech 3104 has a fully programmable printer format. The following section explains how to program it according to the specific needs.

1. Define Handshaking

The system can be configured to operate without a handshake (NONE), using the Clear to Send signal (CTS), or the XON-XOFF sequence. Refer to the printer instruction manual to define which selection is required. The selection NONE is only used for testing purposes. It is not recommended for normal use. If NONE is selected, the system is not able to recognize if the printer is on line or not, or if the paper is empty.

The most commonly used protocol is the CTS, which is a signal generated by the printer to indicate whether it is ready to receive data or not.

```
-PRINTER SCROLL 1 -
Handshaking
> None <
CHOICE ENTER
```

Default: NONE
Selections: NONE, CTS, XON-XOFF

Different printers use different end of line patterns. Select the one you need for your printer.

```
-PRINTER SCROLL 2 -
End of line
> CR <
CHOICE ENTER
```

Default: CR
Selections: CR, LF, CR+LF

Some printers cannot accept characters while they are printing. In some cases, the handshake is not well controlled by the printer, so a delay at end of line is helpful.
A form feed character can be sent to the printer after each report to force the printer to eject the paper. If NO is selected, a normal END OF LINE character(s) is printed at the end of the report.

**A.7.3.1 Periodical Printing**

If you want to generate periodical printing, enter the number of minutes, hours, or days in the following screen. Entering 0 prevents periodical printing. Use the INTV key to switch from minutes to hours and to days.

The system can print at specific times during the day. Enter the time you want to obtain the printing. Use the NEXT key to scroll between the print times (maximum 4). The ON/OFF key enables or disables the displayed print time.
If 24 hours If am/pm
Default: OFF OFF
Min: 00:00 01:00
Max: 23:59 12:59

A.7.3.2 Define Print Format

By selecting YES in the following screen, the system is instructed to print one line each time a new alarm condition occurs. The alarm is printed as follows:

xx-xx-xxxx yy:yyz
kkkkkkkkkkkkkkkkkkk

Where:
xx-xx-xxxx   Day, Month, Year, printed according to the local format as defined in Main Menu 2 - Display Scroll, Section 4.2 of this Appendix.

yy:yyz       Hour, Minutes, am/pm printed according to the local format as defined in Main Menu 2 - Display Scroll, Section 4.3 of this Appendix.

kkkkkkkkkkkkkkkkkk Alarm message, same message appearing on the screen

For example:
01-22-1998 8:14a
Clock Fail
Define if you want to add a heading string in your report. String can be used to add the Customer name as well as other information that you want to include in the print format.

Default: NO
Selections: YES, NO

If you selected YES, the next two scrolls are displayed.

This first one allows the operator to define the string. Use the alphanumeric keypad, pressing the numeric key corresponding to the letter that you want to type. Every time you press a new key, the cursor moves to the right one place. If you need to use two times the same key (example for double letters), move the cursor right using the arrow keys (left and right soft keys).

Default: xxxxxxxxxxxxxxxxxxxxxxxx

Password: Operator
Once you have defined the string, specify where the string has to be placed on the printed report. The coordinate is given in the following way:

\[
\begin{align*}
000000000011111111112222222223... \\
0123456789012345678901234567890...
\end{align*}
\]

\[+------------------------------------------------> X\]

00|This line printed first
01|This line printed second ^
02| | DIRECTION OF
03| | PAPER
04|
05|
06|
. v
. Y

Use the X-pos and Y-pos keys to enter the X and Y coordinates. Confirm with ENTER. By specifying 0,0, the string is not printed.

### - PRINTER SCROLL 9B -
Position string #1
X = 0, Y = 0
ENTER X\Y-pos

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>24</td>
<td>80</td>
</tr>
</tbody>
</table>

Define if you want to add a second heading string in your report.

### - PRINTER SCROLL 10 -
String #2
> yes <
CHOICE ENTER

**Default:** NO
**Selections:** YES, NO
If you selected YES, the next two scrolls are displayed.

- PRINTER SCROLL 10A -
  Contents string #2
  < ENTER >

Default:  =  =

- PRINTER SCROLL 10B -
  String #2 pos.
  X = ___, Y = ___
  ENTER  X\Y-pos

  X   Y
Default:  2, 1
Min:  0, 1
Max:  24, 80

There is a third string. If only one scale is defined, it is a third heading string exactly as the previous two. If more scales are defined, it may be used to define a scale identifier. String definition is different for each scale and it is used as scale heading.

- PRINTER SCROLL 11 -
  String #3
  > yes <
  CHOICE  ENTER

Default:  NO
Selections:  YES, NO
If you selected YES, the next two scrolls are displayed
SCALE # key allows the operator to select the scale.

- PRINTER SCROLL 11A -
  Contents string #3
  SCALE #

Default:  =  =
If only 1 scale is defined or more scales are defined, the ENTER and ARROWS keys compare in the fourth line of the display when the numeric or alphanumeric key is pressed.

X Y
Default: 3, 1
Min: 0, 1
Max: 24, 80

A series of variables can be added in the report. Variables are: MASTER TOTAL, RESET TOTAL, DATE, TIME, WEIGHT, and RATE.

The position must be defined for each variable. If you do not intend to add a variable in the report, you should set its X position to 0.

