HARDY INSTRUMENTS

Tension Controller

HI-3300

INSTALLATION AND SERVICE MANUAL

Table of Contents

Table of Illustrations

CHAPTER 1: OVERVIEW

General Introduction to the Hardy Tension Controller HI 3300 Service Manual

This Service Manual provides the Technician with a complete description of installation, setup, calibration, mapping and troubleshooting procedures for the HI 3300 Tension Controller. To get the maximum service life from this product, technicians should use this instrument in accordance with recommended practices either implied or expressed in this manual. Before using the Tension Controller, all service personnel should read and understand all cautions, warnings, and safety procedures, referenced or explicitly stated in this manual, to insure the safe operation and repair of this instrument. Hardy Instruments sincerely appreciates your business. We encourage input about the performance and operation of our products from our customers. Should you not understand any information in this manual or experience any problems with this product, please contact our Technical Support Department at:

Phone: (858) 278-2900
FAX: (858) 278-6700
E-Mail:

- hardysupport@hardyinst.com
- hi_sales@hardyinstruments.com

Or visit our web site at:

http://www.hardyinstruments.com

Our web site is full of useful information about our tension control, process weighing and vibration analysis products. You can also get the latest updates of the Tension Controller Manual. The latest revised manuals are available FREE in the Support Section of our Web Site. While you're on the site feel free to visit the other web pages which can provide answers to your questions about, load sensors, brakes, vibration analysis or other Hardy instruments. Be sure to sign up for the Hardy Newsletter to get the latest information on all Hardy products and services. For answers to technical issues and service problems check the Hardy Web Tech on our Hardy Web Site. Most problems can be resolved by the Hardy Web Tech, 365 days a year, 24 hours a day 7 days a week. You can still contact a technician by phone during our operating hours if necessary.

Description

The Hardy Instruments Tension Controller is part of a complete line of application specific web tension, process weighing and condition monitoring instruments. The Tension Controller is available as a model HI 3300, a stand alone closed loop, load cell based PID controller with a display (Large font Tension Display with 4 additional lines; 20 characters per line) and key pad or an HI 3300R, blind remote stand-alone PID controller, swivel mounted with no display. A remote 6 digit, 7 segment LED display is available as an option for the HI 3300R. The standard version has a single channel with a 2 channel option.

The HI 3300 Tension Controller is designed with output alarms, for example:

- Low Tension
- High Tension
- Misalignment
- Control Lost

The HI 3300 Tension Controller is field configurable for all web tension applications including but not limited to, converting, printing, plastic film, textiles and other industries where web tension is required. This instrument is a stand-alone PID closed loop controller which operates in auto or manual modes for web tension process control. The display keeps the user up to date as to the current tension value, output in percentage, operating status and tension setpoint for the selected product. Output alarms warn the operator of High tension, Low tension, Misalignment, etc. The Tension Controller contains Hardy Instrument's core features:

- WAVERSAVER® - Eliminates the effects of vibration when measuring tension.
- C2® Electronic Calibration - Calibration without test weights.
- SMM (Secure Memory Module) - Memory for manual transfer of configuration data to another HI 3300 instrument(s).

All of Hardy's 3000 Series instrumentation is loaded with standard features like a selectable 10/100 BaseT Ethernet port and an embedded web server to link performance diagnostics and setup data to and from your local Intranet, Extranet, VPN or via the Internet (World Wide Web). An IR (Infra Red) port provides wireless connectivity to PDA devices for easy configuration, loading and transfer of data. Optional Devicenet®, ControNet®, Profibus®, Allen Bradley Remote I/O®, Ethernet and Ethernet IP® (Coming Soon), Modbus®, Analog and OPC interfaces allow multiple applications to be viewed and controlled from one display and allows 3rd party I/O to be easily added to the system. Mapped I/O saves you wiring costs by distributing the I/O where you need it, at the process or in the control room. The controllers act as a "Master" over Ethernet/IP (pending) and Devicenet communications while optional interfaces for Allen-Bradley Remote I/O, Profibus® and Analog provide communications to PLC® and DCS systems.

NOTE: All registered trademarks are the property of their respective trade associations and corporations.

Built-in Diagnostics provide the ability to troubleshoot individual load cells. Alarms alert you to problems or potential problems that can affect your process. The Tension Controller has Help dialogs that walk you through the instrument set up while Web Site help files are just a key press away.

Typical Applications

- PID Control for Unwinding Zone
- PID Control for Mid-Process (intermediate) Zone.
- PID Control for Rewinding Zone.
- Web and Strand Tension Control

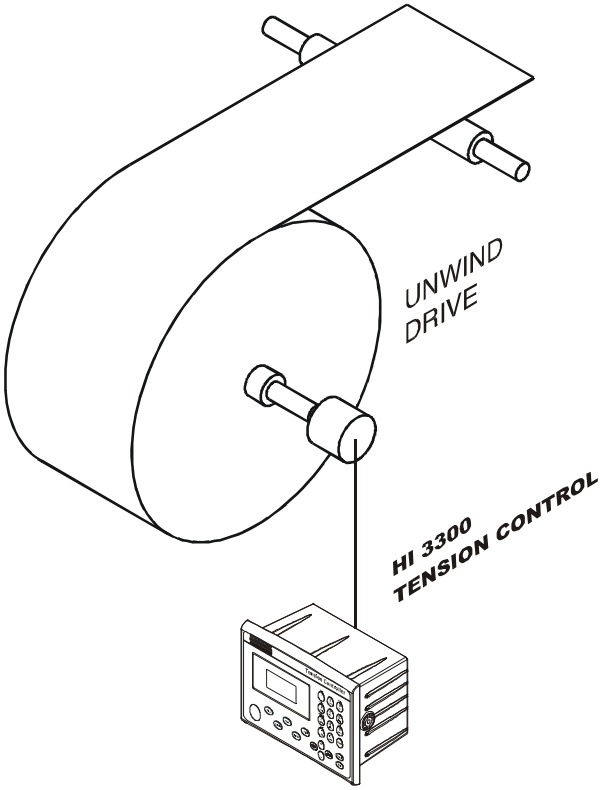


FIG. 1-1 UNWIND ZONE

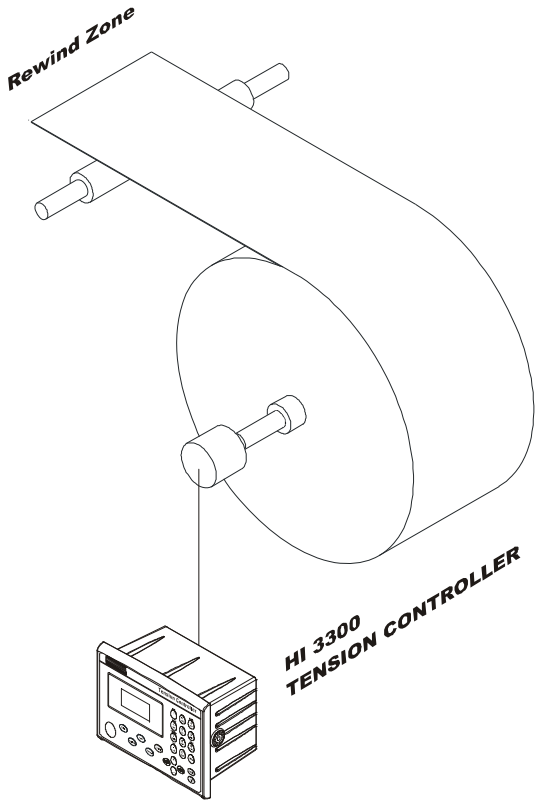


FIG. 1-2 REWIND ZONE

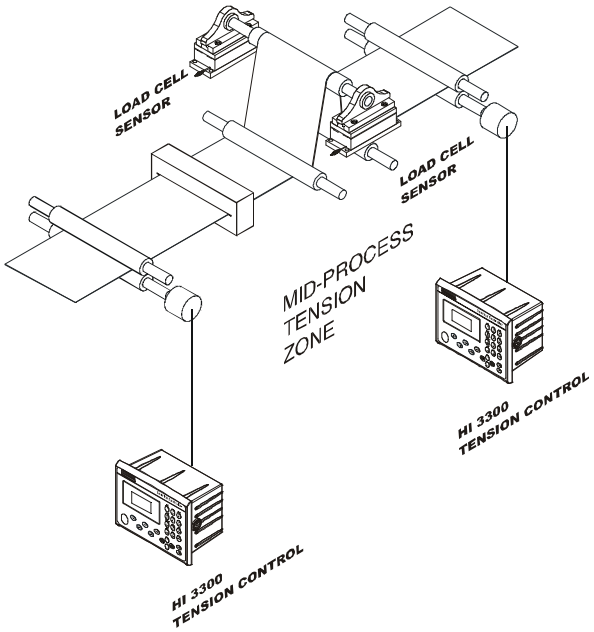


FIG. 1-3 MID-PROCESS ZONE

Hardy Web Tech

We have implemented Hardy Web Tech, our new Online Tech Support Knowledge Base, to serve your tech support needs better than ever before. Hardy Web Tech helps you immediately find answers to your technical questions. Just type in your question and see if your answer exists in our knowledgebase, which is populated by interactions with customers like you.

You can also create your personalized support page, and your own support section that you can access 24/7. You can even view and update your entire call history, as well as maintain your profile containing your product and system information, so we can more effectively meet your needs.

Last, but not least, we invite all user feedback. Click on the "Provide Feedback" link to let us know how we're doing! What do you like about the product? What's missing? How do you like our new support site? Anything! Your comments are important and will help us shape the future direction of our products.

Connectivity

All HI 3000 Series products enable the user to use the selectable 10/100 base T Ethernet port or use its embedded web server to link performance, diagnostics and setup data to and from your intranet, extranet, VPN or the internet. Receive alarms via e-mail or over WAP enabled devices including cellular phones and PDAs. A DeviceNet interface allows multiple applications to be viewed and controlled from a display and additional 3rd party I/O can be easily added to the tension control system. The HI 3300 includes a full line of network interfaces, including:

- ControlNet®
- DeviceNet®
- Allen Bradley Remote I/O
- Profibus®
- Modbus®
- OPC (OLE Process Control)
- Ethernet/IP (Pending)

Setup Dialogs

Setup Dialogs enable the user to walk through the instrument set up. On-board Help files are just a key press or click away.

Mapped I/O

Mapped I/O saves wiring costs by distributing the I/O where you need it, at the process or in the control room. The controller is a DeviceNet Scanner and the DeviceNet Scan table is configured using RS Networks®. Optional interfaces for Allen-Bradley Remote I/O, Profibus and Analog provide communications to PLC and DCS systems.

WAVERSAVER®

Typically, mechanical noise (from other machinery in a plant environment) is present in forces larger than the weight forces trying to be detected. The HI 3300 is fitted with WAVERSAVER® technology which eliminates the effects of vibratory forces present in all industrial weight control and measurement applications. By eliminating the factor of vibratory forces the controller is capable of identifying the actual weight data. WAVERSAVER® can be configured from the front panel to ignore noise with frequencies as low as 0.25 Hz. One of four higher additional cut off frequencies may be selected to provide a faster instrument response time. The default factory configuration is 0.50 Hz vibration frequency immunity.

C2® Calibration

C2® Second Generation Calibration enables a web tension system to be calibrated electronically without using certified test weights which equals the systems load capacity. A C2 weighing system consists of up to eight load sensors, a junction box, interconnect cable and an instrument with C2 capabilities, such as the Tension Controller. All Hardy Instruments C2 certified load sensors contain digital information detailing its unique performance characteristics. The Hardy Tension Controller reads the performance characteristics of each individual load sensor and detects the quantity of load sensors in the system. Calibration is performed by simply adding a reference point from the front panel, PDA, or via the Web Server. The reference can be zero (no weight on the scale) or alternatively, a known weight on the scale. The instrument is capable of performing traditional calibration such as with the use of certified test weights.

NOTE: WAVERSAVER® and C2® are registered trademarks of Hardy Instruments Inc.

On-Board Diagnostics

The HI 3300 has a built in diagnostics utility which enables the operator to rapidly troubleshoot a tension zone from the front panel of the controller or via the Web Server. Simply press the Test button and scroll through several tests that will

furnish the current state of each of the parameters that concern your application and the web tension system. Help is just a click away in the event you should not understand the information on the display or need a description of the parameter.

Secure Memory Module (SMM)

The Secure Memory Module stores critical configuration (up to three product setpoints), calibration and setup data of the HI 3300 Tension Controller, thereby protecting this information from corruption. During system operation when a new parameter is entered, the SMM automatically updates the value in its memory. Data stored in one HI 3300 can be restored in another HI 3300 by physically transferring the SMM to the new instrument. The SMM is conveniently accessible from the instruments rear panel.

Relays

The HI 3300 is fitted with four (4) standard internal selectable 24 - 240 VAC or 5-60VDC Solid State electronic (SPST) relays. The relays can be used to open or close valves or gates, turn on/off motor, mixers, vibration equipment, heaters or coolers to name a few.

Analog Output

The Analog Output enables the transmission of Tension as 0-5 VDC, 0-10 VDC, 0-20 mA or 4-20 mA (or the reverse of these), and makes it possible to span these ranges over a portion of the weight data. Two analog option boards can be installed in each instrument. Both voltage and current data are available simultaneously.

Options

-2S

Dual Scale Input - Adds another channel to the standard instrument enabling the user to add another load cell.

HI 3000-RC

Rear cap for the HI 3000 Series controllers. Upgrades the entire assembly to a NEMA 4X rating by enclosing all the rear panel connectors.

-PB

Profibus interface allows instrument capabilities to be communicated remotely to and from a Siemens or other Profibus compatible processor.

-AC

AC input power for the HI 3000 Series remote mount instrument to act as a booster power supply for multiple instruments on Devicenet.

-RIO

Allen-Bradley Remote I/O interface allows full instrument capabilities to be communicated remotely to and from an Allen-Bradley processor.

-CN

ControlNet - Enables multiple controllers to control I/O on the same wire and permits multicast of both inputs and peer-to-peer data, reducing traffic on the wire and increasing system performance.

-MB

Swivel Mount including bracket and mounting hardware. This mount enables the user to mount the instrument outside an enclosure and rotate the HI 3300 for easier viewing.

Communication Options

NOTE: For installation and configuration instructions for all the Communication Options, please see the HI 3000 Installation and Operation Manual on this CD.

DeviceNet™

DeviceNet is a low-level network designed to connect the Hardy HI 3000 Series Instruments to higher-level controllers such as PCs, PLCs, or embedded controllers. The DeviceNet Network is an open, global industry-standard communication network designed to provide an interface through a single cable from a programmable controller or PC directly to all HI 3000 Series instruments as well as smart devices such as sensors, push buttons, motor starters, simple operator interfaces, drives and other weigh modules. With DeviceNet the user can monitor or control multiple applications from one display and allows 3rd party I/O to be easily added to any system. You no longer have to hard-wire each device to an I/O module or I/O block. The network also provides access to the intelligence present in the instruments for superior diagnostics and troubleshooting to help increase system up time. The DeviceNet network lets you monitor your plant-floor devices from a central location and reconfigure them as your needs change or service them as required. The DeviceNet network's capabilities help reduce integration, and reduce installation and wiring costs

Remote I/O (RIO) Interface to the Allen Bradley Network

The RIO port allows bi-directional communications with Allen-Bradley Programmable Logic Controllers (PLC) and Small Logic Controllers (SLC). The HI 3300 represents a selectable 1/4, 1/2, 3/4 or full rack of discrete I/O (32 bits in the Logic Controllers output and input image files) to the PLC Controller and supports both discrete and block transfers of data. It can support up to 230.4 Kbaud transfer rates.

PROFIBUS

Allows bi-directional communications to Profibus (Process-Fieldbus) products including those made by Siemens, GE Fanuc and Texas Instruments. This interface supports PROFIBUS-DP (Decentralized Periphery) and processes both Selectable Predetermined and Block transfer commands. It supports up to 12 Mbaud transfer rates.

OPC

OLE for Process Control (OPC) enables an HI 3300 module to communicate with any device that supports OLE/COM. The architecture is designed to utilize the Microsoft distributed OLE technology (DCOM) to facilitate clients interfacing to remote servers.

EtherNet/IP™

EtherNet/IP, short for **E**thernet **I**ndustrial **P**rotocol, is an open industrial networking standard that takes advantage of commercial, off-the-shelf Ethernet communication chips and media. Ethernet technology, enables the user to access device-level data from the Internet.The Ethernet/IP networking standard supports both implicit messaging (real-time I/O messaging) and explicit messaging (message exchange). EtherNet/IP is an open network that takes advantage of commercial technology that already exists.
TCP/IP is the transport and network layer protocol of the Internet and is commonly linked with all Ethernet installations and the business world. TCP/IP provides a set of services that any two devices can use to share data. Because Ethernet technology and standard protocol suites such as TCP/IP have been published for public use, standardized software tools and physical media have been mass-produced and are readily available, offering you the benefits of known technology and accessibility. The UDP/IP (User Datagram Protocol) is also used in conjunction with the Ethernet network. UDP/IP provides fast, efficient data transport required for real-time data exchange.

Modbus Over TCP/IP

Combining a versatile, scaleable, and ubiquitous physical network (Ethernet) with a universal networking standard (TCP/IP) and a vendor-neutral data representation (MODBUS®) gives a truly open, accessible network for exchange of process data. It is also extremely simple to implement for any device that supports TCP/IP sockets.
Simplicity: MODBUS® TCP/IP simply takes the MODBUS® instruction set and wraps TCP/IP around it. If you already have a MODBUS® driver and if you understand Ethernet and TCP/IP sockets, you can in short period of time, have a driver up and running and talking to a PC

ControlNet

ControlNet enables multiple controllers to control I/O on the same wire and permits multicast of both inputs and peer-to-peer data, reducing traffic on the wire and increasing system performance.

CHAPTER 2: SPECIFICATIONS

About Chapter 2

Chapter 2 lists the specifications for the HI 3300 Tension Controller. Specifications are listed for the standard instrument and for instruments fitted with optional equipment. The specifications listed are designed to assist in the installation, operation and troubleshooting of the instrument. Service personnel should be familiar with this section before attempting an installation or repair of the instrument.

Specifications for a Standard Instrument

Update Rate:

- 55 updates per second

Resolution:

- Displayed: 1:985,000 (3 mV/V load cells)
- Internal 1:1,048,5761

Excitation Voltage:

- 5 VDC
- Drives up to 8 350 ohm load cells

Averages:

- 1 to 250 - Sliding, User Selectable in Single Unit Increments

Input:

- Up to two (2) 350 ohm Full Wheatstone Bridge, Strain Gauge Load Sensors/Cells (5 volt excitation) on one vessel.
- Up to two (2) LVDT Load Sensors
- Signal Voltage Range ± 120mV/Volt (± 600 mV)

Display:

- Large font Tension (lbf/N) Display
- 4 line x 20 character backlit LCD
- 5 x 7 dot matrix

Display Increments (Graduations):

- 1,2,5,10,20,50,100,200,500 user selectable
- Corresponding weight is dependent on the decimal point location.

Standard Electronic AC Relays:

- Wire Size: 12 AWG Maximum
- Maximum Switch Current: .5 Amps
- Maximum Switch Power: 120 Watts
- Maximum Switch Voltage: .5 Amps @ 240 VAC
- Single Cycle Surge: 85 Amps (Peak)

Standard Electronic DC Relays:

- Wire Size: 12 AWG Maximum
- Maximum Switch Current: .5 Amps
- Maximum Switch Voltage: .5 Amps @ 60 VDC
- Switch Voltage: 5-60 VDC
- 1 second surge: 5 Amps

Non-Linearity:

- 0.0015% of Full Scale

WAVERSAVER®:

- Off
- 7.5 Hz
- 3.5 Hz
- 1.0 Hz
- 0.5 Hz
- 0.25 Hz

Calibration Techniques:

- C2® - Second Generation: Electronic
- Traditional - Calibration with test weights
- Soft Calibration - Wrap Angles or Force Factor

Standard Interfaces:

- Ethernet - 10/100 Base T; embedded server

Excitation Monitor:

- Current less than 10%

Power and Utility Requirements:

Voltage - Universal Power Supply (50/60 Hz)

- 120-240 VAC ± 10%
- 12 - 24 VDC

Frequency

- 47-63 Hz

Power:

- 10 Watts maximum with options

Watts available for DeviceNet Power:

- 15 Watts

Common Mode Voltage Range

- ± 2.5 VDC

Common Mode Rejection:

- 100dB @ 50-60Hz

Environmental Requirements:

Operating Temperature Range:

- -10º to 50º C (14º to 122º F)

Storage Temperature Range:

- -20º to70º C (-4º to 158º F)

Temperature Coefficient:

- Less than 0.005% of full scale per degree C for zero and span.

Humidity Range:

- 0-90% (non-condensing)

Approvals:

- CE
- UL
- CUL

Instrument Local I/O:

- 5 mappable inputs optically isolated
- 4 mappable outputs 48-240 VAC Form A Electronic
- 3rd party mappable over DeviceNet

Physical Characteristics:

Panel Mount (Model # HI 3300-PM)

Depth

- 8.03" (203.96mm) Back of the Bezel to rear cable clearance.

Case Dimensions

- 6.125"H x 8.56"W x 6.03"D (155.57mmH x 217.42mmW x 1.53.16mmD)

Front Panel Dimensions

- 7.686" H x 9.40" W x 0.625" D (195.22mm H x 247.39mm W x 15.87mmD)

Panel Cutout Dimensions

- 6.75" H x 8.94" W (1775mm H x 227mm W)

Case Material

- GE Cycolac Type KJW - Flame Retardant ABS (Acrylanitrile Butadiene Styrene)

Weight

- 4.6 pounds (2.1 Kilograms)

Rating

- Front Panel NEMA 4 Seal

Wall Mount (HI 3300-MB)

Base Dimensions

- 9.3” L x 4.0” W (236.22mm L x 101.60mm W)

Overall Height with HI 3300 installed, as measured from the base to the top of the front plate.

- 11.77” High (298.96mm H)

Swivel Material

- 304 Stainless Steel

Analog CCA

Resolution:

- 16 bit resolution

Output types:

- 0-5V
- 0-10V
- 4-20mA
- 0-20mA

Current Loop Power:

- 0-20, 4-20 mA output: Max Voltage - 12 volts
- 0-10 and 0-10V output: Max Current - 5mA

Integral Nonlinearity:

- ± 0.0045%

Max Offset:

- ± 0.04%

Power Supply:

- Minimum input: 60VAC
- Maximum input: 120VAC RMS

Operating Temperature:

- 0-50 Cº

Specifications for I/O Option Boards

Profibus Option Board

Power Supply:

- +5V max - 350mA

Operating Temperature:

- 0 - 70° C (32° - 158° F)

Profibus Services:

- DP Services

ID Number and GSD Support:

- 1003H with Standard GSD File (May change if required)

Input Size:

- 0-122 Words

Output Size:

- 0-122 Words

Combined Input and Output Size:

- Not exceed 208 Words

ControlNet Option Board

Power Supply:

- +5V max - 350mA

Operating Temperature:

- 0 - 70° C (32° - 158° F)

ControlNet Baud Rate:

- 5 Mbit/second

Max I/O Data Capacity:

- Input - 250 bytes
- Output - 250 bytes

ControlNet Supported Features:

- Redundant Media
- Cyclic Messaging

EtherNet/IP™ Option Card (Pending)

Power Supply:

- +5V max 450mA

Operating Temperature:

- 0 - 70° C (32° - 158° F)

Baud Rate:

- 10/100 Mbit/s

I/O Input:

- 2048 bytes

I/O Output:

- 2048 bytes

Application Interface:

- Parallel

Specification Rel. 2:

- EtherNet/IP level 2 I/O Server CIP (ControlNet & DeviceNet)

Functionality:

- 10/100Mbit MB/TCP +EtherNet/IP + IT functions

RIO Option Board

Power Supply:

- +5V max - 350mA

Operating Temperature:

- 0 - 70° C (32° - 158° F)

RIO Baud Rate:

- 57.6, 115, 225 Kbit/second

Max I/O Data Capacity:

- Input - 63 bytes (Full Rack)
- Output - 63 bytes (Full Rack)
- 15 Bytes Discrete
- 48 Bytes Block

RIO Supported Features:

- Block Transfer Data
- IO Mode
- 1/4, 1/2, 3/4 and Full Rack

Control of the Rack_Size and Starting_Quarter Combinations

Starting Quarter	Valid Rack Sizes
First	For all Rack Sizes
Second	For 1/4, 1/2, 3/4 Racks
Third	For 1/4, 1/2 Racks
Fourth	Only for 1/4 Racks

Table 1: Quarter Combinations

Specifications for Peripherals/Systems Components

HI 215JB-SS1 or PS1 Series:

Case Dimensions:

- 6.25"H x 6.25"W x 4.50D (158.75mmH x 158.75mmW x 114.3mmD)

Weight

- 5 pounds (2.27 Kilograms)

Enclosure Ratings:

- -SS1 Stainless Steel NEMA 4 & 4X
- -PS1 Painted Carbon Steel NEMA 4

CHAPTER 3: INSTALLATION

About Chapter 3

All information contained in Chapter 3 pertains to unpacking, cabling, interconnecting and installing the HI 3300 Tension Controller. Alternatives to any specifications contained or implied in this section are not recommended. It is very important that the user and service personnel be familiar with the procedures contained in this chapter, before installing or operating the HI 3300 Tension Controller.

NOTE: Ethernet and DeviceNet installation and setup instructions are located in the HI 3000 Series Operation and Installation Manual in the Cabling Section. There are also installation instructions in the Quick Installation Guide.

Unpacking

Step 1. Before signing the packing slip, inspect the packing for damage of any kind.
Step 2. Report any damage to the carrier company immediately.
Step 3. Check to see that everything in the package matches the bill of lading. You should normally have:

HI 3300 Panel Mount

- (1) HI 3300 Tension Controller with mating connectors and ordered options installed.
- (1) Mounting Kit with a mounting bracket, gasket and (4) RAF 8-32 captive screws.
- CD containing User Guide and Service Manuals

Step 4. If any items are missing, damaged, or there are any questions, please contact Customer Support at:

Hardy Instruments
9440 Carroll Park Drive, Suite 150
San Diego, CA 92121
Phone: (858) 278-2900
FAX: (858) 278-6700
Web Site: http//www.hardyinstruments.com
E-Mail: hardysupport@hardyinst.com

Step 5. Record the model number and serial number of the Weight Controller. Store in a convenient, secure location for reference when contacting Hardy Instruments Customer Service Department or to buy parts or firmware upgrades.

Disassembly and Reassembly Notes and Cautions

- Always disconnect the power cord before disassembling.

WARNING: FAILURE TO DISCONNECT THE POWER CORD BEFORE DISASSEMBLING MAY CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.

WARNING: MAKE SURE THAT ALL PERSONNEL ARE CLEAR OF THE WEB TENSION MACHINERY BEFORE PUSHING THE START BUTTON. FAILURE TO DO SO MAY CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.

- Make sure that any disassembly is done in a clean, well ventilated, properly controlled static environment.
- Always make sure that the assemblies and sub-assemblies are well supported and insulated when doing any repairs on the instrument.
- Place small fasteners, connectors and electrical parts in closed containers so as not to lose parts during reassembly.
- Read all the disassembly instructions before any disassembly begins. Be sure that you are familiar with the procedures. If any of the instructions for disassembly are unclear, contact Hardy Instruments, Technical Support Department for additional information and assistance.
- Do not disconnect any electrical plug, connector or terminal unless an identification tag is present or one is attached. Always note where the connector or plug was attached to the electrical component or wiring harness.
- Always install complete hardware groups (Screws, Washers, Lock Washers, Spacers, Etc.) back to the original point of removal.
- Always replace broken or damaged modules or hardware immediately!
- Always check to be sure that no loose parts are sitting on printed circuit boards or electrical connectors or wires when disassembling or reassembling.
- Always protect printed circuit boards from electrostatic discharge (ESD). Always use approved ESD wrist straps and anti-static pads.
- Always perform a final inspection after completing any reassembly to be sure that all fasteners are tight, all connectors are secure and there are no loose parts on any

of the printed circuit boards in the instrument.

- Always follow proper safety procedures when working on or around the instrument.

WARNING: IF A LITHIUM BATTERY IS REPLACED WITH AN INCORRECT TYPE IT MAY CAUSE AN EXPLOSION WHICH WILL CAUSE PROPERTY DAMAGE OR PERSONAL INJURY.

Mechanical Installation

Installing the HI 3300 in a Panel

Panel Cutout Specifications

Enclosure Size Requirements:

- Overall depth of the enclosure must be a minimum of 8.5" to allow for the 2" clearance between the rear panel of the HI 3300 Tension Controller and the inside surface of the rear panel of the enclosure. (See Fig. 3-1)
- There must be a 1" clearance completely around the bezel and other installed units.

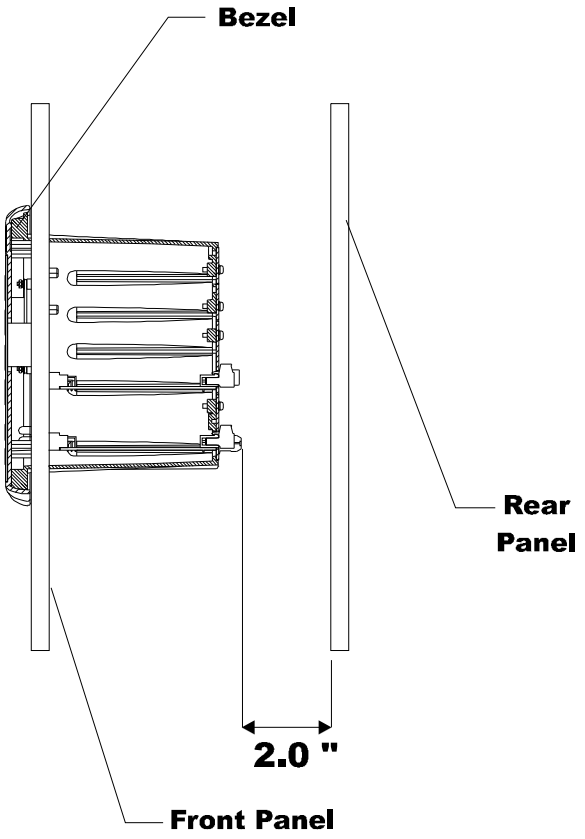


FIG. 3-1 REAR PANEL CLEARANCE REQUIREMENT

Dimensions of the panel cutout. (See Fig. 3-2)

- 8.94” ±.06 (227.076mm ± 1.52mm) Wide
- 6.625” ±.06 (171.45mm ± 1.52mm) High

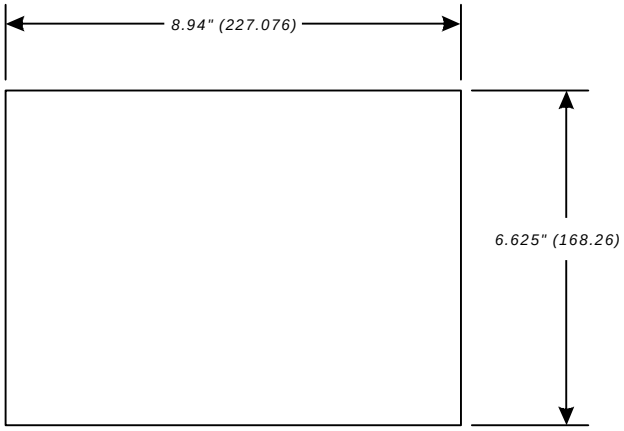


FIG. 3-2 PANEL CUTOUT DIMENSIONS

Installing the HI 3300 Tension Controller

Step 1. Make sure that all Electrostatic Discharge (ESD) precautions are taken before and during installation.

Step 2. The Tension Controller comes with a NEMA 4 & 4X rated compression gasket. Slide the gasket over the rear of the instrument until the gasket is flush with the back side of the front panel. (See Fig. 3-3)

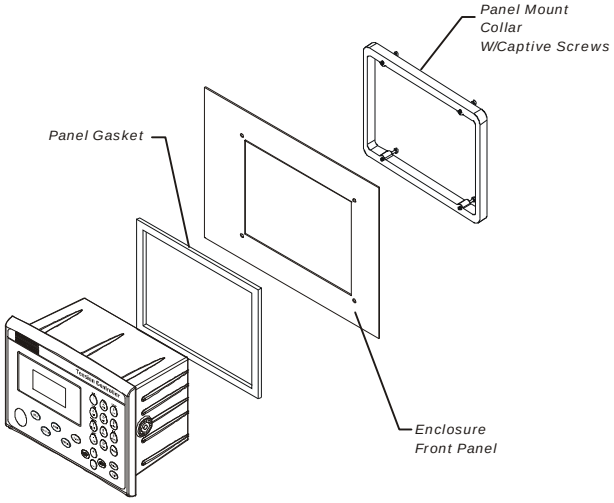


FIG. 3-3 PANEL MOUNT INSTALLATION

Step 3. Gently slide the Tension Controller with the gasket into the cutout in the enclosure front panel or door until the gasket is flush with the enclosure front panel. (See Fig. 3-4) Be sure to secure the instrument with both hands when installing.

Step 4. Line up the instrument's tapped holes with the through holes in the enclosure front panel.

