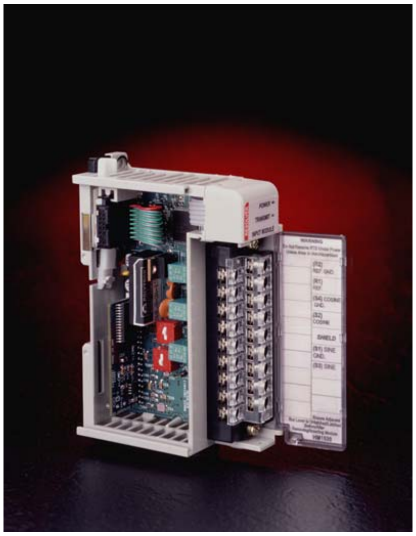
Strain Gage Input Module
Model HM1520E



Instruction Manual

Revised: 03/01/2013

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. “Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls” (Allen-Bradley Publication SGI-1.1) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will the Allen-Bradley Company or Helm Instrument Company be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, the Allen-Bradley Company or Helm Instrument Company cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual we use note to make you aware of safety considerations.

ATTENTION: Identifies information about practices or circumstances that can lead to property damage. Identifies information that is especially important for successful application and understanding of the product.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

ATTENTION: Please check power supply ratings before proceeding! Each tonnage module consumes (+24VDC 65 mA, +5VDC 150mA). Be sure to not overload the power supply.

Helm HM1520E Strain Gage Input Module

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Helm HM1520E Strain Gage Input Module

Preface

Read this preface to familiarize yourself with the rest of this manual. This preface covers the following topics:

- who should use this manual
- the purpose of this manual
- terms and abbreviations
- conventions used in this manual
- Allen-Bradley support

Who Should Use this Manual

Use this manual if you are responsible for the design, installation, programming, or maintenance of an automation control system that used Allen-Bradley small logic controllers.

You should have a basic understanding of PLC products. You should understand electronic process control and be able to interpret the ladder logic instructions required to generate the electronic signals that control your application. If you do not, contact your local Allen-Bradley representative for the proper training before using this product.

Purpose of This Manual

This manual is a learning and reference guide for the Helm StrainGage Module. It contains the information you need to install, wire, and use the module.

Contents of this Manual

Related Documentation

The following documents contain information that may be helpful to you as you use Allen-Bradley SLC products. To obtain a copy of any of the Allen-Bradley documents listed, contact your local Allen-Bradley office or distributor.

For	Read this Document	Document Number
An overview for the MicroLogix™ Programmable Controllers	MicroLogix 1500 Programmable Controllers	1764-UM001A-US-P
A description on how to install and use your MicroLogix Programmable Controller	MicroLogix 1500 Programmable Controller Base Units Installation Instructions and Wiring Diagrams	1764-IN001A-ML-P
A description on how to install the processor into the MicroLogix 1500 Base unit.	MicroLogix 1500 Processor Installation Instructions	1764-IN002A-ML-P
Selecting Discrete Input/Output Modules	Compact Discrete Input/Output Modules Technical Data	1769-2.1
View power usage of expansion modules to determine power supply requirements	Expansion Modules System Qualifier	RA Website Download
End Cap Installation	Compact I/O End Caps/Terminators Installation Instructions	1769-5.16
A complete listing of current Automation Group documentation, including ordering instructions. Also indicates whether the documents are available on CD-ROM or in multi-languages	Automation Group Publication Index	SD499
A glossary of industrial automation terms and abbreviations	Allen-Bradley Industrial Automation Glossary	ICCG-7.1
An article on wire sizes and types for grounding electrical equipment	National Electrical Code	Published by the National Fire Protection Association of Boston, MA.

Terms and Abbreviations

The following terms and abbreviations are used throughout this manual. For definitions of terms not listed here refer to *Allen-Bradley's Industrial Automation Glossary*, Publication ICCG-7.1.

Calibration - Procedure, performed by trained personnel, where machine or press is dynamically loaded to impact on load cells. A process of linearity measuring to determine the loading capacity of the machine.

Calibration Number - Amplification values established during machine calibration or pre-assigned on force load cells.

Channel - Refers to one of two, strain gage inputs available on the modules terminal block.

Chassis - A hardware assembly that houses devices such as I/O modules, adapter modules, processor modules, and power supplies.

Configuration Word - Contains the channel configuration information needed by the module to configure and operate each channel. Information is written to the configuration word through the logic supplied in your ladder program.

Data Word - A 16-bit integer that represent the value of the analog input channel. The channel data word is valid only when the channel is enabled.

Gain - Amplification of an input signal.

Load/Force - Measurement of impact during a machine cycle. Sensors provide the input for this measurement.

Look Window - Resolver or cam activated window, which allows specific degrees in a machine cycle to be processed.

Low Alarm Inhibit - Number of consecutive machine cycles where low alarm is inhibited. Used in a process where machine cycles several times before running speed is established.

LSB - (Least Significant Bit) Refers to a data increment defined as the full scale range divided by the resolution. The bit that represents the smallest value within a string of bits.

Monitor Parts Mode - Status condition used during production run. Sample and compare logic is enabled. On resolver based systems, tracking alarm limits can be enabled.

Multiplexer - A switching system that allows several input signals to share a common A/D converter.

Remote Configuration - A control system where the chassis can be located several thousand feet from the processor chassis.

Terms and Abbreviations (continued)

Resolution - The smallest detectable change in a measurement, typically expressed in engineering units (e.g. 0.15C) or as a number of bits. For example a 12-bit system has 4,096 possible output states. It can therefore measure 1 part in 4096.

Resolver - Sometimes called encoder. Device attached on a machine to determine stroke position. Sine/cosine based resolver required for Helm systems.

Reverse Load - Measurement of negative load/force being exerted on machine following the break-through of material. Also referred to as snap through.

Sample - Load/force values established from a series of machine cycles. Also defined as benchmark.

Sample Count - User input value used to specify how many machine cycles to base the sample on.

Sampling time - The time required by the A/D converter to sample an input channel.

Scale - Value used to describe the press/machine overall tonnage. Set for maximum value of one channel. For example, settings for a 150 ton press = 75.

Setup Mode - Status condition of monitor typically enables during die setup. Machine capacity alarms are enabled. On resolver based systems, press curve alarm can be enabled. This mode is also used during machine and resolver calibrations.

Status Word - Contains status information about the channel's current configuration and operational state. You can use this information in your ladder program to determine whether the channel data word is valid.

Target Load - A reference load established by the user. Used primarily during setup to improve setup time.

Tolerance /Trend Alarm - User defined upper and lower control limits established during the sample and compare process. These limits are established on the peak load and will activate the machine stop relay when exceeded.

Tracking Alarm - Requires resolver input. The sample and compare process is applied to the entire forming force based on user selected upper and lower control limits.

Trend Deviation - Percent of change, high and low, from sample value to current value.

Update Time - The time required for the module to sample and convert the input signals of all enables input channels and make the resulting data values available to the SLC processor.

Common Techniques Used in this Manual

The following conventions are used throughout this manual:

- Bulleted lists such as this one provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.

Product Support

Contact your Helm representative or call Helm direct at 419-893-4356:

- sales and order support
- product technical training
- warranty support
- support service agreements

Your Questions or Comments on this Manual

If you have any suggestions for how this manual could be made more useful to you, please send us your ideas.

Helm HM1520E Strain Gage Input Module

Overview

You have just purchased the most advanced load monitoring solution available. HELM INSTRUMENT COMPANY, INC. manufactures a complete line of load monitoring control solutions for use on metal stamping, forging, compaction and assembly presses; cold forming, cold heating, injection molding and die cast machines.

Standard or custom transducers and load cells are available for in-die monitoring of transfer or progressive tooling.

At HELM, quality is inherent not only in the design of our products but in the attitudes of our employees as well. We're working together to give you the best. After all, that's what our business is all about - providing innovative instrumentation to help make your manufacturing process more productive and your operation more effective.

The Helm strain gage module combines machine and tooling monitoring with programmable limit switch function. User programmable high and low limits protect the machine and tooling to ensure part quality.

Critical setup information can be stored and uploaded as part of a die recipe program. An optional resolver input module is used to compare machine/press tonnage to crank angle for real time signature analysis.

Components

The strain gage module is attached to the controller or to an adjacent I/O module on the din rail. The system is comprised of two parts; the input module and two strain gage based sensors.

Strain Gain Transducer Operation

The primary part of the load monitoring system centers on the measurement. The basic function of the strain gage sensor is to detect the amount of deflection imposed on the press or die as parts are being formed. All strain gage sensors are matched to within 1% and therefore can be replaced without recalibration of the machine.

The Helm strain gage sensors can be mounted to strategic high stress areas of the machine frame or strategically located in tooling or applied to stop blocks. Signals from these sensors are routed to the strain gage module for processing. The strain gage is capable of measuring either a tension or compression signal.

Strain Gage Module Features

- Sample and Compare Logic - processor memorizes the sample or benchmark load and compares each machine cycle against this sample.
- User programmable Sample Count - selectable number of machine cycles on which to base the sample.
- High and Low Capacity Alarm Sets - a discrete load limit for a maximum allowable load and a minimum allowable load.
- High and Low Trend Alarm Sets - set as a percentage of load change on an established sample.
- Low Alarm Inhibit - User programmable option to disable low alarm during process start-up.

Hardware Overview

The strain gage module can be attached to the controller or to an adjacent I/O module before or after din rail mounting. It is a Class 1 module (uses eight input words and eight output words). It interfaces to strain gage based transducers (350ohm or 700ohm).

The module can accept input from two sensors. The module has no output channels. Module configuration requires manual and user programmable setup.

The strain gage module receives and stores digitally converted analog data into its image table for retrieval by processor. The module supports connections from any combination of up to two strain gage sensors.

Any combination of Helm strain gage sensors can be used. Contact Helm for additional information on the type and application of different sensor options.

The Helm module requires (1) input from a cam switch or a proximity sensor for establishing the peak look window.

Getting Started

This chapter can help you to get started using the Helm Strain Gage module. The procedures included here assume that you have a basic understanding of PLC products. You should understand electronic process control and be able to interpret the ladder logic instructions required to generate the electronic signals that control your application.

Because it is a start-up guide, this chapter does not contain detailed explanations about the procedures listed. It does, however, reference other chapters in this book where you can get more information about applying the procedures described in each step. It also references other PLC documentation that may be helpful if you are unfamiliar with programming techniques or system installation requirements.

If you have any questions or are unfamiliar with the terms used or concepts presented in the procedural steps, always read the referenced chapters and other recommended documentation before trying to apply the information.

This chapter will:

- tell you what equipment you need
- explain how to install and wire the module
- show you how to set channels for the sensor input

Required Tools and Equipment

Have the following tools and equipment ready:

- small blade screwdriver
- potentiometer trimmer (tweaker)
- appropriate strain gage cable
- programming equipment

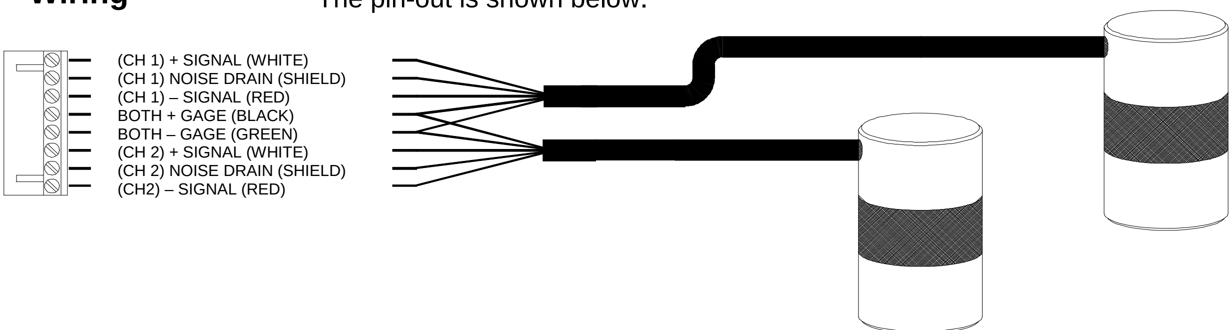
System Operation

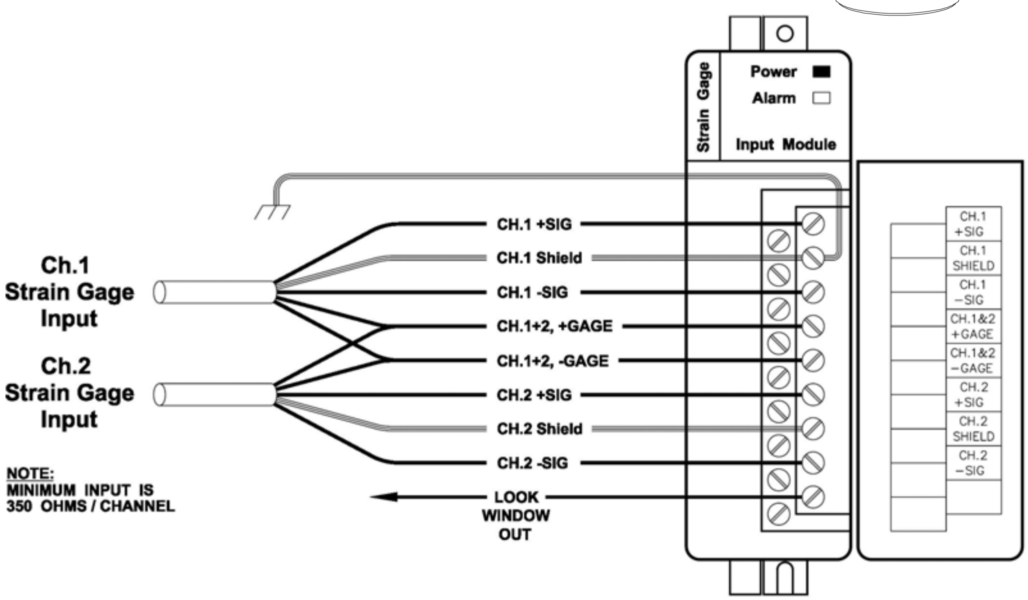
The Strain Gage module communicates to the processor through the parallel backplane interface and receives +5Vdc and +24Vdc power from the power supply through the backplane. No external power supply is required. The MicroLogix and CompactLogix platforms can support up to 8 I/O modules. You may install up to 3 strain gage modules using the base power supply. An additional power supply can be added to support more than 3 modules. Refer to publication 17864-UM100A-US-P for information on expansion power supply systems.

Each individual channel on the module can receive input signals from strain gage based sensors. The module converts the analog values directly into digital values.

Sensor Wiring

The sensors are wired to the modules using the rightmost bank of inputs.
The pin-out is shown below.





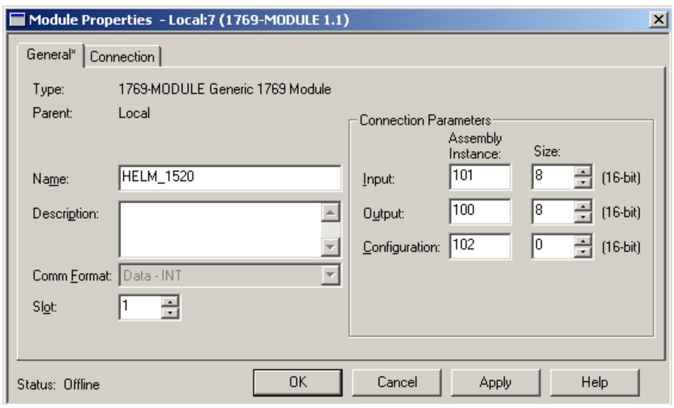
To ensure proper operation and high immunity to electrical noise, always use Helm strain gage cable. To limit noise, keep strain gage cable as far away as possible from power and load lines. The module can support up to two sensor inputs DO NOT attempt to parallel additional gages as you will cause damage to the module and void product warranty.

Channel Configuration Data and Status

RS Logic 500 Configuration:

Product ID Code = 1
Expansion General Configuration
Vendor ID = 3
Product Type = 9
Product Code = 1
Series/Major Rev/Minor Rev = B

RSLogix5000 Configuration – See also Appendix C – Setting up HM1520E



1769-Module Generic
Name: Helm_1520
Comm Format: Data INT

	Assembly	Size
Input:	**101**	**8**
Output:	**100**	**8**
Config:	**102**	**0**

Output Image

No special I/O configuration (SPIO CONFIG) information is required. The module ID code automatically assigns the correct number of input and output words. The following memory map shows how the output and input image tables are defined.
The 8 word output image (output from the CPU to the module) contains information that you configure to define the way a specific channel will work.

Example – If you want to configure channel 2 on the module located in slot 4, the address would be O:4.2.

(o = file type : =element delimiter 4=slot .=word delimiter 2=word)

Bit	Look Window Signal CH 1&2	O:e.0/0
Bit	Bypass Mode CH 1&2	O:e.0/1
Bit	Peak Mode CH 1&2	O:e.0/2
Bit	Monitor Parts Mode Bit	O:e.0/3
Bit	Alarm Reset CH 1&2	O:e.0/4
Bit	Reverse Load CH 1&2	O:e.0/5
Bit	Low Alarm Inhibit CH 1&2	O:e.0/6
Bit	Set Cal Number	O:e.0/7
Bit	D0 Bit of Sample Count	O:e.0/8
Bit	D1 Bit of Sample Count	O:e.0/9
Bit	D2 Bit of Sample Count	O:e.0/10
Bit	D3 Bit of Sample Count	O:e.0/11
Bit	CH1 Auto Zero On-Off	O:e.0/12
Bit	Save Cal Number	O:e.0/13
Bit	Reserved	O:e.0/14
Bit	CH2 Auto Zero On-Off	O:e.0/15
Integer	Scale Value	O:e.1
Integer	Capacity Low Alarm Setting Channel 1 /	O:e.2
	Set Cal Number = 1, CH1 mV/V Set	
Integer	Capacity High Alarm Setting Channel 1	O:e.3
Integer	Capacity Low Alarm Setting Channel 2 /	O:e.4
	Set Cal Number = 1, CH2 mV/V Set	
Integer	Capacity High Alarm Setting Channel 2	O:e.5
Integer	Trend High/Low Alarm Setting Channel 1	O:e.6
Integer	Trend High/Low Alarm Setting Channel 2	O:e.7

Output Image Descriptions

Peak Look Window Bit 0 (O:e.0/0)

When set on (1) the look window is active. When set off (0), the look window is inactive. The module will process data while look window is active.