X Y
Default: 4, 1
Min: 0, 1
Max: 24, 80

X Y
Default: 5, 1
Min: 0, 1
Max: 24, 80
### - PRINTER SCROLL 14 -
**Reset total position**

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: 6, 1</td>
<td>Min: 0, 1</td>
</tr>
</tbody>
</table>

Password: Operator

**X Y-pos**

### - PRINTER SCROLL 15 -
**Master total position**

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: 7, 1</td>
<td>Min: 0, 1</td>
</tr>
</tbody>
</table>

Password: Operator

**X Y-pos**

### - PRINTER SCROLL 16 -
**Weight position**

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: 0, 1</td>
<td>Min: 0, 1</td>
</tr>
</tbody>
</table>

Password: Operator

**X Y-pos**

### - PRINTER SCROLL 17 -
**Rate position**

<table>
<thead>
<tr>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default: 0, 1</td>
<td>Min: 0, 1</td>
</tr>
</tbody>
</table>

Password: Operator

**X Y-pos**
A.7.3.3 The PRINT Key

The PRINT MENU is accessible by press the PRINT key in the Run Menu or, if more scales are defined, in Main Menu 1. It is a single screen menu, which allows the operator to select and start a print report.

The following screen is displayed:

```
- PRINTER SCROLL-
COM #1 no data
Start print TOTALS
PRINT RETURN COM
```

The second line gives the status of the printer:

- **NO DATA** Indicates the printer is idle, no data are being sent to the printer.
- **IS RUNNING** The system is sending data to the printer.

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

- **TOTALS** Print totals (all scales if more scales defined).
- **TOTALS S1** Print total scale 1 (only if enable)
- **TOTALS S2** Print total scale 2 (only if enable)
- **SETUP** Print the setup data of the instrument. (Not available in this version)
- **TRAILS** If audit trails option is active, audit trail data is printed

Print starts after the PRINT key is pressed.

The COM key allows the operator to select the printer in case more than one is installed.

Here are some examples of data that can be printed:

**Print TOTALS, default**

If one scale is defined:

```
TOTALS REPORT
DATE: 01-22-2003
TIME: 8:12a
MASTER TOTAL: 0.00 Tons
RESET TOTAL: 0.00 Tons
```

If more scale is defined:

```
TOTALS REPORT
DATE: 01-22-2003
TIME: 8:12a
```
Menus

SCALE 1
MASTER TOTAL: 0.00 Tons
RESET TOTAL: 0.00 Tons

SCALE 2
MASTER TOTAL: 0.00 Tons
RESET TOTAL: 0.00 Tons

Print ALARM:
01-22-2003  8:14a
Clock fail

Print AUDIT TRAILS:  (Optional)
When print AUDIT TRAILS command is given, the number of records to print is required. This allows the operator to print a portion of the recorded trails.

TRAIL RECORD NR  1
DATE 01-22-2003 TIME 11:59p
VARIABLE scale cap
NEW 400.00
OLD 500.00

TRAIL RECORD NR  2
DATE 01-22-2003 TIME 11:31p
VARIABLE span
NEW 250000
OLD 300000

TRAIL RECORD NR  3
DATE 01-22-2003 TIME 11:59p
VARIABLE div (e)
NEW 0.05
OLD 0.1
A.8. MAIN MENU 6

Main Menu 6 is dedicated to Audit Trails and Linearization.

- MAIN MENU 6 -
Press MENU for more
AUDIT TRAIL LINEAR

A.8.1. Audit Trail

This menu is only displayed if the Audit Trails option is installed.

Audit trail meets NIST HB 44 Category 3: Remote configuration capability, access may be unlimited or controlled through a password. It consists of an event logger that includes an event counter (000 to 999), the parameter description, the date, and time of the change, and the old and new value of the parameter. Parameters may be configuration parameters or routine calibration.

Events and changes may be viewed on the Instrument’s display or printed out by an on-site printer.

The Logger records the before and after setting all configuration parameters that affects the calibration of the scale. It also records when calibration was performed. The Event Counter increments one count for each event.

Audit trail records the time and displays the new and old data for any change in the parameters and functions listed below, indicating each by an event number:
<table>
<thead>
<tr>
<th>Parameter’s Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>w unit</td>
<td>Weight unit</td>
</tr>
<tr>
<td>r unit</td>
<td>Rate unit</td>
</tr>
<tr>
<td>t unit</td>
<td>Total unit</td>
</tr>
<tr>
<td>s div</td>
<td>Scale division</td>
</tr>
<tr>
<td>audit</td>
<td>Audit trail option</td>
</tr>
<tr>
<td>lc sen</td>
<td>Loadcell sensitivity</td>
</tr>
<tr>
<td>s cap</td>
<td>Scale capacity</td>
</tr>
<tr>
<td>r cap</td>
<td>Rate capacity</td>
</tr>
<tr>
<td>lc cap</td>
<td>Loadcell capacity</td>
</tr>
<tr>
<td>lc nr</td>
<td>Loadcell number</td>
</tr>
<tr>
<td>lc rl</td>
<td>Loadcell 1 resistance</td>
</tr>
<tr>
<td>lc r6</td>
<td>Loadcell 6 resistance</td>
</tr>
<tr>
<td>test w</td>
<td>Test weights for WTS span calibration</td>
</tr>
<tr>
<td>rcal r</td>
<td>Rcal resistance for Rcal span calibration</td>
</tr>
<tr>
<td>damp w</td>
<td>Damping weight</td>
</tr>
<tr>
<td>damp rq</td>
<td>Damping rate</td>
</tr>
<tr>
<td>line 1</td>
<td>Linearization factor 1 (0-10%)</td>
</tr>
<tr>
<td>line 10</td>
<td>Linearization factor (90-100%)</td>
</tr>
<tr>
<td>span</td>
<td>Span</td>
</tr>
<tr>
<td>zero</td>
<td>Zero</td>
</tr>
<tr>
<td>rcal c</td>
<td>Rcal calibration constant</td>
</tr>
<tr>
<td>rcal f</td>
<td>Rcal factor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function’s Name</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autozero</td>
<td>Autozero function has been executed</td>
</tr>
<tr>
<td>Autospan Rcal</td>
<td>Autospan with Rcal method has been executed</td>
</tr>
<tr>
<td>Auto span WTS</td>
<td>Auto span with test weight method has been executed</td>
</tr>
<tr>
<td>Cold Start</td>
<td>All instrument data has been lost</td>
</tr>
<tr>
<td>M.total cleared</td>
<td>Master total register has been cleared</td>
</tr>
</tbody>
</table>
Audit trails