CAUTION: ONCE THE GASKET IS COMPRESSED IT SHOULD NOT BE USED AGAIN. WHENEVER THE TENSION CONTROLLER IS REMOVED FROM THE PANEL, RE INSTALL WITH A NEW GASKET.

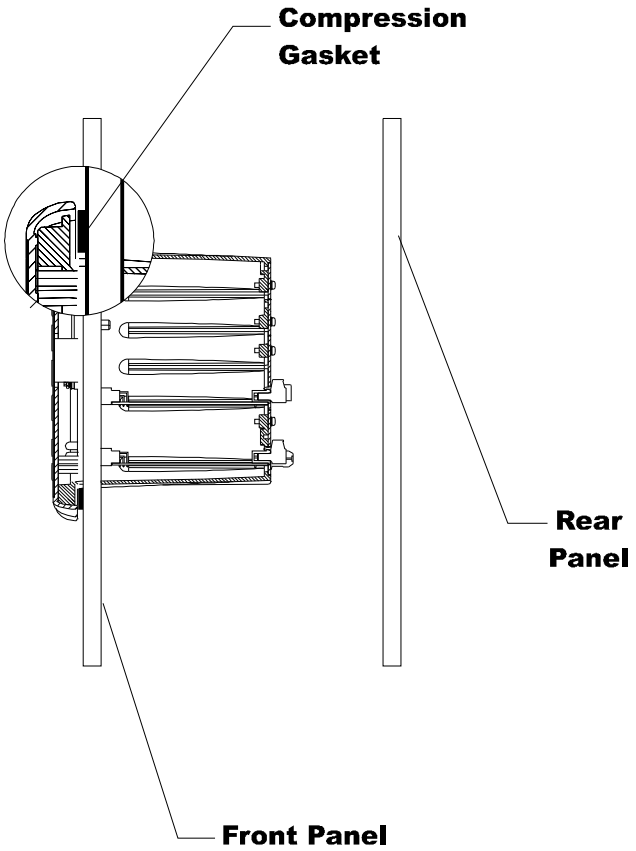


FIG. 3-4 NEMA 4 GASKET FLUSH AGAINST THE FRONT PANEL OF THE ENCLOSURE

Step 5. Gently slide the Panel Mount Collar over the rear of the instrument. (See Fig. 3-3)

Step 6. Push the captive screws through the holes in the Enclosure Front Panel and install the screws into the tapped holes on the instrument until the screws are finger tight.

Step 7. Use a slotted head screwdriver and tighten each screw until the instrument is snug and the compression gasket is tight against the Enclosure Front Panel. DO NOT OVERTIGHTEN!

Step 8. The Panel Mount installation is complete.

Installing the HI 3300 in a Swivel/Wall Mount

About the Swivel/Wall Mount

The swivel mounts allows the Tension Controller to mount on a horizontal or vertical surface. The instrument is mounted in the swivel which is fastened to a hard surface. The mount not only supports the instrument but also allows the Tension Controller to rotate for a better view of the display and more convenient access to the front panel key board. The Swivel Mount also serves as a wall mount. Simply rotate the swivel mount 90 degrees and attach it to a wall. The swivel allows the instrument to rotate several degrees, even with cables and rear cover attached.

Step 1. Use four (4) 1/4 x 20 fasteners to fasten the swivel mount to a horizontal surface. (See Fig. 3-5)

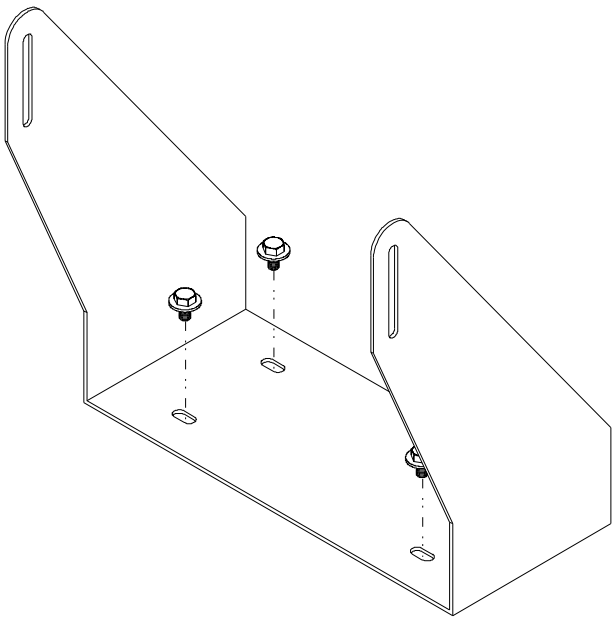


FIG. 3-5 INSTALLING THE SWIVEL MOUNT TO A HORIZONTAL SURFACE

Step 2. Place the Tension Controller between the Swivel Mount brackets so that the threaded holes in the instrument are aligned with the slots in the Swivel bracket. (See Fig. 3-6)

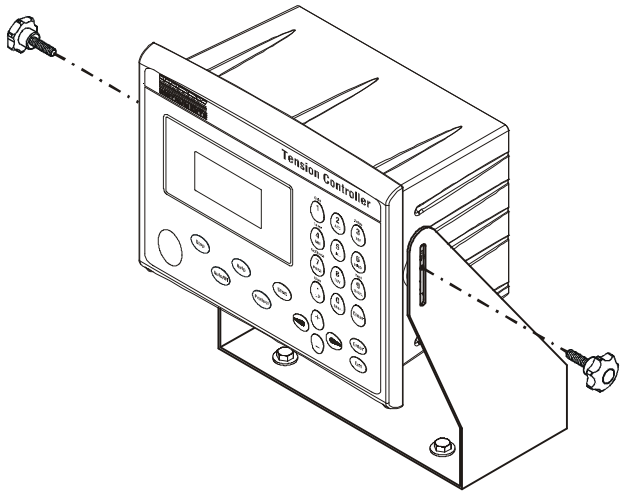


FIG. 3-6 TENSION CONTROLLER INSTALLING IN A SWIVEL MOUNT

Step 3. Screw the two (2) fastener knobs into the threaded holes on each side of the Tension Controller until the brackets are snug against the instrument. (See Fig. 3-6 & 3-7)

CAUTION: DO NOT OVERTIGHTEN.

Step 4. To rotate the instrument in the swivel mount, loosen the two fastener knobs.
Step 5. Rotate the instrument to the position you want.
Step 6. Re-tighten the fastener knobs.

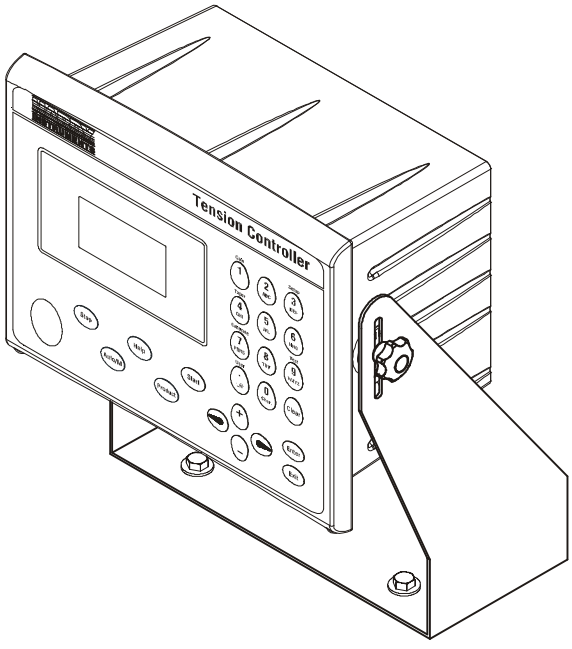


FIG. 3-7 TENSION CONTROLLER INSTALLED IN A SWIVEL MOUNT

Step 7. Use four (4) 1/4 x 20 fasteners to fasten the swivel mount to a vertical surface. (See Fig. 3-8)

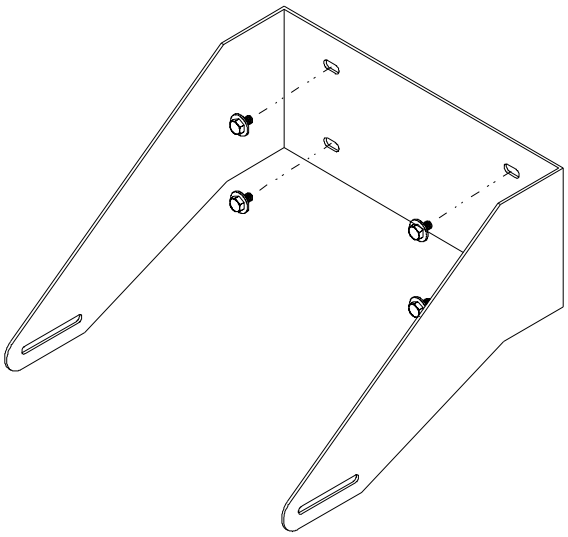


FIG. 3-8 INSTALLING THE SWIVEL MOUNT TO A VERTICAL SURFACE

Step 8. Place the Tension Controller between the Swivel Mount brackets so that the threaded holes in the instrument are aligned with the slots in the Swivel bracket. (See Fig. 3-9)

NOTE: When wall mounted, the unit should support a 14 pound weight for one minute without coming loose or damaging the equipment.

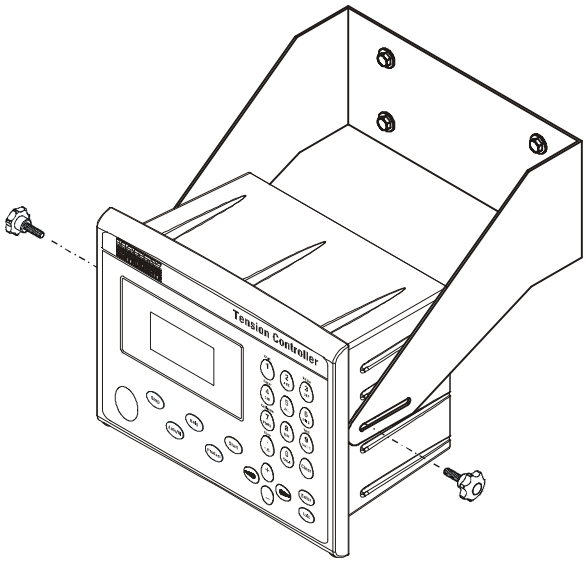


FIG. 3-9 TENSION CONTROLLER INSTALLING IN A SWIVEL WALL MOUNT

Step 9. Screw the two fastener knobs into the threaded holes on each side of the Tension Controller until the brackets are snug against the instrument. (See Figs. 3-9 & 3-10)

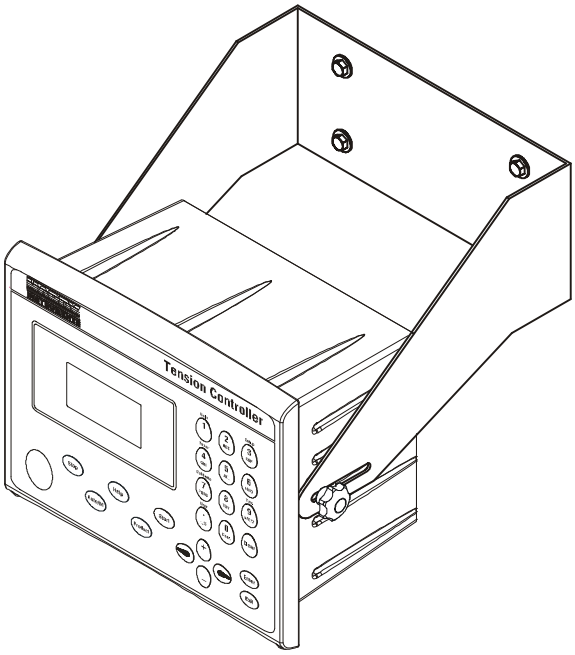


FIG. 3-10 TENSION CONTROLLER INSTALLED IN A SWIVEL/WALL MOUNT

Installing Printed Circuit Boards

Step 1. From the back of the instrument, align the PCB board with the housing slots in the instrument so that the backplane connector is facing the instrument. (See Fig. 3-11)

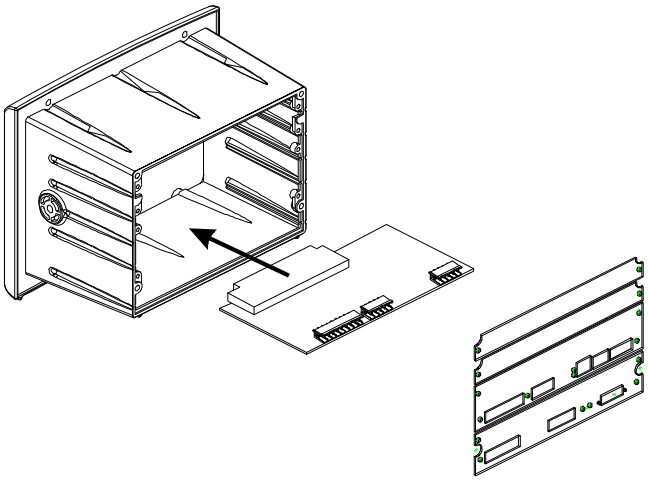


FIG. 3-11 MAIN CONTROLLER BOARD INSTALLATION/LINING UP BOARDS WITH THE SLOTS

Step 2. Gently slide the circuit board into the slots making sure that the each side of the PC board is in the proper slot. (See Fig. 3-12)

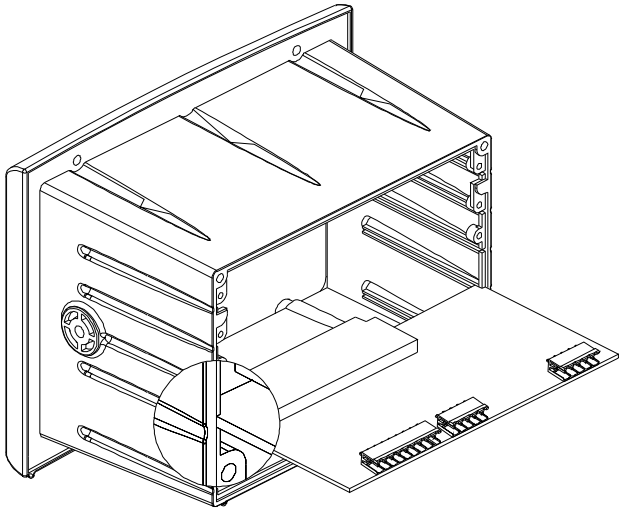


FIG. 3-12 MAIN CONTROLLER BOARD INSTALLATION/SLIDING THE BOARD INTO THE INSTRUMENT

Step 3. Gently push the PC board all the way into the instrument until the backplane connector is connected to the backplane.

Step 4. Install the Main Board rear plate. (See Fig. 3-13)

- Place the Main Board rear plate so that the threaded holes on each side of the instrument chassis are aligned.
- Screw a panhead screw (#4-40) into the threaded hole on the instrument chassis. Do not tighten.
- Screw the panhead screws that attach the rear plate to the Main Board until they are finger tight.
- Use a Phillips head screw driver and tighten all the installed screws until snug.

CAUTION: DO NOT OVERTIGHTEN.

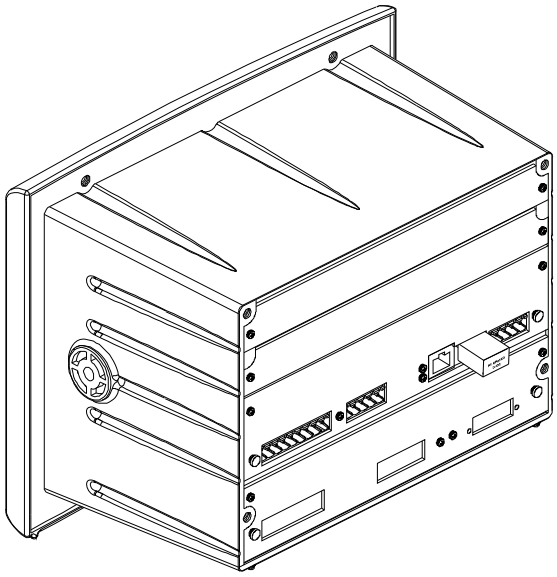


FIG. 3-13 MAIN CONTROLLER BOARD INSTALLED WITH REAR PLATE

Step 5. Installation of all the PC Boards used in any HI 3000 Series Instrument requires the same procedures.

Removing Printed Circuit Boards

Step 1. Unplug all the cables that are connected to the instrument.
Step 2. Use a Phillips head screw driver and remove the two (2) pan head screws that fasten the rear plate to the instrument. You do not need to remove any of the screws that fasten the rear panel to the PC Board.
Step 3. Use your fingers to grasp the two (2) (knurled knobs) that are mounted on the rear panels.
Step 4. Gently pull the knobs away from the instrument until the PC Board is clear of the instrument slots.
Step 5. Store the circuit board in a secure and dry location, free of any ESD.

Electrical Installation

Cabling and Interconnecting

Recommended Installation Procedures

- Carefully plan the cable runs and wiring connections before routing, cutting and trimming cables and wires.

CAUTION: INSTRUMENT POWER AND RELAY WIRES SHOULD BE ROUTED AWAY FROM ALL OTHER SIGNAL CABLES TO AVOID ELECTRICAL INTERFERENCE.

- All cabling should be neatly bundled, tied, and dressed.
- Use a 6 inch service bend to relieve stress on the connectors and to ease servicing the unit.
- Make sure that all plugs are firmly in place.
- Be sure to secure the power cord with the two (2) captive screw-on clips.
- All connections are made at the rear panel of the Tension Controller.

AC Power Wiring

WARNING: DO NOT OPERATE WITH INCORRECT LINE VOLTAGE. TO DO SO WILL RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY. MAKE SURE THAT THE POWER SOURCE DOES NOT EXCEED 240 VAC.

- The AC power should be supplied by a “clean” primary line, directly from the power panel. This line should not supply any other equipment, including the feeding unit, and should be supplied with a minimum 10 amp breaker. (See Fig. 3-16)

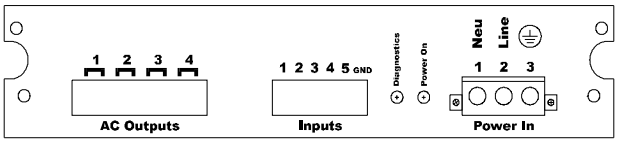


FIG. 3-14 POWER WIRING DIAGRAM

- Power Input J1

  J1-1 Neu (Low)
  J1-2 Line (HI)
  J1-3 Ground

Step 1. The HI 3000 Series instruments are configured with a universal power supply rated from 120 to 240 VAC. The instruments can be powered by a 120 or 240 VAC power source and requires no switching or jumper settings.
Step 2. Install a 3-wire, minimum 14 AWG power line to the 3-pin terminal block connector. (See Fig. 3-16)
Step 3. The power and relay circuit card filters and conditions AC power. However, for noisy power lines, external conditioning may be required.

-DC Power Wiring

WARNING: DO NOT OPERATE WITH INCORRECT LINE VOLTAGE. TO DO SO WILL RESULT IN PROPERTY DAMAGE AND/OR PERSONAL INJURY. MAKE SURE THAT THE POWER SOURCE DOES NOT EXCEED 24 VDC.

- The DC power should be supplied by a “clean” primary line, directly from the DC power source.

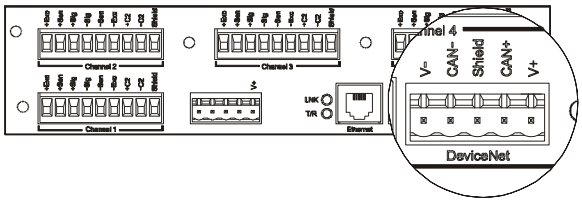


FIG. 3-15 DC POWER SUPPLY CONNECTION

Step 1. Connect your positive and negative DC voltage lines to the Phoenix connector that plugs into the DeviceNet Connector. (See Fig. 3-17)
Step 2. Plug the connector into the DeviceNet Connector at the rear panel.

NOTE: Use DC power source when you have the -DC option and do not have the DeviceNet Option. The DeviceNet option has its own DC power source.

Load Point Connections

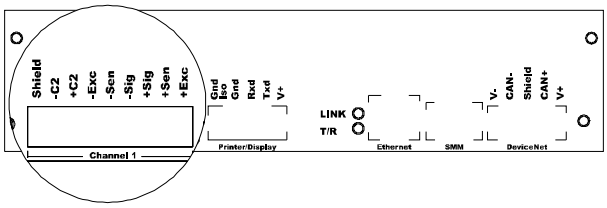


FIG. 3-16 REAR PANEL/LOAD POINT CONNECTIONS

C2® Load Point Connection

Cable color Code for C2 Load Points (left to right facing the rear panel):

- Shield Ground Wire
- C2- Violet
- C2+ Grey
- EXC- Black
- SEN- Brown
- SIG- White
- SIG+ Green
- SEN+ BLUE
- EXC+ RED

Step 1. Remove the factory installed jumper from the terminal block if you are connecting an 8 wire cable from the junction box.
Step 2. Connect the cable (Recommended load cell cable: Hardy Instruments Prt. # 6020-0001) wires to the J9 terminal block according to the cable color chart. (See Below)

NOTE: To purchase Hardy Load Cell cable, contact your local Hardy Representative or Distributor.

Step 3. Plug the terminal block into the Channel 1 connector on the rear panel.

Non-C2 Load Point Connection

Cable color Code for Non-C2 Load Points:

- Shield Ground Wire
- C2- Not Used
- C2+ Not Used
- EXC- Black
- SEN- Brown
- SIG- White
- SIG+ Green
- SEN+ Blue
- EXC+ Red

Step 1. Remove the factory installed jumper from the terminal block if you have 6 wire load cell cable that includes sense wires from the load cell or junction box.
Step 2. Connect the cable (Recommended load cell cable: Hardy Instruments Prt. # 6020-0001) wires to the J9 terminal block according to the Non-C2 cable color chart.
Step 3. Plug the terminal block into the Channel 1 (J9) connector on the rear panel.

LVDT Tension Sensor - MB Series Connection

About LVDT Connections

The LVDT can be wired for compression applications and for Tension applications. To convert from Compression to Tension and back just reverse the SIG+ & SIG- wires (See Figs. 3-19, 20).

Cable Color Code for MB Series LVDT load sensor connection:

- Red EXC+
- Black EXC-
- Yellow SIG-
- Green SIG+

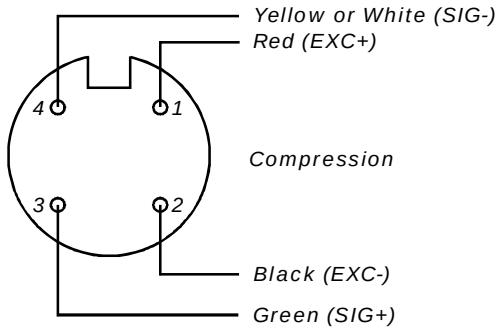


FIG. 3-17 LVDT CONNECTIONS/COMPRESSION

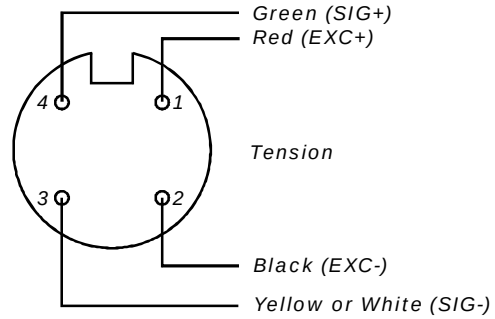


FIG. 3-18 LVDT CONNECTIONS/TENSION (REVERSE WRAP)

- Place jumpers in positions 4-5 and 8-9 (See Fig. 3-19)

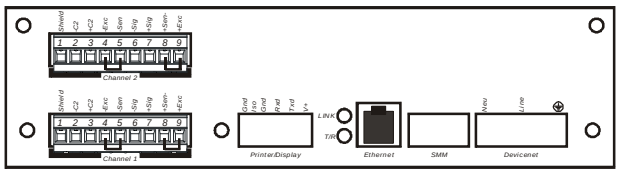


FIG. 3-19 LVDT CONNECTIONS/HI 3300 REAR PANEL

Junction Box Wiring

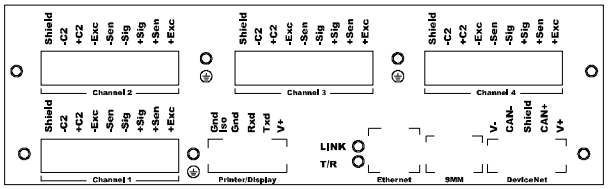


FIG. 3-20 JUNCTION BOX CONNECTIONS

Step 4. Connect the cable wires directly to the terminal blocks according to the C2 or Non-C2 cable color charts.

Step 5. Plug the terminal blocks into Channels 1 thru 4 connectors on the rear panel. Write down which load cell is connected to Channel 1, Channel 2, Channel 3, Channel 4 for future reference.

NOTE: If you have one load point you must plug it into Channel 1. If you have more than one load point you must make sure that you plug one of the load points into Channel 1.

Step 6. If you only have 3 load cells, do not use Channel 4.

Network Option Card Installation

All Network Option Card installation and configuration instructions can be found in the HI 3000 Manual which is located on the Resource CD you received with your HI 3000 Series instrument. If you do not currently have the Resource CD or an HI 3000 manual go to the Hardy Instruments Web Site and download a free copy. For the Analog Option Card Configuration please go to the Analog Option Card Configuration Section of Chapter 4 in this manual.

Installation of Secure Memory Module (SMM)

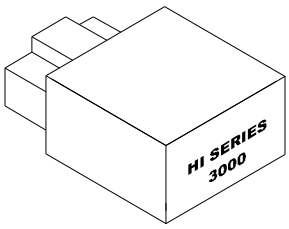


FIG. 3-21 SECURE MEMORY MODULE (SMM)

Step 7. Slide the module with the notch up into the module housing at the rear panel. (See Fig. 3-20 & 21)

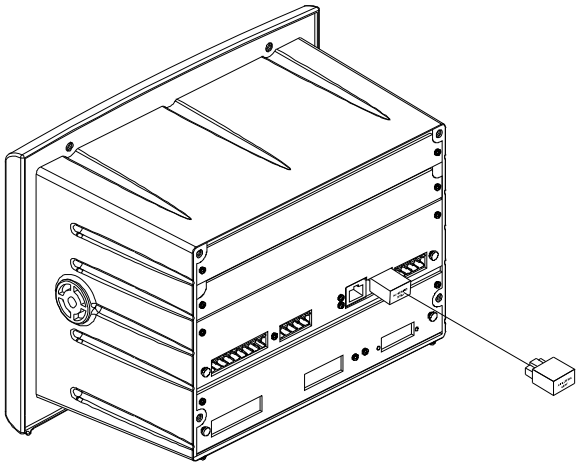


FIG. 3-22 INSTALLING THE SECURE MEMORY MODULE

Step 8. Press the module in until it stops. Do not force the module, it should slide in easily.
Step 9. To remove the module pull the module straight out of the housing. (See Fig. 3-22)

Transferring a Secure Memory Module

CAUTION: DO NOT REMOVE AN SMM WITH THE POWER ON. ALWAYS DISCONNECT THE POWER CABLE FROM THE INSTRUMENT BEFORE REMOVING OR INSTALLING THE SECURE MEMORY MODULE.

Step 1. Disconnect the power cable from the Instrument.
Step 2. Remove the Secure Memory Module from the instrument.
Step 3. Install the Secure Memory Module into the new instrument.
Step 4. Power up the new instrument.

CHAPTER 4: CONFIGURATION

About Chapter 4

Chapter 4 contains step-by-step instructions for configuring the Hardy Instruments, HI 3300 Tension Controller. The procedures include complete instructions for configuring the Tension Controller from the Front Panel, Remote I/O (optional) ControlNet (optional), DeviceNet (Optional) and Web Browser. We highly recommend reading the procedures before configuring the Tension Controller. Being familiar with the configuration procedures insures that the Controller will provide trouble free service.

Getting Started

Before operating the Hardy HI 3300 Tension Controller, check to make sure the following procedures have been performed:

- Power and Load Point cables properly installed.
- Communication cables properly installed.
- Roll Weight and Load Sensors have been Zeroed and Calibrated.

All the features of the Tension Controller operate the same no matter what the interface. First let's get familiar with configuring the HI 3300 from the front panel of the instrument. (See Fig. 4-1)

Help

About Help

As you move through the setup/configuration menus you may on occasion need assistance. If you need help, do the following:

Step 1. Use the up and "-" arrows and move the cursor in front of the Menu Item you want help on.
Step 2. Click the Help button either on the front Panel, or Web Page and a Help Dialog appears. The help dialog tells you what the Menu Item is used for or other descriptive information to help you enter the right parameters for the current menu item.
Step 3. Push the Exit button to return to the current menu.

Operating the Tension Controller from the Front Panel

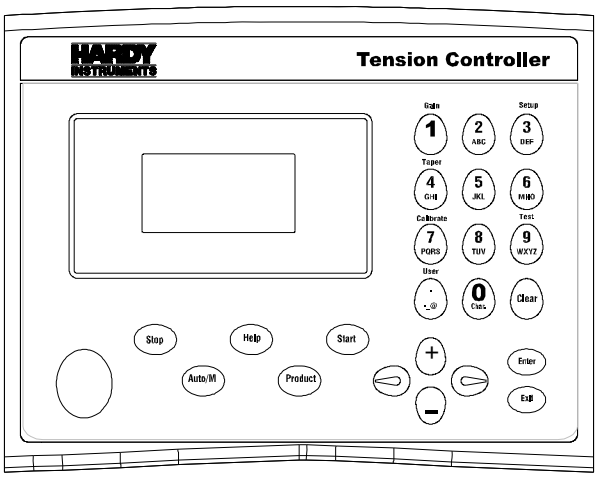


FIG. 4-1 FRONT PANEL

Front Panel Display

The Front Panel Display has a large tension value display with 4 line x 20 Alphanumeric character LCD. The screen displays all the menus for Configuring, Calibrating and Operating the HI 3300 Tension Controller.

Button Functions

Start Button

The Start Button starts or restarts the tension process. Start could also be a dual start where the Start Button will start the process in the controller and send a signal to the VFD to start.

WARNING: THE START BUTTON IS ACTIVE IN ANY MENU. MAKE SURE THAT ALL PERSONNEL ARE CLEAR FROM ANY AND ALL MACHINERY WHEN CONFIGURING THE TENSION CONTROLLER. ACCIDENTALLY STARTING THE SYSTEM WHEN IN THE CONFIGURATION OR CALIBRATION MENUS COULD CAUSE PROPERTY DAMAGE AND/OR PERSONNEL INJURY.

Stop Button

The Stop button stops or initiates a shutdown sequence for the controller. The Stop could also provide a signal to a remote station as well.

NOTE: The Stop button is functional in all menus.

Help Button

The Help button displays a Help message for the current Menu item (the Menu item in front of the cursor) that is displayed. In Standby the Help button does not display a Help message.

Auto/M Button

Enables you to enter or exit the manual or Auto mode of operation. You also see “Auto” or “Manual” in the upper right hand corner of the display telling you which mode you are currently in. When in the Auto mode the PID control is targeting the tension setpoint. In Manual mode if there is ringing or oscillation it reflects the noise level in the system.

Product Button

The Product button opens the Product Menus which allows the user to select among three preconfigured products. It also enables the user to set or reset the Name of the Product and the Tension Setpoint.

Left/Right Arrow, +/- Buttons

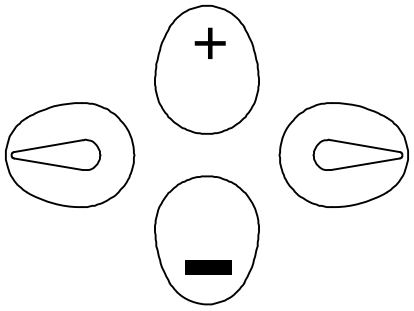


FIG. 4-2 DIRECTIONAL BUTTONS

The “+” and “-” buttons allow the operator to adjust the running tension up or down from the Operating Display when in the Auto Mode. The “+” increases the running tension and the “-” decreases the running tension. The “+” and “-” buttons enable the operator to adjust the output signal from the Operating Display when in the Manual Mode.

When in a Sub-Menu, the +/- buttons move the cursor vertically allowing the user to scroll through each item of a menu. The Left/Right arrow buttons move the cursor horizontally left and right. The Left arrow button has an added backspace function. For example if there are Alpha/Numeric characters that appear in the display, as you press the left button it erases the characters. The Right arrow button moves the cursor to the right in the display and does not erase an alphanumeric entry. The Left/Right arrow buttons also move the cursor through a pick list. (See Fig. 4-2)

Enter Button

The Enter button enters the Alphanumeric value entered for a menu item in the display. The Enter button also enters the selections from a pick list. (See Fig. 4-3)

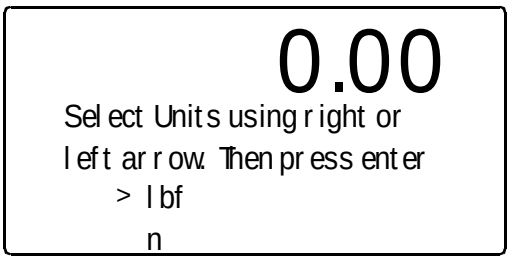


FIG. 4-3 LIST SELECTION/ENTER BUTTON

For example, when selecting units from a pick list, use the left and right arrows to move the cursor in front of the unit you want and press the Enter button.