Bypass Mode Bit (O:e.0/1)
When set on (1) module is in calibration mode. Channels are disabled. No alarms are active.
Only occurs when in Tonnage Calibration Screen.

Peak Mode Bit (O:e.0/2)
When set on (1) module is in setup (peak only monitoring) mode. Capacity alarms are active.

Monitor Parts Mode Bit (O:e.0/3)
When set on (1) module is in Monitor Parts mode. Capacity & Trending alarms are active.

Alarm Reset Bit (O:e.0/4)
When set on (1) alarm reset occurs. Alarm condition must be cleared.

Reverse Load Bit (O:e.0/5)
When set on (1) reverse load values are stored (I:e.1 - I:e.2).

Low Alarm Inhibit Bit (O:e.0/6)
When set on (1) low alarming is disabled for duration. Duration set in ladder counter file.

Set Cal Number (O:e.0/7)
When set on (1) module output addresses O:e.2 and O:e.4 are used to load mV/V values into module.

Sample Count Bits (O:e.0/8-11)
These bits are the binary representation of the number of samples.

CH1 Auto Zero On-Off (O:e.0/12)
When set on (1) in Cal Mode CH1 will balance sensor. When set on (1) in peak or monitor parts mode, it will zero load values developed outside look window.

CH1 Auto Zero On-Off (O:e.0/12)
When set on (1) in Cal Mode CH1 will balance sensor. When set on (1) in peak or monitor parts mode, it will zero load values developed outside look window.

Save Cal Number (O:e.0/13)
When set on (1) the module will save the balance setting or cal number, depending on mode and set bits.

CH2 Auto Zero On-Off (O:e.0/15)
When set on (1) in Cal Mode CH2 will balance sensor. When set on (1) in peak or monitor parts mode, it will zero load values developed outside look window.

Machine Capacity Scale Setting (Integer Word O:e.1)
Represents the total load rating of each load cell. A value must be present to enable module functionality.

Minimum Load Alarm Setting Channel 1 (Integer Word O:e.2)
Set Cal Number O:e.0/7 = 0
Integer value of low capacity alarm setting. Range = 0 to 9999.
A value of 0 disables alarm.

Output Image Descriptions Continued

mV/V Setting Channel 1 (Integer Word O:e.2)
Set Cal Number O:e.0/7 = 1
Integer value of CH1 mV/V setting. Range = 0 to 9999.
A value of 2000 represents 2.000 mV/V.

Capacity Load Alarm Setting Channel 1 (Integer Word O:e.3)
Integer value of high capacity alarm setting. Range = 0 to 9999.
A value of 0 disables alarm.

Minimum Load Alarm Setting Channel 2 (Integer Word O:e.4)
Set Cal Number O:e.0/7 = 0
Integer value of low capacity alarm setting. Range = 0 to 9999.
A value of 0 disables alarm.

mV/V Setting Channel 2 (Integer Word O:e.4)
Set Cal Number O:e.0/7 = 1
Integer value of CH2 mV/V setting. Range = 0 to 9999.
A value of 2000 represents 2.000 mV/V.

Capacity Alarm - High Setting Channel 2 (Integer Word O:e.5)
Integer value of low capacity alarm setting. Range = 0 to 9999

Trend Alarm - Channel 1 High and Low (Integer Word O:e.6)
Integer values of high and low trend alarm settings. Values are set in percent and represent the maximum and minimum percent of change off the sample value. Range = 0 to 99%. High Trend percent is set at high byte of the word value. Low Trend percent is set at low byte of the world value. For example, to set 25% high alarm and a 20% low alarm, the actual word value is 25 * 256 + 20 = 6420. A value of 0 disables alarm.

Trend Alarm - Channel 2 High and Low (Integer Word O:e.7)
Integer values of high and low trend alarm settings. Values are set in percent and represent the maximum and minimum percent of change off the sample value. Range = 0 to 99%. High Trend percent is set at high byte of the word value. Low Trend percent is set at low byte of the world value. For example, to set 25% high alarm and a 20% low alarm, the actual word value is 25 * 256 + 20 = 6420. A value of 0 disables alarm.

Data Table Input Image

The 8-word module input image (input from the module to the CPU) represents data words and status words.

Input words (data words) hold the input data that represents the values of the sensor inputs.

Input words (status bits) contain the various status conditions and reflect the configuration settings you have entered into the output configuration words.

To obtain the status of Channel 2 Capacity Alarm Bit of the module located in slot 2 of the rack, use address I:2

(I =file type : =element delimiter 2 =slot . =word delimiter 0 =word / 2 =bit)

Bit	Channel 1 High Capacity Alarm Bit	I:e.0/0
Bit	Channel 1 Low Capacity Alarm Bit	I:e.0/1
Bit	Channel 2 High Capacity Alarm Bit	I:e.0/2
Bit	Channel 2 Low Capacity Alarm Bit	I:e.0/3
Bit	Channel 1 Trend High Alarm Bit	I:e.0/4
Bit	Channel 1 Trend Low Alarm Bit	I:e.0/5
Bit	Channel 2 Trend High Alarm Bit	I:e.0/6
Bit	Channel 2 Trend Low Alarm Bit	I:e.0/7
Bit	Learn Cycle Indicator Bit	I:e.0/9
Bit	AD Trim Mode	I:e.0/10
Bit	Set Cal Mode	I:e.0/11
Bit	CH1 Sign Bit	I:e.0/12
Bit	CH2 Sign Bit	I:e.0/13
Integer	Channel 1 Load Value	I:e.1
Integer	Channel 2 Load Value	I:e.2
Integer	Channel 1 Deviation value in Percent	I:e.3
Integer	Channel 2 Deviation value in Percent	I:e.4
Integer	Channel 1 Sample value in Ton In Set Cal Mode - CH1 mV/V Status	I:e.5
Integer	Channel 2 Sample value in Ton In Set Cal Mode – CH2 mV/V Status	I:e.6
Integer	Sample Count	I:e.7

Input Image Descriptions

Channel 1 High Capacity Alarm Bit (I:e.0/0)

When on (1) channel 1 load has met or exceeded the high alarm limit.
Load values are stored at integer word I:e.1.

Channel 1 Low Capacity Alarm Bit (I:e.0/1)
When on (1) channel 1 load has met or dropped below the low alarm limit.
Load values are stored at integer word I:e.1.

Channel 2 High Capacity Alarm Bit (I:e.0/2)
When on (1) channel 2 load has met or exceeded the high alarm limit.
Load value is stored at integer word I:e.2.

Channel 2 Low Capacity Alarm Bit (I:e.0/3)
When on (1) channel 2 load has met or dropped below the low alarm limit.
Load value is stored at integer word I:e.2.

Channel 1 High Trend Alarm Bit (I:e.0/4)
When on (1) channel 1 load has met or exceeded the high alarm percentage of sample.
Load values are stored at integer word I:e.1.
Percent of deviation of sample is stored at integer word I:e.5
Percent of deviation of sample is stored at integer word I:e.5

Channel 1 Low Trend Alarm Bit (I:e.0/5)
When on (1) channel 1 load has met or dropped below the low alarm percentage of sample.
Load values are stored at integer word I:e.1.
Percent of deviation of sample is stored at integer word I:e.5

Channel 2 High Trend Alarm Bit (I:e.0/6)
When on (1) channel 2 load has met or exceeded the high alarm limit.
Load value is stored at integer word I:e.2.
Percent of deviation of sample is stored at integer word I:e.6

Channel 2 Low Trend Alarm Bit (I:e.0/7)
When on (1) channel 2 load has met or dropped below the low alarm percentage of sample.
Load value is stored at integer word I:e.2.
Percent of deviation of sample is stored at integer word I:e.6

Learn Cycle Indicator Bit (I:e.0/9)
When on (1) module is sampling tonnage values.

AD Trim Mode Bit (I:e.0/10)
When on (1) the module is in AD Trim mode.

Set Cal Mode Bit (I:e.0/11)
When on (1) the module is in the Set Cal mode.

CH1 Sign Bit (I:e.0/12)
When on (1) the channel 1 peak value is negative.

CH2 Sign Bit (I:e.0/13)
When on (1) the channel 2 peak value is negative.

Input Image Descriptions

Channel 1 Load Value (I:e.1)
Integer word represents peak load on channel 1 for current machine cycle.

If Reverse Bit (O:e.0/5) is on (1) value is reverse load on channel 1 for current machine cycle.

Channel 2 Load Value (I:e.2)
Integer word represents peak load on channel 2 for current machine cycle.
If Reverse Bit (O:e.0/5) is on (1) value is reverse load on channel 2 for current machine cycle.

Channel 1 Percent of Deviation (I:e.3)
Integer word represents the percentage of change current peak load is to sample peak load.

Channel 2 Percent of Deviation (I:e.4)
Integer word represents the percentage of change current peak load is to sample peak load.

Channel 1 Average Sample Value (I:e.5)
Integer word represents the average of the sample load values on channel 1 in Tons.

Channel 2 Average Sample Value (I:e.6)
Integer word represents the average of the sample load values on channel 2 in Tons.

Sample Counter (I:e.7)
Counter used for number of Sample Count.

Integer File

Using RSLogix software, reserve one integer and one counter file for tonnage monitoring.

For illustration purposes in this manual, we have reserved Integer file N10:0 - N10:35.

Data	Description	Address
Integer	Channel 1 Trend Deviation in percent	N10:1
Integer	Channel 2 Trend Deviation in percent	N10:2
Integer	Channel 1 Low Trend Alarm Setting	N10:3
Integer	Channel 1 High Trend Alarm Setting	N10:4
Integer	Channel 2 Low Trend Alarm Setting	N10:5
Integer	Channel 2 High Trend Alarm Setting	N10:6
Integer	256 Multiply register	N10:7
Integer	Channel 1 Peak Value in Tons	N10:8
Integer	Channel 2 Peak Value in Tons	N10:9
Integer	Channel 1 High Capacity Alarm Setting	N10:11
Integer	Channel 1 Low Capacity Alarm Setting	N10:12
Integer	Channel 2 High Capacity Alarm Setting	N10:13
Integer	Channel 2 Low Capacity Alarm Setting	N10:14
Integer	Scale	N10:15
Bit	Channel 1 High Capacity Alarm	N10:16/0
Bit	Channel 1 Low Capacity Alarm	N10:16/1
Bit	Channel 2 High Capacity Alarm	N10:16/2
Bit	Channel 2 Low Capacity Alarm	N10:16/3
Bit	Channel 1 High Trend Alarm	N10:16/4
Bit	Channel 1 Low Trend Alarm	N10:16/5
Bit	Channel 2 High Trend Alarm	N10:16/6
Bit	Channel 2 Low Trend Alarm	N10:16/7
Bit	Learn Cycle Bit	N10:16/9
Bit	Low Alarm Inhibit Bit	N10:16/10
Bit	Alarm Indication Bit (Module Alarm Bit)	N10:16/11
Integer	Low Alarm Inhibit Cycle Count	N10:17
Integer	# Samples (set from 1 to 16)	N10:18
Integer	Current Running Sample Counter	N10:19
Integer	Mode Status Value	N10:20

Integer File

Bit	Cam Cycle Bit	N10:21/0
Bit	Press in Motion Bit	N10:21/1
Bit	Reverse Load Bit	N10:21/6
Bit	Alarm Reset Bit	N10:21/7
Bit	Set Cal Number	N10:21/8
Integer	Channel 1 Calibration Value	N10:22
Integer	Channel 2 Calibration Value	N10:23
Integer	Tonnage Alarm Status	N10:24
Integer	Channel 1 mV/V Setpoint	N10:25
Integer	Channel 2 mV/V Setpoint	N10:26
Integer	Channel 1 Actual mV/V	N10:27
Integer	Channel 2 Actual mV/V	N10:28
Bit	Channel 1 Sign Bit	N10:32/2
Bit	Save to EEPROM Bi	N10:32/3
Bit	Set Cal Mode Indication Bit	N10:32/4
Bit	Channel 2 Sign Bit	N10:32/8
Bit	Auto Zero On-Off Channel 2	N10:32/12
Bit	AD Trim Mode Indication Bit	N10:32/14
Bit	Auto Zero On-Off Channel 1	N10:32/15
Integer	Channel 1 Sample Peak in Tons	N10:33
Integer	Channel 2 Sample Peak in Tons	N10:34

Initial Setup Procedures

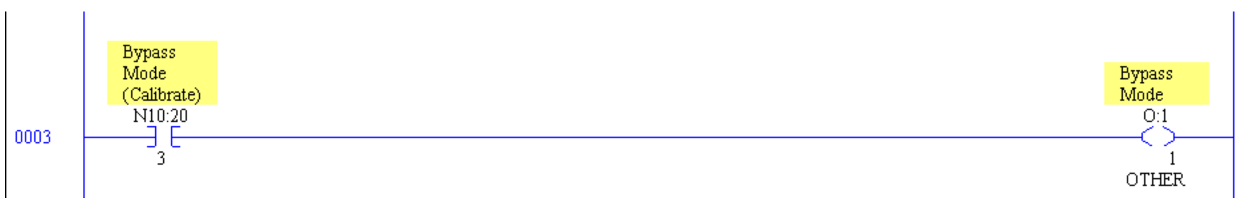
A complete listing of a sample ladder logic program is included at the back of this manual. Examples shown here are for reference.

All values are 0 (default) on initial start-up. This means that all alarms are disabled. You must make the following adjustments for proper operation:

- **set calibration numbers**
- **set meter scale**
- **set capacity (maximum load) alarms**
- **set minimum load alarms**
- **set sample count**
- **set trend alarms**

Step 1. Set the Run mode bit to Bypass

⇒ From your operator interface, put the tonnage module into bypass mode. (Both the setup and run lights on the tonnage module should be off.)



NOTE: Make sure that only 1 bit is set at any time for Mode Status Value, integer N10:20.

Step 2. Balance Sensor Input (In Bypass Mode)

1. If ON (1), Turn Auto Zero OFF (0) for Desired Channel (N10:32/12,N10:32/15).
2. Turn Auto Zero ON (1) for Desired Channel (N10:32/12,N10:32/15).
3. When Cal Value (N10:22, N10:23) equals 0, Turn Auto Zero OFF.
4. Momentarily toggle the Save to EEPROM Bit (N10:32/3).

Step 3. Set Calibration Numbers (In Bypass Mode)

1. Turn Set Cal Number Mode Bit ON (1) (N10:28/8)
2. Enter mV/V Cal Number for the desired Channel (N10:25, N10:26)
   - ⇒ Refer to Initial Cal Number Selection on Page 4-2
   - ⇒ A setting of 2.000 mV/v is entered as 2000
3. Momentarily toggle the Save to EEPROM Bit (N10:32/3).

Initial Setup Procedures

Cal Number Selection:

Load Cell:

Use the mv/V output value listed on Load Cell Certificate. For most strain gage load cells, that value will be in a range from 1.000 to 2.000 mv/V. Nominal 2.000 mv/V is the most common and the industry standard. For 2.000 mv/V, enter 2000.

In the absence of a known mv/V output value for the load cell, use an initial value of 2.000 mv/V (enter 2000). The cell can then be "Field Calibrated", using a known reference load. The mv/V value should be adjusted up or down as needed so that the load cell readout equals the known reference load value. Please note that **to make the load cell readout read smaller, the mv/V value should be increased.** Also, **to make the load cell readout read bigger, the mv/V value should be decreased.**

HT-400 Strain Gain Sensor Installed on Press Structure, PREVIOUSLY CALIBRATED:

For a press that has been previously calibrated and the Calibration Numbers are known, entering the corresponding mv/V calibration value for the HM-1520E module is very simple. Previously calibrated systems may involve Helm tonnage monitors such as Model TLG Loadgards, RLG Loadgards, PTM Loadgards, HM-1520 PLC Strain Gage Modules, etc. The Calibration Numbers for those systems are typically "% Cal Numbers" at a certain shunt resistance, and are also called "Shunt Calibration Values". The % Cal Numbers can be easily converted to the equivalent mv/V Calibration Values by using the example below.

Example:

Existing % Cal Number = 50% at 1 Megohm Shunt Resistance (High Gain)

Use formula: **mv/V Cal Value = (9.125)/(% Cal Number at 1 Meg)**

For example value: mv/V Cal Value = (9.125)/(50) = .1825 mv/V (Enter 1825)

Note: For the above formula to work, the Existing % Cal Number <u>must</u> be expressed at a 1 Megohm shunt resistance value.

Depending upon the particular calibration, the shunt resistance value may be different from the 1 Megohm (1000 K Ohms) value shown above. A % Cal Number at a different shunt value can be converted to the equivalent 1 Megohm shunt resistance value by using the following simple formula.

New % Cal Number at 1 Megohm = (Original % Cal number) x (Orig. Shunt K Ohms)/(1000 K)

Example: Original % Cal Number = 90% at 140K Ohm Shunt Resistance Value (Low Gain)

New % Cal Number at 1 Meg = (90) x (140K)/(1000K) = 12.6% at 1 Megohm

HT-400 Strain Gain Sensor Installed on Press Structure, NEW CALIBRATION:

Low Deflection Press (Low Strain at Sensor Location):

For a Low Deflection press, the strain at the sensor will be low, and the corresponding mv/V output of the sensor will be low. This means that the HM1520E module will have to run at High Gain.