**Default:** No

**Selections:** Yes, No

If the audit trails are enabled, meaning YES is selected, the following screen appears for a short time (3 seconds):

```
- AUDIT TRAILS 1 -
Audit trails
NO
CHOICE ENTER
```

After 3 seconds, the next screen is shown:

```
- AUDIT TRAILS -
Use scroll keys or
enter trail number
```

```
TRAIL EVENT No. 0000
hh:mm    dd-mm-yyyy
ss     nnnnnn = vvvvvv/O (ld)
ss     nnnnnn = vvvvvv/N (ew)
```

- **hh:mm** Time of change
- **mm-dd-yyyy** Date of change, the format may vary depending on the Country
- **ss** Identifies the scale (only if more scales are defined)
- **nnnnnn** Parameter’s name
- **vvvvvv** Parameter’s value, before change (old) after change (new)

Time and date are shown only if an optional Communication board is installed.

The user can scroll between events, which are displayed in order of date, and time. The user can also enter a number to display a specific event.

### A.8.2. Linearization

Manual linearization can be accomplished by applying a known test weight(s) or loading the bin with pre-weighed material and calculation the scale error. Pressing the ACQuire soft key displays the scale weight for the applied known weight. The operator can then enter in a correction factor. Up to five correction factors can be installed in any order and will be internally sorted by scale loading.
Linearization must first be enabled in Main Menu 6 before any menu screens will appear.

**Note:** Prior to performing a manual linearization, the scale should be properly zeroed.

1. Press the **MENU** key repeatedly until Main Menu 6 appears.

Press **LINEAR** soft key to access the Linearization scroll. The following screen appears.

Press **CHOICE** for selections, **YES** to enable, or **NO** to disable linearization. Once enabled, no linearization is done until the operator manually enters the linearization factors.

Default: **NO**
Selections: **YES, NO**
- **NO** turns off linearization and sets all factors to 1.00
- **YES** turns on linearization.
  1. Set linearization to **NO** and return to the **RUN** screen.
  2. Apply bin loading at the points to be linearized. Record the indicated weight for each point.
  3. Calculate the correction factor for each point using the following formula:

\[
\text{Correction Factor} = \frac{\text{Actual or reference weight}}{\text{Displayed weight}}
\]

4. Enter linearization factors

Once the factors have been computed, they must be re-entered. Press the **MENU** key repeatedly until the **LINEAR** soft key is displayed. Press this soft key and then **DOWN ARROW**. Set linearize to **YES**, press **ENTER**. Press the **DOWN ARROW** key to LINEARIZ #1.
Type in the first weight recorded in Step 4 and press ENTER

<table>
<thead>
<tr>
<th>- LINEARIZ #1 -</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight</strong> 0.0 lb</td>
</tr>
<tr>
<td><strong>Fact.</strong> 1.000000</td>
</tr>
</tbody>
</table>

If ENGLISH or MIXED

**Default:** 0.0 lbs
**Min:** 0.0 lbs
**Max:** 500.0 lbs

If METRIC

**Default:** 0.0 lbs
**Min:** 0.0 lbs
**Max:** 226.8 lbs

Type in the first factor calculated in Step 4 and press ENTER

If you enter 1.000 (default value), the load will not be corrected in that portion of the range. A number lower than 1.000 will reduce the span, while a number larger than 1.000 will increase the span.

**Default:** 1.000000
**Min:** 0.000000
**Max:** 1.500000

Press the DOWN ARROW. Repeat Step 5 for all remaining calculated factors.

A.9. MAIN MENU 7

Main Menu 7 contains setup and configuration screens for two independent control loops and enables the operator to define the characteristics and parameters of the loss-in-weight system. If a dual or second single A/D board is installed, the Scale #1 or 2 soft key is visible. Pressing the key switches scales.

<table>
<thead>
<tr>
<th>- MAIN MENU 7 -</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press MENU for more</td>
</tr>
<tr>
<td>CNTR SYSTEM</td>
</tr>
</tbody>
</table>

A.9.1. Control Scroll

The controller output is fully configurable as a PID or P.E.I.C. controller. The controller can act as Master or Slave or in closed loop. The following section explains how to configure the controller. Steps 1 through 11 configure PID Loop 1 and Steps 3 through 23 configure PID Loop 2.
A.9.1.1 Control Action During Shutdown

When the feeder is shutdown (feeder running contact open) and the controller is in auto mode, the control output may correspond to one of the following programmable selections.

- Locked on the last value before shutdown or
- Locked on a vale from 1 to 100% as entered through the keyboard

When the feeder is started, the controller begins the control action from the value at which the output was locked at shutdown.