Exit Button

The Exit button disregards the current value entry, restores the previous value and moves the cursor to the previous menu.

Clear Button

The Clear button clears the total Alpha/Numeric Entry and repositions the cursor for the first entry.

Gain/1 Button

Enables you to change the System Gain (P) while in the Operating Mode. Also enters the integer 1 in the display.

2/ABC Button

Enters the integer 2 in the display. Also enters the characters A, B, C. Pushing the button once enters the integer 2.

NOTE: For numeric entries only: Push the button and the number on the button is entered.

NOTE: For Alphanumeric entries only: Pushing the button once, the first letter on the button is entered in uppercase, A, D, G, and so on. Push the button a second time, the second letter is entered in uppercase, B, E, H, K and so on. Push the button a third time, the third letter is entered in uppercase, C, F, I, L, and so on. Push the button a fourth time, the fourth letter is entered in uppercase, S, Z. Push the button a fifth time the first letter is entered in lowercase, a, d, g, and so on. After you go through the lowercase letters, you can push the button again for the number. You need to push

the buttons rapidly. If you delay too long the instrument will accept the alphanumeric character and move the cursor to the left preparing for the next alphanumeric entry. This is true for all the Alphanumeric buttons. If this occurs use the left arrow button to erase the current entry and enter another.

Setup/3/DEF Button

This enables you to access the configuration and setup menus. Also enters the number 3 and the letters D, E, F.

Taper/4/GHI

Enables you to change Taper percentage on the fly when controller is in operating mode. Also enters the number 4 and the letters C, H, I.

5/JKL Button

Enters the integer 5 and the letters J, K, L.

6/MNO Button

Enters the integer 6 and the letters M, N, O.

Calibrate/7/PQRS Button

Enables the user to calibrate (C2, Traditional Cal, Soft Cal) the instrument when in the operating display. Also enters the integer 7 and letters P, Q, R, S.

8/TUV Button

Enters the integer 8 and the letters T, U, V.

Test/9/WXYZ Button

Enables you to enter the self test or diagnostics mode. Also enters the inter 9 and letters W, X, Y, Z.

User/./_/@ Button

Enables you to change the 3 digit user code while in the standby mode. Also enters the period (.), underscore (_) and @ symbols.

0/Char. Button

Enters the integer 0 in the display. When you push the button the second time a set of characters appears in the display.

Step 1. Using the “+” and "-" arrow buttons move the cursor in front of the character you want to display.
Step 2. Press the Enter Button to select the character.
Step 3. Press the Exit Button to return to the display. The character should now appear next to the cursor.

Starting Up for the First Time

When the HI 3300 Tension Controller powers up after delivery from the factory, The Operating Mode Display appears in the Front Panel Display with the controller on Standby. (See Fig. 4-4) The Operating Display always indicates one of the following modes of operation: (See Figs. 4-5, 6, 7)

- Standby - Prepared and Waiting to Start
- Auto - Instrument controlling the process
- Manual - Operator controlling the process
- Stop - Controller and Process are stopped. You must press Start to Start or Restart the Controller.

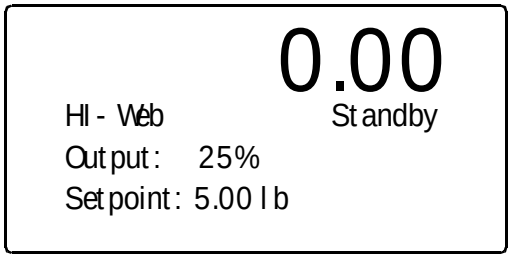


FIG. 4-4 FRONT PANEL/OPERATING MODE DISPLAY/STANDBY

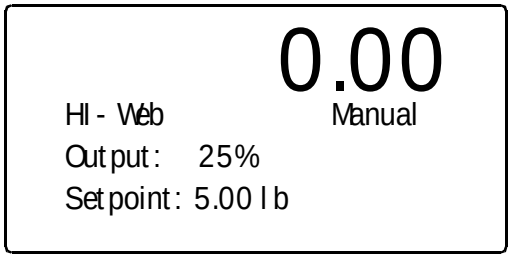


FIG. 4-5 FRONT PANEL/OPERATING MODE DISPLAY/MANUAL

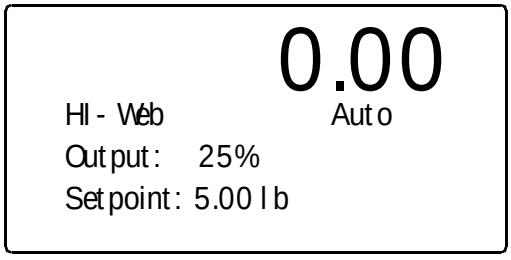


FIG. 4-6 FRONT PANEL/OPERATING MODE DISPLAY/AUTO

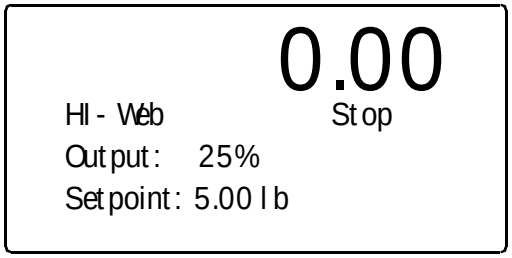


FIG. 4-7 FRONT PANEL/OPERATING MODE DISPLAY/STOP

Let's stop and look at the information on the Operating Display:

- The large number at the top of the display is the current tension in pounds force (lbf) as measured by the load sensor.
- The "HI - Web" is the Instrument ID.
- "Standby, Auto, Manual or Stop" is the current operational mode of the instrument.
- Output is the percentage of the full Analog output signal.
- Setpoint is the Tension Setpoint Value entered for the current product.

NOTE: The Setpoint displays lb, however it is measuring pounds force (lbf).

Tension Controller Configuration From the Front Panel

The Tension Controller Configuration process sets up the instrument to Maintain a Setpoint Tension via a PID Control Algorithm. This includes setting WAVERSAVER®, Max Tension, Units of Measure and other process and instrument parameters required for your process. Here is where the permanent parameters are entered. All the parameters configured except the communications parameters, (IP Address etc.) are stored in the Secure Memory Module (SMM).

Setting the P (Proportional) + I (Integral) + D (Derivative) Parameters (PID)

About PID

A tension control process is a dynamic system which is changing all the time. The actual tension changes from moment to moment. Most often the actual tension will be greater or less than the setpoint. The HI 3300 Tension Controller produces a correction signal that is sent to the tensioning mechanisms (clutch, motor, etc.) in order to maintain the Setpoint Tension.

Proportional - More appropriately called "gain", which is a multiplier that increases the error signal to a value which is useful as a correction signal. The correction signal is proportional to the original error and either increases or decreases the tension to correct for the error signal from the load sensor.

Integral - More appropriately called "stability" provides a correction to the PID algorithm that smooths or slows the Controller output so that tensioning mechanisms don't overreact, which adds stability to the system.

Derivative - More appropriately called "response" looks for the rate at which the error rate changes. The derivative accounts for and adjusts the output signal that corresponds to the rate of change. D is different from P in that D responds early to a rate of change and P only reacts to the absolute error signal at any given point in time.

NOTE: All entered values are for illustration purposes only. Your requirements will vary.

Step 1. Press the Gain/1 button. The PID Parameters Display appears with the cursor in front of Proportional. (See Fig. 4-8)

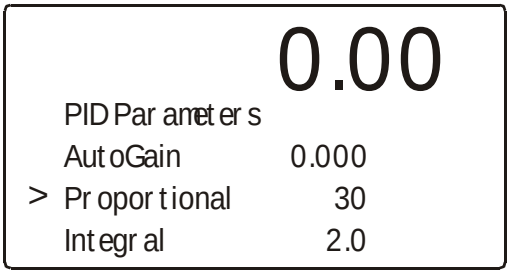


FIG. 4-8 PID PARAMETERS/SETTING PROPORTIONAL

Step 2. Use the alphanumeric key pad and enter the new value.

NOTE: An alternative is to first press the Clear button to clear all entries. Then use the alphanumeric key pad and enter the new value.

Step 3. Press the Enter button to save the entry.
Step 4. Press the "-" button until the cursor is in front of "Integral".
Step 5. Use the alphanumeric key pad and enter the new value. Press the "-" button until the cursor is in front of Derivative.
Step 6. Use the alphanumeric key pad and enter the new value.
Step 7. Press the Enter button to save the entry.
Step 8. Press the Exit button to return to the Operational Display.

Instrument Setup Procedures

Step 1. Press the Setup/3 button. The Setup Menu appears with the cursor next to Process Setup. (See Fig. 4-9)

NOTE: Note that there is a directional arrow on the right side of the display in the Process Setup line. This means that there are sub-menus that need to be configured for this setup parameter. You can press the Enter button to get to these displays. Please refer to the HI 3300 Menu tree for assistance.

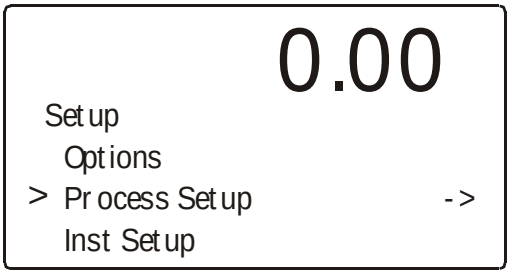


FIG. 4-9 SETUP MENU

Step 2. Press the - button until the cursor is in front of “Inst Setup”. (See Fig. 4-10)

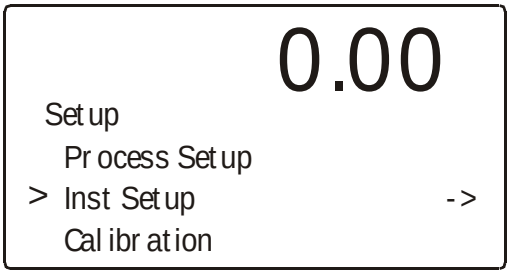


FIG. 4-10 SETUP MENU/SELECTING INSTRUMENT SETUP

Step 3. Press the Enter button. The Instrument Setup Menu Appears with the cursor in front of “Instrument ID:”. (See Fig. 4-11)

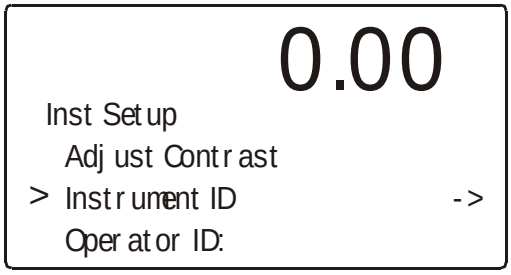


FIG. 4-11 SETUP MENU/SELECTING CHANNEL NAME

Step 4. Press the Enter button. The “Instrument ID” display appears. (See fig. 4-12)

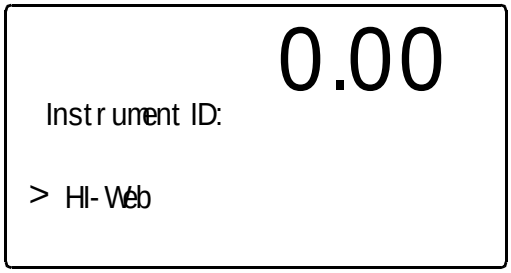


FIG. 4-12 INSTRUMENT ID/SETTING INSTRUMENT ID

Instrument ID

PARAMETER:INSTRUMENT ID
RANGE: 19 CHARACTERS
DEFAULT: HI-WEB

About Instrument ID

The Instrument ID parameter is used to provide specific identification for a Tension Controller. This is extremely important when using several Tension Controllers in a process. A unique Instrument ID allows you to identify one instrument from another.

Step 1. Use the alphanumeric key pad to enter the new Instrument ID. We entered “HI-Web” for Hardy Instrument Web Tension. It is recommended that you be brief and descriptive when entering the Instrument ID. 8-10 characters should be good enough.
Step 2. Press the Enter button to save the setting.
Step 3. Press Enter to return to the Setup Menu.
Step 4. Press the “-” button until the cursor is in front of “Operator ID”. (See Fig. 4-13)

Operator ID

About Operator ID

The Operator ID is the ID of the user who is going to operate the Tension Controller or service the instrument. Select three letters or numbers or any combination of the two that adequately identifies the user. We have provided some examples below for your assistance. The Operator ID is used in connection with the security level of the user.

PARAMETER:OPERATOR ID
RANGE: 3 CHARACTERS
DEFAULT: BLANK

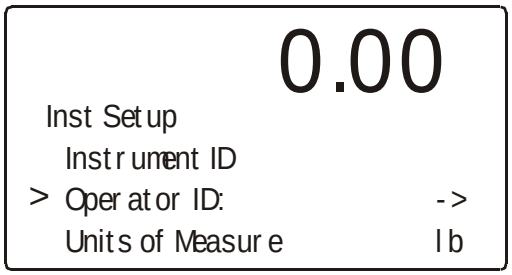


FIG. 4-13 INSTRUMENT SETUP MENU/OPERATOR ID

Step 1. Use the alphanumeric key pad to enter your Operator ID.
Step 2. An Operator ID is three (3) characters long and can consist of alphanumeric characters.

Some examples of Operator IDs:

- Joe
- 312
- J15
- JD7

Step 3. Press the Enter button to set the entry.

Unit of Measure Parameter

About Unit of Measure

The Unit of Measure Parameter sets the scale to either English or Metric units. The Selections are:

- Pounds Force (lb)
- Newtons (N)
- Pounds per Linear Inch (Pli)

NOTE: Pounds (lb) are actually pounds force (lbf). It is simpler to just think of this parameter as pounds rather than pounds force.

PARAMETER:UNIT OF MEASURE
RANGE: LB, N, PLI
DEFAULT: LB

Step 1. Press the "-" arrow button until the cursor is in front of Unit of Measure. (See Fig. 4-14)

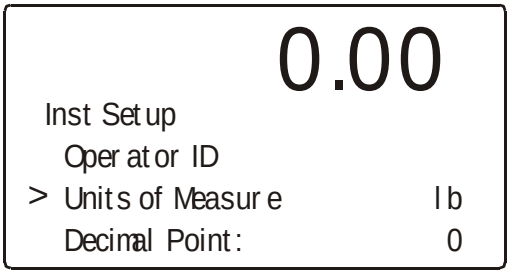


FIG. 4-14 SETUP MENU/UNIT OF MEASURE

Step 2. Press the right or left arrow buttons to make your selection.
Step 3. Press the Enter button to save the setting.

Decimal Point Parameter

About the Decimal Point Parameter

The Decimal Point Parameter is set to determine the resolution you want for tension control. Here you set the location of the decimal point for the tension resolution. The higher the number the farther to the left the decimal point moves and the higher the resolution of the scale..

PARAMETER:DECIMAL POINT
RANGE: 0-4
DEFAULT: 0

Step 1. Press the "-" arrow button until the cursor is in front of Decimal Point. (See Fig. 4-15)

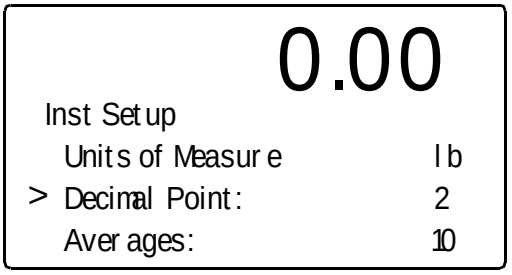


FIG. 4-15 SETUP MENU/DECIMAL POINT

Step 2. Press the right or left arrow buttons to make your selection. The right arrow button increase the value. The Left Arrow button decreases the value.
Step 3. Press the Enter button to set the entry.

Averages Parameter

About the Averages Parameter

This setting is to aid in ignoring the effects of disturbance. If there is a lot of zone disturbance, tension fluctuations can be seen. Applications requiring very quick tension readings should reduce this setting to it's minimum. If the tension is unstable due to zone instability, increase the averages. This sets the number of readings that will be used to compute the Tension. The average is a sliding average so that a new average is available for display at every reading.

The Tension Controller does 55 updates per second which translates to an update approximately every 20 milliseconds. If you average enough tension readings the loss or gain remains smooth. If you average the tension too much you can cause an overreaction.

PARAMETER:AVERAGES
RANGE: 1-250
DEFAULT: 10

Step 1. Press the "-" arrow until the cursor is in front of Averages. (See Fig. 4-16)

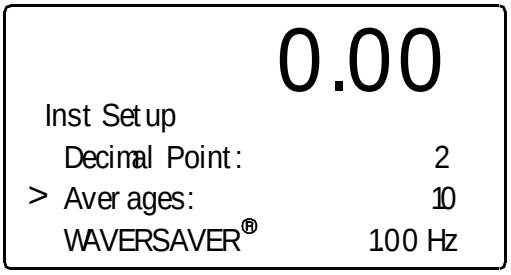


FIG. 4-16 INSTRUMENT SETUP MENU/AVERAGES

Step 2. Use the alphanumeric keypad and enter the value for Averages.
Step 3. Press the Enter button to set the entry.
Step 4. Press the "-" arrow button until the cursor is in front of "WAVERSAVER®".

The WAVERSAVER® Parameter

About the WAVERSAVER Parameter

Typically, mechanical noise (from other machinery in a plant environment) is present in forces larger than the weight forces trying to be detected. The Tension Controller is fitted with WAVERSAVER® technology which eliminates the effects of vibratory forces present in all industrial tension control and measurement applications. By eliminating the factor of vibratory forces the Tension Controller is capable of identifying the actual tension data. WAVERSAVER® enables the Tension Controller to distinguish between actual tension data and mechanical noise, both of which are typically transferred to the Tension Controller by the load cell signal. WAVERSAVER® can be configured to ignore noise with frequencies as low as 0.25 Hz. One of four higher additional cut off frequencies may be selected to provide a faster instrument response time. The WAVERSAVER function is user selectable and can be turned off.

PARAMETER:WAVERSAVER®
RANGE: .25 HZ, .50 HZ, 1.0 HZ, 3.50 HZ, 7.50 HZ, OFF
DEFAULT: 1.00 HZ

Step 1. Press the "-" arrow button until the cursor is in front of WAVERSAVER®. (See Fig. 4-17)

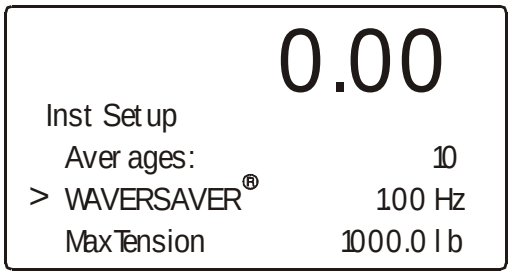


FIG. 4-17 INSTRUMENT SETUP MENU/ WAVERSAVER

Step 2. Press the right or left arrow buttons to select the setting or turn WAVERSAVER off.
Step 3. Press the Enter button to set the entry.
Step 4. Press the "-" arrow button until the cursor is in front of "Capacity". (See Fig. 4-29)

NOTE: When setting WAVERSAVER for higher speed applications (>500 FPM) it is highly recommended to set WAVERSAVER to 1.00 Hz. If the reaction time is too slow for your applications, select OFF.

MaxTension Parameter

About the MaxTension Parameter

The Maxtension value should be any value between the tare weight and maximum capacity of your combined load cells that will not cause faults in your process or the largest value of tension you expect to see. The HI 3300 tares or zeroes the instrument when you set the reference weight in Traditional Calibration or C2 Calibration. (See Chapter 5, Traditional Calibration Procedures, C2 Calibration Procedures.) The PID input is scaled by this value. Also when you press the plus or minus buttons up or down to increase or decrease the

setpoint, each time you push the button it increases or decreases the setpoint by 1% of the Maxtension.

PARAMETER:CAPACITY
RANGE: .0001-99999.0
DEFAULT: 1000.0

Step 1. Press the "-" arrow button until the cursor is in front of MaxTension. (See Fig. 4-18)

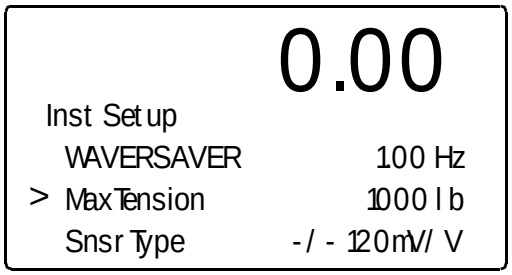


FIG. 4-18 INSTRUMENT SETUP MENU/ MAXTENSION

Step 2. Use the alphanumeric key pad to enter the new total Load Sensor Capacity value.
Step 3. Press the Enter button to set the entry.
Step 4. Press the “-” button until the cursor is in front of “Sensor Typ”. (See Fig. 4-19)

Sensor Type Parameter

About the Sensor Type Parameter

The Sensor Type parameter enables the you to select four load sensor sensitivity ranges. 0-120mV/V, +/-120mV/V, 0-3mV/V, +/-3mV/V, depending on the sensitivity range for the load sensors used for your tension process and whether the load sensors are in compression or tension. It is recommended that you select 0-120mV/V & 3mV/V for compression applications and +/- 120mV/V & +/-3mV/V for tension applications.

PARAMETER:SENSOR TYP
RANGE: 0-120 mV/V, 0-3 mV/V, +/-120mV/V, +/-3mV/V
DEFAULT: 0-3 mV/V

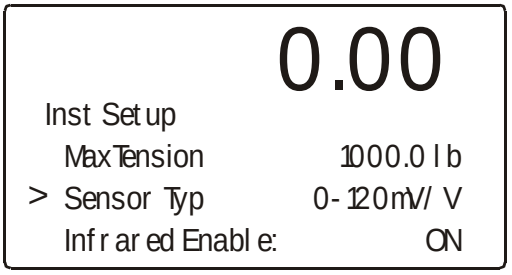


FIG. 4-19 INSTRUMENT SETUP MENU/SENSOR TYPE

Step 1. Press the left or right arrow button to toggle between 0-120 and 0-3 sensitivity depending on the what the sensitivity range of the load sensors on your tension application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the “-” button until the cursor is in front of “Infrared Enable”. (See Fig. 4-20)

Infra Red (IR) Port Parameter

About the IR Port Parameter

The Tension Controller IR Port enables wireless connectivity to PDA devices for configuration and the loading and transfer of data. If your handheld uses Palm OS® 3.3, 3.5 or your Pocket PC has the IrDA (Infrared Data Association) port connection (normally COM3) its infrared (IR) port can perform wireless operations and connect to the IR Port of the Tension Controller.

PARAMETER:IR PORT
RANGE: OFF/ON
DEFAULT: ON

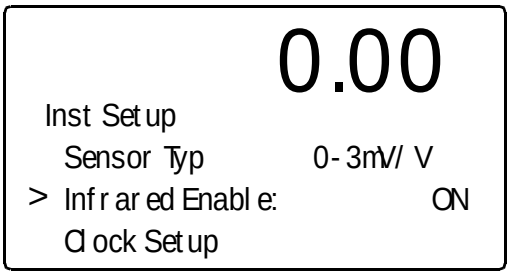


FIG. 4-20 SETUP MENU/IR PORT

Step 4. Use the right or left arrow buttons to toggle between OFF or ON.
Step 5. Press the Enter button to set the entry.
Step 6. Press the “-” button until the cursor is in front of “Clock Setup”. (See Fig. 4-21)

Set Clock Parameter

About Setting the Clock

You set the Hour, Minutes, Month, Day and Year parameters here. These settings are the time stamps for the alarms.

PARAMETER:HOURS
RANGE: hh (0-23)
DEFAULT: NONE

PARAMETER:MINUTES
RANGE: mm (0-59)
DEFAULT: NONE

PARAMETER:MONTH
RANGE: 1-12
DEFAULT: NONE

PARAMETER:DAY
RANGE: dd (01-31)
DEFAULT: NONE

PARAMETER:YEAR
RANGE: yyyy (200 - 2099)
DEFAULT: NONE

PARAMETER:TIMEZONE
RANGE: -12 TO +12
DEFAULT: -8

Step 1. Press the "-" arrow button until the cursor is in front of “Set Clock”. (See Fig. 4-40)

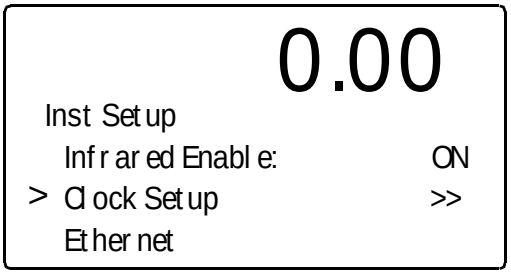


FIG. 4-21 SETUP MENU/SET CLOCK

Step 2. Press the Enter button. The Clock Setup Menu appears with the cursor in front of “Year”. (See Fig. 4-22)

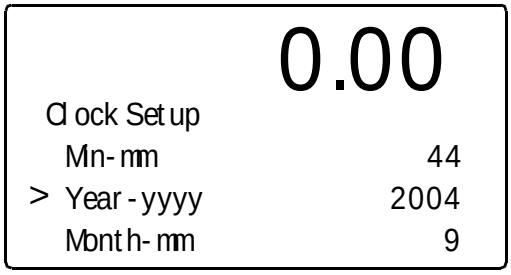


FIG. 4-22 CLOCK SETUP MENU/SET DATE

Step 3. Use the alphanumeric key pad to change the Year setting.
Step 4. Press the Enter button to set the entry.
Step 5. Press the “-” arrow button until the cursor is in front of “Month”.
Step 6. Use the alphanumeric key pad to change the Month setting.
Step 7. Press the Enter button to set the entry.
Step 8. Press the “-” arrow button until the cursor is in front of “Day”.
Step 9. Use the alphanumeric key pad to change the Day setting.
Step 10. Press the “-” button until the cursor is in front of “Hour”. (See Fig. 4-23)

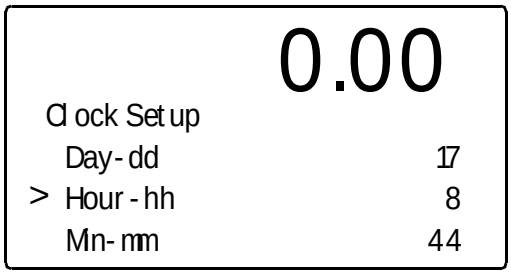


FIG. 4-23 CLOCK SETUP MENU/SET CLOCK

Step 11. Use the alphanumeric key pad to change the Hour setting.
Step 12. Press the Enter button to set the entry.
Step 13. Press the “-” arrow button until the cursor is in front of “Min”.
Step 14. Use the alphanumeric key pad to change the Minutes setting.
Step 15. Press the Enter button to set the entry.
Step 16. Press the "-" arrow button until the cursor is in front of Timezone. (See Fig.4-24)

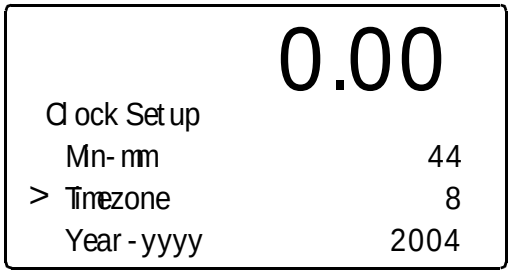


FIG. 4-24 CLOCK SETUP MENU/SET GMT

About Timezones (Greenwich Mean Time)

There are 25 integer World Time Zones from -12 through 0 (GMT) to +12. Each one is 15° of longitude as measured East and West from the Prime Meridian of the World which is at Greenwich, England. Some countries have adopted non-standard time zones, usually a 30 minute offset.

Each Time Zone is measured relative to Greenwich, England. Civilian designations are typically three letter abbreviations (e.g. EST) for most time zones. Below is a list of the abbreviated time zones with the GMT time adjustment. You will see the time zone ranges in the e-mail header.

GMT	Civilian Time Zones	Cities
GMT	GMT: Greenwich Mean UT: Universal UTC: Universal Co-ordinated WET: Western Europe	London, England Dublin, Ireland Edinburgh, Scotland Reykjavik, Iceland Casablanca, Morocco
EAST OF GREENWICH		
+1	CET: Central Europe	Paris, France Berlin, Germany Amsterdam, Holland Brussels, Belgium Vienna, Austria Madrid, Spain Rome, Italy Bern, Switzerland Oslo, Norway
+2	EET: Eastern Europe	Athens, Greece Helsinki, Finland Istanbul, Turkey Jerusalem, Israel Harare, Zimbabwe
+3	BT: Baghdad	Kuwait Nairobi, Kenya Riyadh, Saudi Arabia Moscow. Russia
+3:30		Tehran, Iran
+4		Abu Dhabi, UAE Muscat Tblisi Volgograd Kabul
+4:30		Afghanistan
+5		
+5:30		India
+6		
+6:30		Cocos Islands
+7		
+8	CCT: China Coast	Shanghai, China Hong Kong, China Beijing, China
+9	JST: Japan Standard	Tokyo, Japan Osaka, Japan Taipei, Taiwan
+9:30	Australian Central Standard	Darwin, Australia Adelaide, Australia
+10	GST: Guam Standard	
+10:30		Lord Howe Island
+11		
+11:30		Norfolk Island
+12	IDLE: International Date Line East NZST: New Zealand Standard	Wellington, NZ Fiji Marshall Islands
+13		Rawaki Island
+14		Line Islands
WEST OF GREENWICH		
-1	WAT: West Africa	Azores Cape Verde Islands
-2	AT: Azores	
-3		Brasilia, Brazil Buenos Aires, Agentina Georgetown, Guyana
-3:30		Newfoundland
-4	AST: Atlantic Standard	Caracas, Venezuela La Paz
-5	EST: Eastern Standard	Bogota, Colombia Lima, Peru New York, NY, USA
-6	CST: Central Standard	Chicago, Illinois, USA Mexico City, Mexico Saskatchewan, Canada

TABLE 4-1: GREENWICH TIME ZONES (GMT)

TABLE 4-1: GREENWICH TIME ZONES (GMT)

GMT	Civilian Time Zones	Cities
-7	MST: Mountain Standard	Phoenix, Arizona Denver, Colorado
-8	Pacific Standard	Seattle, Washington Portland, Oregon San Francisco, CA
-9	YST: Yukon Standard	
-10	AHST: Alaska-Hawaii Standard CAT: Central Alaska HST: Hawaii Standard	Anchorage, Alaska Honolulu, Hawaii
-11	NT: Nome	Nome, Alaska
-12	IDLW: International Date Line West	

TABLE 4-1: GREENWICH TIME ZONES (GMT)

Step 17. Check Table 4-2 for the time zone you are in.
Step 18. Press the right or left arrow until the correct time zone appears. For example Pacific Standard Time is -8.
Step 19. Press the Enter button to set the entry.
Step 20. Press the Exit button to return to the SETUP MENU.
Step 21. Press the "-" arrow until the cursor is in front of "Ethernet". (See Fig. 4-25)

Ethernet Parameters

About the Ethernet Parameters

All Tension Controllers are designed with a selectable 10/100 base T Ethernet connection which links your PC to an embedded server in the instrument. You can connect to an instrument via the Internet, Intranet, Extranet, or VPN (Virtual Private Network). Your computer must have an ethernet card and cable with an RJ45 connector to connect to the instrument. Once connected you can, monitor, map and configure any of the instruments from your web browser from any location in your plant or enterprise. Help Dialogs are also available to assist when performing setup or troubleshooting of an instrument. In addition the browser connects you to the Hardy Web Site which connects the user to a full range of customer service and support. File downloads from your control room are a snap. No more hauling devices to download files to an instrument. Should you want to download a file or monitor the instrument from your laptop at the site, simply connect a short cable from the lap top to the Ethernet connect at the rear panel of the instrument to transfer files, monitor or configure the instrument. No matter where you are, if you are connected to our instrument you can configure and troubleshoot the HI 3300 Tension Controller.

About IP Addresses

An IP address consists of 32 bits. It is composed of two parts:

- The Network Number
- The Host Number

By convention, the address is expressed as four decimal numbers separated by periods, such as "200.1.2.3" representing the decimal value of each of the four bytes. Valid addresses thus range from 0.0.0.0 to 255.255.255.255, a total of about 4.3 billion addresses.

It is recommended that you leave the Mask, Gate and DNS settings alone. Contact your Network Administrator if you need to set these parameters.

PARAMETER:ETHERNET
RANGE: 0.0.0.0 - 255.255.255.255
DEFAULT: NONE

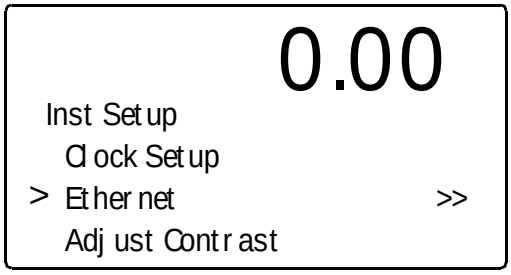


FIG. 4-25 SETUP MENU/ETHERNET

Step 22. Press the Enter button. The Ethernet Menu appears with the cursor in front of the IP Address. (See Fig. 4-26)

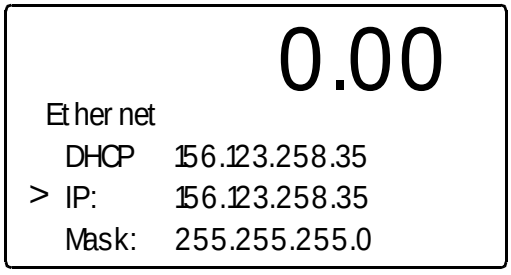


FIG. 4-26 ETHERNET MENU/IP ADDRESS WITH DEFAULT IP ADDRESS

Step 23. Press the Clear button to clear the address.
Step 24. Use the alphanumeric key pad to enter the new address. Remember there must be a period between each part of the address. (e.g. 186.245.263.12)

Step 25. This is the only parameter you need to change. If you need to change the other parameters, contact your Network Administrator for assistance.
Step 26. Press the Enter button to set the entry.
Step 27. Press the "-" arrow until the cursor is in front of Adjust Contrast. (See Fig. 4-27)

Set LCD Contrast Parameter

About the Set LCD Contrast Parameter

The Set LCD Contrast Parameter is used to increase or decrease the contrast on the display. Press the right arrow button to increase the contrast. Press the left arrow to decrease the contrast.