For a Low Deflection/High Gain situation, use an initial mv/V Calibration Value of .1825 mv/V (Enter 1825). For reference, this value is equivalent to a % Cal Number of 50% at 1 Megohm shunt resistance. As the press is cycled with calibration load cells to generate a known load at capacity, compare the Strain Gain sensor reading to the calibration load cell actual tonnage. The mv/V value should be adjusted up or down as needed so that the Strain Gain sensor readout equals the calibration load cell value. Please note that **to make the load cell readout read smaller, the mv/V value should be increased.** Also, **to make the load cell readout read bigger, the mv/V value should be decreased.**

High Deflection Press (High Strain at Sensor Location):

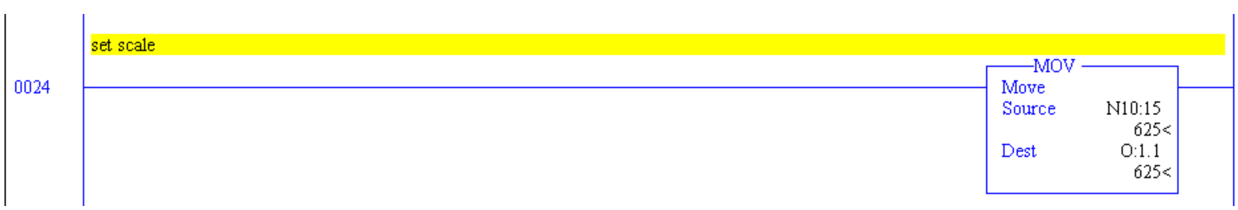
For a High Deflection press, the strain at the sensor will be high, and the corresponding mv/V output of the sensor will be high. This means that the HM1520E module will run at Low Gain.

For a High Deflection/Low Gain situation, use an initial mv/V Calibration Value of .6518 mv/V (Enter 6518). For reference, this value is equivalent to a % Cal Number of 100% at 140K shunt resistance. As the press is cycled with calibration load cells to generate a known load at capacity, compare the Strain Gain sensor reading to the calibration load cell actual tonnage. The mv/V value should be adjusted up or down as needed so that the Strain Gain sensor readout equals the calibration load cell value. Please note that **to make the load cell readout read smaller, the mv/V value should be increased.** Also, **to make the load cell readout read bigger, the mv/V value should be decreased.**

Step 4. Set Machine Capacity Scale

The three position switch should be placed in the ON (top) position.

This setting is based off of one channel. It represents the maximum allowable load or tonnage from one sensor location. Integer N10:14 should be set from your operator interface.



Setting Machine Capacity Scale using (1) two channel force module:

If 2 sensors are installed on the left and right sides of a 60 ton press, set the Scale to 30 (maximum capacity of one sensor).

Use the following table as a reference for setting the Machine Capacity Scale for a single force module installation with two sensors. Divide the press/machine capacity by the number of sensors (2) and set Scale to the result.

PRESS CAPACITY	SCALE SETTING	PRESS CAPACITY	SWITCH SETTING	PRESS CAPACITY	SWITCH SETTING
20	10	30	15	40	20
45	22	50	25	60	30
80	40	110	55	150	75
...					
200	100	250	125	300	150

If 2 sensors are installed in the tooling rather than on the press structure, set the Machine Capacity Scale to the highest load/tonnage of one sensor.

Setting Machine Capacity Scale for multiple channel systems.

Divide the Machine capacity by the number of sensors and set Machine Capacity Scale on all modules to the result.

Example: If 2 load modules are used for monitoring a straight side press with 4 sensors mounted on the press columns, set the Machine Capacity Scale on both modules to the highest load/tonnage of one sensor.

Use the following table as a reference for setting the Machine Capacity Scale for a system comprised of (2) force modules and (4) sensors.

PRESS CAPACITY	SWITCH SETTING (same on all modules)	PRESS CAPACITY	SWITCH SETTING (same on all modules)	PRESS CAPACITY	SWITCH SETTING (same on all modules)
100	25	125	31	150	37
175	43	200	50	250	62
275	68	300	75	350	87
400	100	450	112	500	125
...					
800	200	1000	250	1200	300

Step 5. Set Capacity Alarms

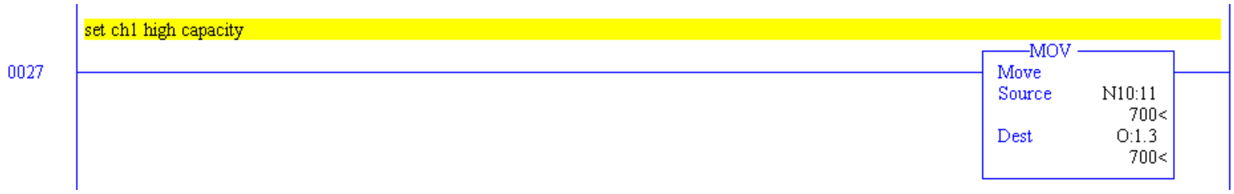
This value is a discrete load/tonnage value, not a percentage.

NOTE: Although the range of values for capacity alarm settings is 0 to 9999, it is recommended that you do not enter values that exceed the capacity rating of the machine/press. A value of 0 disables capacity alarm set.

To determine the maximum rating for each channel, divide the total machine/press capacity by the number of sensor inputs. EXAMPLE: A press or slide rated at 100 tons with a (2) channel force module would have a capacity alarm setting of 50 tons per sensor input.

This setting differs from the Scale setting as it can be adjusted up or down depending on the nature of the process.

The recommended maximum value is 195% of Machine Capacity Scale.

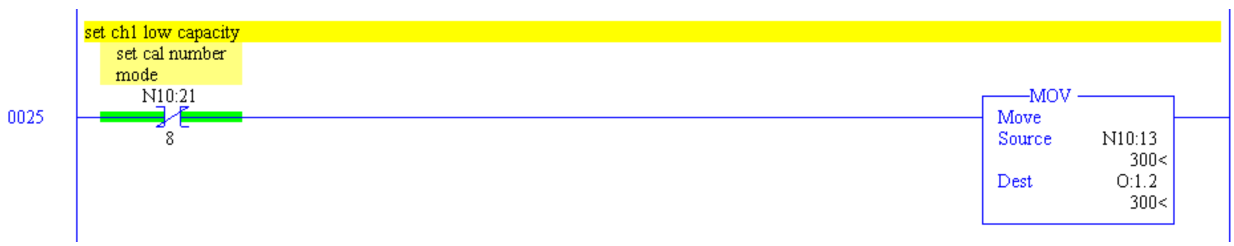


Step 6. Set Minimum Low Alarm

This value is a discrete load/tonnage value, not a percentage.

The range of this value is 0 to 9999. A value of 0 disables Minimum Low Alarm. Use a value here that represents a minimum load/tonnage that is acceptable for the process.

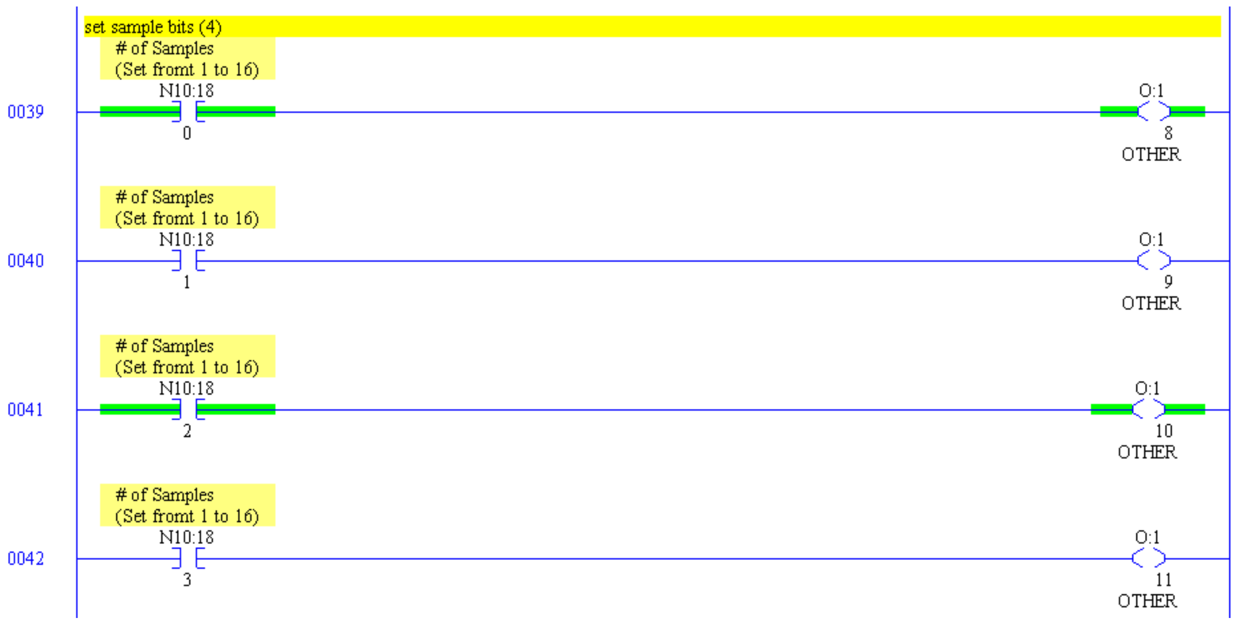
Use this alarm setting when running in Peak Mode to alarm against low load/tonnage hits.



Step 7. Set Sample Count

The sample count is a user programmable parameter that tells the processor how many machine strokes are required to establish sample or benchmark load values. The value can range from 0 to 16. A value of 0 invalidates the Monitor Parts mode. You should set Sample Count to a minimum of 1 to enable Monitor Parts mode.

Note: Each time you change Monitor Parts mode bit from ON to OFF, the sample value is cleared. During normal operations, Monitor Parts mode is enabled when beginning a process run. If the process varies due to change in material thickness, for example, it may be necessary to take a new sample.



Initial Setup Procedures

Step 8. Set Trend Alarms

The Trend Alarm settings are established as a percentage of allowable change in load. These percentages are applied to the sample load values. There is a High Trend Alarm set and a Low Trend Alarm set for each channel. The limits can range from 0 to 99%. A setting of 0 disables the alarm.

These alarms are active when the Monitor Parts Mode bit is ON. When monitor parts mode is enabled, the sample process takes place.

Example: Monitor Parts mode is enabled with a sample count of 4 and high and low Trend Alarms set at 10%. The load generated on the next 4 machine cycles is averaged to obtain the sample value for each channel. A sample of 30 tons is calculated for channel 1 and a sample of 40 tons is calculated for channel 2.

If any succeeding machine stroke develops tonnage of 33 (10% of 30 = 3 tons) or higher on channel 1 the High Trend Alarm is reached and the alarm bit is turned ON. If tonnage falls to 27, the Low Trend Alarm set is reached and the alarm bit is turned ON.

You have completed the basic setup and the module is operational.

Additional Application Notes

Mode Status
The three modes are Bypass, Peak, Monitor Parts

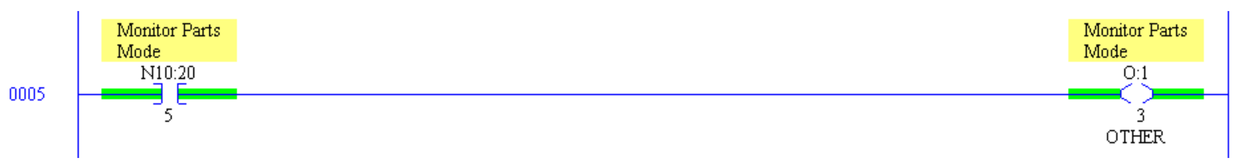
Bypass Mode
Used for module setup and at the time of calibration. All alarms are disabled in bypass mode.

Peak Mode

In Peak Mode operation, the high capacity alarms and the low minimum alarms are active. There is no sample calculation and high and low Trend alarms are inactive. This mode is used primarily during machine setup operations.

Monitor Parts Mode

When Monitor Parts Mode bit is turned ON, the sample is calculated based on the number of sample counts and the high and low Trend alarms are activated. The High Capacity and Low Minimum Alarms remain active.



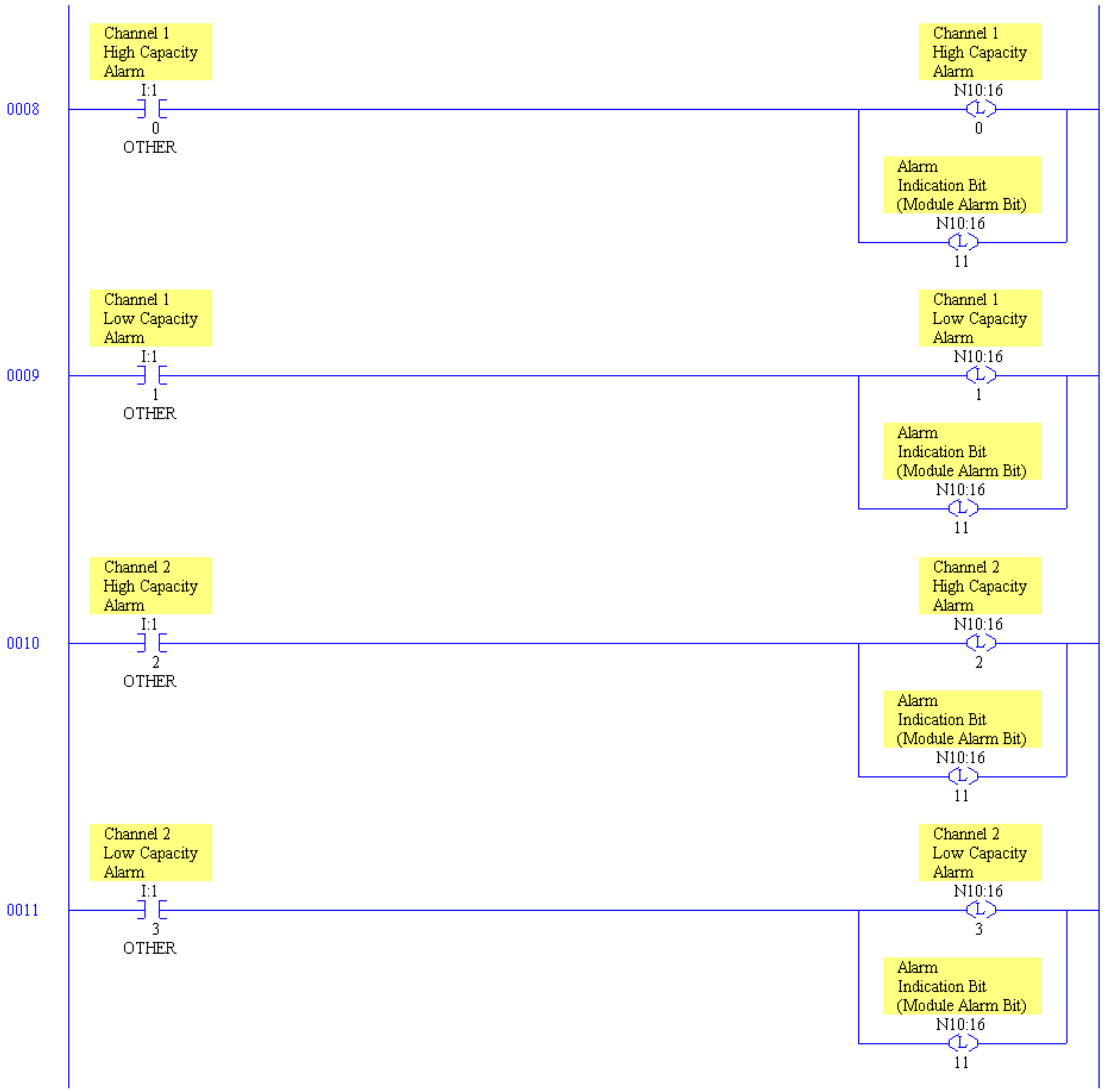
The panel function switch in these 3 rungs need to be a button on your operator interface (multistate pushbutton with 3 states) that writes 3 different values to tag N10:20

1st state - 8 bypass
2nd state - 16 peak
3rd state - 32 monitor parts

Additional Application Notes

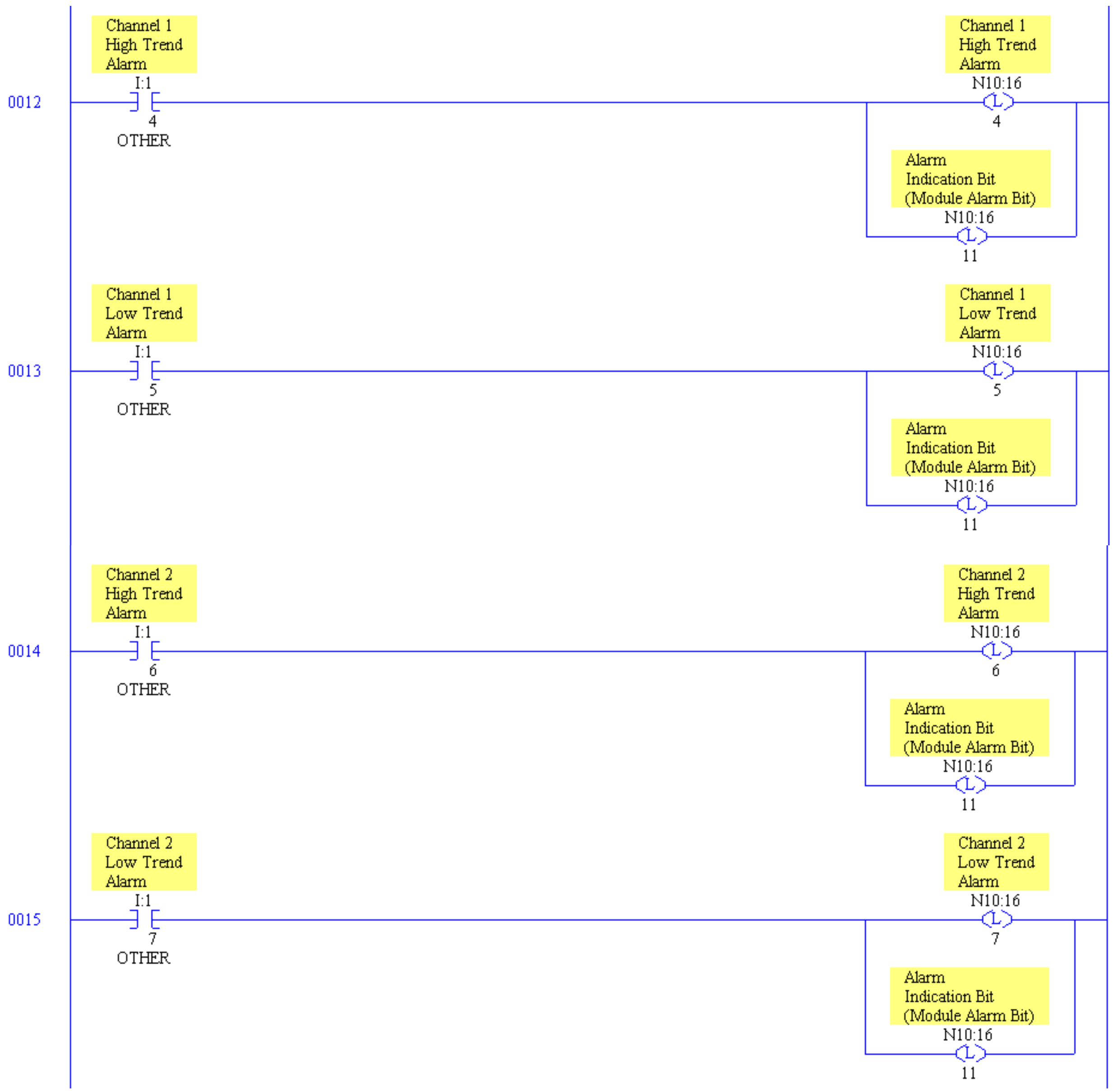
Alarm Bits - 9 bits used to determine which alarm condition is detected.