A feeder run normally open contact is required.

Default: SEL
Selections: LOCK, SEL

When the feeder is not running (feeder running contact open), the control output can be locked (LOCK) to the last value, or set (SEL) to the value entered in the next screen.

Only if START OUT is set to SEL:

Default: 0 %
Min: 0 %
Max: 100 %

A.9.1.2 High Control Limit

The control output, when in AUTO, cannot exceed this value

Default: 100 %
Min: 0 %
Max: 100 %
A.9.1.3 Low Control Limit

The control output, when in AUTO, cannot be lower this value

Default: 0 %
Min: 0 %
Max: 100 %

Proportional Band

Proportional control actions respond to the amount of process deviation from setpoint. It changes the position of the final control element, in direct proportion to the difference between process variable and setpoint. The proportional band is expressed as that percentage of the total scale range, which corresponds to the full corrective range of the final control element. If proportional band is set to 100%, then a 0 to 100% process variable change causes the output to change 100% of its range. If proportional band is set to 200%, then a 0 to 100% process variable change causes the output to change 50% of its range.

Default: 200 %
Min: 50 %
Max: 900 %

Entering 0% turns off proportional band term.
A.9.1.4   Integral (Reset) Time

Reset action responds to a combination of the amount and duration of the process deviation. Integral time sets the slope of the output correction signal. A 100% change in process variable results in a 100% change in output correction signal at the integral time entered.

Set integral time to 0 to inhibit action or if control mode is P.E.I.C

Default: 0.1 min
Min: 0 min
Max: 10 min

Entering 0 time turns off proportional integral term.

A.9.1.5   Derivative (Rate) Time

Rate action responds to the speed and direction of the process deviation. In most feeder applications, derivative is set to zero.

Set derivative time to 0 to inhibit action if control mode is P.E.I.C.

Default: 0 min
Min: 0 min
Max: 10 min

A.9.1.6   P.E.I.C. Time (Process Lag)

Process lag is the time duration following a change in the control element until the effect of that change can be measured at the source of the process variable signal. Lag may be measured in the process by making a small manual change in the final control element and observing the elapse time until the process variable display shows the effect of the change. P.E.I.C. control mode is always disabled when time is set to 0. Setting the time to other than zero enables raise and lower digital outputs to become active. Control output may be analog or time proportional.
When set to 0, there is not a P.E.I.C. action. Control output can be analog or time proportional. If time proportional, see Main Menu 4, I/O Definition scroll, digital outputs.

**A.9.1.7 Set Point Source**

Define the setpoint source. Local setpoint should always be entered by keyboard, remote setpoint can be received from serial line or analog input. If ANALOG IN or SERIAL IN is selected, the LOC/REM key (or LOC/REM digital input) is used to switch from local to remote setpoint.

**Default:** LOCAL

**Selections** LOCAL, ANALOG IN, SERIAL IN

**A.9.1.8 Setpoint Units**

Only if setpoint source is REMOTE (Analog in, Serial in), enter a setpoint delay and scales down the remote setpoint.
This delay shifts the remote setpoint signal in time.

**Setpoint delay**

Default: 0 min  
Min: 0 min  
Max: 500 min

For control systems where several weigh feeders operate in ratio control, it may be that the transport lag time from each feeder to the mixing point is different. To insure a correct ratio at the mixing point, an analog delay can be entered for remote setpoint.

**Percent of ingredient**

Default: 100 %  
Min: 0 %  
Max: 100 %

**A.9.1.9 Process Variable Damping**

Process variable damping averages the process variable to avoid undersized jumps of the control output.

**Process var damping**

Default: 0 sec  
Min: 0 sec  
Max: 120 sec

**A.9.1.10 Enable PID+S**

Enable the PID+S function for quick control response when setpoint changes.
A.9.1.11 Jump Cut-Off Function

The Jump Cut-Off function, when enabled, eliminates system instability that may be caused by temporary disturbances that may cause the rate of flow indication to jump. Example: A vibrator that periodically shakes the hopper Jump is enabled in the following scroll and is based on two parameters: the delay (CO_DELAY) and the deviation (CO_DEV).

After batch start, the system tries to reach the desired setpoint and during this time, the Jump Cut-Off is inactive. When the error between flow rate and setpoint enters the bandwidth defined by CO_DEV and stays in this range for a minimum of 1 second, Jump Cut-Off assumes the system is stable. At the same time, it starts to monitor the deviation.

If the deviation moves outside the CO_DEV limit, the Jump Cut-Off forces the rate to equal the setpoint and sets a timer to CO_DELAY value. When the timer reaches zero, the rate is released to the real value, restarting normal control action. The time may be longer if two conditions are detected during the time interval:

- A change in polarity of the error if an error is detected; the timer is restarted and set to CO_DELAY value.
- If after the initial peak starts to decrease, that forced the error outside its limits and the error decreasing, the time is frozen until the error enters the stability band or reverts its trend.

The period of time that the control is frozen is indicated by the letter “C” in the RUN scroll.

If the control action is not running

If the setpoint changes and the difference between the new and previous value is more than CO_DEV

Password: Service

Default: NO
Selections YES, NO

If YES is selected, the following two scrolls appear.
Defines CO_DELAY TIME

- **CNTRL**   SCROLL 15A-
  Delay
  5 sec
  ENTER  SCALE #

Default: 5 sec
Min: 1 sec
Max: 120 sec

Defines CO_DEV, stability range and cut-off limits.