PARAMETER:ADJUST CONTRAST
RANGE: NONE
DEFAULT: NONE

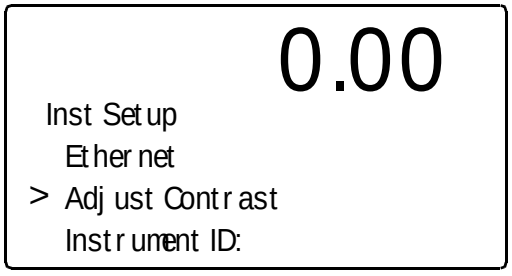


FIG. 4-27 INSTRUMENT SETUP/ADJUSTING DISPLAY CONTRAST

Step 1. Press the left or right arrow button to increase or decrease the contrast.
Step 2. Press the Enter button to set the adjustment.

NOTE: If you don't press the Enter button the Display Contrast will return to the previous setting.

Step 3. Press the Exit button to return to the Setup Menu.
Step 4. Press the "+" or "-" button until the cursor is in front of "Process Setup". (See Fig. 4-28)

Process Setup Procedures

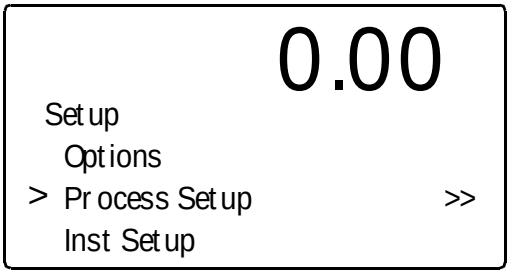


FIG. 4-28 SETUP MENU/SELECTING PROCESS SETUP

Step 5. Press the Enter button. The Process Setup menu appears with the cursor in front of "Setpnt in Use". (See Fig. 4-29)

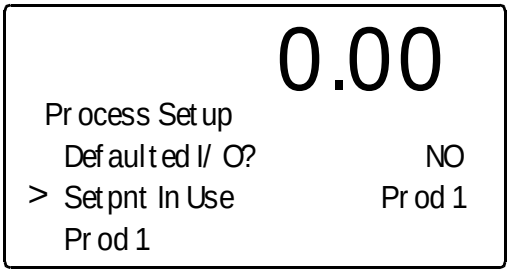


FIG. 4-29 PROCESS SETUP DISPLAY

Setpoint in Use Parameter

About the Setpoint in Use Parameter

The Setpoint in Use Parameter allows the user to view and/or select the Product that is currently being processed. There are three selections, Prod 1, Prod 2, Prod 3. This parameter also enables the user to setup three tension setpoints for three different products in advance and select the setpoints at the time of process.

- For example, you can set up three set-points for Polyethylene, Saran, and Poly-styrene. Prod 1 (Polyethylene - 0.12 lb) Prod 2 (Saran - 0.15 lb) and Prod 3 (Poly-styrene-1.0 lb). As you process these webs you simply select Prod 1, Prod 2, Prod 3 with the proper tension setpoints.

NOTE: The tension setpoints are typical running tensions yours may vary.

PARAMETER:SETPNT IN USE
RANGE: PROD 1, PROD 2, PROD 3

DEFAULT: PROD 1

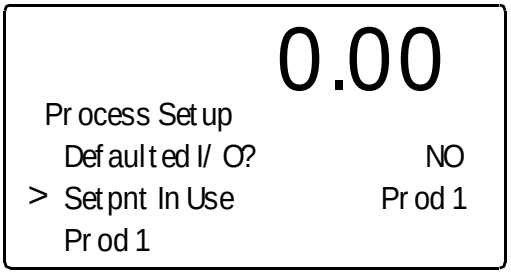


FIG. 4-30 INSTRUMENT SETUP MENU/SELECTING A PRODUCT

Step 1. Press the left or right arrow buttons to select Prod 1, Prod 2 or Prod 3.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Prod 1" (See Fig. 4-31)

Prod 1 Parameter

About the Prod 1 Parameter

This parameter menu allows the user to give the Process a name and set the tension setpoint. The Name and tension setpoint of the Product is displayed on the Operational Display. Prod 1 is also the default setpoint parameter if you do not configure Prod 2 or Prod 3.

PARAMETER:PROD1
RANGE: NAME: 9 CHARACTERS, SETPOINT: 0-99999
DEFAULT: NONE

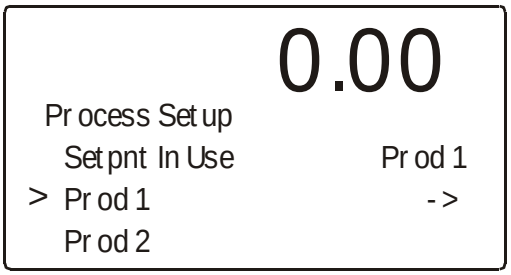


FIG. 4-31 PROCESS SETUP MENU/SETTING PROD 1 PARAMETERS

Step 1. Press the Enter button. The Prod1 Menu appears. (See Fig. 4-32)

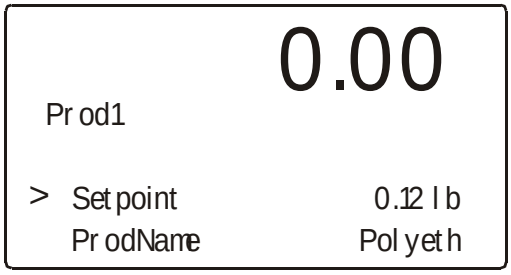


FIG. 4-32 PROD1 MENU/SETTING PRODUCT 1 NAME

Step 2. The cursor is now in front of "Setpoint"
Step 3. Use the alphanumeric key pad to enter the tension setpoint you want for this product. We use 0.12 lb which is a typical running tension for Polyethylene. Yours may vary.
Step 4. Press the Enter button to set the entry.
Step 5. Use the alphanumeric key pad to type the Product Name. In our example we used "Polyeth" for Polythylene. In order for the entire Product Name to appear on the Operational Display try to use an abbreviation of the product name.
Step 6. Press the Enter button to set the entry.
Step 7. Press the Exit button to return to the Instrument Setup Menu.
Step 8. Press the "-" button until the cursor is in front of "Prod 2" (See Fig. 4-32)

Prod 2 Parameter

About the Prod 2 Parameter

This parameter menu allows the user to give the Process a name and set the tension setpoint. The Name and tension setpoint of the Product is displayed on the Operational Display.

PARAMETER:PROD2
RANGE: NAME: 9 CHARACTERS, SETPOINT: 0-99999
DEFAULT: NONE

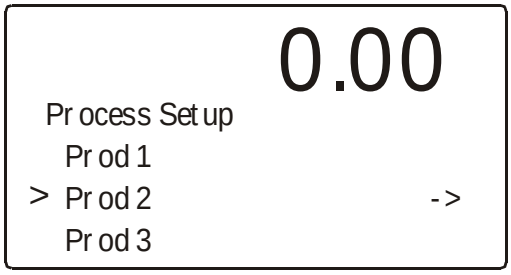


FIG. 4-33 PROCESS SETUP MENU/SETTING PROD 2 PARAMETERS

Step 1. Press the Enter button. The Prod1 Menu appears. (See Fig. 4-34)

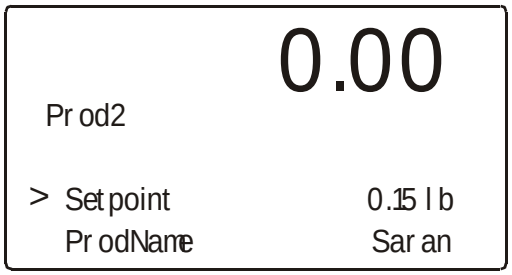


FIG. 4-34 PROD2 MENU/SETTING PRODUCT 2 NAME & SETPOINT

Step 2. The cursor is now in front of “Setpoint”
Step 3. Use the alphanumeric key pad to enter the tension setpoint you want for this product. We used 0.15 lb which is a typical running tension for Saran. Yours may vary.
Step 4. Press the Enter button to set the entry.
Step 5. Use the alphanumeric key pad to type the Product Name. In our example we used “Saran” (Polyvinylidene Chloride). In order for the Product Name to appear on the Operational Display try to use an abbreviation of the product name.
Step 6. Press the Enter button to set the entry.
Step 7. Press the Exit button to return to the Instrument Setup Menu.
Step 8. Press the “-” button until the cursor is in front of “Prod3” (See Fig. 4-35)

Prod 3 Parameter

About the Prod 3 Parameter

This parameter menu allows the user to give the Process a name and set the tension setpoint. The Name and tension setpoint of the Product is displayed on the Operational Display.

PARAMETER:PROD3
RANGE: NAME: 9 CHARACTERS, SETPOINT: 0-99999
DEFAULT: NONE

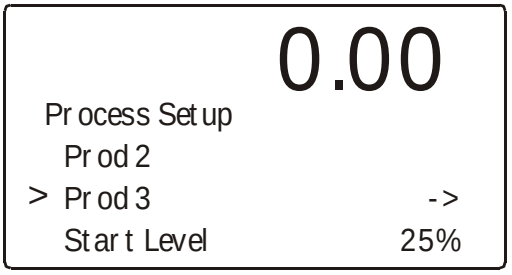


FIG. 4-35 INSTRUMENT SETUP MENU/SETTING PROD 3 PARAMETERS

Step 1. Press the Enter button. The Prod3 Menu appears. (See Fig. 4-36)

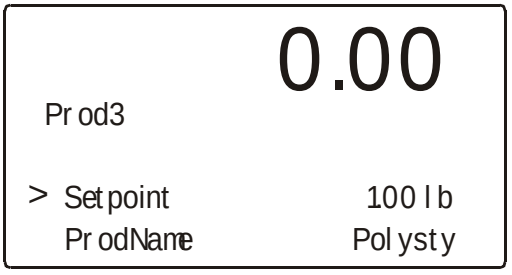


FIG. 4-36 PROD3 MENU/SETTING PRODUCT 3 NAME

Step 2. The cursor is now in front of “Setpoint”
Step 3. Use the alphanumeric key pad to enter the tension setpoint you want for this product. We use 1.00 lb which is a typical running tension for Polystyrene. Yours may vary.
Step 4. Press the Enter button to set the entry.
Step 5. Use the alphanumeric key pad to type the Product Name. In our example we used “Polysty” for Polystyrene. In order for the Product Name to appear on the Operational Display try to use an abbreviation of the product name.
Step 6. Press the Enter button to set the entry.
Step 7. Press the Exit button to return to the Instrument Setup Menu.
Step 8. Press the “-” button until the cursor is in front of “Start Level” (See Fig. 4-37)

Start Level Parameter

About Start Level Parameter

The Start Level Parameter setting applies a fixed percentage output level when the controller is in Standby or when Starting. It is important that you set the Start Level to zero (0) for Mid-process or Winding applications.

PARAMETER:START LEVEL
RANGE: 0-100%
DEFAULT: 2%

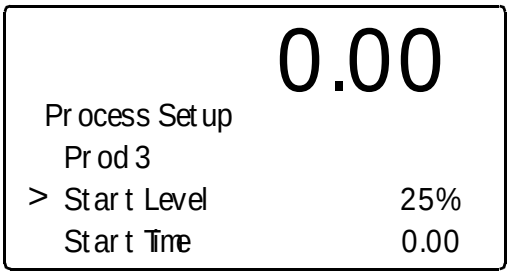


FIG. 4-37 PROCESS SETUP MENU/START LEVEL

Step 1. Use the alphanumeric key pad to enter the Start Level value for your applications.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Start Time" (See Fig. 4-38)

Start Time Parameter

About The Start Time Parameter

The Start Time Parameter holds the Start Level output for the length of time entered in the Start Time Parameter. The Start Time should be set to time out immediately before the machine reaches maximum speed. This allows the machine to accelerate to full speed before the controller starts automatically controlling. It is important that you set the Start Time to zero (0) for Mid-process or Rewinding applications.

PARAMETER:START TIME
RANGE: 0.00-100.0 SECONDS
DEFAULT: 1.0

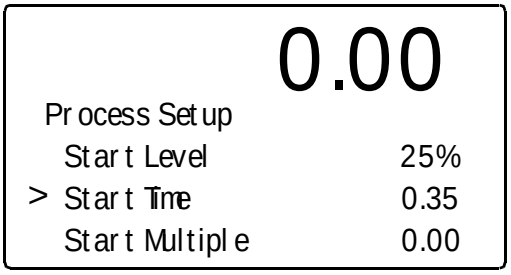


FIG. 4-38 PROCESS SETUP MENU/START TIME

Step 1. Use the alphanumeric key pad and enter the Start Time you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Start Multiple" (See Fig. 4-39).

Start Multiple Parameter

About the Start Multiple Parameter

The Start Level Multiplier allows for auto-adjusting start levels in an application that has multiple start/stops. In an unwind application, the output required at the start for a full diameter roll is often much greater than the output required when the roll is closer to its core diameter. By inputting a Start Multiplier, each consecutive start will be based on the output level of the last time the process was stopped. The level of this next start output will be equal to [Start Multiplier] x [Output % at Last Stop]. Thus, if the output level was 50% at the last stopping point and the Start Multiplier is 0.5, the output level at the next start will be 25%. The Autostart routine is reset to the stored Start Level % upon receipt of the Splice Input. Thus, in our example application, if the Start Level % parameter is 80%, after a momentary receipt of the Splice input, the output level at the subsequent Start will be 80%.

PARAMETER:START MULTIPLE
RANGE: 0.00-2.00
DEFAULT: 0.00

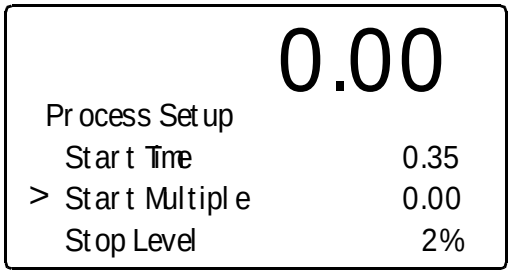


FIG. 4-39 PROCESS SETUP/SETTING START MULTIPLE

Step 1. Use the alphanumeric key pad to enter the Start Multiple value for your applications.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Stop Level" (See Fig. 4-40)

Stop Level Parameter

About The Stop Level Parameter

WARNING: THIS PARAMETER IS NOT THE EMERGENCY STOP PARAMETER. STOP SHOULD NEVER BE USED FOR EMERGENCY STOPS. TO DO SO MAY RESULT IN PERSONAL INJURY AND/OR PROPERTY DAMAGE.

Stop Level increases the torque applied to a decelerating roll to stop it. Make sure when setting the Stop Level you set it high enough to stop a roll but avoid creating a slack web. It

is important that you set the Stop Level to zero (0) for Mid-process or Rewinding applications.

PARAMETER:STOP LEVEL
RANGE: 0 - 100%
DEFAULT: 100%

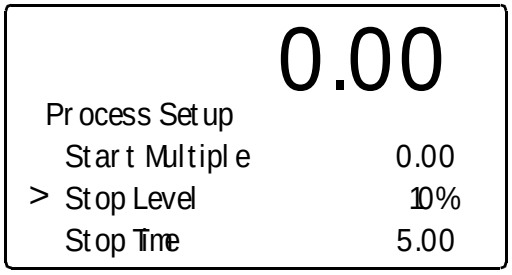


FIG. 4-40 PROCESS SETUP MENU/STOP LEVEL

Step 1. Use the alphanumeric key pad and enter the Stop Level you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Stop Time" (See Fig. 4-41)

Stop Time

About The Stop Time Parameter

The Stop Time Parameter depends on the amount of time it takes for a machine to decelerate from a run state to a complete stop. After the Stop Time times out the controller automatically resets to the Start Level ready to resume the process. To restart the controller you need to press the Start button. It is important that you set the Stop Time to zero (0) for Mid-process or Rewinding applications.

PARAMETER:STOP TIME
RANGE: 0.00 - 100.0 SECONDS
DEFAULT: 5.0

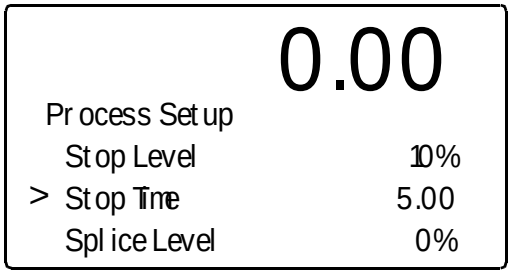


FIG. 4-41 INSTRUMENT SETUP MENU/STOP TIME

Step 1. Use the alphanumeric key pad and enter the Stop Time you need for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Splice Level" (See Fig. 4-42)

Splice Level Parameter

About Splice The Level Parameter

Splice Level Parameter is the output signal level you want the controller to maintain when a flying transfer or flying splice is made in the web. The Controller receives a Splice input signal via Input #2 telling the controller to shift to the Splice Level. The Splice Level is set as a percentage of the full output signal.

PARAMETER:SPLICE LEVEL
RANGE: 0-100%
DEFAULT: 0%

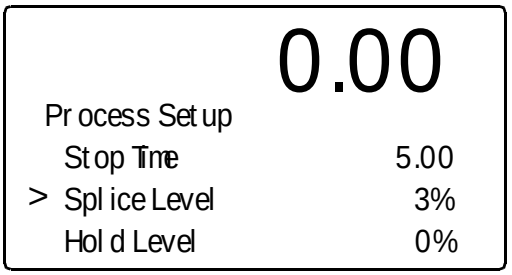


FIG. 4-42 INSTRUMENT SETUP MENU/SETTING SPLICE LEVEL

Step 1. Use the alphanumeric key pad and enter the Splice Level you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Hold Level" (See Fig. 4-43)

Hold Level Parameter

About The Hold Level Parameter

The Hold Level is the output signal level (percentage) you want the controller to maintain when the system is in a hold state.

PARAMETER:HOLD LEVEL
RANGE: 0-100%
DEFAULT: 0%

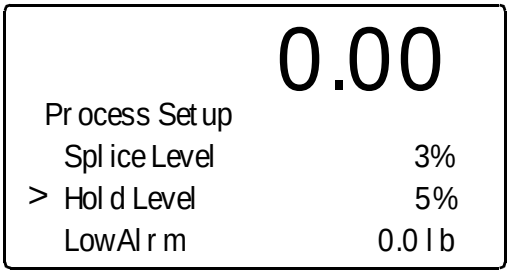


FIG. 4-43 INSTRUMENT SETUP MENU/SETTING THE HOLD LEVEL

Step 1. Use the alphanumeric key pad and enter the Splice Level you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Low Alarm" (See Fig. 4-44)

Low Alarm Parameter

About The Low Alarm Parameter

The Low Alarm Level is set at the lowest tension level you can allow in your system to prevent damage to the web (such as bagging, slack tension, breaking, etc.). When the system reaches the Low Alarm Level the controller activates an output relay which can be connected to any device including an audio or visual alarm.

PARAMETER:LOW ALARM
RANGE: -99999.0 - +99999.0
DEFAULT: 0

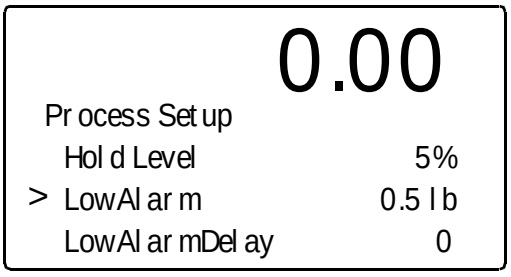


FIG. 4-44 INSTRUMENT SETUP MENU/SETTING LOW ALARM

Step 1. Use the alphanumeric key pad and enter the Low Alarm Level you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Low Alarm Delay" (See Fig. 4-45)

Low Alarm Delay Parameter

About The Low Alarm Delay Parameter

Often the system will reach a low level for short periods of time. These time periods are so short that they don't have a negative material effect. The Low Alarm Delay is a time delay that occurs before the Low Level Alarm output signal is triggered, to avoid false Low Alarm Level conditions. To set this parameter most often you need to rely on the history you have with your system and web material.

PARAMETER:LOW ALARM DELAY
RANGE: 0.00 - 100.0 SECONDS
DEFAULT: 0.00

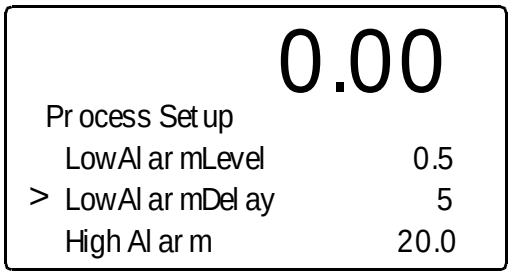


FIG. 4-45 INSTRUMENT SETUP MENU/SETTING LOW ALARM DELAY

Step 1. Use the alphanumeric key pad and enter the Low Alarm Delay you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "High Alarm" (See Fig. 4-46)

High Alarm Parameter

About The High Alarm Parameter

The High Alarm is set at the highest tension level you can allow in your system to prevent damage to the web (such as bagging, slack tension, breaking, etc.). When the system reaches the High Alarm the controller activates an output relay which can be connected to any device including an audio or visual alarm.

PARAMETER:HIGH ALARM
RANGE: -99999.0 - +99999.0
DEFAULT: 100.0

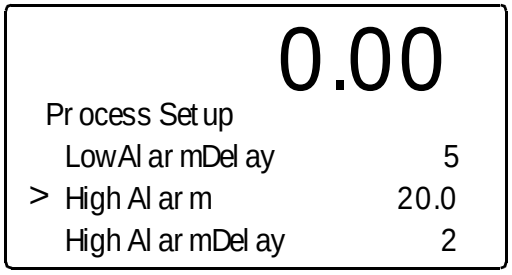


FIG. 4-46 INSTRUMENT SETUP MENU/SETTING HIGH ALARM

Step 1. Use the alphanumeric key pad and enter the High Alarm Level you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "High Alarm Delay" (See Fig. 4-47)

High Alarm Delay Parameter

About The High Alarm Delay Parameter

Often the system will reach a high level for short periods of time. These time periods are so short that they don't have a negative material effect. The High Alarm Delay is a time delay that occurs before the High Level Alarm output signal is triggered, to avoid false High Alarm Level conditions. To set this parameter most often you need to rely on the history you have with your system and web material.

PARAMETER:HIGH ALARM DELAY
RANGE: 0.00 - 100.0 SECONDS
DEFAULT: 0

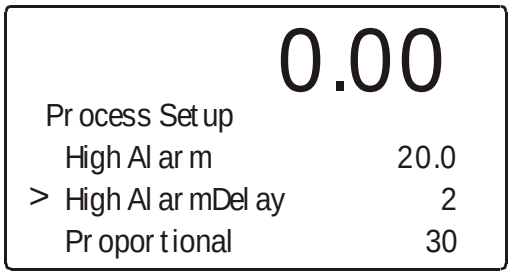


FIG. 4-47 INSTRUMENT SETUP MENU/SETTING HIGH ALARM DELAY

Step 1. Use the alphanumeric key pad and enter the High Alarm Level you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "AlignTol" (See Fig. 4-48)

Misalignment Tolerance Parameter

About Misalignment Tolerance

There are occasions where the transducer is connected to a roll that is misaligned. The misalignment will make the controller read the pounds force (lbf) or pounds per linear inch (Pli) incorrectly. Misalignment is caused by one side of a roller moving forward or backward. If that is the case you need to provide for the misalignment by entering in a tolerance (offset) for the misalignment to achieve an accurate tension reading. Misalignment Tolerance Parameter only applies to 2 channel load cell systems.

PARAMETER:MISALIGNMENT TOLERANCE
RANGE: 0.0001 - 99999.0
DEFAULT: 1000.0

Step 1. Use the alphanumeric key pad and enter the Misalignment Tolerance you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Proportional" (See Fig. 4-49)

Proportional Parameter

NOTE: The PID values can also be modified by pushing the Gain/1 button.

About Proportional Parameter

The Proportional Parameter more appropriately called "gain", which is a multiplier that increases the error signal to a value which is useful as a correction signal. The correction signal is proportional to the original error and either increases or decreases the tension to correct for the error signal from the load sensor.

PARAMETER:PROPORTIONAL
RANGE: 0 - 1000.0
DEFAULT: 10

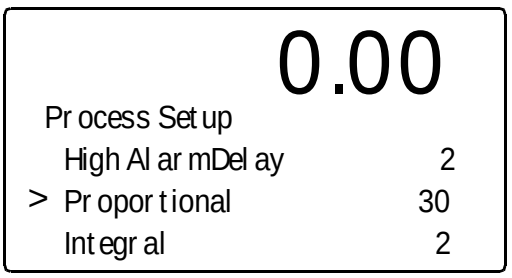


FIG. 4-48 INSTRUMENT SETUP MENU/SETTING THE PROPORTIONAL VALUE

Step 1. Use the alphanumeric key pad and enter the Proportional value you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Integral" (See Fig. 4-50)

Integral Parameter

About The Integral Parameter

The Integral parameter more appropriately called "stability" and provides a correction to the PID algorithm that smooths or slows the Controller output so that tensioning mechanisms don't overreact, which adds stability to the system.

PARAMETER:INTEGRAL
RANGE: 0 - 1000.0
DEFAULT: 2.0

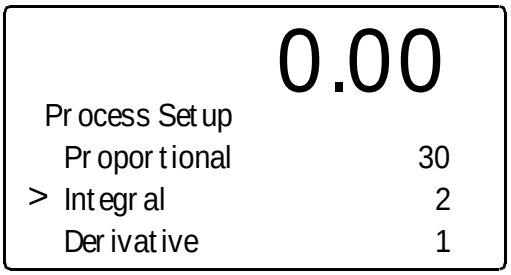


FIG. 4-49 PROCESS SETUP MENU/SETTING THE INTEGRAL VALUE

Step 1. Use the alphanumeric key pad and enter the Integral value you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Derivative" (See Fig. 4-51)

Derivative Parameter

About the Derivative Parameter

The Derivative parameter more appropriately called "response" looks for the rate at which the error rate changes. The derivative accounts for and adjusts the output signal that corresponds to the rate of change. D is different from P in that D responds early to a rate of change and P only reacts to the absolute error signal at any given point in time.

PARAMETER:DERIVATIVE
RANGE: 0.0 - 1000.0
DEFAULT: 0.0

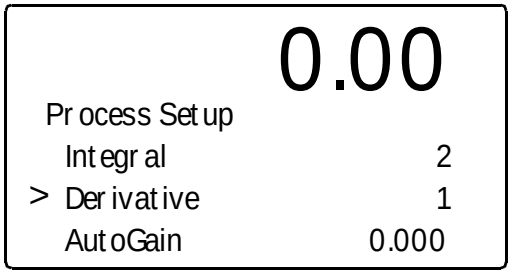


FIG. 4-50 PROCESS SETUP MENU/SETTING THE DERIVATIVE VALUE

Step 1. Use the alphanumeric key pad and enter the Derivative value you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "AutoGain" (See Fig. 4-52)

AutoGain Parameter

About the AutoGain Parameter

The response required in controlling winding or unwinding of a large roll (whether web or strand) is different than that for a small diameter roll. Due to the large inertia level of a large roll, the controller will need to react more aggressively than when controlling a small roll. This equates to braking an 18 wheeler versus a pickup. The multiplier functions to make the control more aggressive for a large diameter roll by increasing the Gain parameter for an increased output level. Keep in mind that the output level is directly proportional to the Roll Diameter as expressed in the following formula:

- New Gain = Gain + (Current Output% x Multiplier)

For example:

- If the stored Gain is 20 and the Gain multiplier is 0.5 and the Output Level is 80%, the Adjusted Gain Level, therefore is:

  Adjusted Gain Level = 20 + (80 x 0.5)
  Adjusted Gain Level = 20 + 40
  Adjusted Gain Level = 60

- In our example the Gain (rate of change of control) is three times greater at an 80% output level than at a 0% output level.

PARAMETER:AUTOGAIN
RANGE: 0.000 - 2.000
DEFAULT: 0.000

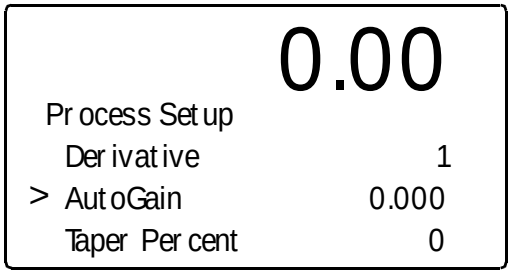


FIG. 4-51 PROCESS SETUP/SETTING AUTOGAIN

Step 1. Use the alphanumeric key pad and enter the Auto-Gain value you want for this application. To shut off the AutoGain enter zero (0).
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Taper Percent" (See Fig. 4-52)

Taper Percent Parameter (Rewind Only)

About The Taper Percent Parameter

The Taper Percent is determined by the percentage difference between the diameter of a full roll, or the diameter of the roll when starting a process and the diameter of the core when the process is complete.

PARAMETER:TAPER PERCENT
RANGE: 0-100%
DEFAULT: 0%

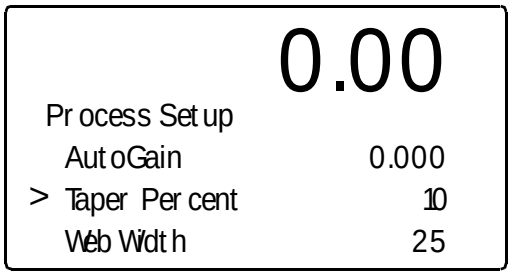


FIG. 4-52 PROCESS SETUP MENU/SETTING THE TAPER PERCENT

Step 1. Use the alphanumeric key pad and enter the Taper Percent value you want for this application.
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Web Width" (See Fig. 4-53)

Web Width

About Web Width

If you selected pounds per linear inch as you units of measure you will also have to enter the actual web width dimension parameter. If you selected pounds force or Newtons you don't have to enter a web width value.

PARAMETER:WEB WIDTH
RANGE: 0.01 - 99999.0
DEFAULT: 0

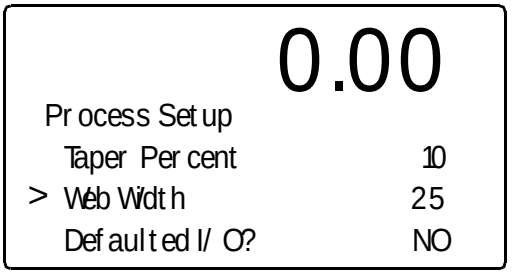


FIG. 4-53 PROCESS SETUP/SETTING WEB WIDTH

Step 1. Use the alphanumeric key pad and enter the Web Width value you need for this application. For strand tension applications enter zero (0).
Step 2. Press the Enter button to set the entry.
Step 3. Press the "-" button until the cursor is in front of "Defaulted I/O?" (See Fig. 4-54)

Defaulted I/O? Parameter

About the Defaulted I/O? Parameter

The Tension Controller has a default designation for the 5 inputs and 4 output relays. If you want to keep the defaults select YES. If you want to reassign the inputs and outputs select NO.

The Default I/Os are:

I/O	DEFAULT
Relay 1	Start/Stop Signal
Relay 2	Low Level Alarm
Relay 3	High Level Alarm
Relay 4	(Spare)
Input 1	Remote Start/Stop
Input 2	Splicing Input
Input 3	Hold Input
Input 4	Spare
Input 5	(Spare)

TABLE 5: DEFAULT I/O

PARAMETER:DEFAULTED I/O?
RANGE: YES/NO
DEFAULT: YES

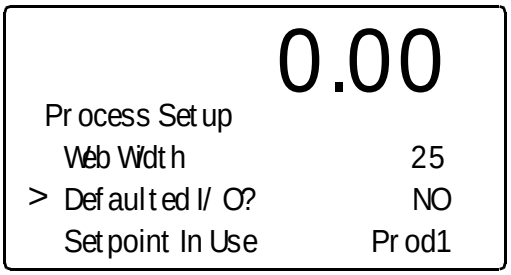


FIG. 4-54 PROCESS SETUP/SELECTING DEFAULTED I/P?

Tension Controller Configuration From the Web Page

NOTE: For complete explanations of each of the parameters, please go to the Configuration From the Front Panel Section of this manual or click on the Help button at the top of the page.