High Capacity and Low Capacity Alarm bits - Channel 1 & Channel 2



Additional Application Notes

Trend High and Low Alarm bits



Machine / Top Stop bit

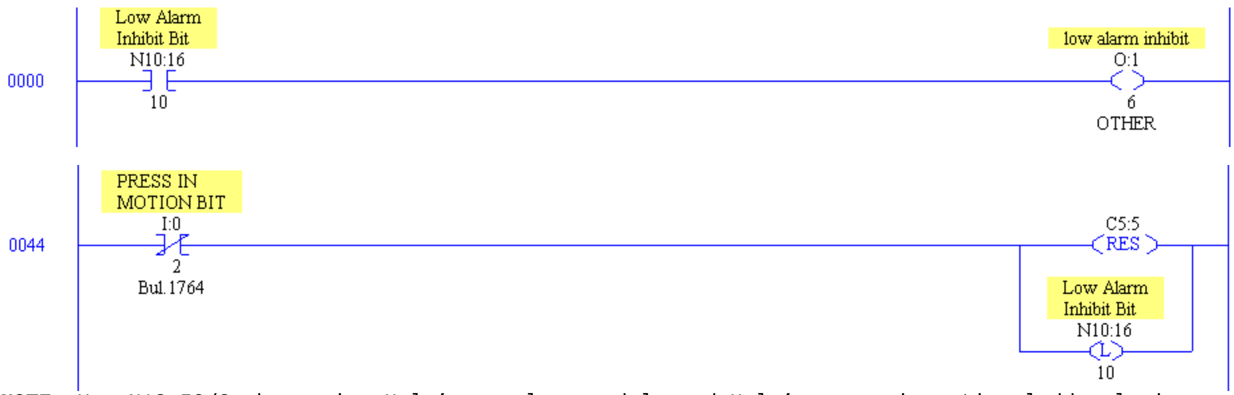
```
CAUSES EITHER E-STOP OR TOP STOP RELAY TO DROP OUT WHEN THERE IS A TONNAGE
FAULT
| CH'S 1&2  |                                                                                    E-STOP OR   |
| MODULE    |                                                                                    TOP STOP    |
| ALARM BIT |                                                                                    RELAY       |
|    N10:16                                                                                       O:2      |
|----]/[-------------------------------------------------------------------------------------------( )-----|
|       11                                                                                             0     |
```

NOTE: Customer mapped in output module.

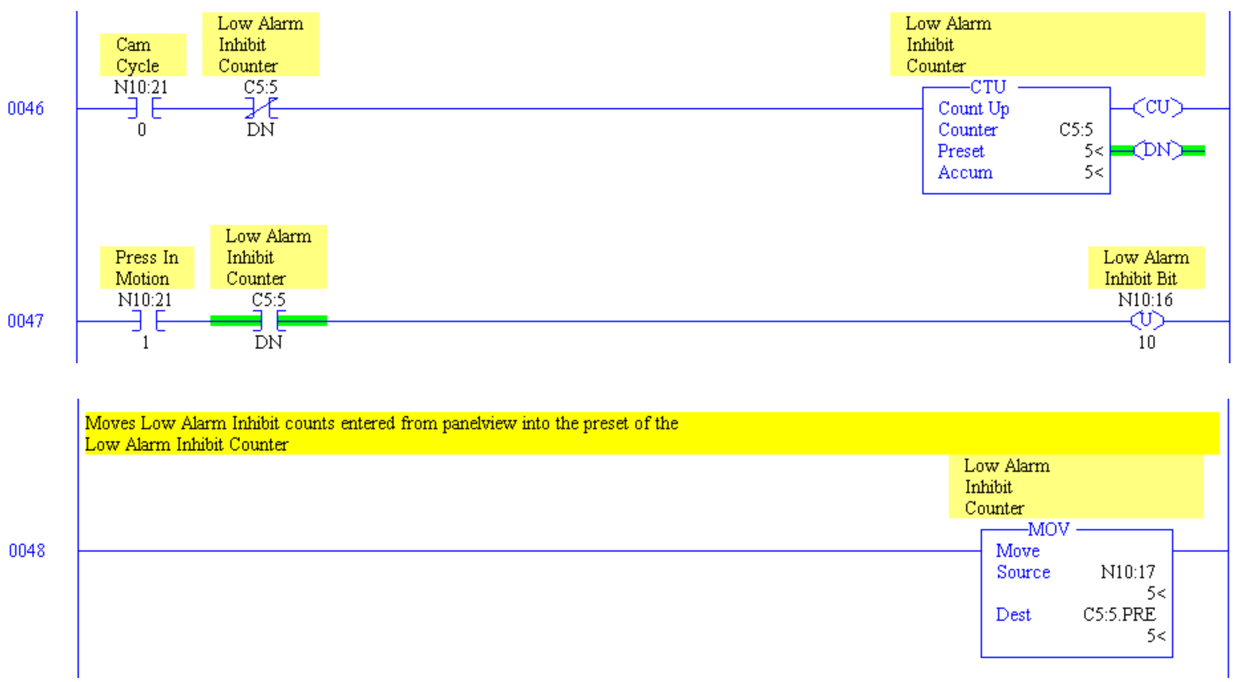
Additional Application Notes

Low Alarm Inhibit

In some processes it may be necessary to inhibit the Low Capacity alarm during machine ramp up. Use the following example to set the low alarm inhibit bit based on a counter.



NOTE: Use N12:50/2 when using Helm's resolver module and Helm's press in motion ladder logic or use customer's own press in motion bit.



Additional Application Notes

Peak Look Window

The following example details the peak look window requirement.

```
Rung 2:3
SETS UP CAM WINDOW FOR TONNAGE MODULE
|                                                                                                                   PANELVIEW  |
|                                                                                                                   AND CH'S   |
|                                                                                                                   1&2 MODULE |
|                                                                                                                   CAM CYCLE  |
|                                                                                                                   BIT        |
| +LIM---------------+                                                                                                N10:21   |
|-+LIMIT TEST        +--------------------------------------------------------------------------------------------( )-----|
| |Low Lim         90|                                                                                                   0     |
| |                  |                                                                                                         |
| |Test        N153:0|                                                                                                         |
| |                 0|                                                                                                         |
| |High Lim       220|                                                                                                         |
| |                  |                                                                                                         |
| +------------------+                                                                                                         |
```

\- OR –

```
Rung 2:7
|           |                                                       |
| prox probe|                                                       |
| or rotary |                                           ch's 1&2    |
| cam input |                                           cam bit     |
|    I:4                                                   N10:21   |
|----] [--------------------------------------------------( )-----|
|       0                                                     0     |
```

Note: Customer mapped in input.

Input for the Look Window can be obtained from a rotary cam limit switch, proximity probe or position resolver.

N10:21/1 Indicates the machine stop and start status on the Panel.
This bit is set to 1 (ON) when a module alarm occurs.

N10:21/0 Set bit to 1 (ON) during peak window time, clear at other times.

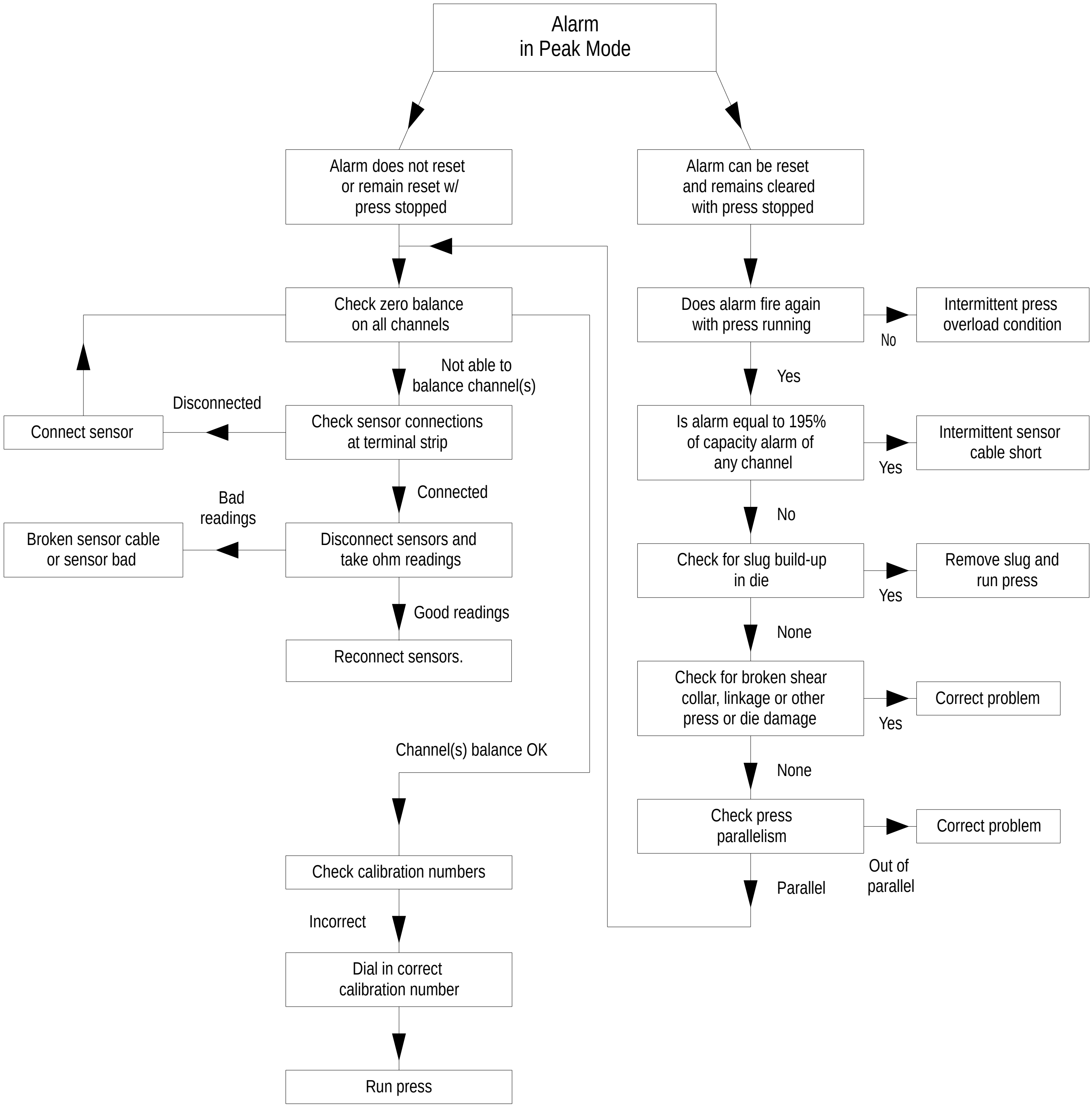
System Trouble-shooting Guide

Make sure three position switch is in top (ON) position. (See diagram page 1-3)

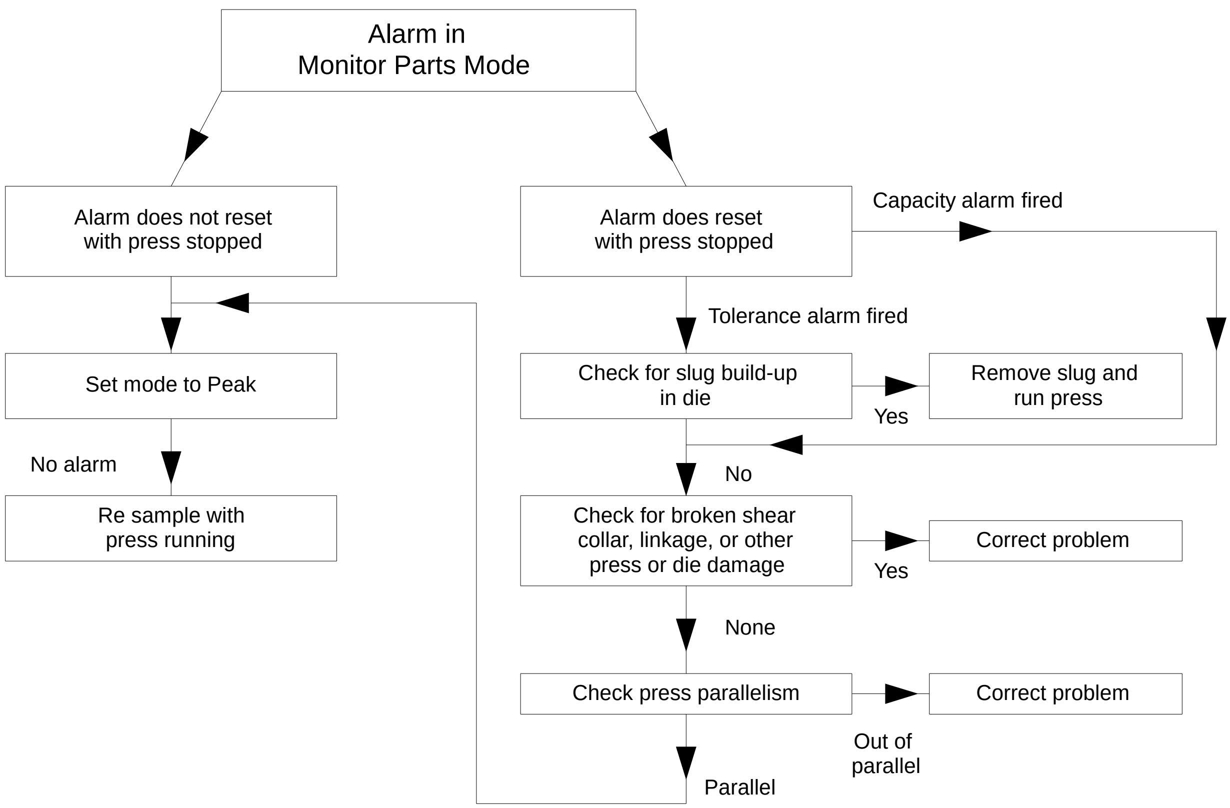
HT-400 Sensor Ohm Readings

Green-Black.	350 ohms
Red-White	350 ohms
All other color combinations	266 ohms
All colors to Ground.	open
Shield to Ground	open

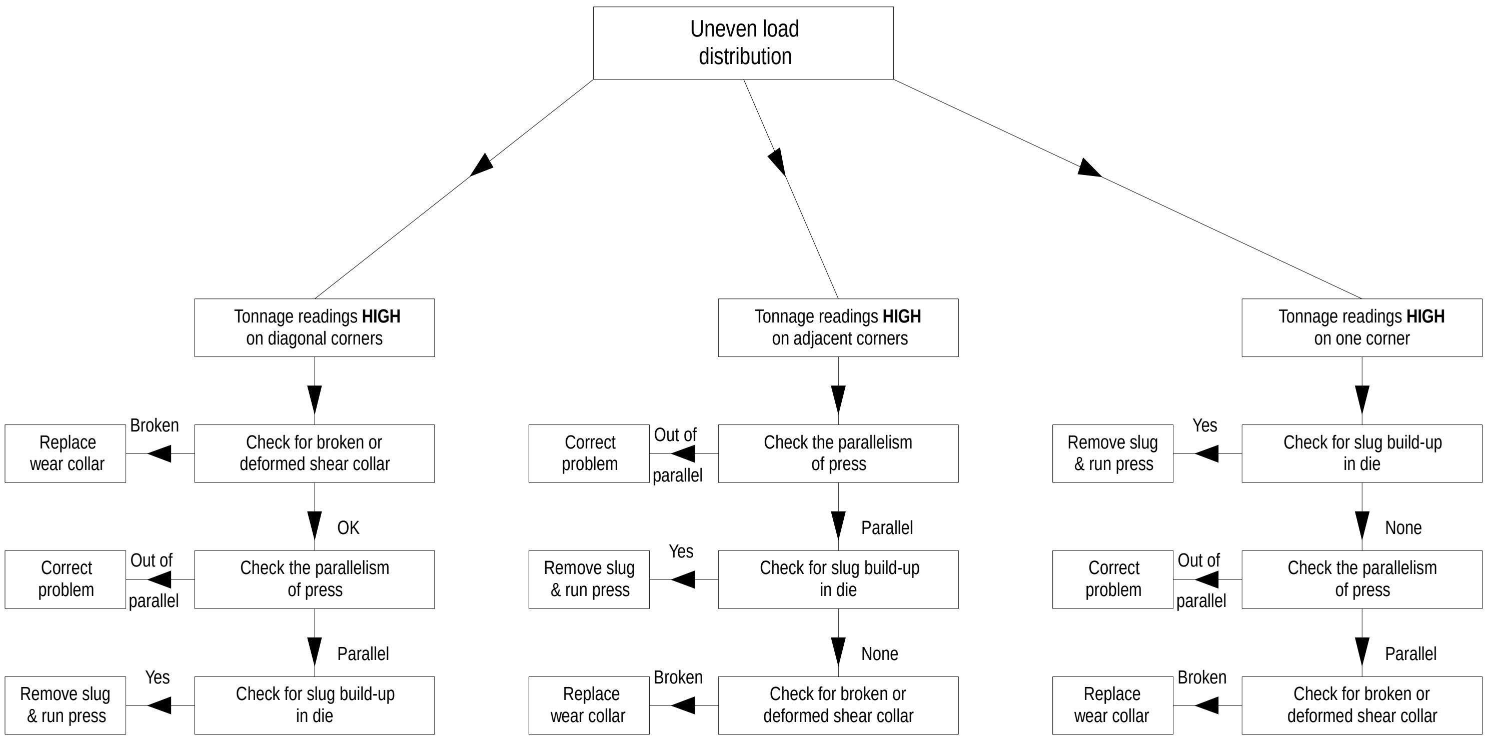
System Trouble-shooting Guide



System Trouble-shooting Guide



System Trouble-shooting Guide



Appendix A

Electrical Specifications:

Backplane Current Consumption	
Backplane Power Consumption	10W
Number of Channels	2 (isolated)
I/O Chassis Location	Any I/O module slot except 0
A/D Conversion Method	Successive Approximation - 12 bit
Normal Mode Rejection (between + input and - input)	50 db at 2000 gain
AMP roll-off frequency	650 Hz at 3000 Gain
Current Rating	132mA @ 5V 70mA @ 24V
Calibration	PRogrammable
Isolation	500 VDC continuous between inputs and chassis ground, and between inputs and backplane

Physical Specifications:

LED Indicators	6 LED's for alarm status
Module ID Code	3535
Recommended Cable	Strain Gage Cable (Helm part number 6117)
Terminal Strip	8-pin removable

Environmental Specifications:

Operating Temperature	0°C to 60°C (32°F to 140°F)
Hazardous Environment Classification	Class 1 Division 2 Hazardous Environment

Input Specifications:

Type of Input	Strain Gage (350 ohm, 700 ohm)
Input Impedance	1K
Display Resolution	Up to 0.1% of full scale
Overall Module Accuracy	1% of full scale
Module Update Time	140 µsec

Appendix B

Ladder Programming Summary:

Appendix B, Section 2 - ladder interface for a 2 channel tonnage system

Appendix B, Section 3 - ladder interface for a 4 channel tonnage system

Appendix B, Section 4 - ladder file required for every strain gage module in your plc. Ex: 2 tonnage modules = 2 files, each with a different integer table and different I/O addresses.