- **CNTRL**   SCROLL 15B-
  Deviation
  5.0 %
  ENTER  SCALE #

Default: 5.0 %
Min: 0.1 %
Max: 50 %

**A.9.1.12  Autotuning**

Selecting YES in the next scroll enables the autotuning mode. Autotuning allows an increased speed response of the system at the start and when the setpoint changes. When active, the loss-in-weight controller automatically determines the regulation parameters. The rate interval and the weight constant is the basis of the regulation error.

- **CNTRL**   SCROLL 16-
  Autotuning
  NO
  CHOICE  ENTER  SCALE #

Default: NO
Selections: NO, YES
A.9.2. System Scroll

The System Scroll defines the characteristics and parameters of the loss in weight system.

A.9.2.1 Setting Maximum Rate and Dead Band

The first entry is the rate capacity, which is the maximum rate of the scale.

<table>
<thead>
<tr>
<th>- SYSTEM SCROLL 1-</th>
<th>Password: Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max rate capacity</td>
<td>100.0 Lb/h</td>
</tr>
<tr>
<td>ENTER</td>
<td>SCALE #</td>
</tr>
</tbody>
</table>

Default: 100.0
Min: 1
Max: 200000

A.9.2.2 Enter Minimum Rate

<table>
<thead>
<tr>
<th>- SYSTEM SCROLL 2-</th>
<th>Password: Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min rate capacity</td>
<td>0.0 Lb/h</td>
</tr>
<tr>
<td>ENTER</td>
<td>SCALE #</td>
</tr>
</tbody>
</table>

Default: 0.0
Min: 5.0
Max: 0.0

A.9.2.3 Setting Refill Parameters

Define the two-weight setpoint for starting and stopping the refill. Setpoints can be entered in percent of scale capacity or in engineering units. Press the UNIT key to switch between % and engineering units.

Enter the start refill set.

<table>
<thead>
<tr>
<th>- SYSTEM SCROLL 4-</th>
<th>Password: Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start refill set</td>
<td>20 %</td>
</tr>
<tr>
<td>ENTER</td>
<td>UNITS SCALE #</td>
</tr>
</tbody>
</table>

Default: 20 %
Min: 0 %
Max: 105 %
Enter the end refill set.

**- SYSTEM SCROLL 5-**
End refill set
80 %
Enter UNITS SCALE #

**Default:** 80 %  
**Min:** 0 %  
**Max:** 105 %

Define if refill can be executed when the system is in manual mode.

**- SYSTEM SCROLL 6-**
Refill on manual
>NO<
CHOICE ENTER SCALE #

**Default:** NO  
**Selections:** NO, YES

At the end of the refill, the system waits the time specified before restarting normal action (control and rate computation)

**- SYSTEM SCROLL 7-**
End refill time
10 sec
ENTER SCALE #

**Default:** 10 sec  
**Min:** 0 sec  
**Max:** 600 sec

Refill must be completed in a shorter time than what is entered here. If it takes longer, an alarm is activated.

**- SYSTEM SCROLL 8-**
Refill time-out
90 sec
ENTER SCALE #

**Default:** 90 sec  
**Min:** 0 sec  
**Max:** 600 sec
A.9.2.4 Density Compensation

A difference of density may occur between the start and end of the refill. This determines a variation in the flow rate for the same control output. The rate will be lower at end of refill than it was at the beginning. This variation, due to the pressure of the material, may be compensated by the system.

- SYSTEM SCROLL 9-
  Density compensation mode
  >none<
  ENTER     SCALE #

Password: Operator

Default: NONE
Selections: NONE, CORRECT, SET, AUTO

If CORRECT is selected, enter the correction in percent.

- SYSTEM SCROLL 9A-
  Control out correct
  0 %
  ENTER +/- SCALE #

Password: Operator

Default: 0 %
Min: 0 %
Max: 100 %

If SET selected, enter the control output value in percent.

- SYSTEM SCROLL 9B-
  Control out value
  0 %
  ENTER +/- SCALE #

Password: Operator

Default: 0 %
Min: 0 %
Max: 100 %
A.9.2.5 Setting Rate Acquisition Parameters

The two parameters, which determine how the system computes the rate, are RATE INTERVAL and WEIGHT CONSTANT. They are defined in the next two scrolls.

- SYSTEM SCROLL 10-
Rate interval
1.0 sec
ENTER SCALE #

Default: 1.0 sec
Min: 0.1 sec
Max: 10 sec

Password: Operator

- SYSTEM SCROLL 11-
Weight constant
4
ENTER SCALE #

Default: 4
Min: 1
Max: 16

Password: Operator
Appendix B
System Design Information

B.1. Flow Rate Considerations

In a loss-in-weight system, the flow rate measurement is done by making the difference between two subsequent weight measurements. The time between the two measurements has to be short enough to keep the response time of the system within an acceptable value.

Therefore, the difference between the two weights is a very low value and it is strongly affected by any noise in the weight signal, which may be produced by vibrations of the mechanical parts.

The accuracy and stability of the flow rate measurements gets better under the following conditions:

- Increase of the speed variation of the weight signal by reducing the hopper discharge time and increasing the ratio between net weight and loadcell capacity.

- Reduction of the weight signal noise caused by mechanical vibrations by increasing the ruggedness of the mechanical structure supporting the weight hopper.

To handle the above problems, the loss-in-weight controller provides various averaging and damping of the signals.

Each of the two weight values used to calculate the weight difference is the average of a number of weight measurements; this number is called “WEIGHT CONSTANT” (W) and is adjustable from 2 to 16.