Step 1. From the Tension Controller Home Page, click on Configuration. (See Fig. 4-55) The Configuration Page appears. (See fig. 4-56)

FIG. 4-55 TENSION CONTROLLER HOME PAGE/ SELECTING CONFIGURATION

Instrument Setup

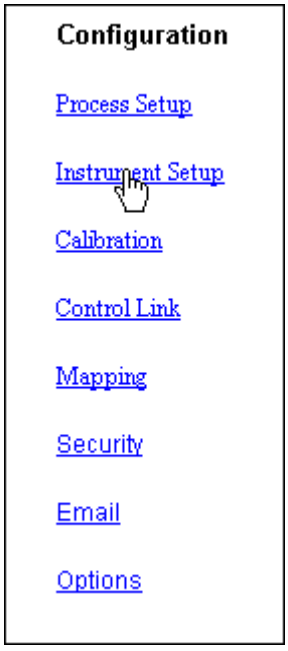


FIG. 4-56 CONFIGURATION PAGE/SELECTING INSTRUMENT SETUP

Step 2. Click on Instrument Setup. The Configuration-Instrument Setup Page appears. (See Fig. 4-57)

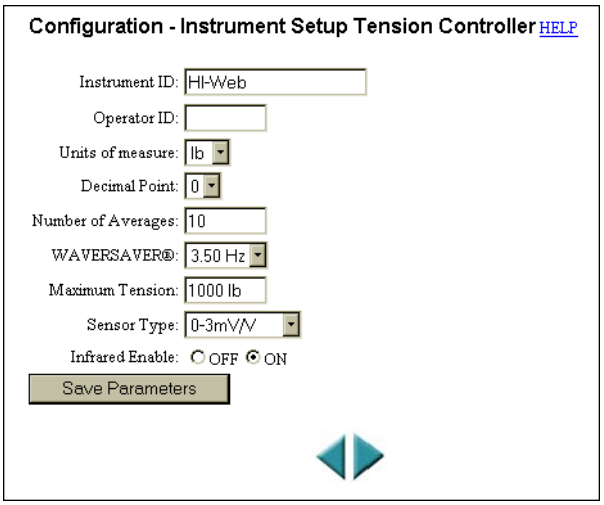


FIG. 4-57 CONFIGURATION - INSTRUMENT SETUP TENSION CONTROLLER PAGE

Step 3. To create or change a Instrument ID, double click in the text field next to Instrument ID.

Step 4. Type in the Instrument ID. There are only 19 characters so be brief but descriptive. We entered HI-Web (Hardy Instruments Web Tension)

Step 5. To create or change an Operator ID, double click in the text field next to Operator ID.

Step 6. Type in the User ID. Remember you only have three characters so be brief. We used “JD” (John Doe).

Step 7. To select the Unit of measure, click on the Unit of Measure pull down menu. (See Fig. 4-58)

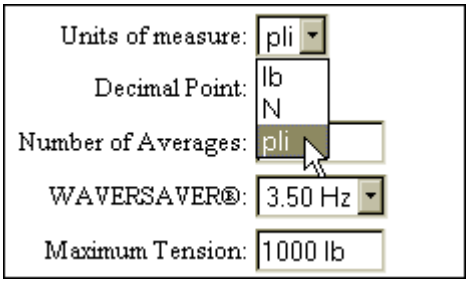


FIG. 4-58 CONFIGURATION - INSTRUMENT SETUP TENSION CONTROLLER PAGE/SELECTING UNIT OF MEASURE

Step 8. Click on the Unit of measure you want for this channel. In our example we selected “pli” (pounds per linear inch).

Step 9. To set the Decimal point, click on the Decimal Point pull down menu. (See Fig. 4-59)

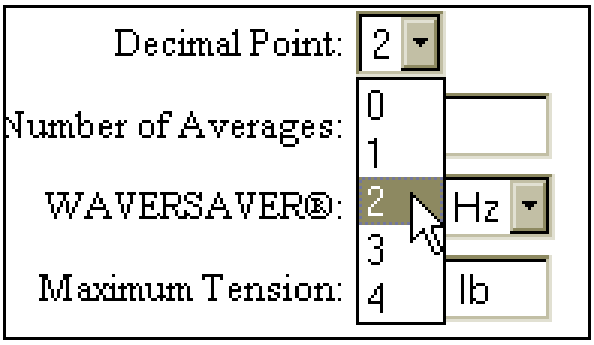


FIG. 4-59 INSTRUMENT SETUP MENU/SELECTING DECIMAL POINT

Step 10. Click on the decimal place you want for this application. In our example we selected “2”.

Step 11. To set the Number of Averages, double click in the text field next to Number of Averages.

Step 12. Type in the number of averages for the device connected to this instrument. In our example we selected 10.

Step 13. To select the WAVERSAVER® setting, click on the WAVERSAVER pull down menu. (See Fig. 4-60)

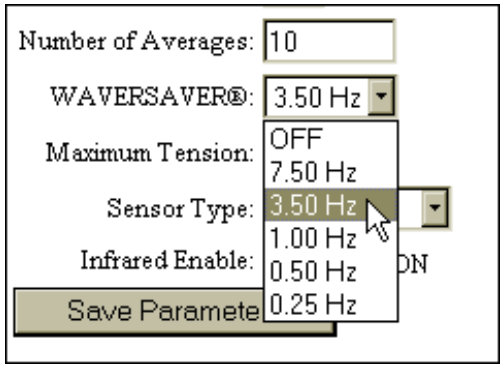


FIG. 4-60 INSTRUMENT SETUP PAGE/SELECTING WAVERSAVER SETTING

Step 14. Click on the WAVERSAVER level you want for this application. Remember the higher the frequency the more dampening occurs, however it can slow the instrument somewhat. If instrument response is critical try selecting a lower frequency until the vibration dampening is suitable for your application. In our example we selected “3.50 Hz”.

Step 15. To Set the Total Load Sensor Maximum Tension, double click in the text field next to Maximum Tension.

Step 16. Type in the Total Capacity of the load sensors attached to this instrument. In our example we selected 1,000 lbs.

Step 17. To select the Load Sensor Type, click on the Sensor Type pull down menu. (See Fig. 4-61)

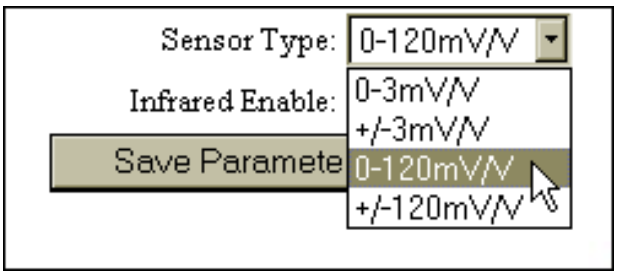


FIG. 4-61 INSTRUMENT SETUP PAGE/SELECTING SENSOR TYPE

Step 18. Click on the load sensor type that is connected to the Tension Controller. In our example we selected 0-120mV/V. This is the sensitivity of the load sensor(s) that are connected to the controller.

Step 19. To turn ON the wireless infrared system, click in the radio button next to YES.

Step 20. To turn OFF the wireless infrared system, click in the radio button next to NO.

Step 21. Instrument Setup page appears. (See Fig. 4-62)

NOTE: You can click on the Save Parameters button anytime during this process. If you only change one parameter, click on the Save Parameters button. You must click on the Save Parameters button in order for the changes to occur.

Step 22. Click on the right arrow at the bottom of the page. The Clock Setup Page appears. (See Fig. 4-62)

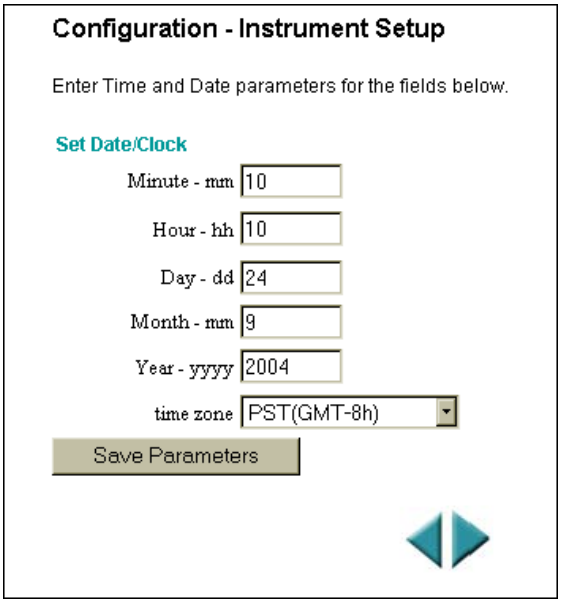


FIG. 4-62 INSTRUMENT SETUP/CLOCK SETUP

Set Date/Clock Parameters

Step 1. Double click in the Minute-mm field. Enter the current minutes. (See Fig. 4-100)

Step 2. Double click in the Hour-hh field. Enter the current minutes.

Step 3. Double click in the Day-dd field. Enter the current day.

Step 4. Double click in the Month-mm field. Enter the current month.

Step 5. Double click in the Year-yyyy field. Enter the Current year.

Step 6. Double click in the Timezone field. Check Table 4-2 Civilian Time Zones, GMT on page 40 for the time zone you are in. Enter the correct Greenwich Mean Time value. Don't forget to enter the positive (+) or negative (-) sign. For our example we used the default time zone which is -8 or PST (Pacific Standard Time).

Step 7. Click on the Save Parameters button to save the setting.

The Instrument Setup is complete.

Process Setup

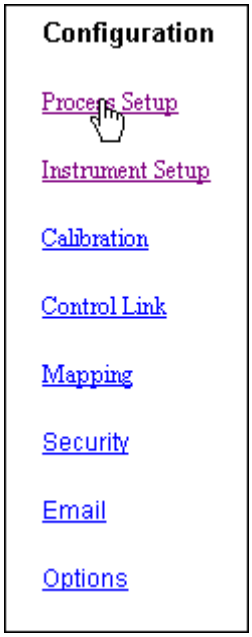


FIG. 4-63 CONFIGURATION/SELECTING PROCESS SETUP

Step 1. Click on Process Setup. The Configuration-Process Setup Page appears. (See Fig. 4-64)

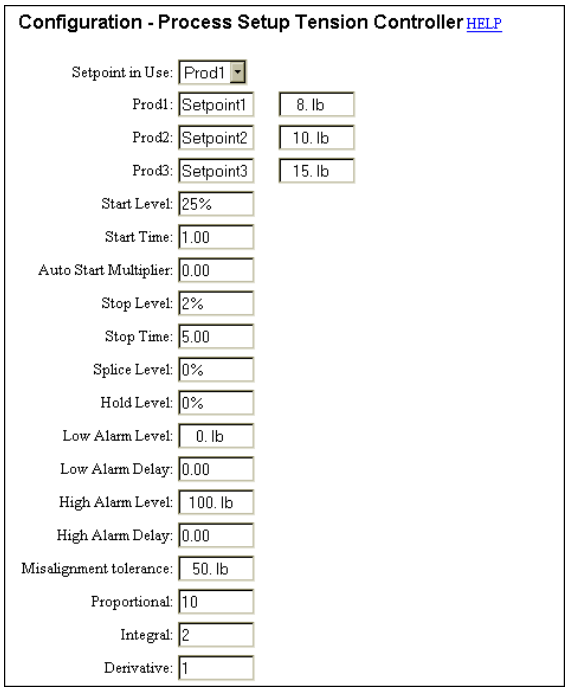


FIG. 4-64 PROCESS SETUP/IMAGE 1

Step 2. To select the product currently being used (Product 1, Product 2, Product 3) click on the Setpoint in Use pull down menu. (See Fig. 4-65)

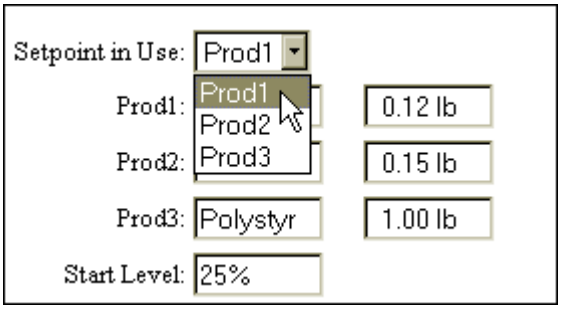


FIG. 4-65 SELECTING PRODUCT CURRENTLY IN USE

Step 3. Click on the Product currently in use. By selecting the product, if you have preset the tension setpoints for Prod1, Prod2, Prod3, it will automatically set the tension setpoint for selected product. In our example we selected Prod1 Polyethylene with a setpoint of 0.12 lb.

Step 4. To setup Prod1:

- Double click in the text field next to Prod1.
- Type in the Product name. In our example we selected Polyethylene (Polyeth).
- Click in the setpoint field to the right.
- Type in the Setpoint you want for this product. In our example we entered 0.12 lb.

Step 5. To setup Prod2:

- Double click in the text field next to Prod2.
- Type in the Product name. In our example we selected Saran.
- Click in the setpoint field to the right.
- Type in the Setpoint you want for this product. In our example we entered 0.15 lb.

Step 6. To setup Prod3:

- Double click in the text field next to Prod3.
- Type in the Product name. In our example we selected Polystyrene (Polystyr).
- Click in the setpoint field to the right.
- Type in the Setpoint you want for this product. In our example we entered 1.00 lb.

Step 7. To set the Start Level, click in the text field next to Start Level.

Step 8. Type in the Start Level you want for the product you selected. In our example we set 25%.

Step 9. To set the Start Time, click in the text field next to Start Time.

Step 10. Type in the Start Time you want for the product you selected. In our example we set 5.00 seconds.

Step 11. To set the Auto Start Multiplier, double click in the text field next to Auto Start Multiplier.

Step 12. Type in the multiplier you want to use for this application. In our example we used 3.

Step 13. To set the Stop Level, click in the text field next to Stop Level.

Step 14. Type in the Stop Level you want for the product you selected. In our example we set 10%.

Step 15. To set the Stop Time, click in the text field next to Stop Time.

Step 16. Type in the Stop Time you want for the product you selected. In our example we set 5 seconds.

Step 17. To set the Splice Level, click in the text field next to Splice Level.

Step 18. Type in the Splice Level you want for the product you selected. In our example we set 0%.

Step 19. To set the Hold Level, click in the text field next to Hold Level.

Step 20. Type in the Hold Level you want for the product you selected. In our example we set 0%.

Step 21. To set the Low Alarm Level, click in the text field next to Low Alarm Level.
Step 22. Type in the Low Alarm Level you want for the product you selected. In our example we set 0.11lb.
Step 23. To set the Low Alarm Delay, click in the text field next to Low Alarm Delay.
Step 24. Type in the Low Alarm Delay you want for the product you selected. In our example we set 0 seconds.
Step 25. To set the High Alarm Level, click in the text field next to High Alarm Level.
Step 26. Type in the High Alarm Level you want for the product you selected. In our example we set 100.00 lbs.
Step 27. To set the High Alarm Delay, click in the text field next to High Alarm Delay.
Step 28. Type in the High Alarm Delay you want for the product you selected. In our example we set 0 seconds.
Step 29. To set the Misalignment Tolerance, click in the text field
Step 30. To set the Proportional, click in the text field next to Proportional.
Step 31. Type in the Proportional value you want for the product you selected. In our example we set 30.
Step 32. To set the Integral, click in the text field next to Integral.
Step 33. Type in the Integral value you want for the product you selected. In our example we set 2.
Step 34. To set the Derivative, click in the text field next to Derivative.
Step 35. Type in the Derivative value you want for the product you selected. In our example we set 1.
Step 36. To set the Auto Gain Adjust, click in the text field next to Auto Gain Adjust.
Step 37. Type in the Auto Gain Adjust value you want for the product you selected. In our example we set 0.00.
Step 38. Scroll down to the bottom section of the Second Page Instrument Parameters list. (See Fig. 4-66)

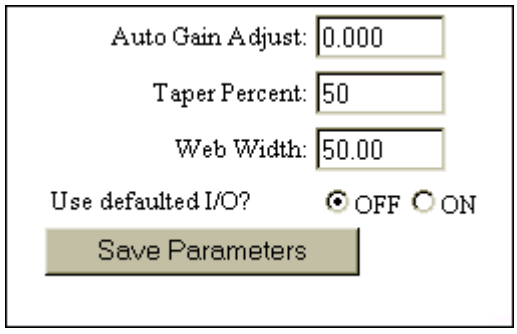


FIG. 4-66 BOTTOM SECTION OF PROCESS SETUP

Step 39. To set the Auto Gain Adjust, click in the text field next to Auto Gain Adjust.
Step 40. Type in the Auto Gain Adjustment you want to use for this application. In our example we are not using the Auto Gain Adjustment so we typed in 0.000.
Step 41. To set the Taper Percent, click in the text field next to Taper Percent.
Step 42. Type in the Taper Percent value you want for the product you selected. In our example we set 50.
Step 43. To set the Web Width parameter, click in the text field next to Web Width.
Step 44. Enter the width of the web for this application. In our example we entered 50 inches.
Step 45. To select whether you want to use the Default inputs, click in the radio button next to ON or the radio button next to OFF.

- ON = Yes I want to use the default inputs.
- OFF = No I don't want to use the defaults inputs, I will set them up on my own.

Step 46. To save the parameters at this point you can click on the Save Parameters button. This can be done at anytime in the process.

The Process Setup is Complete

Analog Option Card Configuration

The Analog Output Option card can be configured from the Front Panel and the Web Page. You need to configure the instrument for each Analog Output Option Card Slot (0 or 1) and for each channel (0 or 1) on each Slot. Make sure when configuring an Analog Output Option Card Slot that the configuration mode selection matches the Option Card wiring selection. For example if you have wired your output card for voltage configure it for voltage, DO NOT configure it for current.

PARAMETER:ANALOG CARD SLOT 0 OR 1
RANGE: 0-5 V, 0-10 V, 0-20 MILLIAMPS, 4-20 MILLIAMPS
DEFAULT: 0-10 V

Analog Option Card Configuration from the Front Panel

Step 1. From the Operating Mode Display Press the Setup/ 3 button. The Setup Display appears. (See Fig. 4-67)

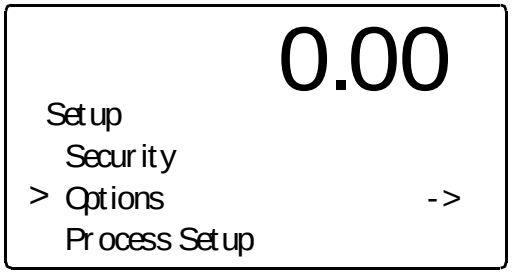


FIG. 4-67 SETUP DISPLAY/SELECTING OPTIONS

Step 2. Press the + or - buttons until the cursor is in front of Options.
Step 3. Press the Enter button. The Options Display appears. (See Fig. 4-68)

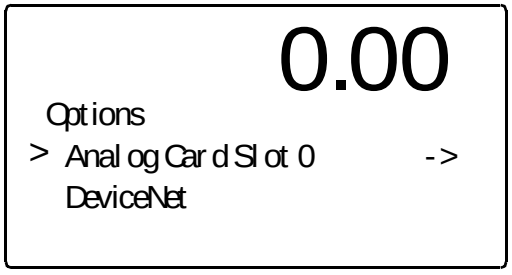


FIG. 4-68 OPTIONS DISPLAY/SELECTING ANALOG CARD SLOT 0

Step 4. Press the + or - button until the cursor is in front of "Analog Card Slot 0" or Analog Card Slot 1"
Step 5. Press the Enter button. the Analog Card Slot 0 or 1 display appeares. (See Fig. 4-69) In our example we selected Analog Card Slot 0.

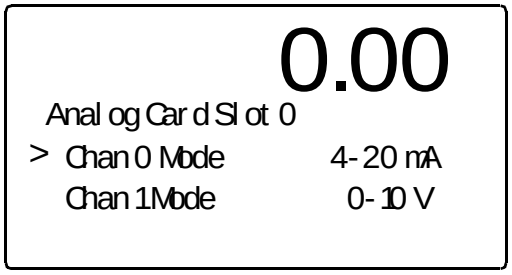


FIG. 4-69 ANALOG CARD SLOT 0/SELECTING MODE

Step 6. Press the Enter button to save the configuration.
Step 7. Press the right or left buttons to select the mode that matches the Analog Card Output wiring. In our example we selected 4-20 mA for Channel 0.
Step 8. Press the - button until the cursor is in front of Chan 1 Mode. (See Fig. 4-70)
Step 9. Press the right or left button to select the mode that matches the Analog Card Output wiring for Channel 1. In our example we selected 0-10 V for Channel 1. (See Fig. 4-70)

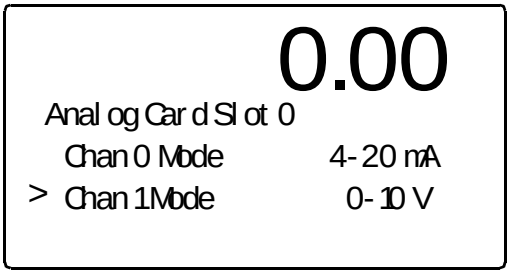


FIG. 4-70 ANALOG CARD SLOT 0/CHAN 1 MODE SELECTION

Step 10. Press the Enter button to save the configuration.
Step 11. If you have an Analog Card installed in Slot 1 the Options Display will list Analog Card Slot 1. Repeat Steps 1-9 above to configure the Analog Card Slot 1.
Step 12. If you have an Analog Card installed in Slot 0 and Slot 1 the Options display will list both the Analog Card Slot 0 and Analog Card Slot 1. (See Fig. 4-71)

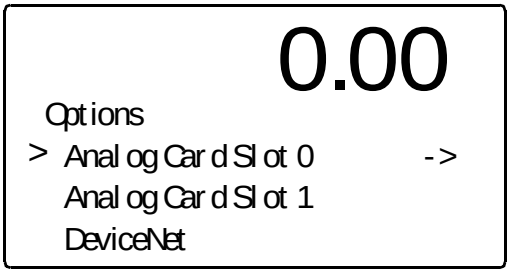


FIG. 4-71 2 ANALOG CARDS INSTALLED

Step 13. Press the Exit button to return to the Operating Mode display.

Analog Output Option Card Configuration from the Web Page

Step 1. From the Tension Control. Home Page click on Configuration. (See Fig. 4-72) The Configuration page appears. (See Fig. 4-73)

FIG. 4-72 TENSION CONTROL HOME PAGE/ SELECING CONFIGURATION

FIG. 4-73 CONFIGURATION PAGE/SELECTING OPTIONS

Step 2. Click on Options. The Options page appears. (See Fig. 4-74)

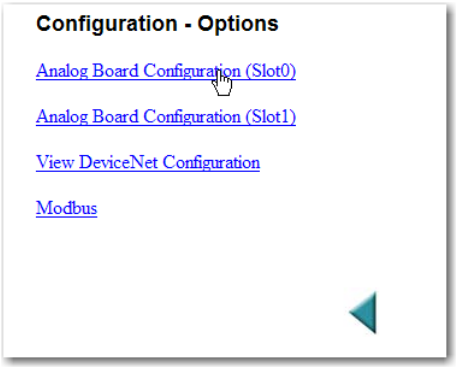


FIG. 4-74 OPTIONS PAGE/SELECING ANALOG BOARD CONFIGURATION (SLOT 0)

NOTE: If only one Analog Option Board is installed, only one card will appear in the Options page.

Step 3. Click on the Analog Option Board you want to configure. The Analog Option Board Configuration page appears. (See Fig. 4-75) In our example we selected Analog Board (Slot 0).

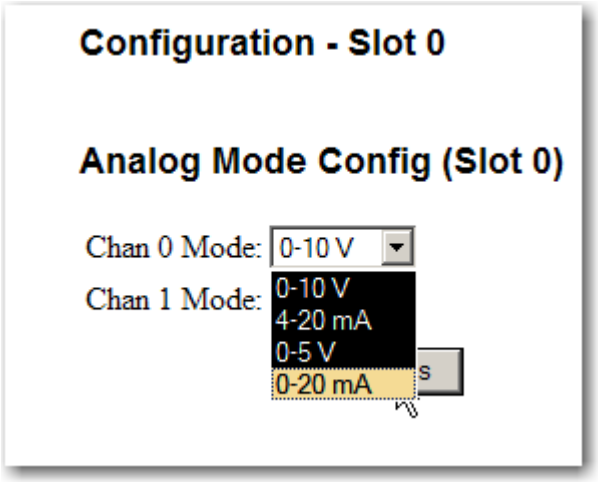


FIG. 4-75 CONFIGURATION/SLOT 0/SETTING CHAN 0 MODE

Step 4. Click on the Chan0 Mode pull down list.
Step 5. Click on the Mode that matches the installed wiring. For example if you wired the Analog Board for current select a current mode. If you wired the Analog Board for voltage select a voltage mode. In our example we selected 0-20 mA.
Step 6. Click on the Chan 1 Mode pull down list.
Step 7. Click on the Mode that matches the installed wiring for Channel 1. Our example, 0-10V.

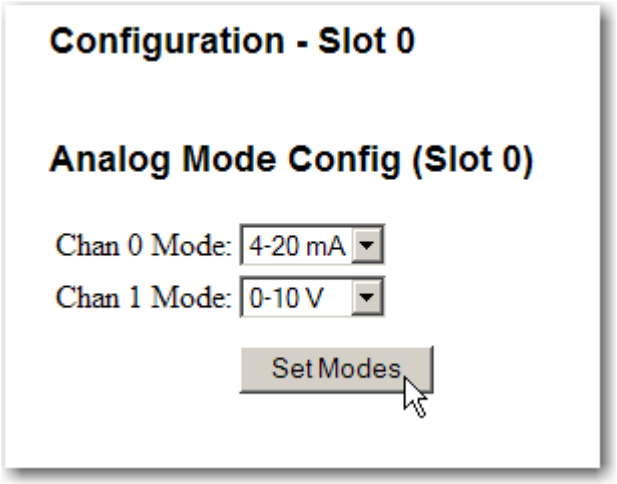


FIG. 4-76 CONFIGURATION SLOT 0/SETING MODES

Step 8. Click on the Set Modes button to save the settings.
Step 9. To Configure the Analog Board in Slot 1, from the Options Page click on Analog Board Configuration (Slot 1). See Fig. 4-77)

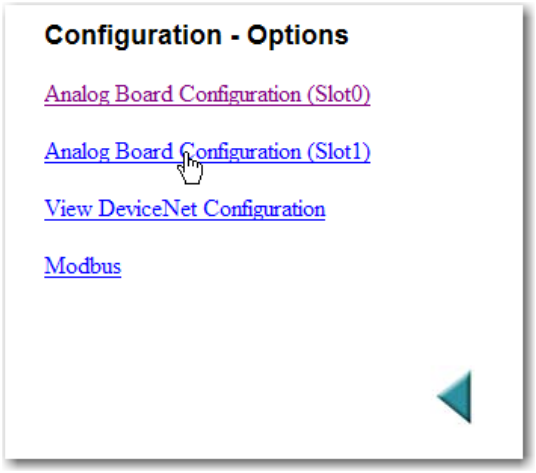


FIG. 4-77 OPTIONS/SELECTION ANALOG BOARD CONFIGURATION (SLOT 1)

Step 10. Repeat Steps 4-8. (See Fig. 4-78 & 4-79)

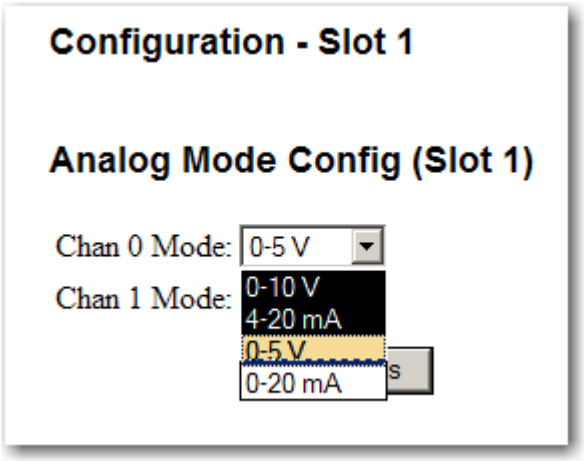


FIG. 4-78 CONFIGURATION SLOT 1/SELECTING CHANNEL MODES

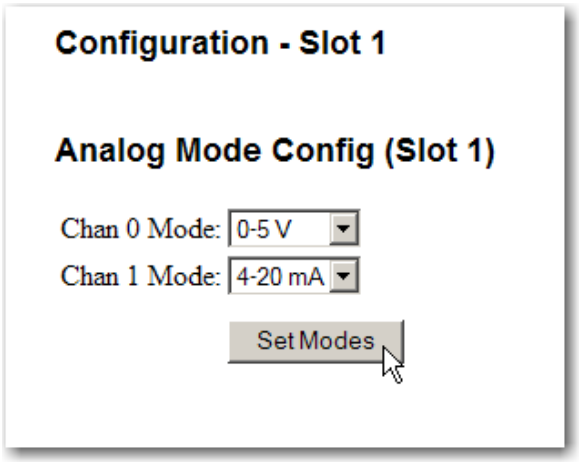


FIG. 4-79 ANALOG CONFIG (SLOT 1) MODE CONFIGURATION CHAN 0 AND CHAN 1

Step 11. From the Configuration page click on Mapping. (See Fig. 4-80) The Mapping page appears. (See Fig. 4-81)

FIG. 4-80 CONFIGURATION PAGE/SLECTING MAPPING

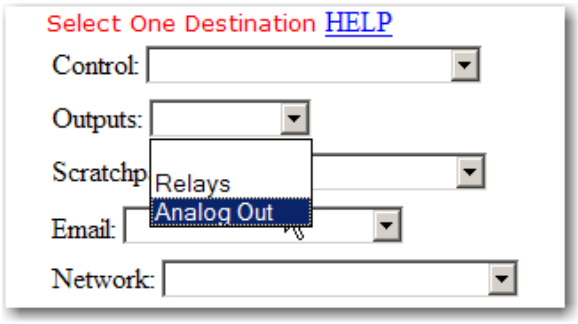


FIG. 4-81 MAPPING PAGE/SELECTIN DESTINATION

Step 12. Click on the Output pull down list.

Step 13. Click on Analog Out. A pull down list with all the installed Analog Option Boards. (See Fig. 4-82)

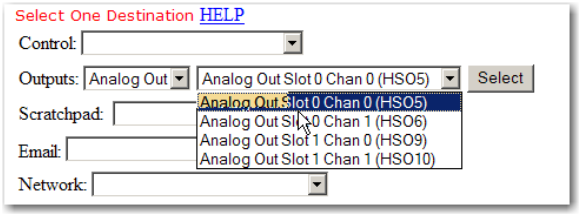


FIG. 4-82 MAPPING DESTINATION/SELECTING ANALOG OUT SLOT 0 CHAN 0 (HSO5)

Step 14. Click on the Analog Output you want to map. In our example we selected Analog Out Slot 0, Channel 0 (HSO5)

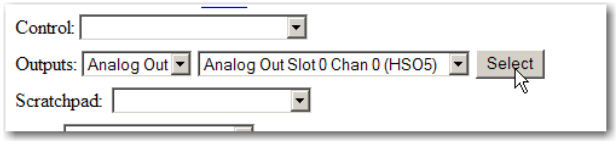


FIG. 4-83 SELECTING ANALOG OUT SLOT 0 (HSO5)

Step 15. Click on the Select button. The Analog Out Slot 0 Chan 0 symbol (HSO5) appears to the left of the equals sign in the mapping text field. (See Fig. 4-84)

FIG. 4-84 DESTINATION ENTERED

Step 16. To select a Source click on the Local pull down list. (See Fig. 4-85)

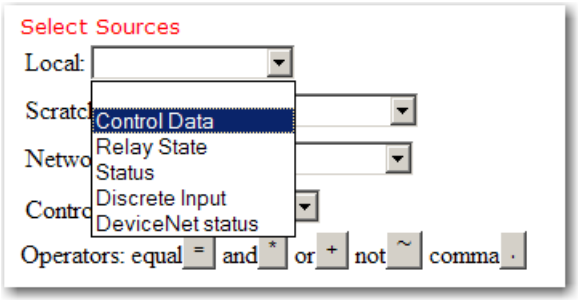


FIG. 4-85 SELECT SOURCE/SELECTING CONTROL DATA

Step 17. Click on the Local Source you want for your application. In our example we selected Control Data. The Control Data options pull down list appears to the right. (See Fig. 4-86)

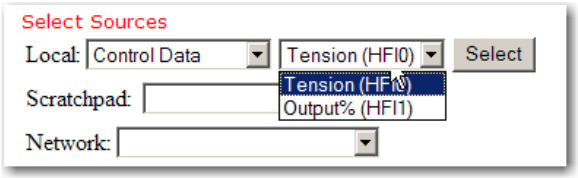


FIG. 4-86 CONTROL DATA/OPTIONS PULL DOWN MENU

Step 18. Click on either Tension or Output%. In our example we selected Tension.

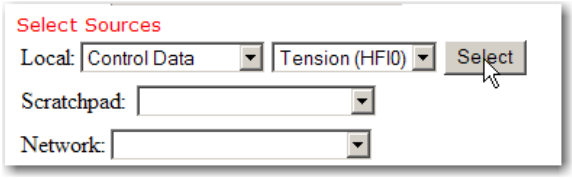


FIG. 4-87 SELECTING THE SOURCE

Step 19. Click on the Select button. The Source Symbol (HF10) appears to the right of the equals sign in the Mapping text field.

FIG. 4-88 MAPPING CONTROL DATA TO ANALOG OUT SLOT 0

Step 20. Click on the Map button. The mapping assignment statement appears in the Mapping list. (See Fig. 4-89) Control Data is now mapped to the selected Analog Output table.