Note: 1.) For 2 channel system - use ladder in sections 2 & 4

2.) For 4 channel system - use ladder in sections 3 and have 2 files same as section 4, the file for CH'S 1 & 2 uses integer N10 and file and file for CH'S 3 & 4 uses integer N11.

3.) If creating a system with more than 2 strain gage modules, use Appendix B, Section 3 as a reference. This file has all the common integers needed for each strain gage module.

Appendix B

Items needed to map into program:

1.) Press in motion bit

a.) If you are using Helm HR-1101 resolver for position input and are using our sample ladder:

```
| helm's    |                                                      press in   |
| press in  |                                                      motion bit |
| motion bit|                                                                 |
|   N12:50                                                          N10:21    |
|----] [-------------------------------------------------------------( )-----|
|       2                                                               1    |
```

b.) If you have your own press in motion bit

```
| customer  |                                                      press in   |
| press in  |                                                      motion bit |
| motion bit|                                                                 |
|     N7:0                                                          N10:21    |
|----] [-------------------------------------------------------------( )-----|
|       0                                                               1    |
```

2.) Resolver or a rotary cam or prox probe

a.) If using resolver, map the angle value into N153:0

```
SETS UP CAM WINDOW FOR TONNAGE MODULE
|                                                                                                                   PANELVIEW  |
|                                                                                                                   AND CH'S   |
|                                                                                                                   1&2 MODULE |
|                                                                                                                   CAM CYCLE  |
|                                                                                                                   BIT        |
| +LIM---------------+                                                                                                 N10:21  |
|-+LIMIT TEST        +--------------------------------------------------------------------------------------------------( )-----|
| |Low Lim        600|                                                                                                     0    |
| |                  |                                                                                                          |
| |Test        N153:0|                                                                                                          |
| |                 0|                                                                                                          |
| |High Lim      2830|                                                                                                          |
| |                  |                 Note : Centers Signature in look window.                                                 |
| +------------------+                                                                                                          |
```

Appendix B

b.) If using rotary cam or prox probe and it' a:

1.) 2 CH system, modify rung 2:3

```
|              |                                                        |
| prox probe|                                                          |
| or rotary |                                           ch's 1&2       |
| cam input |                                           cam bit        |
|    I:4                                                   N10:21      |
|----] [-------------------------------------------------------( )-----|
|       0                                                     0        |
```

2.) 4 CH system, modify rung 3:3

```
|                                                                      |
| prox probe                                                           |
| or rotary                                            ch's 1&2        |
| cam input                                            cam bit         |
|    I:4                                                  N10:21       |
|----] [----------------------------------------------+----( )-----+-|
|       0                                             |       0     | |
|                                                     |             | |
|                                                     |             | |
|                                                     | ch's 3&4    | |
|                                                     | cam bit     | |
|                                                     |    N11:21   | |
|                                                     +----( )-----+ |
|                                                             0        |
```

NOTE: Make sure prox probe or rotary cam is on between 90 to 220°

3.) Top Stop or E-Stop

a.) 2 CH system, modify rung 2:13 for where top stop or e-stop relay is connected.

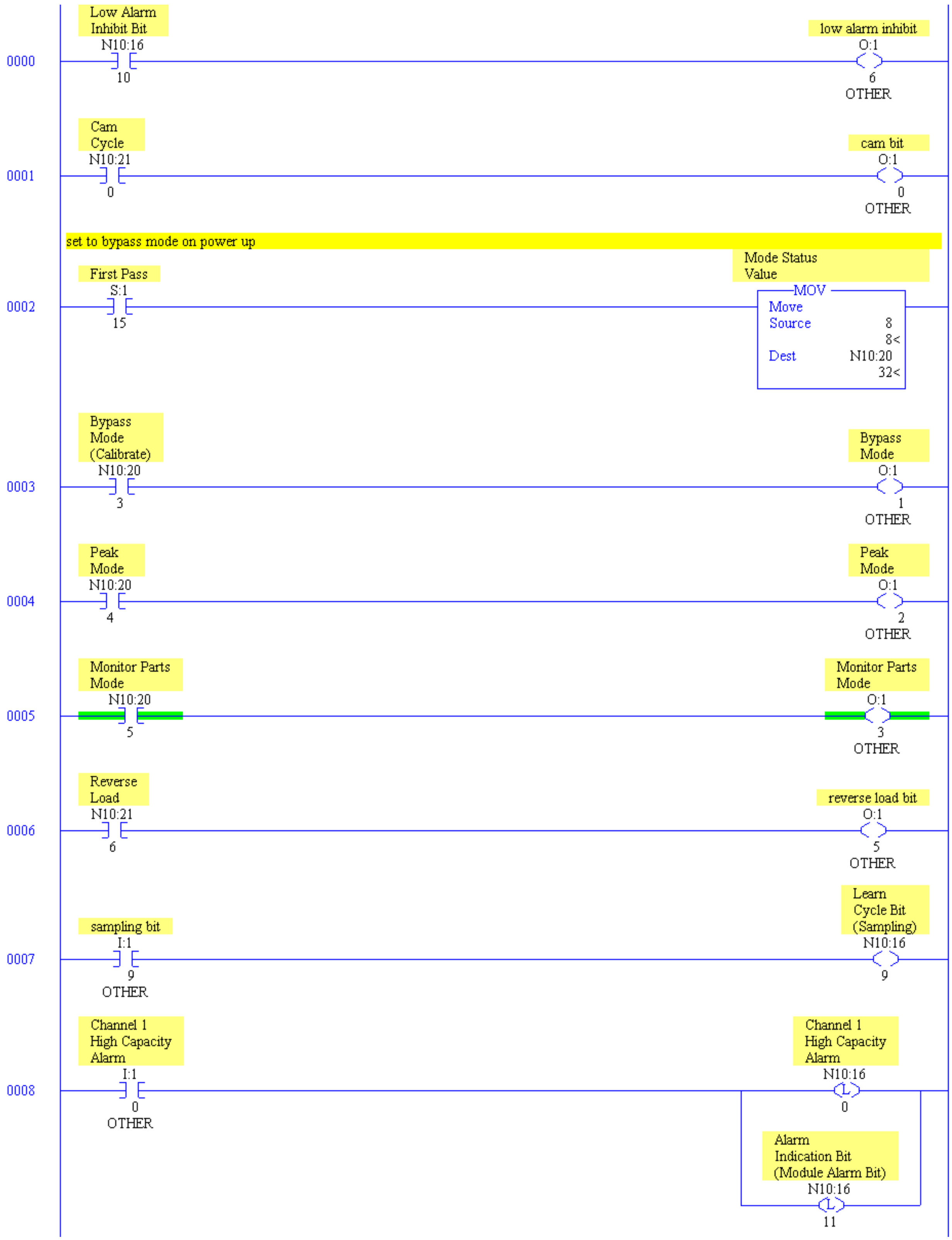
```
| ch's 1&2  |                                                top stop   |
| module    |                                                or e-stop  |
| alarm bit |                                                relay      |
|    N10:16                                                     O:7    |
|----]/[---------------------------------------------------------( )-----|
|       11                                                        0    |
```

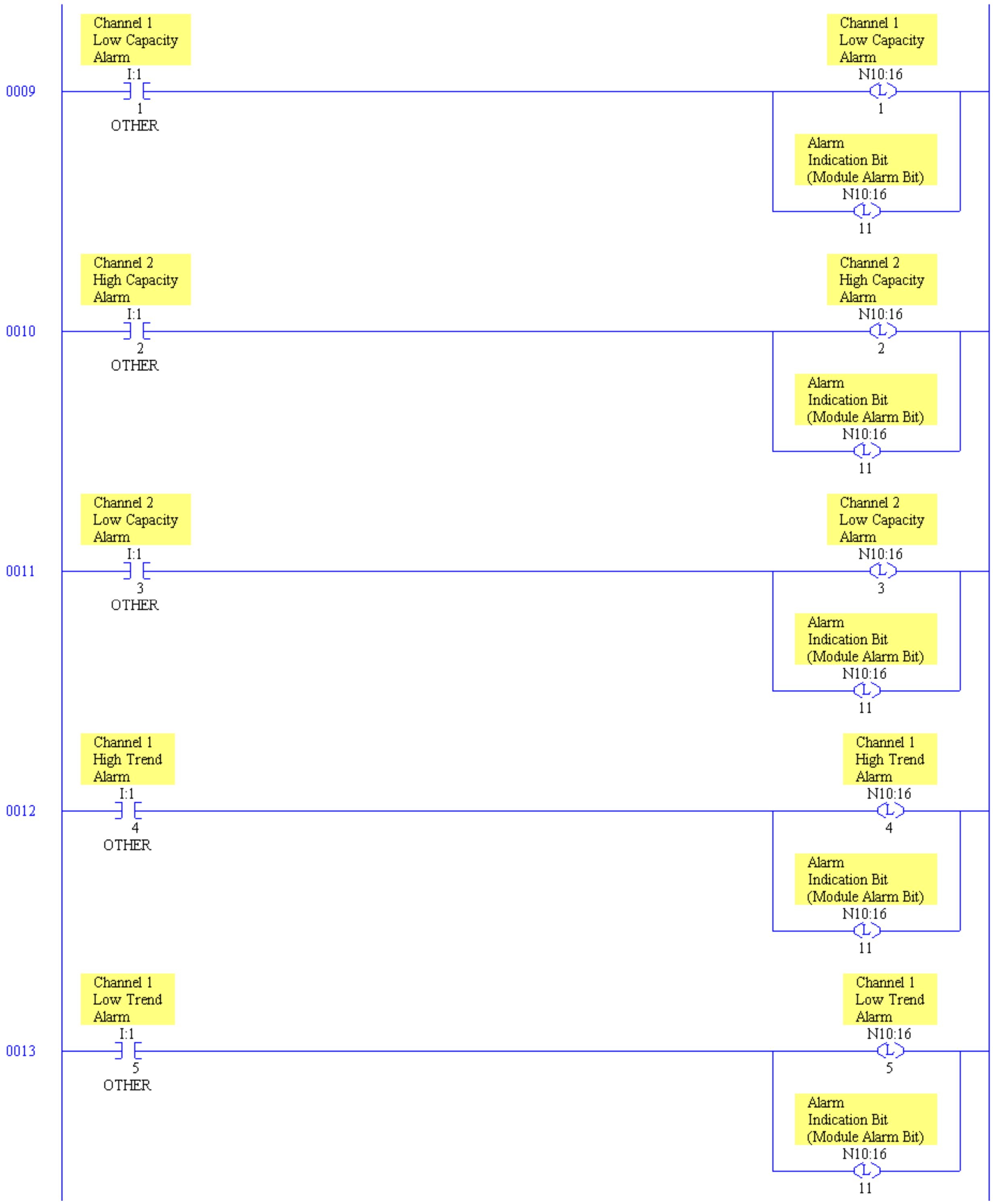
NOTE: Whenever output module is located.

b.) 4 CH system, modify rung 3:27

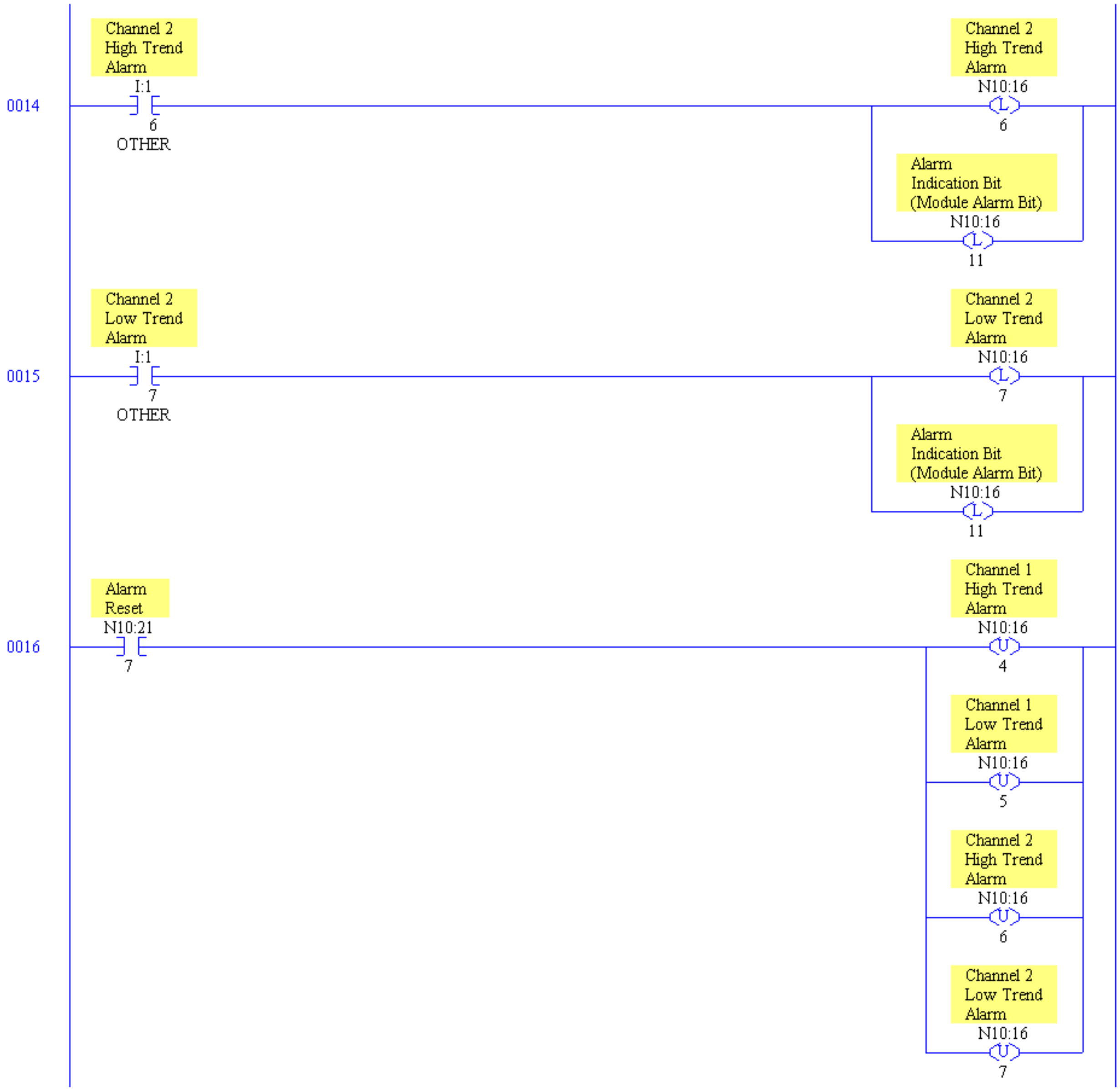
```
| ch's 1&2  |ch's 3&4  |                                     top stop   |
| module    |module    |                                     or e-stop  |
| alarm bit |alarm bit |                                     relay      |
|    N10:16     N11:16                                          O:7    |
|----]/[--------]/[----------------------------------------------( )-----|
|      11          11                                            0    |
```

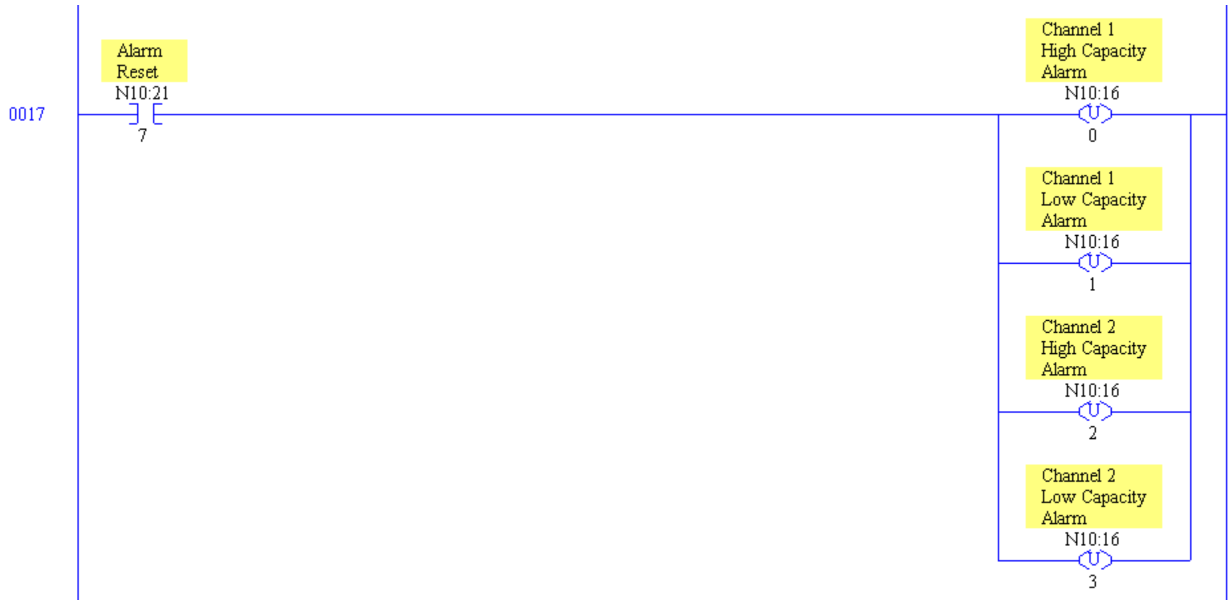
NOTE: Wherever output module is located.