The time within two subsequent weight measurements is also adjustable and is called “RATE INTERVAL” (T) (value adjustable from 0.1 to 6.0 seconds).

The product of W times T is called “RATE FACTOR” (F), and defines the difference in time within the two-weight value, used to calculate the weight difference.

However, the program calculates and updates the flow rate value at each T time by using the values memorized on a number of memories equal to “W” shifted each one from the other of “T” time.

This means that after a step variations of actual flow rate the time required for the calculated flow rate to represent 100 % of the variations is equal to F with linear change from old to new value. (See Figure B-1).
A damping action (asymptotic curve) can also be applied to the calculated flow rate value for additional filtering to compensate plant vibrations. On sizing a loss-in-weight system, extreme care should be taken to maintain the full-scale flow within the acceptable limits to avoid running into unstable operating conditions.

The minimum acceptable flow rate is given by the following formulas:

\[
QFS_{\text{min}} = \frac{CTC}{WORK \text{ hours}}
\]

\[
F > 3600 \times WORK \text{ hours} \times 100 \div RESOLUTION \times RATE \text{ accuracy}
\]

Where:

- \(QFS_{\text{min}}\) [kg/h] Minimum full scale rate
- \(WORK\_HOURS\) [h] Maximum number of working hours without refilling
- \(RANGE\_ACCURACY\) [%] Required accuracy for rate
- \(RESOLUTION\) converter at [counts] Nominal resolution of the A/D converter at 100% of loadcell
- \(CTC\) [kg] Total loadcell capacity
\[ QFS_{\text{max}} = H_{\text{lev}} - L_{\text{lev}} / 100 \times CAPACITY / WORK \text{ hours} \]

\[ F < 3600 \times WORK \text{ hours} \times RATE \text{ accuracy} / 100 \]

Where:
- \( QFS_{\text{man}} \): Maximum full scale rate [kg/h]
- \( H_{\text{LEV}} \): High Weight set point (stops refilling) [%]
- \( L_{\text{LEV}} \): Low Weight set point (starts refilling) [%]
- \( CAPACITY \): Full scale weight [kg]

The system must be designed so that a value of parameter \( F \) can be determined, which satisfied both conditions.

In addition, discharge time larger than 3 hours has to be considered critical, because the effect of little vibrations would become acceptable to an extent that may compromise the functionality of the system.

In addition, the quality of the feeding machine must be taken in consideration. Low rates mean very small amounts of materials to be moved, so the feeding machine must be able to modulate the flow of material in the smoothest way, avoiding to from blocks of material or temporary absence of it.
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Appendix C
Linearization

Request *REC 3909* from the factory
Appendix D
Digital and Analog Input/Output

The Loss-in-Weight Controller has provision for up to 24 programmable digital inputs and 24 programmable digital outputs. Standard I/O includes five programmable inputs, four programmable outputs, and one non-programmable Micro-Tech hardware fault output.

Optional DIO boards can be added if additional I/O is required.

D.1. Mother Board Digital I/O

D.1.1. Digital Inputs

(5) programmable digital (DC) inputs (Appendix Figure D-1)
- Optically isolated
- Powered by internal 24 V DIO supply, 6 mA
- Cable Length: 150 ohm maximum (7500 ft of 20 AWG)

Appendix Figure D-1: General Purpose Digital Inputs
D.1.2. Digital Outputs

Four (3) programmable, and one (1) non-programmable failure, outputs (on Relay Board) (Appendix Figure D-2) One (1) output programmable (on Mother Board)

- Isolated Relay Outputs
- Solid state Output

Appendix Figure D-2: Isolated Relay Outputs

Appendix Figure D-3: Solid State Output
D.2. Digital Input/Output Board Configuration

In addition to the programmable digital inputs and outputs on the motherboard, optional Digital I/O (DIO) expansion boards can be added. Available boards are DIO input board 16 inputs/4 outputs, output board 16 outputs/14 inputs or 20 inputs/20 outputs by adding both boards.

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

Selectable jumpers OP1 and OP2 located on the lower right hand side of the DIO boards control internal or external 24 VDC power for the DIO boards. All inputs and outputs use the same selected power supply.

Appendix Table D-1: DIO Board Jumper Settings (OP1/OP2)

<table>
<thead>
<tr>
<th>POWER SOURCE</th>
<th>OP1</th>
<th>OP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERNAL</td>
<td>“A”</td>
<td>“A:“</td>
</tr>
<tr>
<td>EXTERNAL</td>
<td>“B”</td>
<td>“B”</td>
</tr>
</tbody>
</table>

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

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

The output IC’s can be replaced with 2981 type IC’s for current sourcing applications. Wire jumpers W1 through W4 must be relocated for current sourcing. In most cases, it is recommended the boards be returned to the factory for converting from current sinking (default) to current sourcing.

Appendix Table D-2: DIO Board Jumper Settings for Current Sourcing

<table>
<thead>
<tr>
<th>JUMPERS</th>
<th>W1</th>
<th>W2</th>
<th>W3</th>
<th>W4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinking (default)</td>
<td>“Yes”</td>
<td>“No”</td>
<td>“Yes”</td>
<td>“No”</td>
</tr>
<tr>
<td>Sourcing</td>
<td>“No”</td>
<td>“Yes”</td>
<td>“No”</td>
<td>“Yes”</td>
</tr>
</tbody>
</table>
D.2.1.  16 In/4 Out DIO Board Specifications
- (16) Programmable inputs
  See Section D.1.1 specifications
- (4) Programmable outputs
  See Section D.1.2 specifications
- Connector
  25 pin D connector (male). Connector is interchangeable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.