FIG. 4-89 MAPPING LIST/CONTROL DATA MAPPED TO ANALOG OUTPUT

Step 21. To see a more detailed listing of the mappings click on “Click here for an expanded map”. The expanded mapping dialog box appears with all the mappings listed including the latest analog output mapping. (See Fig. 4-90)

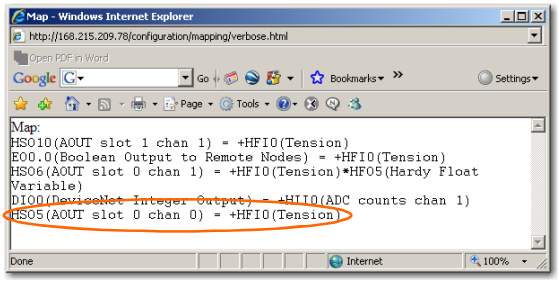


FIG. 4-90 EXPANDED MAPPING DIALOG BOX

Step 22. This completes the Analog Output Board configuration for Slot 0. To configure the Analog Output Board for Slot 1 repeat all the steps above.

CHAPTER 5: CALIBRATION

About Chapter 5

Chapter 5 pertains to the calibration procedures for the HI 3300 Tension Controller. Alternatives to any procedures implied or explicitly contained in this chapter are not recommended. In order for the Tension Controller to work properly, it must be calibrated prior to operation. Be sure to follow all the procedures completely to insure that the weights read by the Tension Controller are accurate. It is very important that the user and service personnel be familiar with the procedures contained in this chapter, before installing or operating the HI 3300 Tension Controller.

Getting Started

The HI 3300 Tension Controller can be calibrated three ways. The first is the Hardy C2® Second Generation calibration which requires no test weights. Hardy C2® Calibration is one of the Core Technologies. The second calibration technique is called traditional calibration which requires certified test weights. It is important to note that the procedures contained in this section either explicitly stated or implied should be followed to guarantee the performance of the instrument. The third is Soft Calibration which does not require any test weights. Alternatives to the procedures listed here are not recommended.

Before you can calibrate the instrument you first need to check to see if the system is ready to be calibrated.

Binding

Step 1. Due a visual check to see if the load sensors have been installed so that nothing is binding the load cell or other parts of the web tension system. Make sure that nothing is draped over the rolls or sheaves, such as a cable, electrical cord or other objects. You want to be sure that you are able to zero or tare the instrument to compensate for the tare weight (deadload).

Step 2. Make sure that all cables are properly connected between the load sensors, junction boxes, drive and the Tension Controller.

Step 3. That the cord and weight are installed correctly and that the known weight is suspended freely with nothing touching it. (See Fig. 5-1)

Traditional Calibration From the Front Panel

WARNING: THE START BUTTON IS ACTIVE IN ANY MENU. MAKE SURE THAT ALL PERSONNEL ARE CLEAR FROM ANY AND ALL MACHINERY WHEN CALIBRATING THE TENSION CONTROLLER. ACCIDENTALLY STARTING THE SYSTEM WHEN IN THE CONFIGURATION OR CALIBRATION MENUS COULD CAUSE PROPERTY DAMAGE AND/OR PERSONNEL INJURY.

About Traditional Calibration

Traditional Calibration is the method of calibration that uses test weights. We recommend that the test weights total 25% to 100% of the Maximum Tension for your application. Make sure you know the exact weight. See Fig. 5-1 for the proper mechanical configuration for a Hard Cal.

Mechanical Calibration Setup for Traditional Calibration

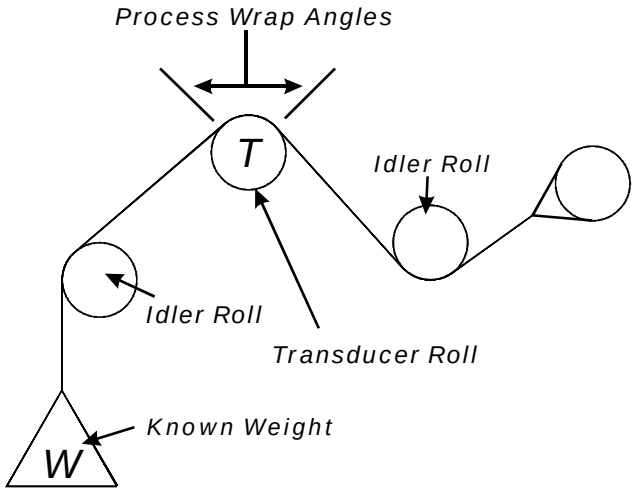


FIG. 5-1 CALIBRATION MECHANICAL SETUP

Step 1. You can press the Calibration/7 button to get directly to the Calibration Menu.

Step 2. An alternative is to Press the Setup/3 button. The Setup Menu appears. (See Fig. 5-2)

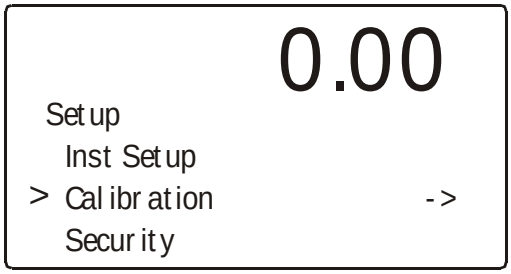


FIG. 5-2 SETUP MENU/SELECTING CALIBRATION

Step 3. Press the "-" button until the cursor is in front of "Calibration". (See Fig. 5-2)

Step 4. Press the Enter button. The CALIBRATION Menu appears with the cursor next to “Snsr Type”. (See Fig. 5-3)

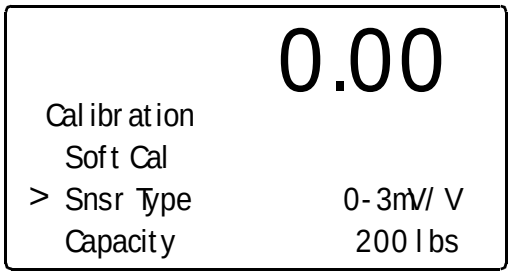


FIG. 5-3 CALIBRATION/SELECTING SENSOR TYPE

Step 5. Press the Right or Left arrow buttons to select the sensor type. The sensor types are categorized by the sensitivity of the Load Cell type which is posted on the load cell or with the load cell documentation.

Step 6. Press the Enter Button to set the entry.

Step 7. Press the “-” button until the cursor is in front of “Capacity”. (See Fig. 5-4)

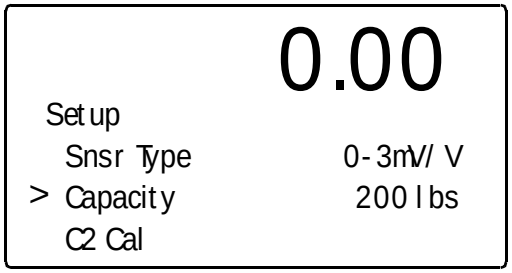


FIG. 5-4 TRADITIONAL CALIBRATION/ZERO VALUE

Step 8. Use the alphanumeric key pad and enter the total capacity of all the load sensors used for your application. For example if you are using two load sensors that are rated at 100 lbs each, you enter 200 lbs. (100 x 2 = Maximum Capacity)

Step 9. Press the Enter button to set the entry.

Step 10. Press the Enter Button to set the entry. Press the “-” button until the cursor is in front of “C2Cal”. See Fig. 5-5)

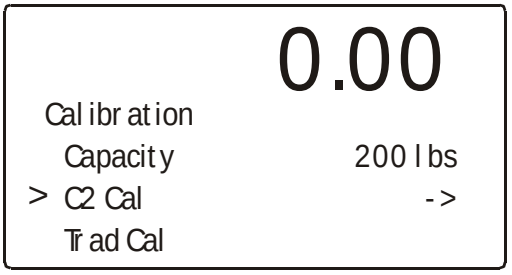


FIG. 5-5 CALIBRATION/C2 CAL

Step 11. Press the “-” button until the cursor is in front of “Trad Cal”. (See Fig. 5-6)

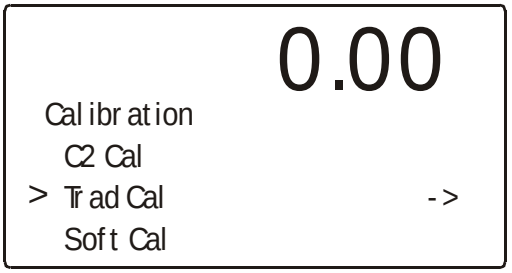


FIG. 5-6 CALIBRATION/SELECTING TRADITIONAL CALIBRATION

Step 12. Press the Enter button. The “Trad Cal” menu appears, with the cursor pointing to “Ref Wgt.” (See Fig. 5-7)

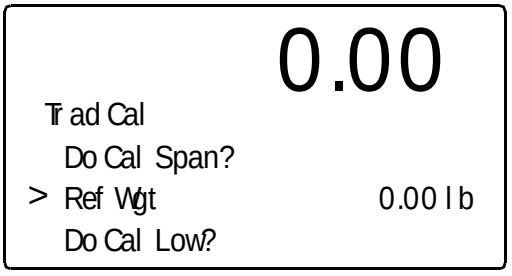


FIG. 5-7 CALIBRATION ENTERING REFERENCE WEIGHT

Step 13. Traditional Calibration requires a zero point and the physical placement of test weights on the scale. To Set the Reference Weight:

- Remove all weight from the end of the cable or cord. (See Fig. 5-8) The Reference weight should almost always be 0.00.
- Use the alphanumeric key pad and enter 0.00.

- Press the Enter button to set the entry.

Step 14. Press the "-" button until the cursor is in front of "Do Cal Low?". (See Fig. 5-9)

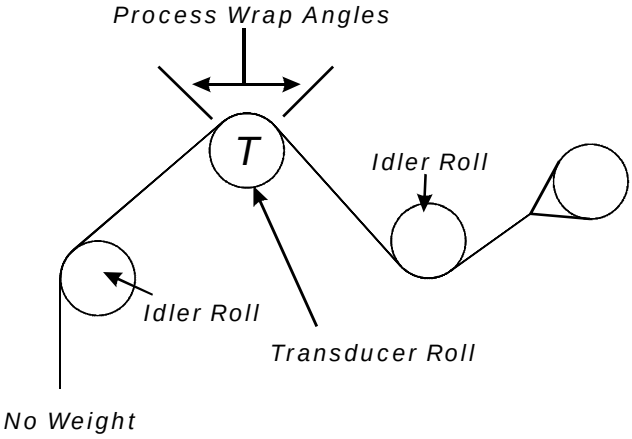


FIG. 5-8 CALIBRATION SETUP WITH NO WEIGHT

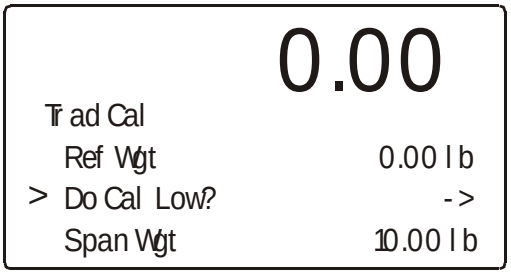


FIG. 5-9 DO TRADITIONAL CALIBRATION/ZERO

Step 15. Press the Enter button to do the Cal Low (Zero) Calibration.

- If "Function OK" appears the Zero Calibration is complete.
- If an "ERR" appears go to Chapter 7, Troubleshooting for more information.

Step 16. Press the Down arrow button until the cursor is in front of Span Wgt. (See Fig. 5-10) To Set the Span Value:

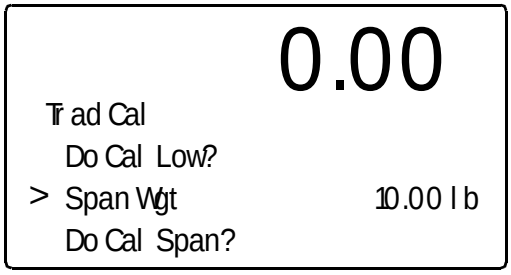


FIG. 5-10 TRADITIONAL CALIBRATION/ ENTERING SPAN WEIGHT

- Place the certified test weight on the end of the cable or cord. (See Fig. 5-11)
- Use the alphanumeric key pad to enter the value of the test weight. (If a 10 lb.weight is used, enter 10).

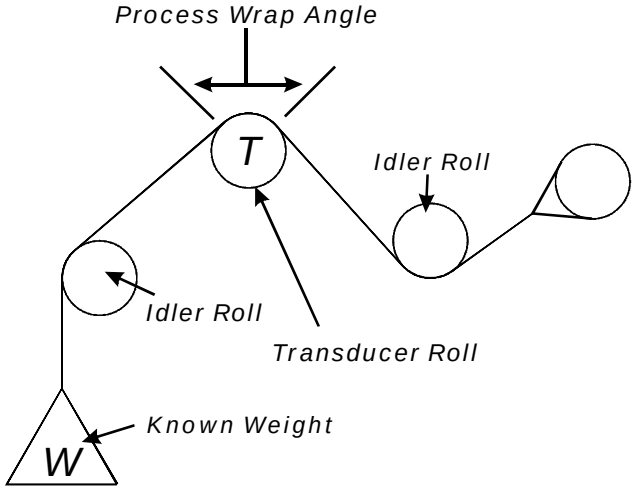


FIG. 5-11 SPAN CALIBRATION/SPAN WEIGHT

Step 17. Press the Down arrow button until the cursor is in front of the Do Span Cal?. (See Fig. 5-12)

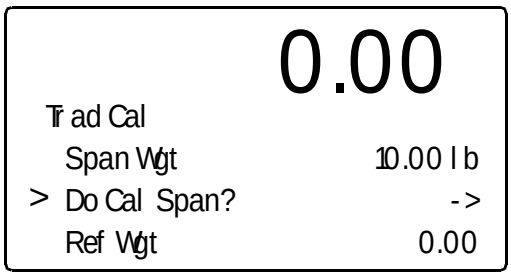


FIG. 5-12 TRADITIONAL CALIBRATION/SPAN CALIBRATION

Step 18. Press the Enter button to do the Span Calibration.

- If “Function OK” appears the Span Calibration is complete
- If an “ERR” number appears go to Chapter 7, Troubleshooting for more information.

Step 19. End of Traditional Calibration.
Step 20. Remove the rope and weight from the rollers or sheaves.

Soft Calibration from the Front Panel

About Soft Calibration

Soft Calibration does not require you disassemble your web zone or process to do another hard calibration. By entering a few calibration parameters you used during Traditional Calibration you can do a Soft Calibration which resets the Tension Controller to the original Traditional Calibration. This eliminates the necessity of using the Test Weights over and over again. Simply enter the calibration values and do the Soft Cal and you are back in calibration.

Step 1. In the Calibration Menu press the “-” button until the cursor is in front of Soft Cal. (See Fig. 5-13)

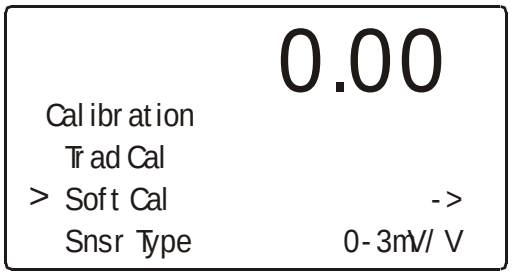


FIG. 5-13 CALIBRATION MENU/SELECTING SOFT CALIBRATION

Step 2. Press the Enter button. The Soft Cal Sub-Menu appears with the cursor in front of “Ref Wgt”. (See Fig. 5-14)

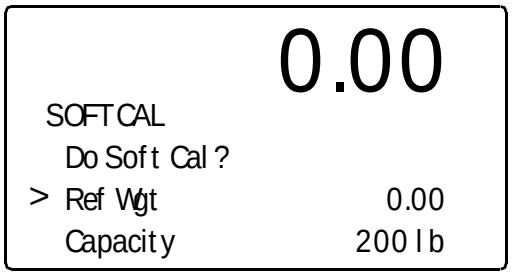


FIG. 5-14 SOFT CALIBRATION MENU/ENTERING REFERENCE WEIGHT

Step 3. Use the alphanumeric key pad and enter 0.00 if the current setting is not 0.00.
Step 4. Press the Enter button to set the entry.
Step 5. Press on the “-” button until the cursor is in front of “Capacity”. (See Fig. 5-15)

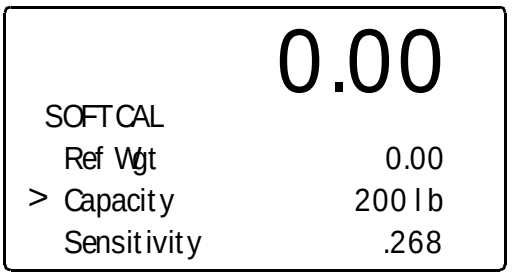


FIG. 5-15 SOFT CALIBRATION MENU/ENTERING LOAD SENSOR CAPACITY

Step 6. Use the alphanumeric key pad and enter the combined Maximum capacity of the load cells on your system.
Step 7. Press the Enter button to set the entry.
Step 8. Press on the “-” button until the cursor is in front of “Sensitivity”. (See Fig. 5-16)

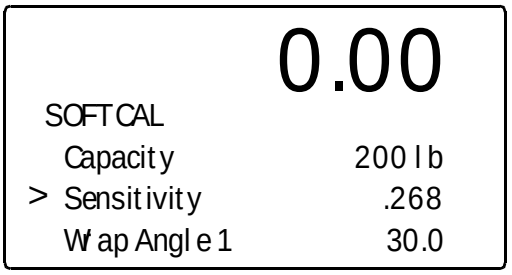


FIG. 5-16 SOFT CALIBRATION MENU/ENTERING SENSITIVITY OF THE LOAD CELLS

Step 9. Use the alphanumeric key pad and enter the Sensitivity of the load cells on your system.

Step 10. If you do not know the sensitivity of your load cell do the following:

- With no tension on the roller, record the millivolt reading (X_1) using either a digital multimeter or the Diagnostics function located in the Test Menu. (See Chapter 7, Diagnostics for instructions)
- Apply a known test weight to the roller or sheave. (See Fig. 5-17)

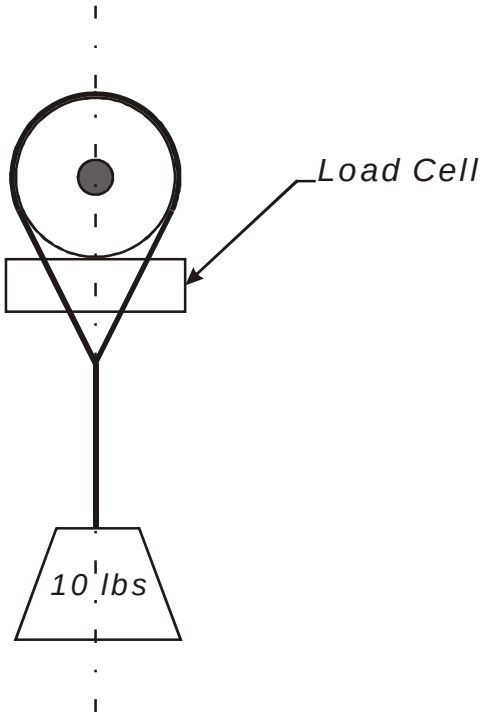


FIG. 5-17 TEST WEIGHT CONFIGURATION

- Record the millivolt reading (X_2).
- Formula:

  Sensitivity = X2 - X1/ Excitation Voltage
  Capacity = Reference Weight

  Example:
  Reference Weight = 10 lbs
  mV when no wrap applied = 50mV = X_2
  10 lbs applied = 100mV = X_1
  Sensitivity = (X2-X1)/Excitation
  Sensitivity = (100mV-50mV)/5V
  Sensitivity = (50mV)/5V
  Sensitivity = 10mV/V

- Use the above for the sensitivity value.

Step 11. Press the Enter button to set the entry.
Step 12. Press on the "-" button until the cursor is in front of Wrap Angle 1". (See Fig. 5-18)

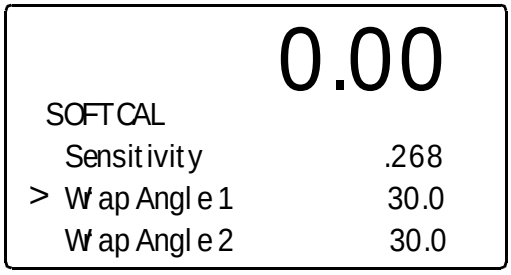


FIG. 5-18 SOFT CALIBRATION MENU/ENTERING WRAP ANGLE 1

Step 13. Use the alphanumeric key pad and enter Wrap Angle #1 for your application.
Step 14. Press the Enter button to set the entry.
Step 15. Press on the "-" button until the cursor is in front of Wrap Angle 2". (See Fig. 5-19)

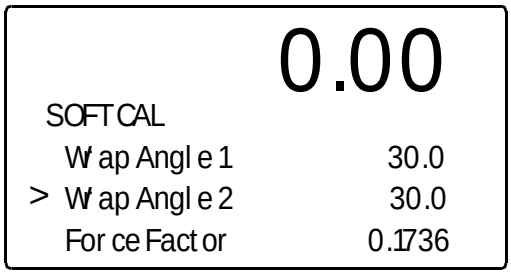


FIG. 5-19 SOFT CALIBRATION MENU/ENTERING WRAP ANGLE 2

Step 16. Use the alphanumeric key pad and enter Wrap Angle #2 for your application.
Step 17. Press the Enter button to set the entry.
Step 18. Press on the "-" button until the cursor is in front of "Force Factor". (See Fig. 5-20)

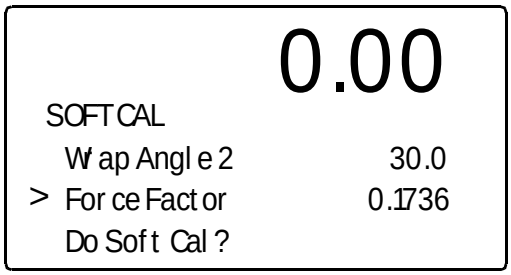


FIG. 5-20 SOFT CALIBRATION/ENTERING FORCE FACTOR

NOTE: If you do not know Wrap Angle 1 or Wrap Angle 2 enter the Force Factor value.

Step 19. Use the alphanumeric key pad and enter the Force Factor for your application.
Step 20. Press the Enter button to set the entry.
Step 21. Press on the "-" button until the cursor is in front of "Do Soft Cal?". (See Fig. 5-21)

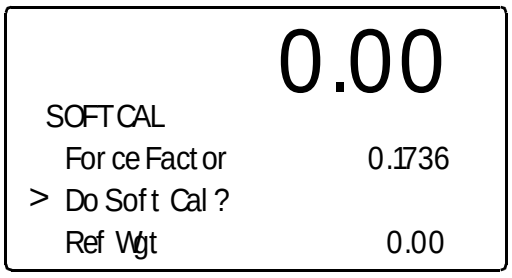


FIG. 5-21 SOFT CALIBRATION/DOING THE SOFT CALIBRATION

Step 22. Press the Enter button to do the Span Calibration.

- If "Cal Completed OK" appears the Soft Calibration is complete.
- If an "ERR number" appears go to Chapter 7, Troubleshooting for more information.

Step 23. End of Soft Calibration.
Step 24. Press the Exit button to return to the Operating Menu.

C2 Calibration From the Front Panel

Step 1. Press the Setup/3 button. The Setup Menu appears.
Step 2. Press the "-" button until the cursor is in front of Calibration. (See Fig. 5-22)

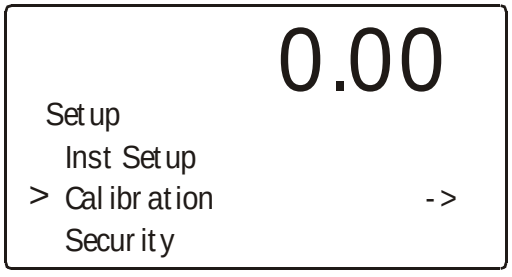


FIG. 5-22 CONFIGURATION MENU/SELECTING SETUP

Step 3. Press the Enter button. The Calibration Menu appears with the cursor next to Snsr Type. (See Fig. 5-23)

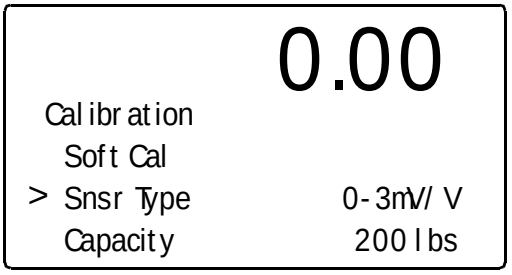


FIG. 5-23 CALIBRATION/SELECTING SENSOR TYPE

Step 4. Press the Right or Left arrow buttons to select the sensor type. The sensor types are categorized by the sensitivity of the Load Cell type which is posted on the load cell or with the load cell documentation.
Step 5. Press the Enter Button to set the entry. Press the "-" button until the cursor is in front of "Capacity". (See Fig. 5-24).

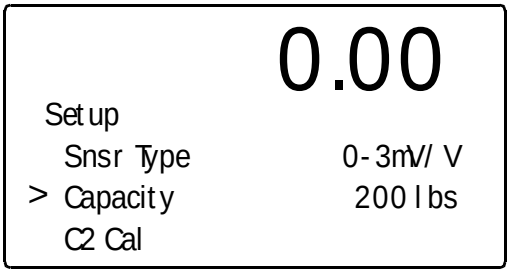


FIG. 5-24 TRADITIONAL CALIBRATION/ZERO VALUE

Step 6. Use the alphanumeric key pad and enter the total capacity of all the load sensors used for your application. For example if you are using two load sensors that are rated at 100 lbs each, you enter 200 lbs. (100 x 2 = Maximum Capacity)
Step 7. Press the Enter button to set the entry. Press the "-" button until the cursor is in front of "C2 Cal". See Fig. 5-25)

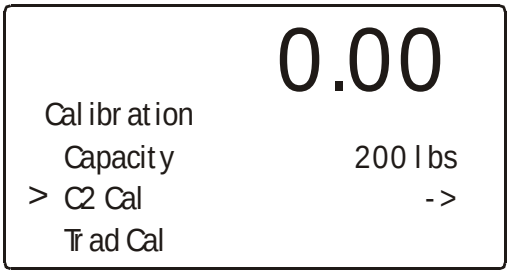


FIG. 5-25 CALIBRATION/

Step 8. Press the Enter button. The C2 CAL Sub-menu appears with the cursor in front of “Load Sensor Num”. (See Fig. 5-26)

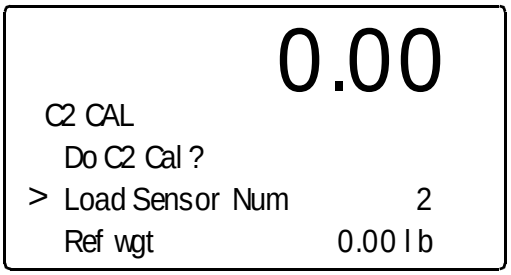


FIG. 5-26 C2 CALIBRATION SUB-MENU

Step 9. The Load Sensor number is a read only field. It tells you how many load sensors are connected to the instrument.

Step 10. Press the down arrow button to move the cursor in front of the “Ref Wgt”. (See Fig. 5-27)

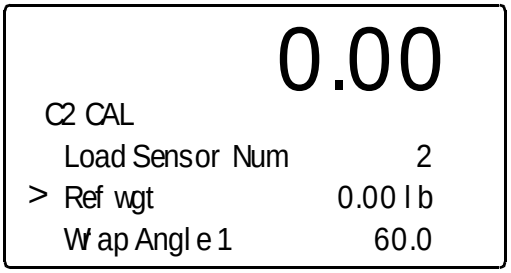


FIG. 5-27 ENTERING THE REFERENCE POINT

Step 11. The Reference Weight should be 0.00 if it is not use the alphanumeric keypad and enter 0.00 lb.

Step 12. Press the “-” arrow button to move the cursor in front of “Wrap Angle 1”. (See Fig. 5-28)

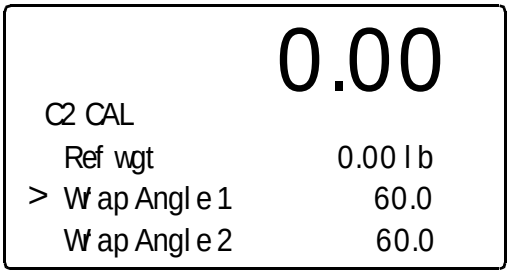


FIG. 5-28 C2 CAL/ENTERING WRAP ANGLE 1

Step 13. Use the alphanumeric key pad and enter Wrap Angle 1.

Step 14. Press the Enter button to set the entry.

Step 15. Press the “-” button to move the cursor in front of “Wrap Angle 2”.

Step 16. Use the alphanumeric key pad and enter Wrap Angle 2.

Step 17. Press the Enter button to set the entry.

Step 18. Press the “-” button to move the cursor in front of “Force Factor”. (See Fig. 5-29)

NOTE: If you did not enter values for Wrap Angle 1 or Wrap Angle 2 you enter the Force Factor if you know what it is. If you entered values for Wrap Angle 1 and Wrap Angle 2 the force factor (Force Factor = (cos Wrap Angle 1) + (cos Wrap Angle 2) is calculated for you and stored in non-volatile memory. If you don’t know either wrap angles or the force factor, the force factor is calculated when you do a traditional calibration and saved in non-volatile memory.

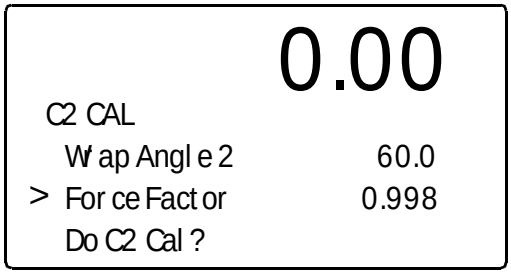


FIG. 5-29 C2 CAL/ENTERING FORCE FACTOR

Step 19. Use the alphanumeric key pad and enter the Force Factor for your application.

Step 20. Press the down arrow button to move the cursor in front of “Do C2 Calibration”. (See Fig. 5-30)

Step 21. Wait 15 seconds for the scale to settle.

Step 22. Press the Enter button to complete the Calibration.

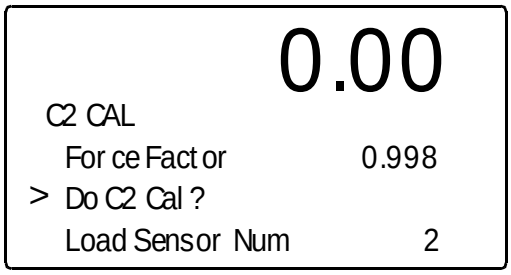


FIG. 5-30 C2 CALIBRATION

Step 23. A “Cal Completed OK” momentarily appears on the screen indicating the calibration was successful

- A message that says “Function Error” means that the calibration was not successful. Check Chapter 7 - Troubleshooting of this manual for corrective action.
- Another message may occur which is: Security Violation. This means that the User does not have the security level required to do a calibration.

Step 24. Press the Exit button until you return to the Standby display.

Step 25. C2 calibration is complete.

C2 Calibration From the Web Page

Step 1. On the Tension Controller Home Page click on Configuration. (See Fig. 5-31) The Configuration page appears. (See Fig. 5-32)

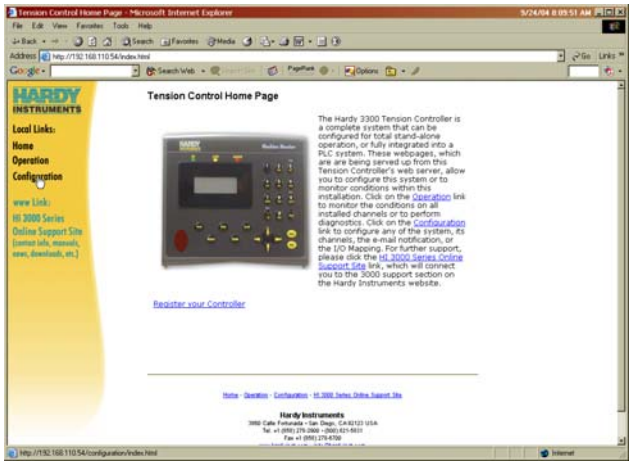


FIG. 5-31 CONFIGURATION MENU/SELECTING SETUP

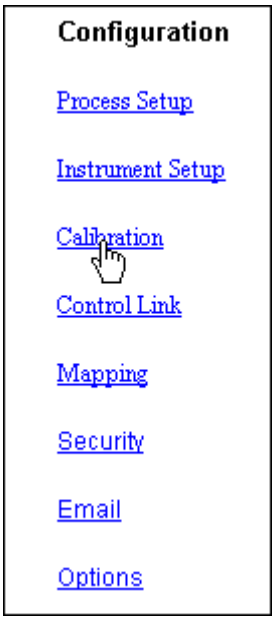


FIG. 5-32 CONFIGURATION PAGE

Step 2. Click on Calibration. The Calibration Sub-menu appears. (See Figs. 5-33)

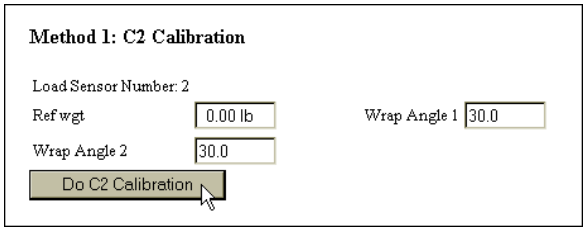


FIG. 5-33 METHOD 1: C2 CALIBRATION

Step 3. The Load Sensor number is a read only field. It tells you how many load sensors are connected to the instrument. If this number does not reflect the actual number of load sensors go to Chapter 7 - Troubleshooting.