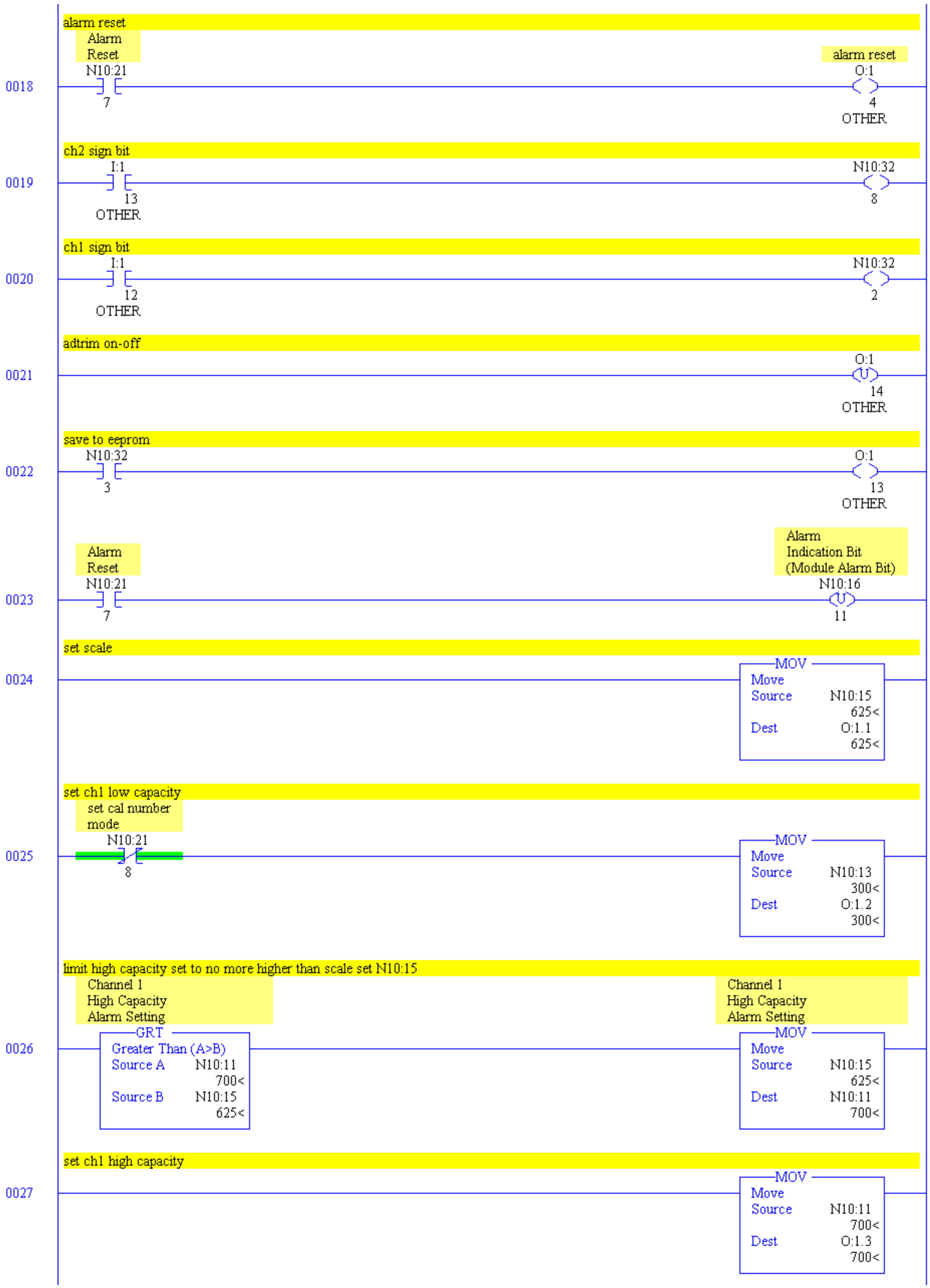

0000
Low Alarm
Inhibit Bit
N10:16
10
low alarm inhibit
O:1
6
OTHER
0001
Cam
Cycle
N10:21
0
cam bit
O:1
0
OTHER
set to bypass mode on power up
0002
First Pass
S:1
15
Mode Status
Value
MOV
Move
Source 8
8<
Dest N10:20
32<
0003
Bypass
Mode
(Calibrate)
N10:20
3
Bypass
Mode
O:1
1
OTHER
0004
Peak
Mode
N10:20
4
Peak
Mode
O:1
2
OTHER
0005
Monitor Parts
Mode
N10:20
5
Monitor Parts
Mode
O:1
3
OTHER
0006
Reverse
Load
N10:21
6
reverse load bit
O:1
5
OTHER
0007
sampling bit
I:1
9
OTHER
Learn
Cycle Bit
(Sampling)
N10:16
9
0008
Channel 1
High Capacity
Alarm
I:1
0
OTHER
Channel 1
High Capacity
Alarm
N10:16
L
0
Alarm
Indication Bit
(Module Alarm Bit)
N10:16
L
11


0009
Channel 1 Low Capacity Alarm
I:1
1
OTHER
Channel 1 Low Capacity Alarm
N10:16
L
1
Alarm Indication Bit (Module Alarm Bit)
N10:16
L
11
0010
Channel 2 High Capacity Alarm
I:1
2
OTHER
Channel 2 High Capacity Alarm
N10:16
L
2
Alarm Indication Bit (Module Alarm Bit)
N10:16
L
11
0011
Channel 2 Low Capacity Alarm
I:1
3
OTHER
Channel 2 Low Capacity Alarm
N10:16
L
3
Alarm Indication Bit (Module Alarm Bit)
N10:16
L
11
0012
Channel 1 High Trend Alarm
I:1
4
OTHER
Channel 1 High Trend Alarm
N10:16
L
4
Alarm Indication Bit (Module Alarm Bit)
N10:16
L
11
0013
Channel 1 Low Trend Alarm
I:1
5
OTHER
Channel 1 Low Trend Alarm
N10:16
L
5
Alarm Indication Bit (Module Alarm Bit)
N10:16
L
11

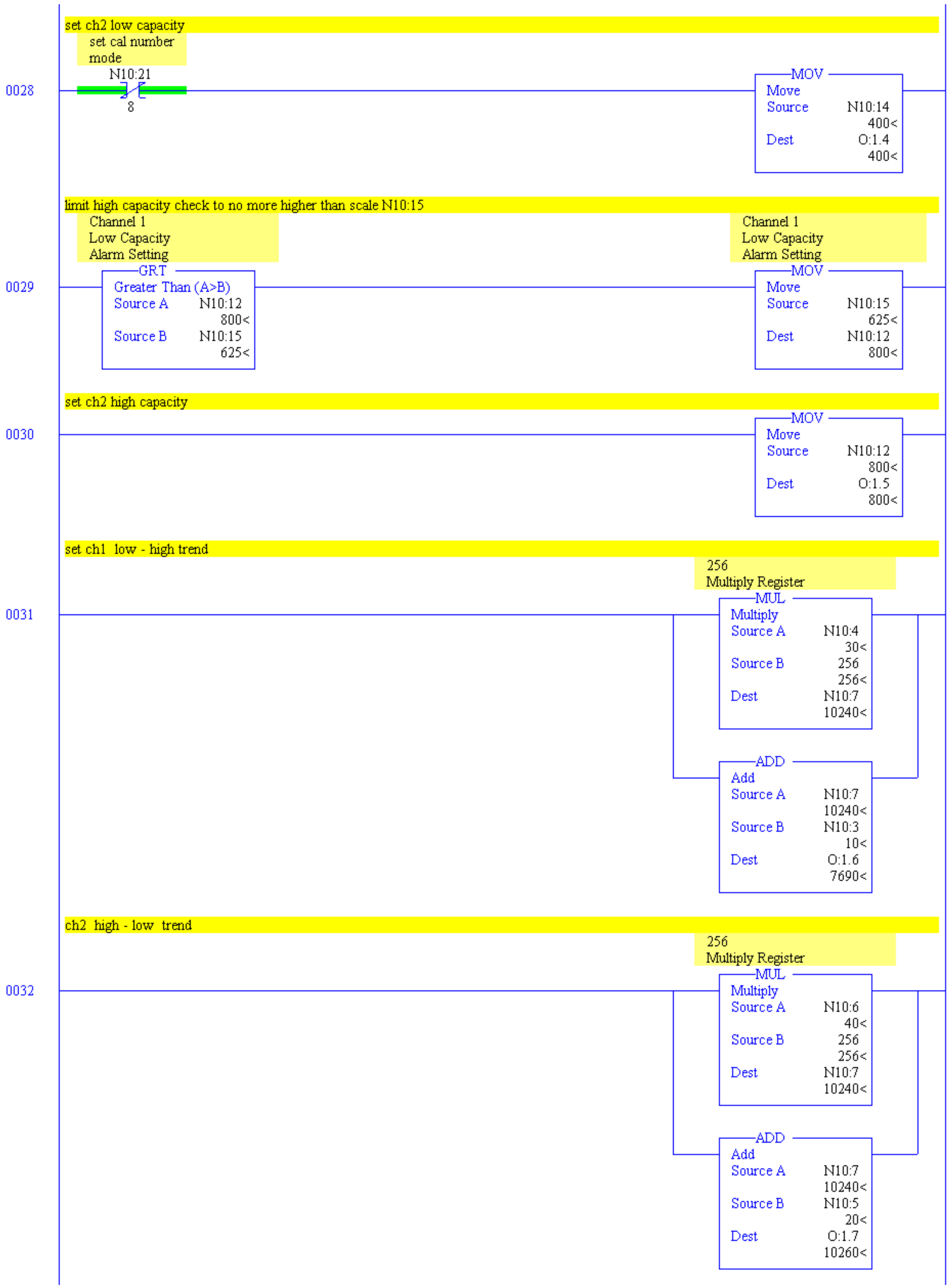
Helm HM1520E Strain Gage Input Module

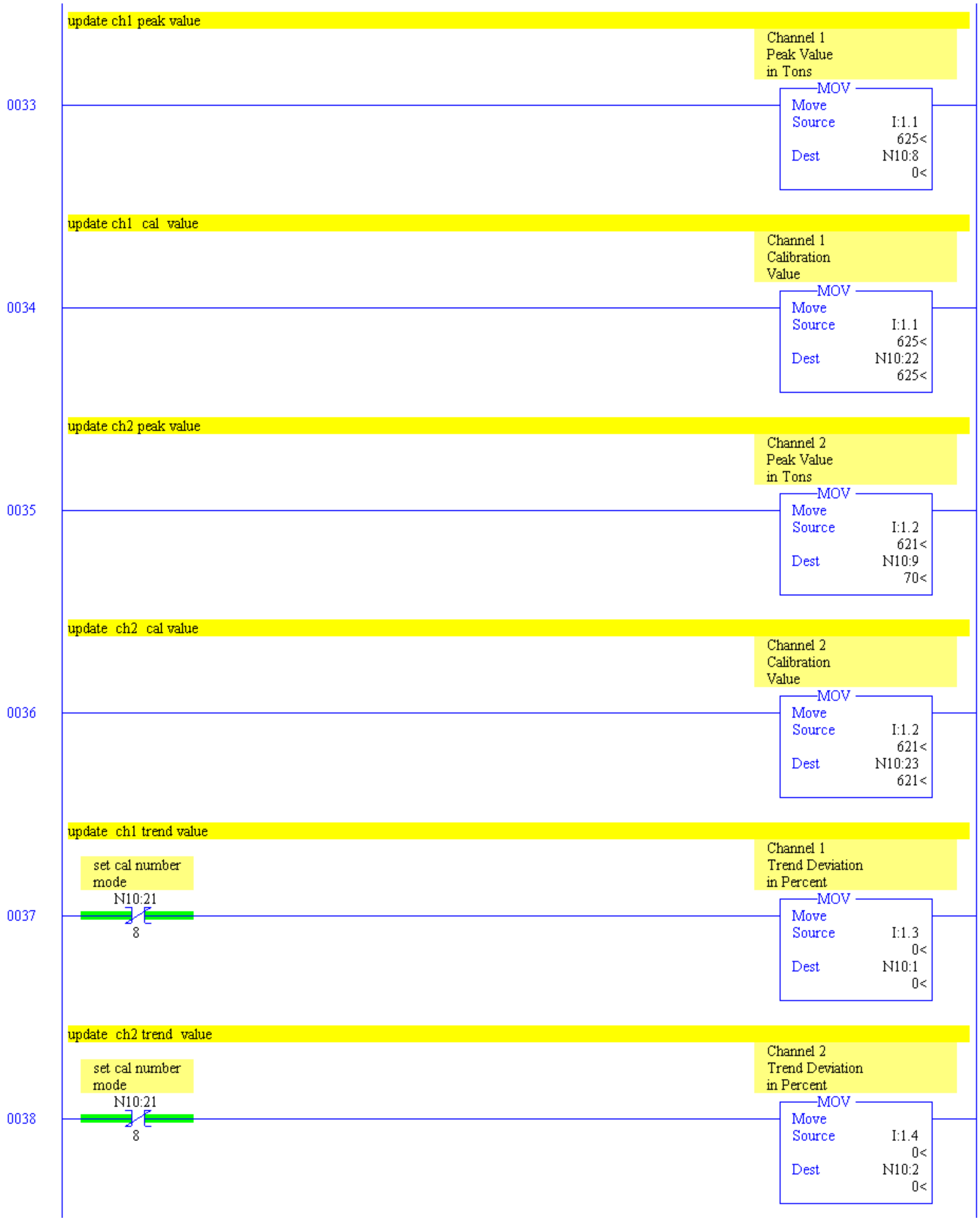


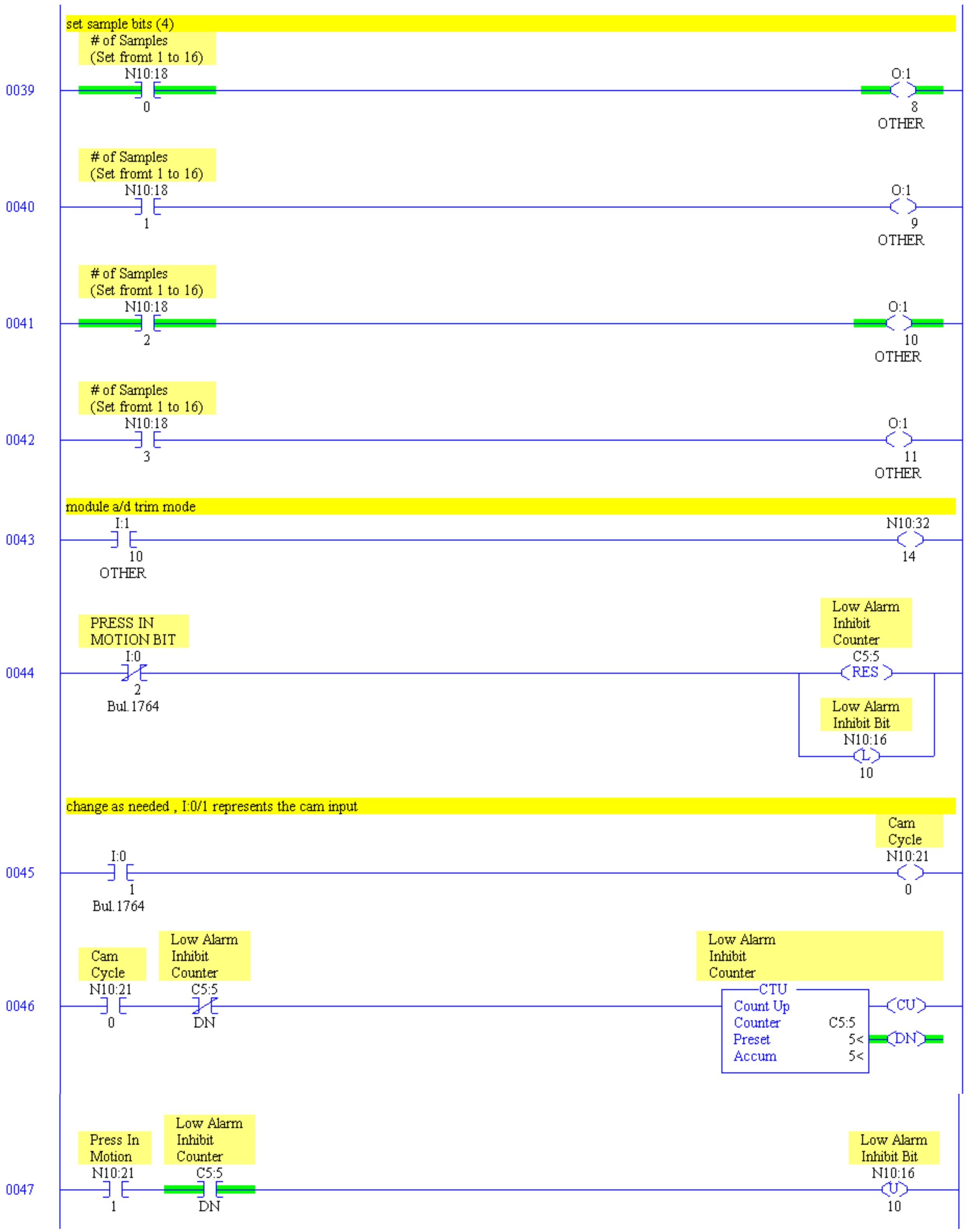

0017
Alarm
Reset
N10:21
7
Channel 1
High Capacity
Alarm
N10:16
U
0
Channel 1
Low Capacity
Alarm
N10:16
U
1
Channel 2
High Capacity
Alarm
N10:16
U
2
Channel 2
Low Capacity
Alarm
N10:16
U
3