D.2.2.  4 In/16 Out DIO Board Specifications
- (4) Programmable inputs
  See Section D.1.1 specifications
- (16) Programmable outputs
  See Section D.1.2 specifications
- Connector
  25 pin D connector (female). Connector is interchangeable with a 20 or 22 pin subminiature D connector dimensionally complying with MIL-C-24308.
Appendix Figure D-4: Digital Inputs/Outputs

[Diagram showing digital input/output circuitry with labels for general-purpose input, sinking driver output, and sourcing driver output.]
D.3. BCD Input Option

BCD can remotely enter load sizes for load out or batching applications. An optional Load Out input board is required. See Appendix Figure D-5 for wiring instructions.

Appendix Figure D-5: BCD Input Option Wiring
D.4. Analog I/O Boards

The analog I/O board is available in two configurations described below. *Type A* (option) has one current output only, whereas, *Type B* has two voltage inputs and two current outputs. The Micro-Tech 3104 can support up to four analog inputs and four analog outputs.

**Type A:** Current Output Board is a user definable 0-24/4-20 or 20-4/20-0 mA output *(Appendix figure D-7).*

- Rate
- Speed, or
- Load
- Optically isolated
- Isolated power source
- Voltage output by adding an internal dropping resistor
- Output range: User selectable 0-20mA or 4-20 mA, representing 0 to 100% variable.
- Resistive load: 800 ohms max.
- Capacitive load: No limit
- Field wiring: Connections are made to the terminal strip on bottom edge of the analog board. Note that connector is removable for ease of termination.

**Appendix Figure D-6: Current Output**

![Current Output Diagram](image-url)
Appendix Figure D-7: Current Output PC Board (Type A)
Type B: Analog Input/Output board has two ±5 VDC differential inputs (Appendix Figure D-9) and two user definable 0-20/4-20 or 20-4/20-0 mA outputs (Appendix Figure D-6).

Inputs
- None
- Setpoint (S.P.)
- Moisture Compensation

Outputs
- None
- Weight
- Rate, or
- Control

Analog inputs are +/-5 VDC. Jumpers W3 and/or W4 are used to select 240 ohm impedance for 0-20/4-20 mA inputs (see Appendix Figure D-10).

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

Max. non-destructive input voltage: 12 V peak
Field wiring: Connections are made to the terminal strip on bottom edge of the analog board. Note that connector is removable for ease of termination.

Appendix Figure D-9: Analog Input

2 current outputs (see Appendix Figure D-6). Same as described in Type A board
Appendix Figure D-10: Analog I/O PC Board (Type B)
D.5. Load Out Option

If your Micro-Tech 3104 is equipped with the Load Out Option, Refer to REC 3910

D.5.1. Load Out (Optional)

The load out option includes additional hardware designed to make the Loss-in-Weight Controller control a batch sequence. Once the system has been set up, the operator enters the load size and gives the start command. The Loss-in-Weight Controller then controls all functions.

START and STOP keys on the front panel are only 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 can be provided by external signals (manual pushbutton 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 or the Comm.

D.6. Communications Options

The following table gives references for specific communications options.

Appendix Table D-3: Communications Options Reference

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Reference Manual</th>
<th>REC Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>068053</td>
<td>Standard Comm A Board</td>
<td>REC 3949</td>
</tr>
<tr>
<td>055517</td>
<td>Allen Bradley RIO</td>
<td>REC 4012</td>
</tr>
<tr>
<td>056713</td>
<td>Profibus-DP</td>
<td>REC 4063</td>
</tr>
<tr>
<td>068147</td>
<td>DeviceNet</td>
<td>REC 4150</td>
</tr>
</tbody>
</table>

D.6.1. Standard Comm A Board

Refer to REC 3949 if the optional communication board is installed.

D.6.2. Allen-Bradley Remote I/O

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

D.6.3. Profibus-DP

Refer to Profibus-DP, REC 4063 if this option is installed.

D.6.4. DeviceNet

Refer to REC 4150 if this option is installed.
Appendix E
Optional Documentation

This appendix contains references to documents that may be useful for installation and operation of your Micro-Tech 3104.

- **REC3952d – Micro-Tech 2105 Belt Loss-in-weight controller – Serial Communications**
- **REC 4153a - DeviceNet Comms Manual MT 2000 Integrators, Model 2105**
- **REC 3910b – Micro-Tech 2000 Model 2101 Integrated Load Out**
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Appendix F
Engineering Drawings

- Field Wiring Diagram Loss-in-Weight Controller – Micro-Tech 3104 – D07361F-E001
- Loss-in-Weight System 3104 Integrator – D07361F-Y001
# Appendix G
Available Analog I/O and A/D Configuration – Micro-Tech 3000 Series

N°1 Out on Mother Board
N°1 Out on Current Out Board (Type A)
N°2 Out  N°2 In on Analog I/O Board (Type B)