Step 4. Double click in the Weight text field to enter the Reference Weight or click in the Reference Weight text field. (See Fig. 5-33) Type in the reference weight which should in almost all cases be 0.00.

Step 5. Double click in the Wrap Angle 1 text field.

NOTE: If you do not know the wrap angle and know the Force Factor, enter the Force Factor instead. (See Fig. 5-34)

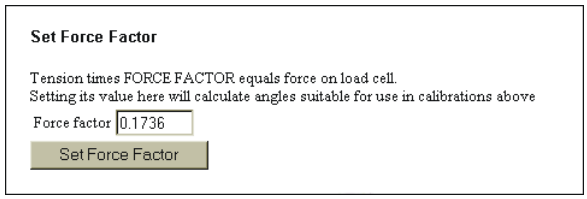


FIG. 5-34 SETTING FORCE FACTOR

Step 6. Enter the Wrap Angle 1 value.
Step 7. Double click in the Wrap Angle 2 text field.
Step 8. Enter the Wrap Angle 2 value.
Step 9. Click on the Do C2 Calibration button.
Step 10. A page appears telling you that the C2 Calibration completed OK. (See Fig. 5-35)

FIG. 5-35 CAL COMPLETED OK

Step 11. Click on "Back" to return to the Calibration page.
Step 12. Click on "Home" to return to the Tension Controller Home page.
Step 13. C2 calibration is complete.

Traditional Calibration From the Web Page

Step 1. On the Tension Controller Home Page Click on Configuration. (See Fig. 5-36) The Configuration page appears. (See Fig. 5-37)

FIG. 5-36 CONFIGURATION MENU/SELECTING SETUP

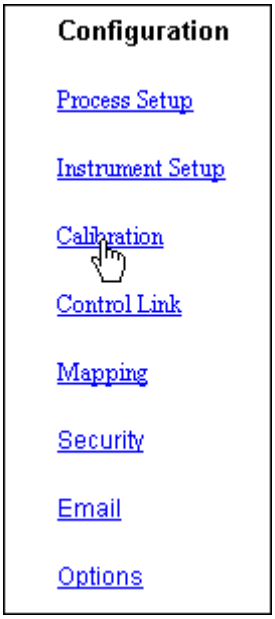


FIG. 5-37 CONFIGURATION PAGE/SELECTING CALIBRATION

Step 2. Click on Calibration. The Calibration Sub-menu appears. (See Figs. 5-38 & 39)

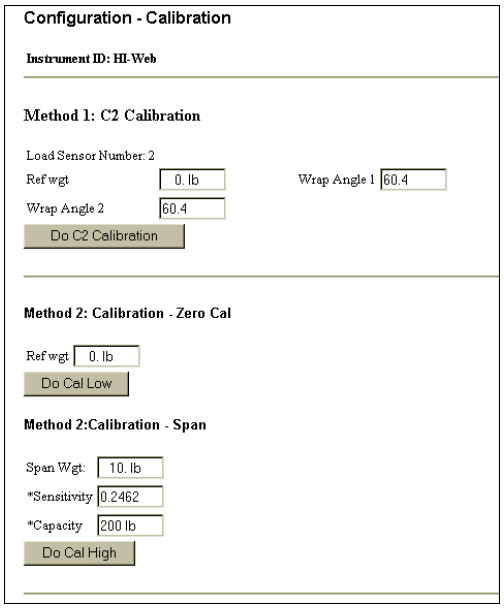


FIG. 5-38 CALIBRATION SUB-MENU

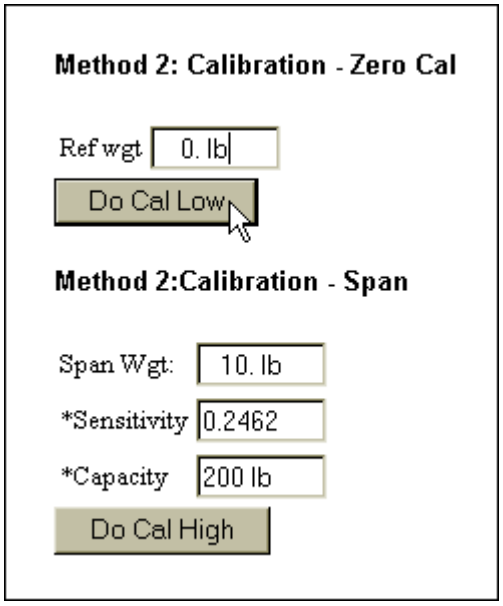


FIG. 5-39 METHOD 2: CALIBRATION - ZERO CAL

Step 3. If the Method 2: Calibration - Zero Cal reference weight is any value other than 0.0 go to Step 4 otherwise go to Step 10.

Step 4. To clear the entry, press the left mouse button and hold while moving the cursor over the current Reference Weight which highlights the weight value.

Step 5. Use your keyboard to type in 0.00 (See Fig. 5-39)

Step 6. Click on the Do Cal Low button.

Step 7. A page telling you that the Cal Completed OK appears. (See Fig. 5-40)

FIG. 5-40 CAL LOW COMPLETED OK

Step 8. Click on "Back" to return to the Calibration page.

Step 9. Place a certified test weight on the rope or cord, this is your span weight.

Step 10. To enter the Span Weight double click in the Span Weight field. (See Fig. 5-39)

Step 11. Use your keyboard to type in the new Span Weight value. In our example we entered 10.00 lbs. (See Fig. 5-39)

Step 12. Click in the Sensitivity text field. Use your keyboard and enter the rated sensitivity of the Load Sensor.

Step 13. Click in the Capacity text field. (See Fig. 5-39) Type in the combined Maximum capacity of the load cells on your system.

Step 14. Click on the Do Cal High button.

Step 15. A page telling you that the Do Cal High Calibration completed OK. (See Fig. 5-41)

FIG. 5-41 CAL COMPLETED OK

Step 16. Click on "Home" to return to the Tension Controller Home page.

Step 17. Traditional calibration is complete.

Soft Calibration from the Web Page

Step 1. From the Home Page Click on Configuration. (See Fig. 5-42) The Configuration Page appears. (See Fig. 5-43)

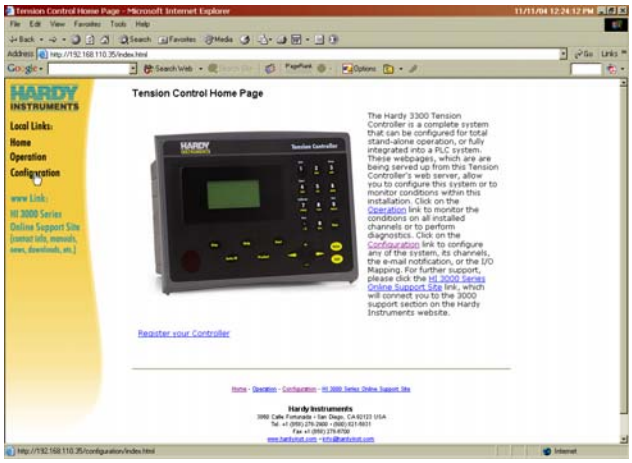


FIG. 5-42 HOME PAGE/SELECTING CONFIGURATION

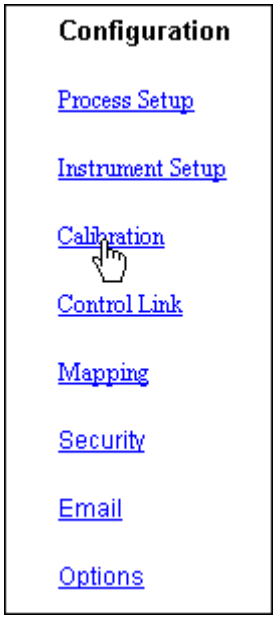


FIG. 5-43 CONFIGURATION MENU/SELECTING CALIBRATION

Step 2. Click on Calibration. The Calibration page appears. Scroll down to Method 3: Calibration - Soft Cal (See Fig. 44)

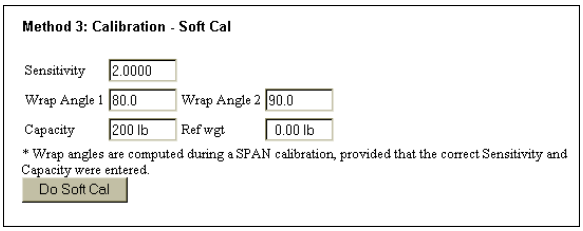


FIG. 5-44 CALIBRATION PAGE/SOFT CALIBRATION

Step 3. Click in the Sensitivity text field.
Step 4. Enter the sensitivity of the load sensors you are using for this application.
Step 5. Click in the Wrap Angle 1 text field.
Step 6. Enter Wrap Angle 1.
Step 7. Click in the Wrap Angle 2 text field.
Step 8. Enter Wrap Angle 2.
Step 9. Click in the Capacity text field.
Step 10. Enter the Total Load Cell capacity.
Step 11. Click in the Ref Wgt text field.
Step 12. Enter the Reference Weight, 0.00.
Step 13. Click on the Do Soft Cal.
Step 14. If the Soft Calibration was successful, a message page appears with “Cal completed OK”. (See Fig. 5-45)
Step 15. Soft Calibration Complete.

FIG. 5-45 SOFT CAL SUCCESSFUL

CAUTION: BINDING ON A ROLL OR LOAD SENSOR DOES NOT ALLOW THE LOAD SENSOR FREE MOVEMENT AND MAY PREVENT THE INSTRUMENT FROM RETURNING TO THE ORIGINAL ZERO REFERENCE POINT.

Step 16. Check to see that the load cell is mounted so that 100% of the load vertically passes through the load cell. (See Fig. 5-46)

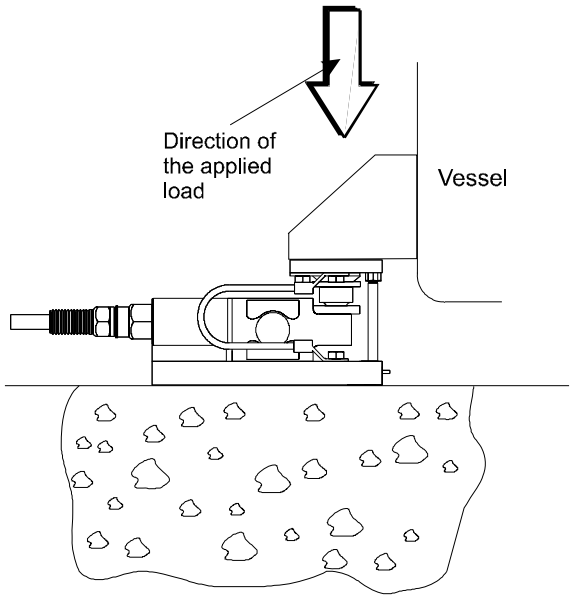


FIG. 5-46 PROPERLY INSTALLED LOAD CELL WITH NO BINDING

Electrical Check Procedures

Step 1. Check to see that there is power to the controller.

a. If there is power to the controller The front panel display should be lit.
b. If the display appears with a value the unit is ready for calibration.

Step 2. Check to see that all communication and power cables are securely fastened to the connectors on the rear panel.

CHAPTER 6: MAPPING

About Mapping

Mapping is a simple process where you connect input (called a “Source”) to an output (called a “Destination”). In addition you can map any of the parameters to the outputs and Inputs. The benefit of Mapping is that it requires no programming whatsoever. Simply select a Destination and a Source and your in business.

Mapping to a Network Output Table

In English we might say: “Connect High Tension Alarm to (Control Link Float Out)”.

- Control Link Float Out is the Destination.
- High Tension Alarm is the Source

In Assignment Statement form this mapping would look like this:

- Destination = Source or
- Control Link Float Out = High Tension Alarm

From the Web Browser lets go through the process:

Step 1. From the Tension Control Home Page click on Configuration. (See Fig. 6-1) The Configuration Page appears. (See Fig. 6-2)

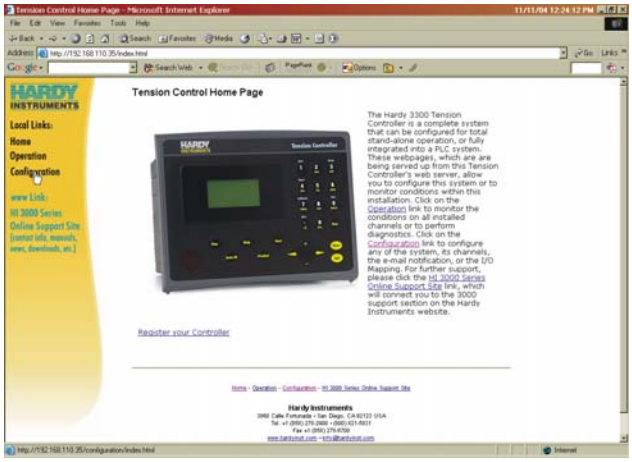


FIG. 6-1 HOME PAGE/SELECTING CONFIGURATION

Step 2. Click on Mapping. (See Fig. 6-2) The Configuration Mapping Page appears. All the pull down menus include all the Destinations and Sources for the HI 3300. (See Fig. 6-3)

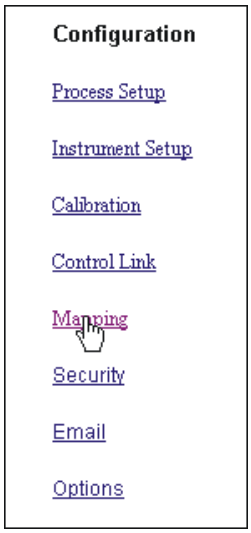


FIG. 6-2 CONFIGURATION PAGE/SELECTING MAPPING SETUP

Selecting a Destination

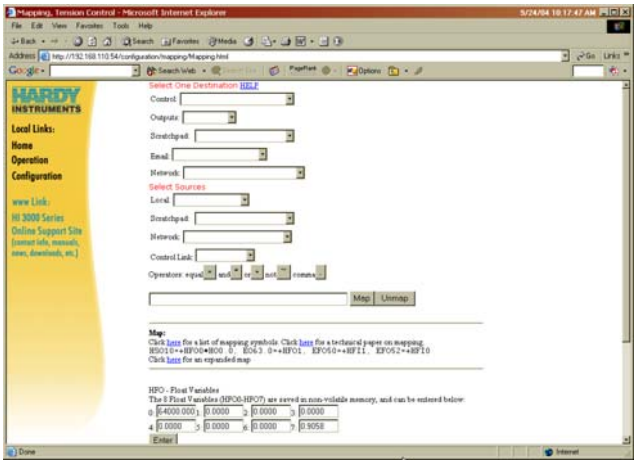


FIG. 6-3 MAPPING PAGE

Step 3. Under Destination, click on the Network Pull Down Menu. (See Fig. 6-4)

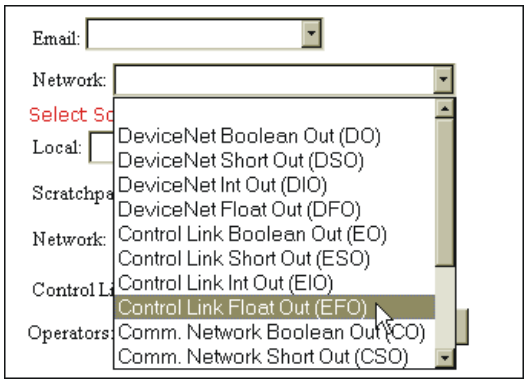


FIG. 6-4 SELECTING DESTINATION/NETWORK/ CONTROL LINK FLOAT OUT (EFO)

Step 4. Click on “Control Link Float Out (EFO)”. Control Link Float Out (EFO) appears in the text field and a Word selection appears. (See Fig. 6-5)

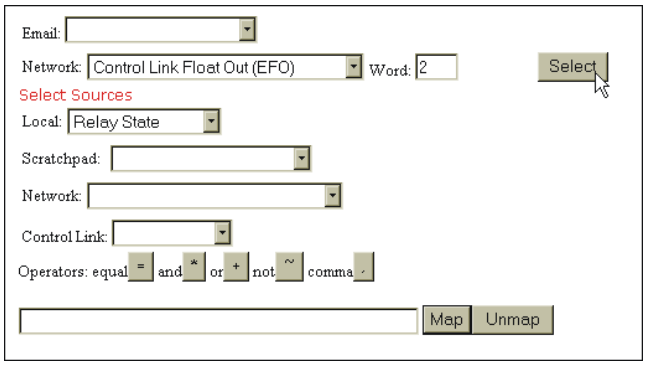


FIG. 6-5 DESTINATION/SELECTING CONTROL LINK FLOAT OUT (EFO) WORD 2

Step 5. Click in the Word text field and type in the word you want. We selected Word 2.
Step 6. Click on the Select button. The Destination is entered in the Map field. (See Fig. 6-6)

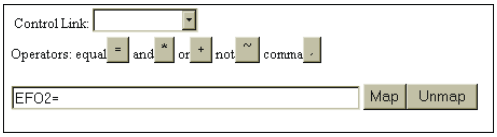


FIG. 6-6 “EFO2=” IS ENTERED IN THE MAP TEX-TILES

Selecting a Source

Step 7. Under Source, click on the Local Pull Down Menu.

Step 8. Click on Status. (See Fig. 6-7) Status appears in the Local Pull Down Menu with an additional pull down menu to the right and a Select button.

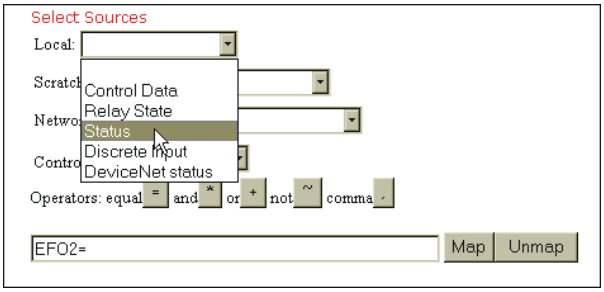


FIG. 6-7 SELECT SOURCES/SELECTING STATUS

Step 9. Click on pull down menu.
Step 10. Click on High Tension Alarm (HI1.3) (See Fig. 6-8)

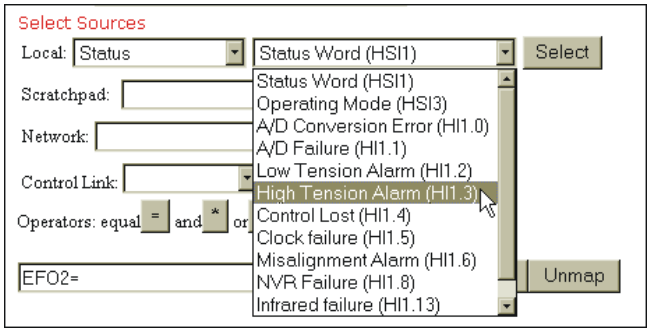


FIG. 6-8 STATUS SOURCE PULL DOWN MENU/ SELECTING HIGH TENSION ALARM (HI1.3)

Step 11. High Tension Alarm appears in the pull down menu. (See Fig. 6-9)

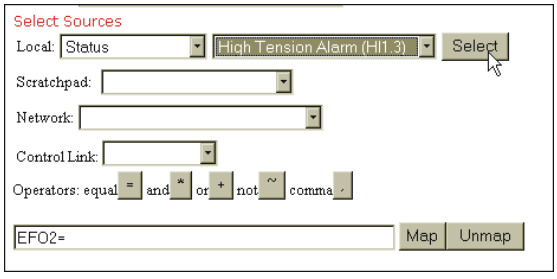


FIG. 6-9 SELECT SOURCES/SELECTING HIGH TENSION ALARM (HI1.3)

Step 12. Click on the Select button. The source appears to the right of the equal (=) sign. (See Fig. 6-10)

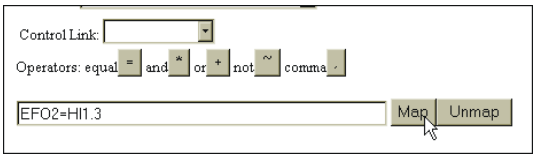


FIG. 6-10 MAPPING HIGH TENSION ALARM TO CONTROL LINK FLOAT OUT

Step 13. Click on the Map button. The new map appears in the list of mappings. (See Fig. 6-11)

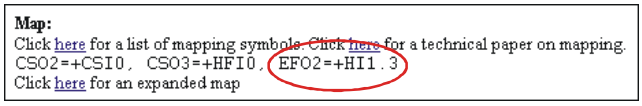


FIG. 6-11 HIGH TENSION ALARM IS MAPPED TO CONTROL LINK FLOAT OUT

Step 14. To see the expanded map click on the blue underlined here. The Map dialog box appears with the mappings extended. (See Fig. 6-12)

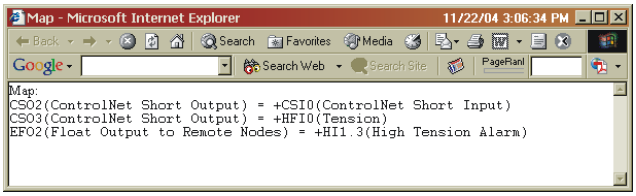


FIG. 6-12 EXTENDED MAP DISPLAY

Step 15. Now let's take a moment to take a look at the Mapping page.

Destinations:

- Control: Include the following:

1. Start/Stop (HO4.0)
2. Splice/Splice Stop (HO4.1)
3. Hold/Hold Stop (HO4.2)
4. Start (HO4.3)
5. Stop (HO4.4)
6. Setpoint 1 (HFO9)
7. Setpoint 2 (HFO10)
8. Setpoint 3 (HFO11)
9. PID P (HFO12)
10. PID I (HFO13)
11. PID D (HFO14)
12. Start Level (HFO15)
13. Stop Level (HFO16)
14. Splice Level (HFO17)
15. Start Time (HFO18)
16. Stop time (HFO19)
17. Taper Adjustment (HFO20)
18. Command Interface (CMD0)

- Outputs: Include the following:

19. Relays

    a. All Relays (HSO0)
    b. Relay 1 (HO0.0)
    c. Relay 2 (HO0.1)
    d. Relay 3 (HO0.2)
    e. Relay 4 (HO0.3)

1. Analog Out

    a. Analog Out Slot 0 Chan 0 (HSO5)
    b. Analog Out Slot 0 Chan 1 (HSO6)

- Scratchpad which are empty registers you can do whatever you want with. Scratchpad includes the following:

1. Float Variable 0 (HFO0)
2. Float Variable 1 (HFO1)
3. Float Variable 2 (HFO2)
4. Float Variable 3 (HFO3)
5. Float Variable 4 (HFO4)
6. Float Variable 5 (HFO5)
7. Float Variable 6 (HFO6)
8. Float Variable 7 (HFO7)

- E-Mail includes E-Mail Outputs such as:

1. Send email #0 (HO3.0)
2. Send email #1 (HO3.1)
3. Send email #2 (HO3.2)
4. Send email #3 (HO3.3)
5. Send email #4 (HO3.4)
6. Send email #5 (HO3.5)
7. Send email #6 (HO3.6)
8. Send email #7 (HO3.7)
9. Send email #8 (HO3.8)
10. Send email #9 (HO3.9)

- Network: Includes the following:

1. DeviceNet Boolean Out (DO)
2. DeviceNet Short Out (DSO)
3. DeviceNet Int Out (DIO)
4. DeviceNet Float Out (DFO)
5. Control Link Boolean Out (EO)
6. Control Link Short Out (ESO)
7. Control Link Int Out (EIO)
8. Control Link Float Out (EFO)
9. Comm. Network Boolean Out (CO)

10. Comm. Network Short Out (CSO)
11. Comm. Network Int Out (CIO)
12. Comm. Network Float Out (CFO)
13. Modbus Boolean Out (MO)
14. Modbus Short Out (MSO)
15. Modbus Int Out (MIO)
16. Modbus Float Out (MFO)

NOTE: Communication (Comm.) is used when a ControlNet or Profibus Option Card is installed.

Sources:

- Local Inputs include the following:

1. Control Data

    a. Tension (HFI0)
    b. Output% (HFI1)

2. Relay State

    a. All Relays (HSO0)
    b. Relay 1 (HO0.0)
    c. Relay 2 (HO0.1)
    d. Relay 3 (HO0.2)
    e. Relay 4 (HO0.3)

3. Status

    a. Status Word (HSI1)
    b. Operating Mode (HSI3)
    c. A/D Conversion Error (HI1.0)
    d. A/D Failure (HI1.1)
    e. Low Tension Alarm (HI1.2)
    f. High Tension Alarm (HI1.3)
    g. Control Loss (HI1.4)
    h. Clock Failure (HI1.5)
    i. Misalignment Alarm (HI1.6)
    j. NVR Failure (HI1.8)
    k. Infrared Failure (HI1.9)
    l. Status=Started (HI2.0)

4. Discrete Inputs

    a. Discrete Input (HSI0)
    b. Discrete Input 0 (HSI0.0)
    c. Discrete Input 1 (HSI0.1)
    d. Discrete Input 2 (HSI0.2)
    e. Discrete Input 3 (HSI0.3)
    f. Discrete Input 4 (HSI0.4)

5. DeviceNet Status

    a. DeviceNet status, node 0-15 (HSI40)
    b. DeviceNet status, nodes 16-31 (HSI41)
    c. DeviceNet status, nodes 32-47 (HSI42)
    d. DeviceNet status, nodes 48-63 (HSI43)

- Scratchpad which are empty registers you can do whatever you want with. Scratchpad includes the following:

1. Float Variable 0 (HFO0)
2. Float Variable 1 (HFO1)
3. Float Variable 2 (HFO2)
4. Float Variable 3 (HFO3)
5. Float Variable 4 (HFO4)
6. Float Variable 5 (HFO5)
7. Float Variable 6 (HFO6)
8. Float Variable 7 (HFO7)

- Networks include the following:

1. DeviceNet Boolean In (DI)
2. DeviceNet Short In (DSI)
3. DeviceNet Int In (DII)
4. DeviceNet Float In (DFI)
5. Comm. Network Boolean In (CI)
6. Comm. Network Short In (CSI)
7. Comm. Network Int In (CII)
8. Comm. Network Float In (CFI)
9. Modbus Boolean In (MI)
10. Modbus Short In (MSI)
11. Modbus Int In (MII)
12. Modbus Float In (MFI)

- Control Link enables you to select the Node Address and the type of value and word number and includes the following:

1. Node 0 (0)
2. Node 1 (1)
3. Node 2 (2)
4. Node 3 (3)
5. Node 4 (4)
6. Node 5 (5)
7. Node 6 (6)
8. Node 7 (7)
9. Node 8 (8)
10. Node 9 (9)
11. Node 10 (U)
12. Node 11 (V)
13. Node 12 (W)
14. Node 13 (X)
15. Node 14 (Y)
16. Node 15 (Z)

NOTE: For a complete description of nodes please go to the HI 3000 Manual, Installation Section, ControlNet and Profibus Installation, subchapters.

Example #2 Mapping an Alarm

Commonly an alarm is mapped (assigned) to an e-Mail Output. Lets say we want to map a source such as the Low Tension Alarm to an e-Mail destination. Our Assignment Statement is:

- Destination = Source
- Sending e-mail #0 = Low Tension Alarm (HI1.2)

NOTE: To set up E-mail go to the HI 3000 Manual, E-Mail Chapter.

Step 1. On the Mapping Setup Page click on the Email pull down menu. (See Fig. 6-13)

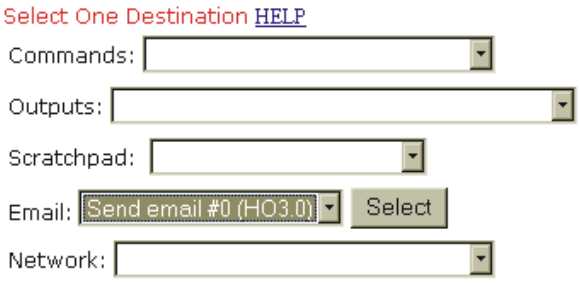


FIG. 6-13 DESTINATION/SEND EMAIL #0 (HO3.0)

Step 2. Click on Send email #0 (HO3.0). A Select button appears. (See Fig. 6-13)
Step 3. Click on the Select button. (See Fig. 6-13) The Send email #0 appears in the mapping text box. (See Fig. 6-14)

FIG. 6-14 SEND EMAIL #0 (HO3.0) SELECTED AS A DESTINATION

Step 4. Click on the Local pull down menu.
Step 5. Click on Status.
Step 6. Scroll down until you see Low Tension Alarm.
Step 7. Click on Low Tension Alarm. A Select button appears to the right. (See Fig. 6-15)

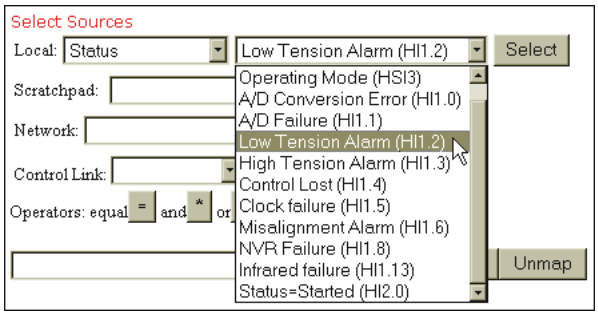


FIG. 6-15 SELECTING LOW TENSION ALARM ALARM

Step 8. Click on the Select button. The Low Tension Alarm Source (HI1.2) appears on the right side of the equals sign. (See Fig. 6-16)

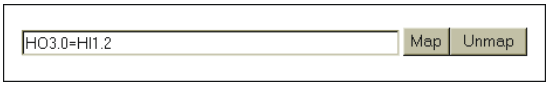


FIG. 6-16 MAPPING/SELECTING LOW TENSION ALARM AS THE SOURCE

Step 9. Click on the Map button.
Step 10. The Mapping Assignment Statement is complete. (See Fig. 6-17) Send email #0(HO3.0) = Low Tension Alarm (HI1.2) (See Fig. 6-17)

FIG. 6-17 LOW TENSION ALARM (HI1.2) IS MAPPED TO SEND EMAIL #0 (HO3.0)

Another Mapping Example

Step 1. Map Tension (HFI0) to DeviceNet Float Out (DFO)
Step 2. Under Destination, click on the Network pull down menu.
Step 3. Click on DeviceNet Float Out.
Step 4. Network DeviceNet Float Out appears with Word selection to the right.
Step 5. Accept the default word “0”.
Step 6. Click on Select. The Destination appears in the Mapping text field.
Step 7. Under Sources, click on the Local pull down menu.
Step 8. Click on Control Data. A pull down menu appears to the right with Tension (HFI0) in the field.
Step 9. Click on the Select button to select the Tension source.
Step 10. In the Map field you will see DFO0=HFI0.
Step 11. Click on the Map button.

Step 12. You have now mapped the Tension value located in the input table to the DeviceNet Float out located in the output table. The Tension value is now available for the DeviceNet scanner when it polls the output table of the HI 3300. The Tension reading can be sent to a PLC or other Master device in your DeviceNet Network.

Mapping Multiple Sources

Now that you know how to map (assign) a single source to a destination we can move onto multiple sources mapping. Lets say you want the High Tension Alarm and Low Tension Alarm mapped to a single relay output. We want to select relay output 2 in this case.

Our Assignment Statement looks like this:

Destination = Source 1 + Source 2

Relay 2 = High Tension Alarm + Low Tension Alarm

In this Assignment Statement we use a boolean operator. "+" which in boolean Assignment Statements means "or". This means that one or the other alarms will activate output relay 2 depending on the tension reading.

Here's the process:

Step 1. From the Mapping Page/Destination click on the Outputs pull down menu and select Relays. (See Fig. 6-18)

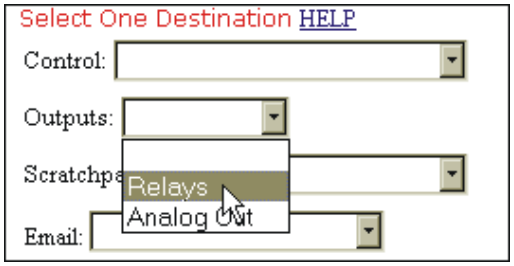


FIG. 6-18 OUTPUTS/SELECTING RELAYS

Step 2. Relays appears in the Output Menu with the Output Relays pull down menu to the right. (See Fig. 6-19)

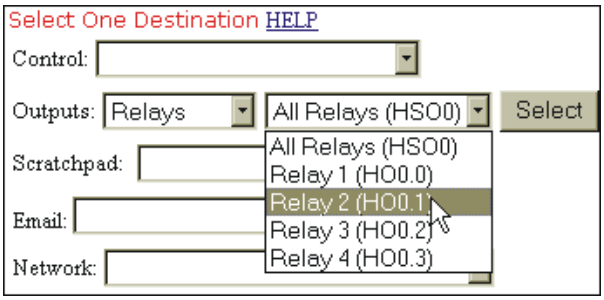


FIG. 6-19 OUTPUT RELAYS/SELECTING RELAY 2 (HO0.1)

Step 3. Click on Relay 2 (HO0.1).
Step 4. Click on the Select button. Relay 2 (HO0.1) appears in the Map field. (See Fig. 6-20)

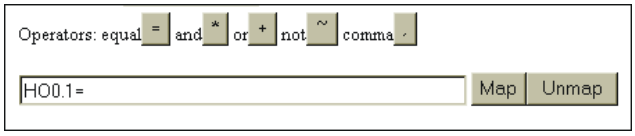


FIG. 6-20 OUTPUT RELAY 2 (HO0.1) APPEARS IN THE MAP FIELD

Step 5. Under Select Sources, Click on the Local pull down menu and select Status. (See Fig. 6-21) A Status pull down menu appears to the right of the Status.