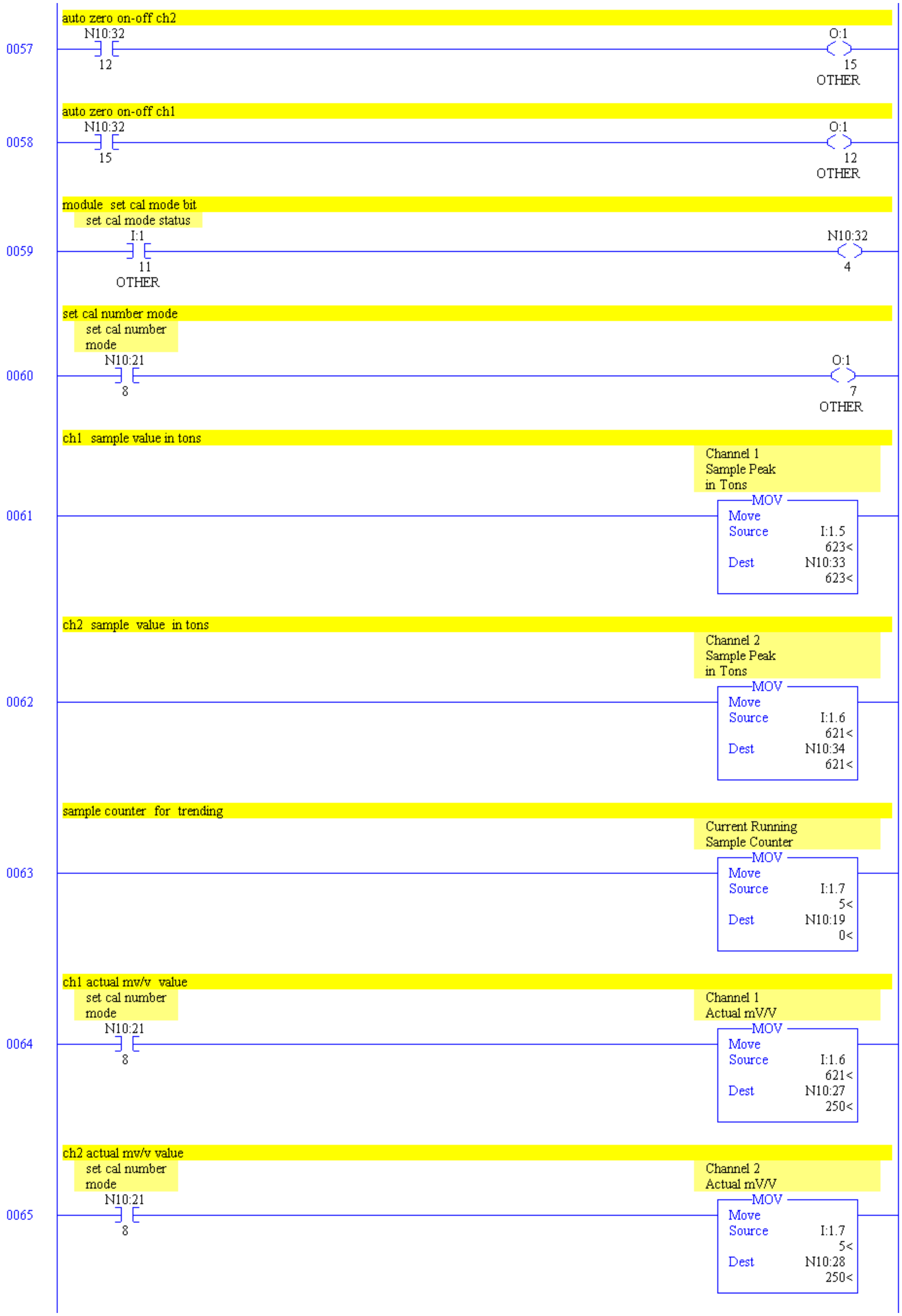
0018
alarm reset
Alarm Reset
N10:21
7
alarm reset
O:1
4
OTHER
0019
ch2 sign bit
I:1
13
OTHER
N10:32
8
0020
ch1 sign bit
I:1
12
OTHER
N10:32
2
0021
adtrim on-off
O:1
U
14
OTHER
0022
save to eeprom
N10:32
3
O:1
13
OTHER
0023
Alarm Reset
N10:21
7
Alarm Indication Bit (Module Alarm Bit)
N10:16
U
11
0024
set scale
MOV
Move
Source N10:15
625<
Dest O:1.1
625<
0025
set ch1 low capacity
set cal number mode
N10:21
8
MOV
Move
Source N10:13
300<
Dest O:1.2
300<
0026
limit high capacity set to no more higher than scale set N10:15
Channel 1 High Capacity Alarm Setting
GRT
Greater Than (A>B)
Source A N10:11
700<
Source B N10:15
625<
Channel 1 High Capacity Alarm Setting
MOV
Move
Source N10:15
625<
Dest N10:11
700<
0027
set ch1 high capacity
MOV
Move
Source N10:11
700<
Dest O:1.3
700<


set ch2 low capacity
set cal number mode
N10:21
8
0028
MOV
Move
Source N10:14
400<
Dest O:1.4
400<
limit high capacity check to no more higher than scale N10:15
Channel 1 Low Capacity Alarm Setting
GRT
Greater Than (A>B)
Source A N10:12
800<
Source B N10:15
625<
0029
Channel 1 Low Capacity Alarm Setting
MOV
Move
Source N10:15
625<
Dest N10:12
800<
set ch2 high capacity
0030
MOV
Move
Source N10:12
800<
Dest O:1.5
800<
set ch1 low - high trend
0031
256 Multiply Register
MUL
Multiply
Source A N10:4
30<
Source B 256
256<
Dest N10:7
10240<
ADD
Add
Source A N10:7
10240<
Source B N10:3
10<
Dest O:1.6
7690<
ch2 high - low trend
0032
256 Multiply Register
MUL
Multiply
Source A N10:6
40<
Source B 256
256<
Dest N10:7
10240<
ADD
Add
Source A N10:7
10240<
Source B N10:5
20<
Dest O:1.7
10260<

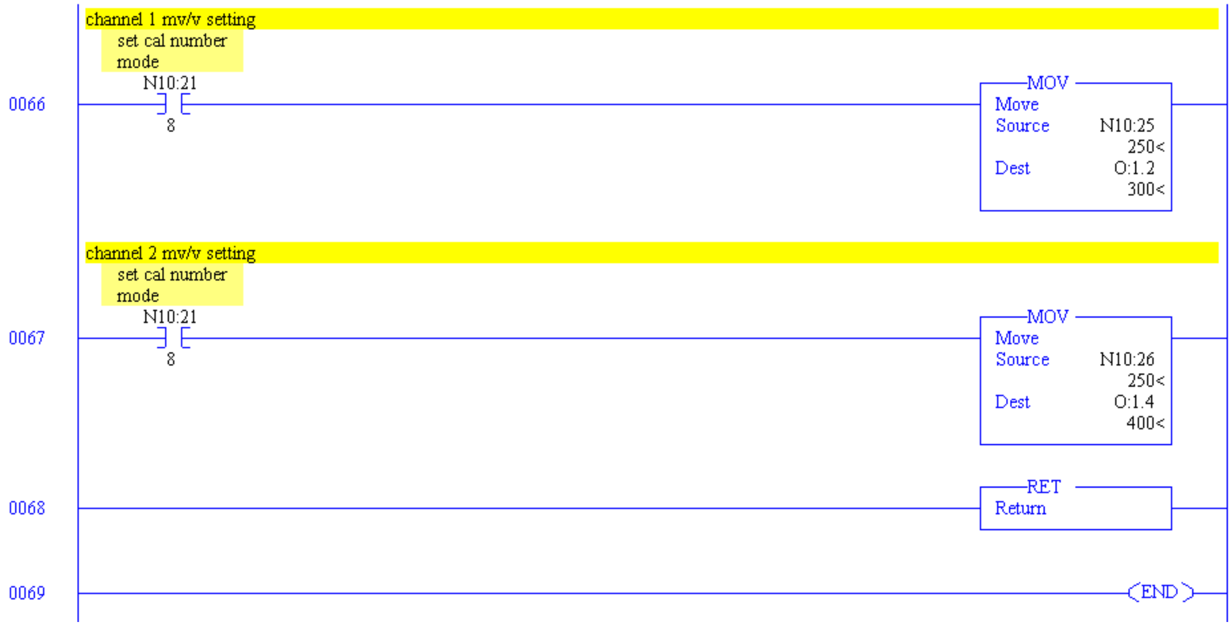

update ch1 peak value
Channel 1 Peak Value in Tons
0033
MOV
Move
Source I:1.1
625<
Dest N10:8
0<
update ch1 cal value
Channel 1 Calibration Value
0034
MOV
Move
Source I:1.1
625<
Dest N10:22
625<
update ch2 peak value
Channel 2 Peak Value in Tons
0035
MOV
Move
Source I:1.2
621<
Dest N10:9
70<
update ch2 cal value
Channel 2 Calibration Value
0036
MOV
Move
Source I:1.2
621<
Dest N10:23
621<
update ch1 trend value
set cal number mode
N10:21
8
Channel 1 Trend Deviation in Percent
0037
MOV
Move
Source I:1.3
0<
Dest N10:1
0<
update ch2 trend value
set cal number mode
N10:21
8
Channel 2 Trend Deviation in Percent
0038
MOV
Move
Source I:1.4
0<
Dest N10:2
0<


set sample bits (4)
# of Samples
(Set fromt 1 to 16)
N10:18
0039
0
O:1
8
OTHER
# of Samples
(Set fromt 1 to 16)
N10:18
0040
1
O:1
9
OTHER
# of Samples
(Set fromt 1 to 16)
N10:18
0041
2
O:1
10
OTHER
# of Samples
(Set fromt 1 to 16)
N10:18
0042
3
O:1
11
OTHER
module a/d trim mode
I:1
0043
10
OTHER
N10:32
14
PRESS IN
MOTION BIT
I:0
0044
2
Bul.1764
Low Alarm
Inhibit
Counter
C5:5
RES
Low Alarm
Inhibit Bit
N10:16
L
10
change as needed , I:0/1 represents the cam input
I:0
0045
1
Bul.1764
Cam
Cycle
N10:21
0
Cam
Cycle
N10:21
0046
0
Low Alarm
Inhibit
Counter
C5:5
DN
Low Alarm
Inhibit
Counter
CTU
Count Up
Counter C5:5
Preset 5<
Accum 5<
CU
DN
Press In
Motion
N10:21
0047
1
Low Alarm
Inhibit
Counter
C5:5
DN
Low Alarm
Inhibit Bit
N10:16
U
10


Moves Low Alarm Inhibit counts entered from panelview into the preset of the
Low Alarm Inhibit Counter
Low Alarm Inhibit Counter
0048
MOV
Move
Source N10:17
5<
Dest C5:5.PRE
5<
panelview alarm status bits
0049
Channel 1 High Capacity Alarm
N10:16
0
Tonnage Alarm Status
N10:24
0
0050
Channel 1 Low Capacity Alarm
N10:16
1
Tonnage Alarm Status
N10:24
1
0051
Channel 2 High Capacity Alarm
N10:16
2
Tonnage Alarm Status
N10:24
2
0052
Channel 2 Low Capacity Alarm
N10:16
3
Tonnage Alarm Status
N10:24
3
0053
Channel 1 High Trend Alarm
N10:16
4
Tonnage Alarm Status
N10:24
4
0054
Channel 1 Low Trend Alarm
N10:16
5
Tonnage Alarm Status
N10:24
5
0055
Channel 2 High Trend Alarm
N10:16
6
Tonnage Alarm Status
N10:24
6
0056
Channel 2 Low Trend Alarm
N10:16
7
Tonnage Alarm Status
N10:24
7



auto zero on-off ch2
0057
N10:32
12
O:1
15
OTHER
auto zero on-off ch1
0058
N10:32
15
O:1
12
OTHER
module set cal mode bit
set cal mode status
0059
I:1
11
OTHER
N10:32
4
set cal number mode
set cal number mode
0060
N10:21
8
O:1
7
OTHER
ch1 sample value in tons
Channel 1 Sample Peak in Tons
0061
MOV
Move
Source I:1.5
623<
Dest N10:33
623<
ch2 sample value in tons
Channel 2 Sample Peak in Tons
0062
MOV
Move
Source I:1.6
621<
Dest N10:34
621<
sample counter for trending
Current Running Sample Counter
0063
MOV
Move
Source I:1.7
5<
Dest N10:19
0<
ch1 actual mv/v value
set cal number mode
Channel 1 Actual mV/V
0064
N10:21
8
MOV
Move
Source I:1.6
621<
Dest N10:27
250<
ch2 actual mv/v value
set cal number mode
Channel 2 Actual mV/V
0065
N10:21
8
MOV
Move
Source I:1.7
5<
Dest N10:28
250<


channel 1 mv/v setting
set cal number mode
N10:21
0066
8
MOV
Move
Source N10:25
250<
Dest O:1.2
300<
channel 2 mv/v setting
set cal number mode
N10:21
0067
8
MOV
Move
Source N10:26
250<
Dest O:1.4
400<
0068
RET
Return
0069
END

Appendix C
RSLogix 5000
Ladder Programming

Setting Up HM1520E Module for CompactLogix

Adding HM1520E module to your RXLogix 5000 project file

Open the RSLogix 5000 project in which you wish to install the module.
Right click on I/O Configuration
Select New Module
Select 1769 MODULE – Generic 1769 Module
Click OK

Module Properties:
Enter Module name (must begin with a letter)   *example HELM HM1520E*
Enter Module description
Enter Slot location
Select Comm Format. Must be Data – INT