## Appendix Table G-1

<table>
<thead>
<tr>
<th>Mod.3101/3102/3104/3105/3107</th>
<th>Analog Out</th>
<th>Analog In</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td># 2</td>
<td># 3</td>
</tr>
<tr>
<td>On Mother Board</td>
<td>Out 1</td>
<td>Out 2</td>
</tr>
<tr>
<td></td>
<td>1st Board (Type B)</td>
<td>2nd Board (Type B)</td>
</tr>
<tr>
<td>On Mother Board</td>
<td>Out 1</td>
<td>Out 2</td>
</tr>
<tr>
<td></td>
<td>Board (Type B)</td>
<td>Board (Type A)</td>
</tr>
<tr>
<td>On Mother Board</td>
<td>Out</td>
<td>Out</td>
</tr>
<tr>
<td></td>
<td>1st Board (Type A)</td>
<td>2nd Board (Type A)</td>
</tr>
</tbody>
</table>

## Appendix Table G-2

<table>
<thead>
<tr>
<th>Mod.3100</th>
<th>Analog Out</th>
<th>Analog In</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td># 2</td>
<td># 3</td>
</tr>
<tr>
<td>On Mother Board</td>
<td>Out 1</td>
<td>Out 2</td>
</tr>
<tr>
<td></td>
<td>1st Board (Type B)</td>
<td>2nd Board (Type B)</td>
</tr>
<tr>
<td>On Mother Board</td>
<td>Out 1</td>
<td>Out 2</td>
</tr>
<tr>
<td></td>
<td>Board (Type B)</td>
<td>Board (Type A)</td>
</tr>
<tr>
<td>On Mother Board</td>
<td>Out</td>
<td>Out</td>
</tr>
<tr>
<td></td>
<td>1st Board (Type A)</td>
<td>2nd Board (Type A)</td>
</tr>
</tbody>
</table>

## Appendix Table G-3

<table>
<thead>
<tr>
<th>Mod.3106</th>
<th>Analog Out</th>
<th>Analog In</th>
</tr>
</thead>
<tbody>
<tr>
<td># 1</td>
<td># 2</td>
<td># 4</td>
</tr>
<tr>
<td>On Mother Board</td>
<td>Out 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Board (Type B)</td>
<td></td>
</tr>
<tr>
<td>On</td>
<td>Out</td>
<td></td>
</tr>
</tbody>
</table>

Thermo Fisher Scientific
Available Analog I/O and A/D Configuration – Micro-Tech 3000 Series  

REC 4185 Rev B
G.1. Available A/D Configuration on Micro-Tech 3000

N°1 A/D Input on Mother Board
N°1 A/D Input on A/D Board (1 Channel)
N°2 A/D Input on A/D Board (2 Channel) (Sensing available only on 1 Channel)

SLOT READY SEQUENCY

<table>
<thead>
<tr>
<th>Slot 1</th>
<th>A/D First</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot 2</td>
<td>A/D Second</td>
</tr>
<tr>
<td>Slot 3</td>
<td>A/D Fourth</td>
</tr>
<tr>
<td>A/D Third</td>
<td></td>
</tr>
</tbody>
</table>

The program reads in this sequence:
- First the A/D channel(s) on Slot 1
- Second A/D channel(s) on Slot 2
- Third A/D channel on Motherboard
- Fourth A/D channel(s) on Slot 3

NOTES:
5. YOU CANNOT INSERT 1 CHANNEL A/D BOARDS IF A 2 CHANNEL A/D BOARD IS PRESENT.
6. 1 CHANNEL A/D BOARDS CAN BE INSERTED INTO ANY SLOT
7. 2 CHANNEL A/D BOARD (S) MUST BE INSERTED ONLY IN SLOT 1 OR 2.
### Mod.3100 – Mod.3102 A/D INPUT

<table>
<thead>
<tr>
<th></th>
<th># 1</th>
<th># 2</th>
<th># 3</th>
<th># 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In1 A/D Board (1ch.) Slot 1</td>
<td>In1 A/D Board (1ch.) Slot 2</td>
<td>A/D In on Motherboard</td>
<td>In1 A/D Board (1ch.) Slot 3</td>
</tr>
<tr>
<td></td>
<td>In1 First A/D Board (2Ch.) Slot 1</td>
<td>In2</td>
<td>In1 Second A/D Board (2Ch.) Slot 2</td>
<td>In2 Not Available</td>
</tr>
<tr>
<td></td>
<td>In1 A/D Board (2Ch.) Slot 1 or 2</td>
<td>In2</td>
<td>A/D In on Motherboard</td>
<td></td>
</tr>
</tbody>
</table>

### Mod.3104 A/D INPUT

<table>
<thead>
<tr>
<th></th>
<th># 1</th>
<th># 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In1 A/D Board (1ch.) Slot 1 or 2</td>
<td>A/D In on Motherboard</td>
</tr>
<tr>
<td></td>
<td>If in Slot 3 In #2</td>
<td>In #1 if A/D Board in Slot 3</td>
</tr>
<tr>
<td></td>
<td>In1 A/D Board (2ch.) Slot 1 or 2</td>
<td>A/D In on Motherboard</td>
</tr>
<tr>
<td></td>
<td>The program recognize A/D Board (2ch.) as A/D Board (1ch.)</td>
<td></td>
</tr>
</tbody>
</table>

### Mod.3101 / Mod.3105 A/D INPUT

<table>
<thead>
<tr>
<th></th>
<th># 1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A/D In on Motherboard</td>
</tr>
<tr>
<td></td>
<td>In1 A/D Board (1ch.) Slot 1 or 2</td>
</tr>
<tr>
<td></td>
<td>In1 A/D Board (2ch.) Slot 1 or 2</td>
</tr>
<tr>
<td></td>
<td>The program recognize A/D Board (2ch.) as A/D Board (1ch.)</td>
</tr>
</tbody>
</table>