Connection Parameters

INPUT	101	8
OUTPUT	100	8
CONFIGURATION	102	0

I/O Data Tags for RSLogix 5000

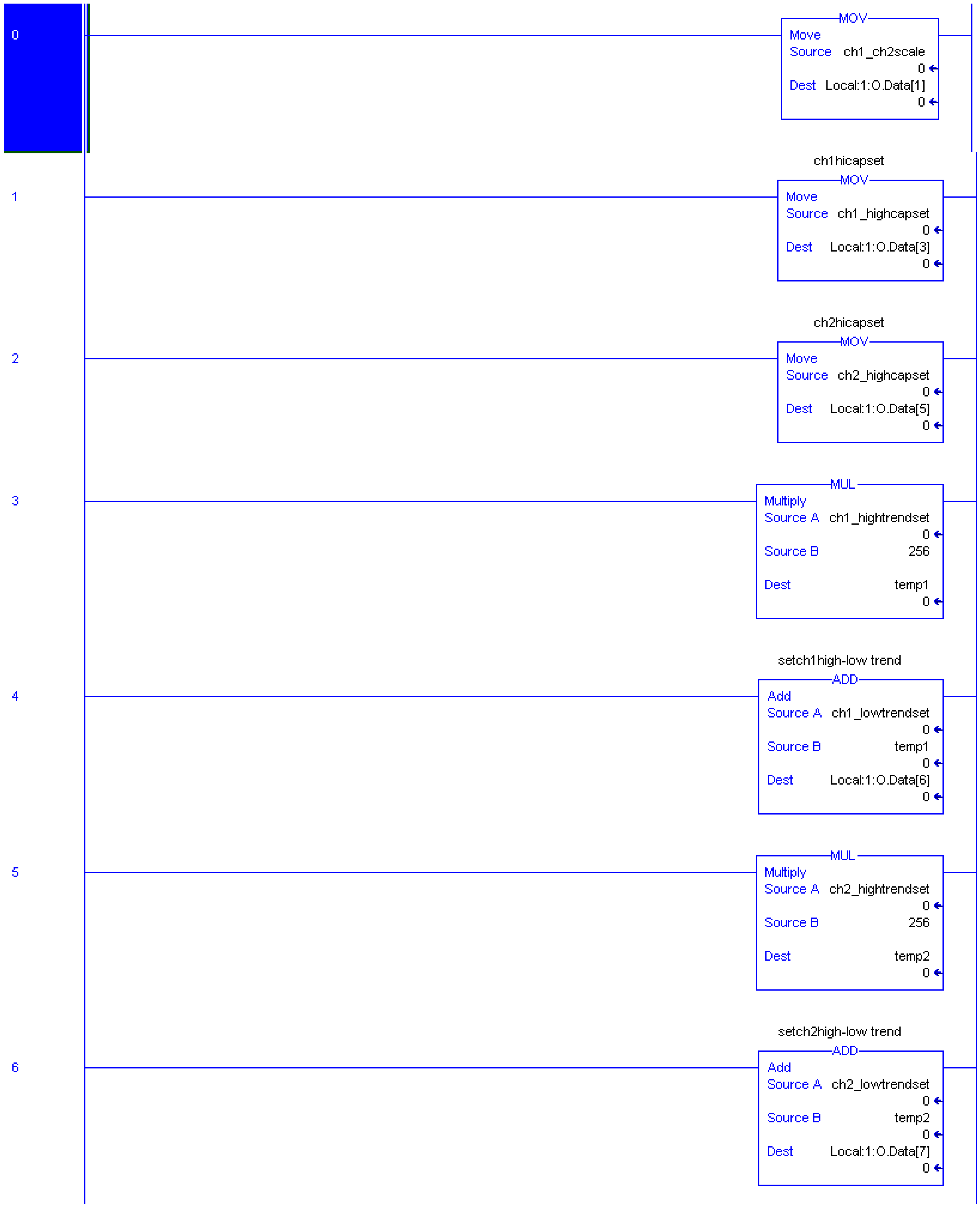
INPUT IMAGE DATA TAGS

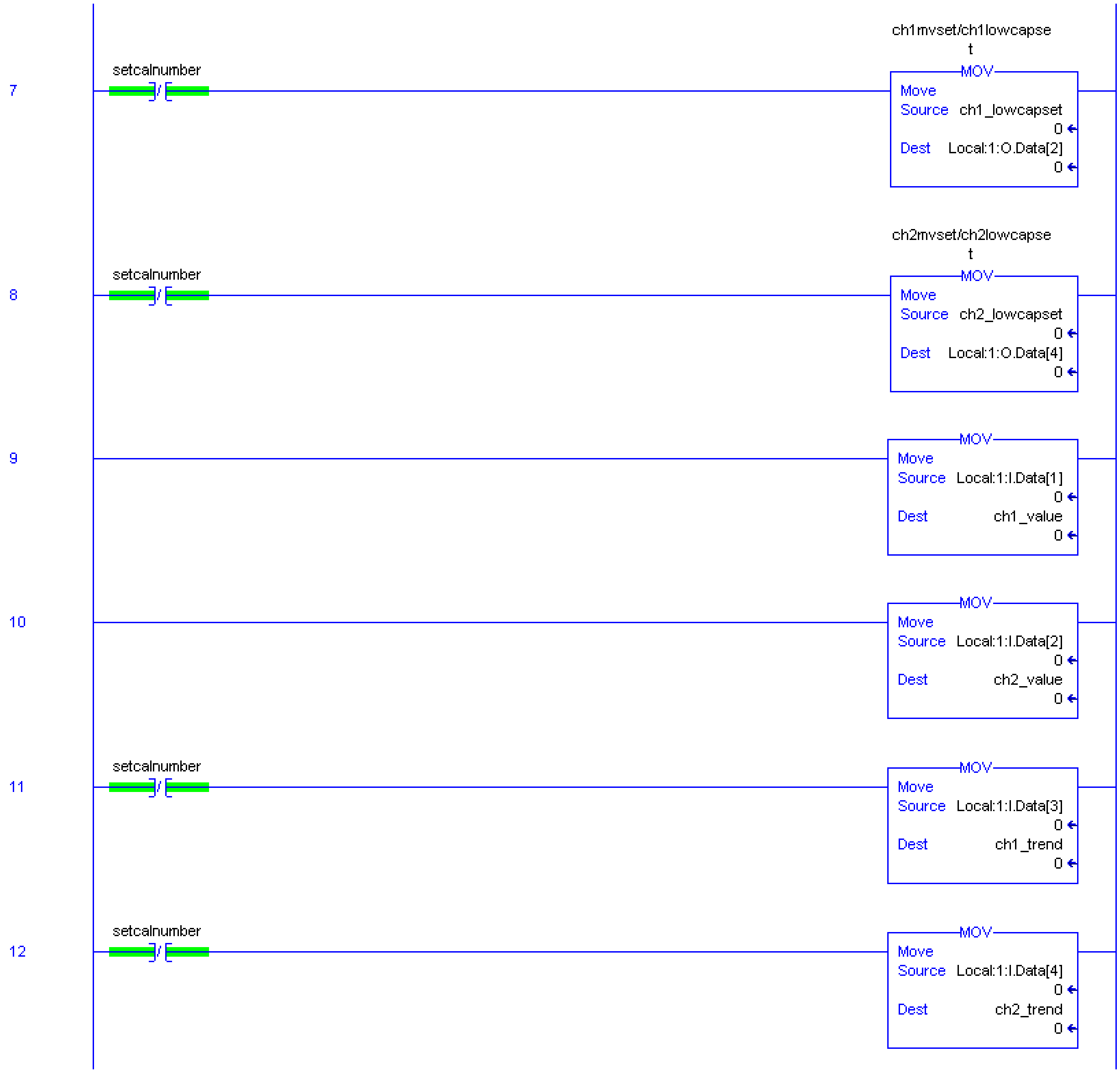
Data Tags Local:x.I	**Data Type**	**Bit**	**Description**
.Data[0]	BIT	0	Channel 1 High Capacity Alarm Indication Bit
		1	Channel 1 Low Capacity Alarm Indication Bit
		2	Channel 2 High Capacity Alarm Indication Bit
		3	Channel 2 Low Capacity Alarm Indication Bit
		4	Channel 1 High Trend Alarm
		5	Channel 1 Low Trend Alarm
		6	Channel 2 High Trend Alarm
		7	Channel 2 Low Trend Alarm
		8	Reserved
		9	Learn Cycle Indication Bit
		10	A/D Trim Mode Bit
		11	Set Cal Mode
		12	Ch1 Sign Bit
		13	Ch2 Sign Bit
.Data[1]	INT	-	Channel 1 (Left) Load Value
.Data[2]	INT	-	Channel 2 (Right) Load Value
.Data[3]	INT	-	Channel 1 Percent Deviation Value
.Data[4]	INT	-	Channel 2 Percent Deviation Value
.Data[5]	INT	-	Channel 1 Sample Value in Tons
.Data[6]	INT	-	Channel 2 Sample Value in Tons / Ch1 mV/V Status
.Data[7]	INT	-	Sample Count / Ch2 mV/V Status

OUTPUT IMAGE TAGS

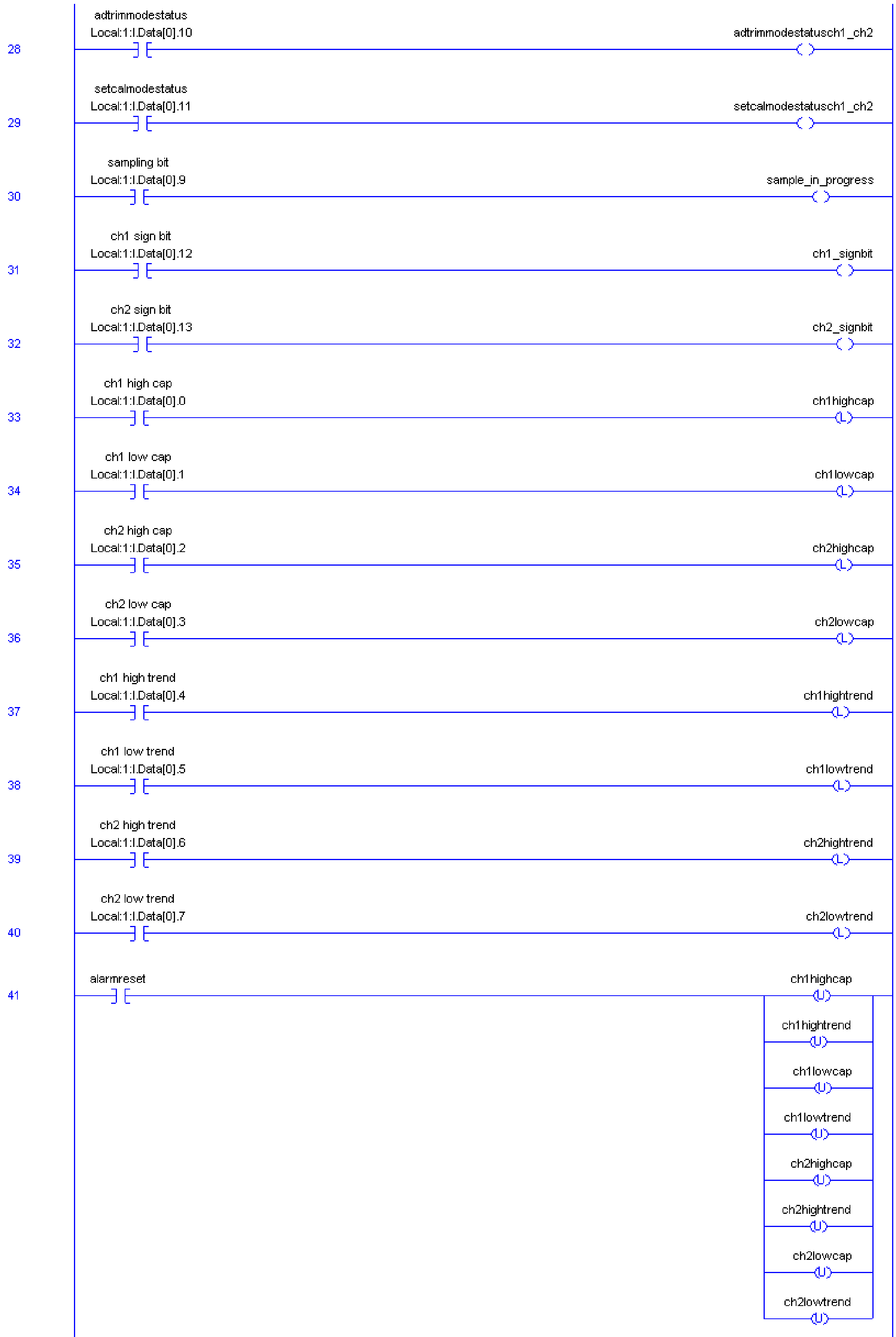
Data Tags Local:x.O	Data Type	Bit	Description
.Data[0]	Bit	0	Look Window Signal Input Bit
		1	Set Bypass Mode Bit
		2	Set Peak Mode Bit
		3	Set Monitor Parts Mode Bit
		4	Alarm Reset Bit
		5	Reverse Load Enable Bit
		6	Low Alarm Inhibit Enable Bit
		7	Set Cal Number Mode Bit
		8	Sample Count D0 Bit
		9	Sample Count D1 Bit
		10	Sample Count D2 Bit
		11	Sample Count D3 Bit
		12	Channel 1 Auto-Zero On-Off
		13	Save to EEPROM
		14	Reserved
		15	Channel 2 Auto-Zero On-Off
.Data[1]	INT	-	Set Scale Value
.Data[2]	INT	-	Set Channel 1 Low Capacity Alarm Value / Channel 1 mV/V Setpoint
.Data[3]	INT	-	Set Channel 1 High Capacity Alarm Value
.Data[4]	INT	-	Set Channel 2 Low Capacity Alarm Value / Channel 2 mV/V Setpoint
.Data[5]	INT	-	Set Channel 2 High Capacity Alarm Value
.Data[6]	INT HByte LByte	-	Channel 1 Trend High/Low Value Set Ch1 High Trend Percent value (0 – 99) Set Ch1 Low Trend Percent value (0 – 99)
.Data[7]	INT HByte LByte	-	Channel 2 Trend High/Low Value Set Ch2 High Trend Percent value (0 – 99) Set Ch2 Low Trend Percent value (0 – 99)

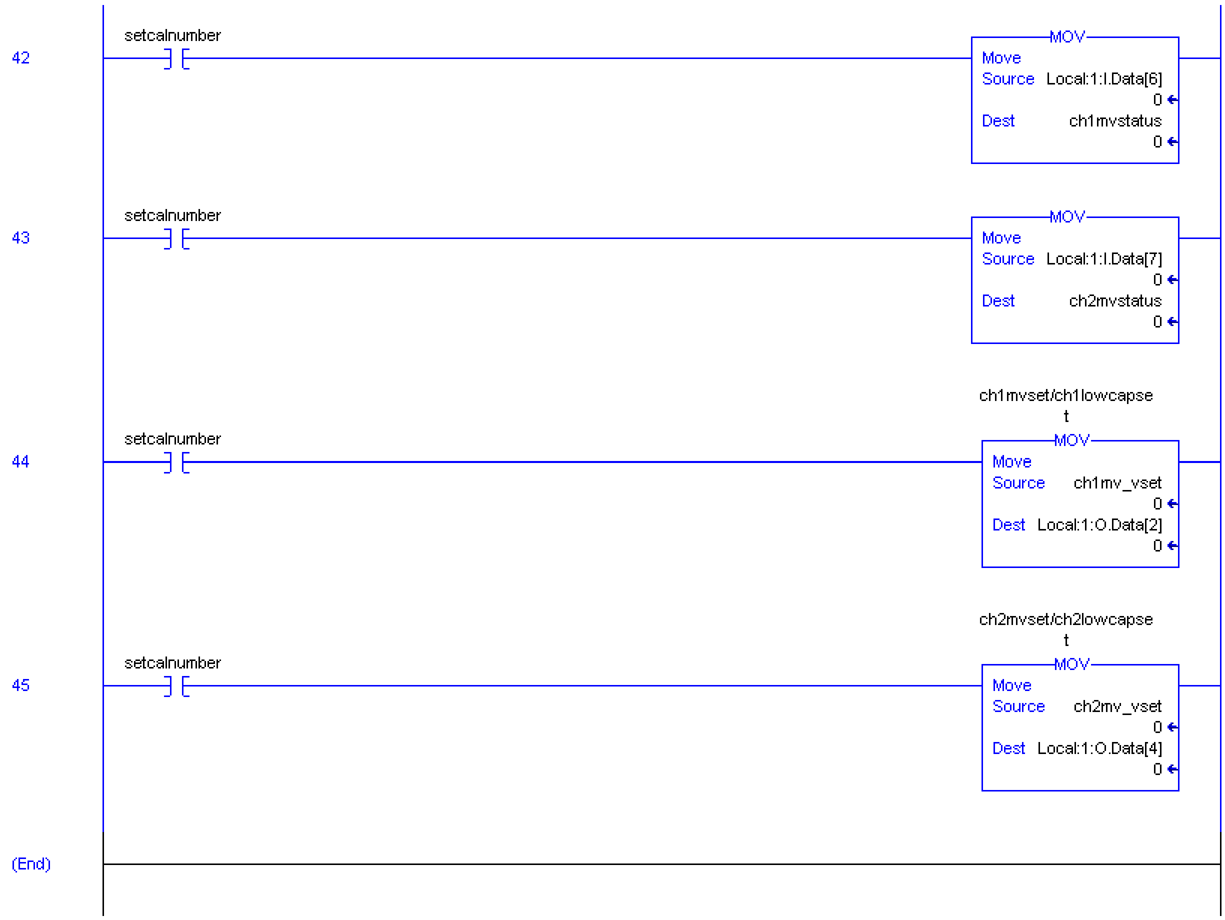
Appendix C
RSLogix 5000
Ladder Programming




7
setcalnumber
ch1mvset/ch1lowcapse
t
MOV
Move
Source ch1_lowcapset
0
Dest Local:1:O.Data[2]
0
8
setcalnumber
ch2mvset/ch2lowcapse
t
MOV
Move
Source ch2_lowcapset
0
Dest Local:1:O.Data[4]
0
9
MOV
Move
Source Local:1:I.Data[1]
0
Dest ch1_value
0
10
MOV
Move
Source Local:1:I.Data[2]
0
Dest ch2_value
0
11
setcalnumber
MOV
Move
Source Local:1:I.Data[3]
0
Dest ch1_trend
0
12
setcalnumber
MOV
Move
Source Local:1:I.Data[4]
0
Dest ch2_trend
0

Rung	Contact	Output	Address
13	cambit	cam bit	Local:1:O.Data[0].0
14	bypassmode	bypass	Local:1:O.Data[0].1
15	peakmode	peak	Local:1:O.Data[0].2
16	monitormode	monitor	Local:1:O.Data[0].3
17	reverseload	rev load	Local:1:O.Data[0].5
18	lowalarminh	lowalarminh	Local:1:O.Data[0].6
19	sampleset.0	samplebit0	Local:1:O.Data[0].8
20	sampleset.1	samplebit1	Local:1:O.Data[0].9
21	sampleset.2	samplebit2	Local:1:O.Data[0].10
22	sampleset.3	samplebit3	Local:1:O.Data[0].11
23	alarmreset	alarm reset	Local:1:O.Data[0].4
24	setcalnumber	setcalnumber	Local:1:O.Data[0].7
25	ch2_azonoff	ch2azonoff	Local:1:O.Data[0].15
26	ch1_azonoff	ch1azonoff	Local:1:O.Data[0].12
27	savetoeeprom	savetoeeprom	Local:1:O.Data[0].13


28
adtrimmodestatus
Local:1:I.Data[0].10
adtrimmodestatusch1_ch2
29
setcalmodestatus
Local:1:I.Data[0].11
setcalmodestatusch1_ch2
30
sampling bit
Local:1:I.Data[0].9
sample_in_progress
31
ch1 sign bit
Local:1:I.Data[0].12
ch1_signbit
32
ch2 sign bit
Local:1:I.Data[0].13
ch2_signbit
33
ch1 high cap
Local:1:I.Data[0].0
ch1highcap
L
34
ch1 low cap
Local:1:I.Data[0].1
ch1lowcap
L
35
ch2 high cap
Local:1:I.Data[0].2
ch2highcap
L
36
ch2 low cap
Local:1:I.Data[0].3
ch2lowcap
L
37
ch1 high trend
Local:1:I.Data[0].4
ch1hightrend
L
38
ch1 low trend
Local:1:I.Data[0].5
ch1lowtrend
L
39
ch2 high trend
Local:1:I.Data[0].6
ch2hightrend
L
40
ch2 low trend
Local:1:I.Data[0].7
ch2lowtrend
L
41
alarmreset
ch1highcap
U
ch1hightrend
U
ch1lowcap
U
ch1lowtrend
U
ch2highcap
U
ch2hightrend
U
ch2lowcap
U
ch2lowtrend
U


42
setcalnumber
MOV
Move
Source Local:1:I.Data[6]
0
Dest ch1mvstatus
0
43
setcalnumber
MOV
Move
Source Local:1:I.Data[7]
0
Dest ch2mvstatus
0
44
setcalnumber
ch1mvset/ch1lowcapse
t
MOV
Move
Source ch1mv_vset
0
Dest Local:1:O.Data[2]
0
45
setcalnumber
ch2mvset/ch2lowcapse
t
MOV
Move
Source ch2mv_vset
0
Dest Local:1:O.Data[4]
0
(End)