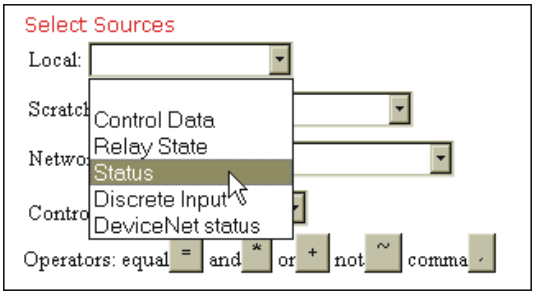


FIG. 6-21 SELECT SOURCES/LOCAL/SELECTING STATUS

Step 6. Click on the Status Pull Down menu.
Step 7. Click on High Tension Alarm (HI1.3). (See Fig. 6-22)

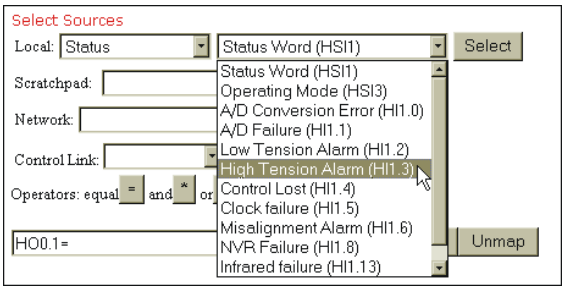


FIG. 6-22 SELECT SOURCES/LOCAL/SELECTING HIGH TENSION ALARM (HI1.3)

Step 8. Click on the Select button. “HI1.3” appears to the right of the equals (=) sign. (See Fig. 6-23)

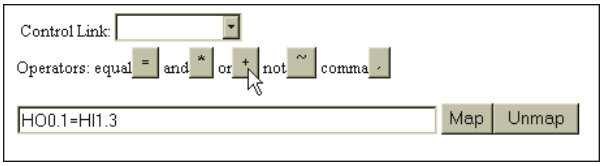


FIG. 6-23 HIGH TENSION ALARM (HI1.3) SOURCE ADDED

Step 9. To add another Source to the Assignment Statement and make it a Boolean “or” Statement, click on the “or” button above the Assignment Statement. (See Fig. 6-24) A “+” plus sign appears to the right of the High Tension Alarm (HI1.3). (See Fig. 6-25)

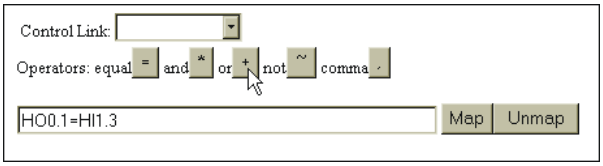


FIG. 6-24 HIGH TENSION ALARM (HI1.3) ADDED TO THE MAP FIELD

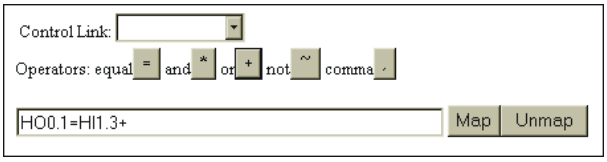


FIG. 6-25 SETPOINTS/EXPANSION CHANNEL ALERT ALARMS

Step 10. Click on the Local pull down menu. (See Fig. 6-22)
Step 11. Click on Status.
Step 12. Click on the Status Pull Down menu.
Step 13. Click on Low Tension Alarm.

Step 14. Click on the Select button to the right of the Local fields to add the “Low Tension Alarm (HI1.2)” to the Assignment Statement. (See Fig. 6-20)

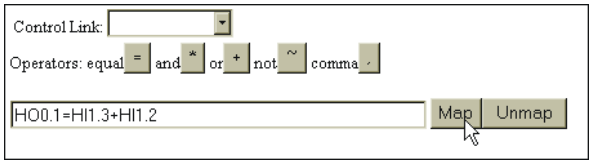


FIG. 6-26 LOW TENSION ALARM (HI1.2) ADDED AS THE SECOND SOURCE TO THE ASSIGNMENT STATEMENT

Step 15. Click on the Map button to save the mapping. The multiple source map appears in the Current Mappings listing. (See Fig. 6-21)

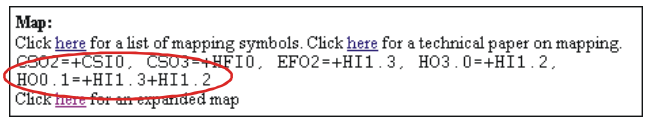


FIG. 6-27 MULTIPLE SOURCE MAP

Step 16. You have now mapped multiple sources to a single destination.

Simple Network Mapping

Mapping to a Network Output

If you want to send data to a PLC from the HI 3300 you need to map the data to a network output. Here is the process:

Step 1. From the Mapping Page, Destination Section, click on the Network pull down menu and select DeviceNet Boolean Out. (See Fig. 6-28)

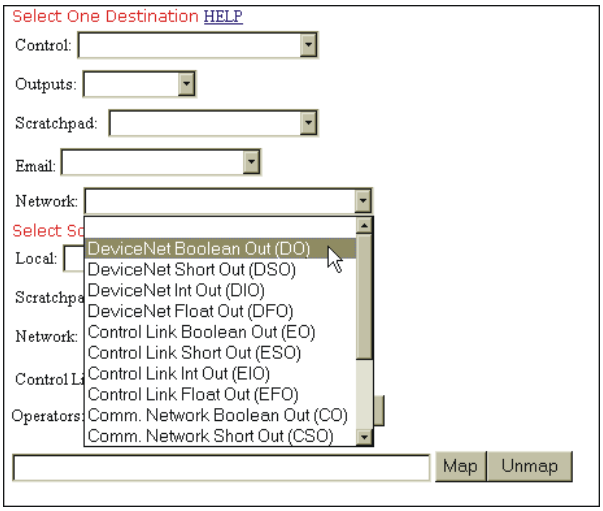


FIG. 6-28 DESTINATION/NETWORK/SELECTING DEVICENET BOOLEAN OUT

FIG. 6-29 NETWORK/SELECTING DEVICENET BOOLEAN OUT (DO), WORD 2, BIT 2

Step 2. Double click in the Word text box and type in the number 2.
Step 3. Double click in the Bit text box and type in the number 2.
Step 4. Click on the Select button to set the Destination. The "DeviceNet Boolean Out" address appears on the left side of the Assignment Statement. (See Fig. 6-30)

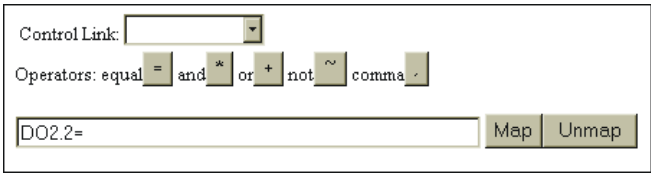


FIG. 6-30 DEVICENET BOOLEAN OUT (DO2.2) SET AS DESTINATION

*NOTE: The DeviceNet Boolean Out address DO2.2 means the following. DO = **D**eviceNet **O**ut. 2.2 =* Word 2, Bit 2.

Step 5. In the Select Source Section of the Mapping Page click on the Local Pull Down Menu.
Step 6. Click on Control Data. A second pull down menu appears. (See Fig. 6-31)

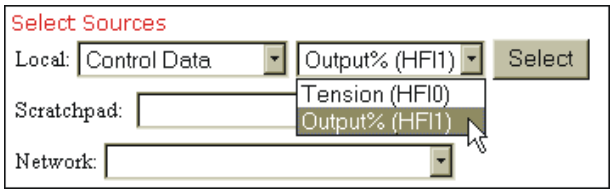


FIG. 6-31 SOURCE/CONTROL DATA/OUTPUT% (HFI1)

Step 7. Click on the pull down menu and click on Output% (HFI1).
Step 8. Click on the Select button to enter Output% as the source of the Assignment Statement.
Step 9. The Output% (HFI1) appears on the right side of the Assignment Statement. (See Fig. 6-32)

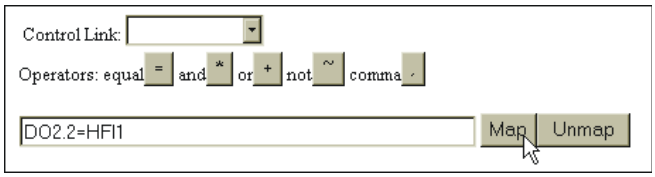


FIG. 6-32 ASSIGNMENT STATEMENT MAPPING OUTPUT% TO DEVICENET BOOLEAN OUT, WORD 2, BIT 2 (DO2.2)

Step 10. Click on the Map button.
Step 11. Output% is now available to the PLC via the DeviceNet Scanner. (See Fig. 6-33)

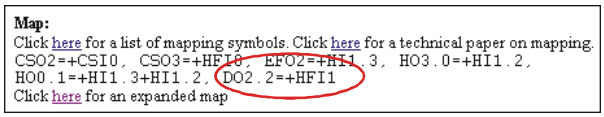


FIG. 6-33 SIMPLE NETWORK MAP/OUTPUT% MAPPED TO DEVICENET BOOLEAN OUT (DO2.2)

Mapping a Network Input to a Local Output

If you want a Controller to send instructions to an HI 3300 you will have to map the local Output to a network input. Here is the process:

NOTE: Keep in mind that the network input on the HI 3300 will now be the source for the PLC output. This enables the Controller to send instructions to the network input table of the HI 3300 and in turn to the HI 3300 output table.

Step 1. From the Mapping Page, click on the Network pull down menu and select Analog Out, Slot 1, Chan 0 (See Fig. 6-27)

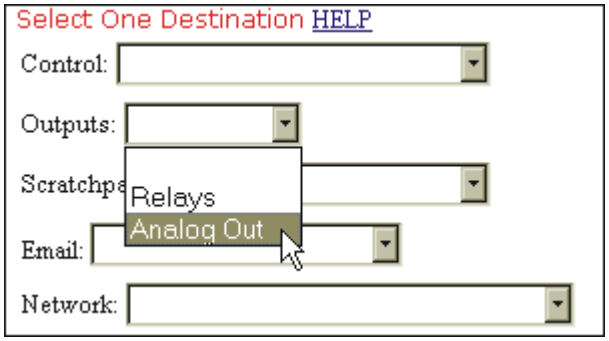


FIG. 6-34 OUTPUTS/ANALOG OUT

Step 2. Click on the Analog Out Slot 0 Chan 0 (HSO5). (See Fig. 6-35)

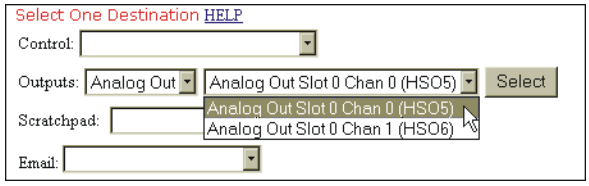


FIG. 6-35 DESTINATION SELECTING ANALOG OUT SLOT 0, CHAN 0

Step 3. Click on the Select button to select Analog Out as the Destination for the left side of the Assignment Statement. (See Fig. 6-36)

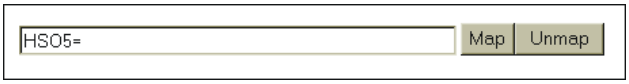


FIG. 6-36 ANALOG OUT (HSO5) SLOT 0, CHAN 0 SET AS DESTINATION

Step 4. Under Select Sources, Click on the Network: pull down menu. (See Fig. 6-37)

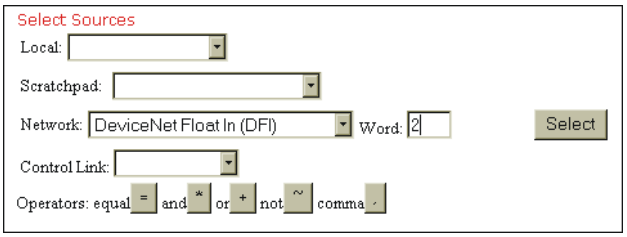


FIG. 6-37 NETWORK/SELECTING DEVICENET FLOAT IN (DFI)

Step 5. Click on “DeviceNet Float In (DFI)” to select it as the Source for the Assignment Statement. (See Fig. 6-37)

Step 6. Click in the Word text box and type in the number “2”.

Step 7. Click on the Select button to enter the source.

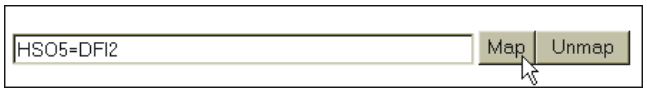


FIG. 6-38 ASSIGNMENT STATEMENT MAPPING DEVICENET FLOAT IN (DFI) TO ANALOG OUT SLOT 1, CHAN 0 (HSO9)

Step 8. Now whatever is sent to Devicenet Float In (DFI2) from the Network Controller will be sent to Analog Out Channel 0 (HSO5).

FIG. 6-39 DEVICENET FLOAT IN ASSIGNED TO ANALOG OUT SLOT 0, CHAN 0

A Definition of Mapping

Mapping (Addressing I/O) is the same as using an Assignment Statement. The Destination is located on the left hand side of the equals (=) sign and is a memory address (variable). The Source is the data located on the right hand side of the equals (=) sign at a memory address. So when you refer to the right hand side of the Assignment Statement you are referring to the data only and not the address even though the address is listed.

- Memory Address (Variable) = Data (Values, states)

The equals (=) sign assigns the data stored at the Memory Address on the right side of the Assignment Statement to the

Memory Address on the left side of the Assignment Statement.

This is exactly what you are doing when you map a source to a destination.

The things that can be mapped are organized into Input Image Tables and Output Image Tables, which are arrays of variables (i.e. memory locations of a certain size based on the type assigned to the variable) with addresses where data is stored.

A table is called an “output” image table if the items in the table are permitted to be on the left hand side of an Assignment Statement. The Output variables are also further identified by the first two letters of the variable:

- HO - Hardy Output Image Table
- DO - DeviceNet Output Image Table
- CO - ControlNet Output Image Table or Profibus Output Image Table.

NOTE: You won’t use ControlNet and Profibus at the same time so they can both use the same tables.

If the items in the table are only permitted on the right hand side of an Assignment Statement, we call it an “input” image table:

- HI - Hardy Input Image Table
- DI - DeviceNet Input Image Table
- CI - ControlNet Input Image Table or Profibus Output Image Table.

For example, the digital inputs on the Tension Controller are found in an input image table, as are the items in the DeviceNet input image table.

The HI 3300 scans through the I/O image tables 55 times a second and reads any values that are contained in the tables. If there is nothing stored in the tables the controller does nothing with it. If there are state values or other values stored in the tables, the firmware processes the data and outputs it to an output device or the screen.

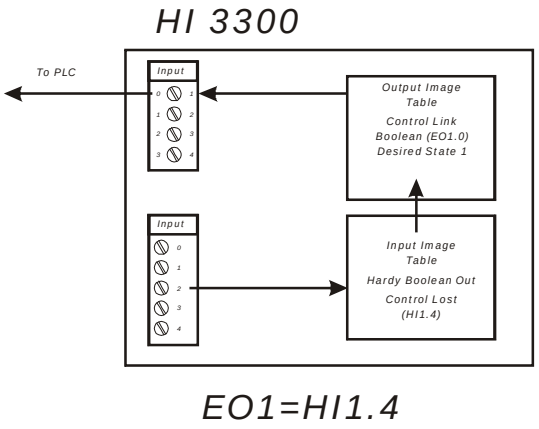


FIG. 6-40 MAPPING CONTROL LOST INPUT TO CONTROL LINK BOOLEAN OUTPUT

Boolean Mapping

A Boolean variable is a variable that can have the value 0 (FALSE) or 1 (TRUE). In the HI 3300 Tension Controller there are 3 boolean operations supported:

- AND - The symbol for “AND” in a Boolean Assignment Statement is “*”.
- OR - The symbol for “OR” in a Boolean Assignment Statement is “+”.
- NOT - the symbol for “NOT” in a Boolean Assignment Statement is “~”.

The Boolean image tables are arrays of short (2 byte) integers. An individual Boolean variable in the image table is located by its word offset and its bit offset. Boolean image tables are given 2 letter names as follows:

- DI is the DeviceNet input image table.
- DO is the DeviceNet output image table.
- HI is the Hardy input image table.
- HO is the Hardy output image table.
- RI is RIO input image table.
- RO is RIO output image table.

The RIO input and output images tables are mapped to physical external devices using RSLogix. DeviceNet and ControlNet input and output image tables are mapped to physical external devices using Rockwell Software’s RS NetWorx. The Hardy input and output image tables have pre-defined meanings for certain bits within the tables.

NOTE: Make sure you use RS NetWorx for DeviceNet and RS NetWorx for ControlNet. They are two different applications.

A Boolean variable is addressed with the syntax below:

[tablename][word offset].[bit offset]

Example:

DI0.3 is bit #3 in the DeviceNet input table, word #0.

Analog Mapping

An analog variable is one that can have many different values. The HI 3300 Tension Controller supports float, 16 bit integer, and 32 bit integer analog variable types.
There are three (3) analog operations supported. The symbols are the same as the Boolean operations, but with different meanings.

- Multiply - The symbol for “Multiply” is “*”.
- Add - The symbol for “Add” is “+”.
- Negate - the symbol for “Negate” is “~”.

Analog tables are given 3 letter names as follows:

DFI, DFO, DSI, DSO, DII, DIO all refer to DeviceNet tables, where the item is a float, a short integer, or a 32 bit integer depending on the first letter in the table name. HFI is a table of Hardy defined floating point numbers.

An analog variable is address with the syntax below:

[tablename][offset]

Example:

- DFO2=HFI0
- Explanation - DeviceNet Float Output Word 2 = Gross Weight

The offset is an offset in words in the case of the DeviceNet tables. The offsets in Hardy tables have various predefined meanings.

- HFI0 - is Gross Weight
- HFI1 - is Net Weight
- . . . . other offsets to be determined.

When an analog equation is evaluated, all terms get converted to float. The final result is then converted to the type of the LHS (Left Hand Side).

Mixed Mapping

It is permissible to have analog variables appear in Boolean equations and to have Boolean variables in analog equations. (We call a mixed equation “Boolean” if its LHS is a Boolean term, and “Analog” if its LHS is an analog term) The interpretation is the following:

A Boolean variable in an analog equation is converted to 1.0 or 0.0.
An Analog variable in a Boolean equation is TRUE if it is greater than zero (0) and FALSE if it is less than or equal to zero (0).

Example:

- DO1.0=HFI0
- Explanation - DeviceNet Output Word 1, Bit 0 = Tension

Special (Command) Mapping)

Command Interface consists of:

- 16 bit words
- Word 0 Command #
- Word 1 Parameter ID
- Words 2&3 Data.

The commands defined are the following:

WRITEINTEGER, command number 0x1000
The WRITEINTEGER command is used to set the value of integer valued parameters.
Command data:
2 bytes: PARAMETER NUMBER: the number (PARAMID) of the parameter to write.
4 bytes: PARAMETER VALUE: what to set the parameter to.

Data returned by the HI 3300: 8 bytes, echoing the WRITEINTEGER command.

WRITEFLOAT, command number 0x1001
The WRITEFLOAT command is used to set the value of float valued parameters.
Command data:
2 bytes: PARAMETER NUMBER: the number (PARAMID) of the parameter to write.
4 bytes: PARAMETER VALUE: what to set the parameter to.

Data returned by the HI 3300: 8 bytes, echoing the WRITEFLOAT command.

WRITESTRING, command number0x1002
The WRITESTRING command can be used to set the value of any parameter.
Command data:
2 bytes: PARAMETER NUMBER: the number (PARAMID) of the parameter to write.
Variable number of bytes: a zero terminated ASCII string, giving the value to set the parameter to.

Data returned by the HI 3300: 8 bytes, echoing the first 8 bytes of the WRITESTRING command.

READINTEGER 0x2000
READFLOAT 0x2001
These commands are used to read the value of integer or float parameters.
Command data:
2 bytes: PARAMETER NUMBER: the number (PARAMID) of the parameter to read.

Data returned by the HI 3300: 8 bytes. The first 4 bytes echo the command, and the next 4 contain the value of the parameter.

Setting up the command interface in mapping:
Use an equation of the form
CMD0 = (in_table)*(out_table)
In_table is an input table, defining where the command is written.
Out_table defines where the reply data is written.

Example:

CMD0*DOO0

This equation says the command will be written to the DeviceNet input table, at word offset 0, and the reply data is written to the DeviceNet output table, at word offset zero.

It is legal to omit the Out_table.

Example:

CMD0=DSI3

This equation says that the command will be written to the DeviceNet input table, at word offset 3, but no reply data will be written.

Command (CMD) Interface can be used for different tables, or multiple locations in one table. Example:

CMD0=DSI0*DSO0+RSI0*RSO0+RSI8*RSO8

Which says a command can show up in DeviceNet input table word 0; Return in DeviceNet Out Table Word 0 or RIO input table word 0; Return in RIO out table word 0 or RIO input table word 8; return RIO out table word 8.

Input and output do not need to start at the same word:

Example: **CMO0=DSI0*DSO4**

Command in DeviceNet input word 0; return DeviceNet out word 4

Command Interface

Parameter Numbers, Code Explanations, Valid Ranges and Default Settings

CAUTION: THESE VALUES AND EXPLANATIONS CAN CHANGE. ALWAYS CHECK ON THE HARDY WEB SITE FOR THE NEWEST COMMAND INTERFACE LIST BEFORE USING THE COMMAND INTERFACE.

*NOTE: The default parameter values are marked by **DEF** and bold type.*

Getting the Parameter Information on the Web Browser

Step 1. From the Tension Controller Home Page, click on Operation. (See Fig. 6-41) The Operation Page appears. (See Fig. 6-42)

FIG. 6-41 TENSION CONTROLLER HOME PAGE/ SELECTING OPERATION

Step 2. Click on Diagnostics. (See Fig. 6-42) The Diagnostics Page appears. (See Fig. 6-43)

FIG. 6-42 OPERATION PAGE/SELECTION DIAGNOSTICS

Step 3. Click on Parameters. (See Fig. 6-43) A complete list of the Parameters with settings appears. (See Fig. 6-44)

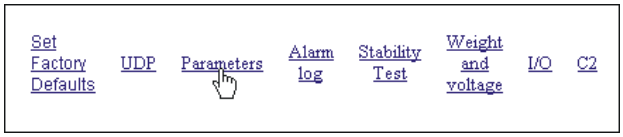


FIG. 6-43 DIAGNOSTICS PAGE/SELECTING PARAMETERS

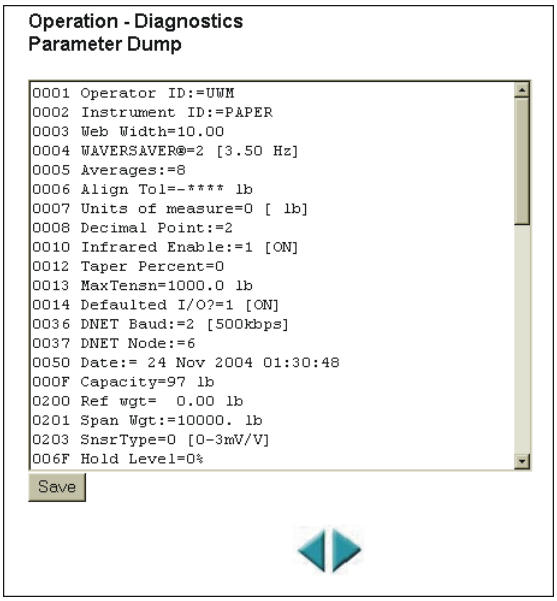


FIG. 6-44 PARAMETER DUMP

Mapping a Hardy Control-Link Network to a ControlNet/DeviceNet/Profibus Network

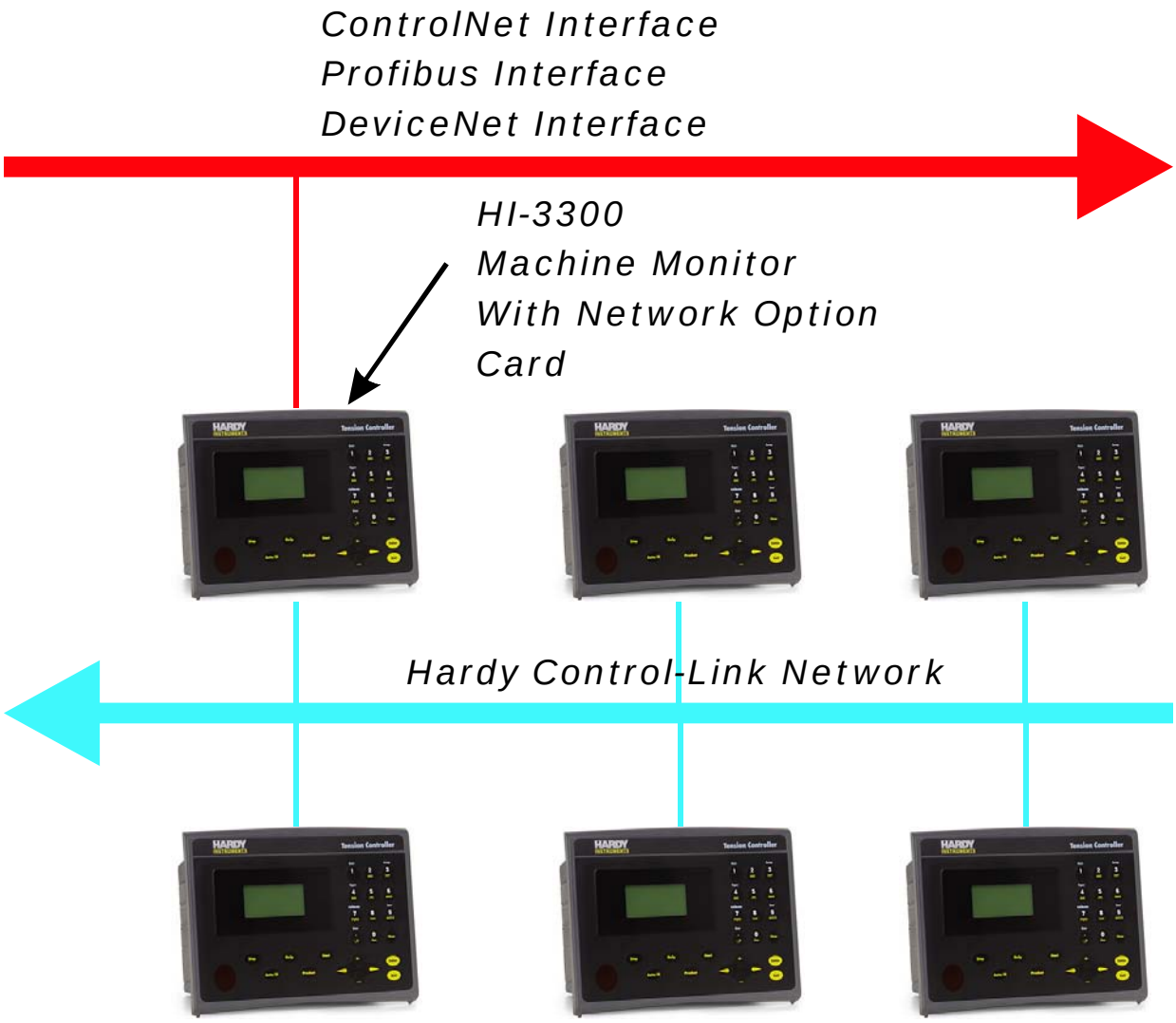


FIG. 6-45 HARDY CONTROL-LINK NETWORK CONNECTED TO A CONTROLNET/DEVICENET/PROFIBUS NETWORK

The Hardy HI 3300 Tension Controllers are designed to save you money. To connect a Hardy Control-Link Network to a ControlNet/DeviceNet/Profibus Network simply purchase one of the Hardy HI 3300 Series Network Interface Option Cards and install it in the instrument that you want to directly connect to the other network. You can map to this instrument from all the other instruments on the Hardy Control-Link Network, rather than buy a separate network card for each instrument. (See Fig. 6-36)

Step 1. Determine into which Instrument you want to install the Network option card.

Step 2. To install the network card. See the HI 3000 Installation and Operation manual, Cabling and Installation Section.

Step 3. Connect the network cables from the designated HI 3000 Series Instrument and begin mapping to that instrument from either the Hardy Control-Link Network or the ControlNet/DeviceNet/Profibus Network.

CHAPTER 7: TROUBLESHOOTING

About Chapter 7

Chapter 7 consists of all the procedures for troubleshooting the electrical, mechanical and firmware elements of the HI 3300 Tension Controller in the event of a malfunction. Included in Chapter 7 is a comprehensive flow chart to provide a road map for troubleshooting an entire Tension Controller system, including load cells and cabling.

Disassembly and Reassembly Notes and Cautions

- Always disconnect the power cord before disassembling.

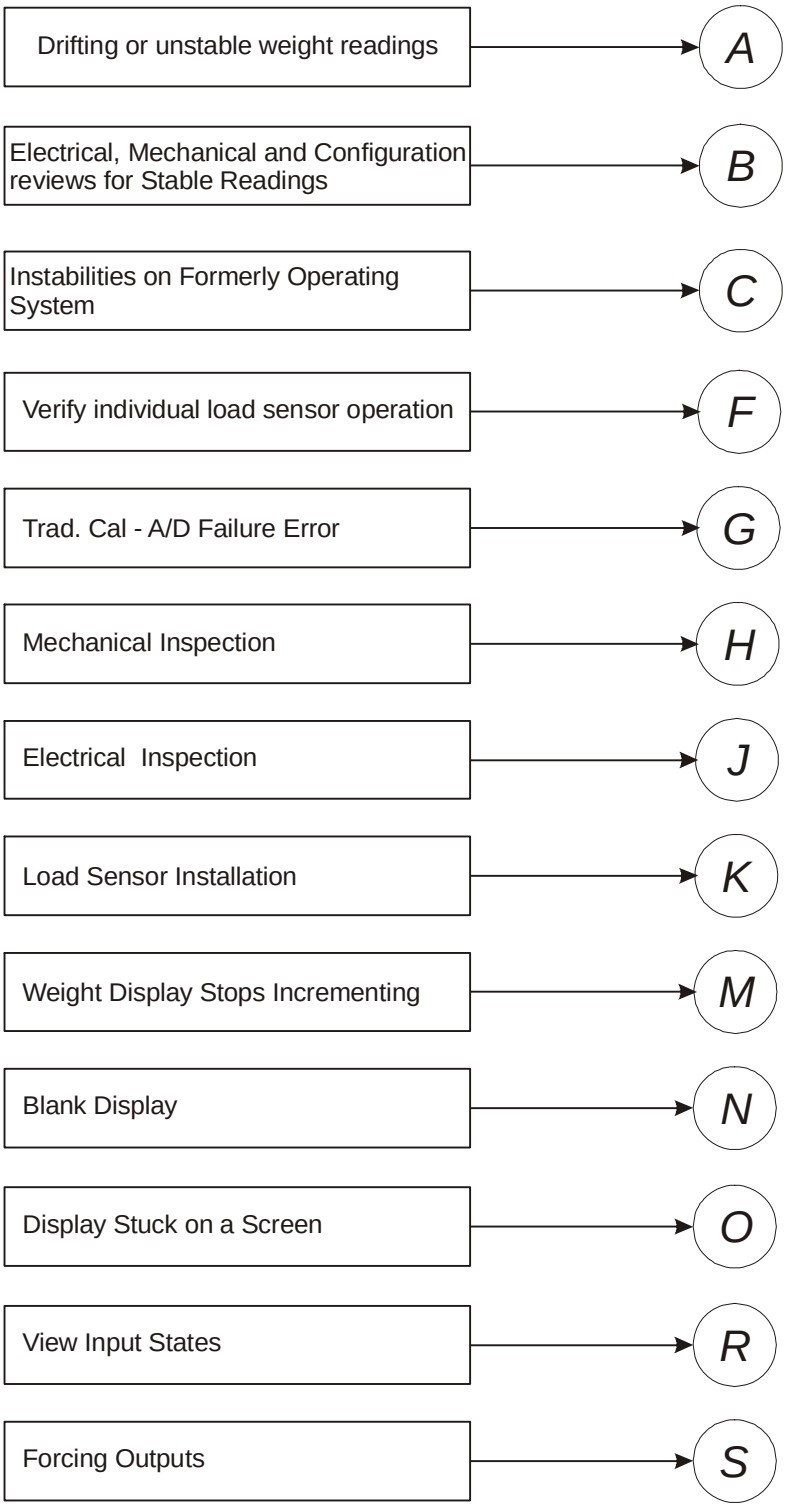
WARNING: FAILURE TO DISCONNECT THE POWER CORD BEFORE DISASSEMBLING MAY CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE.

- Any repairs should be made by an authorized trained technician.
- Make sure that any disassembly is done in a clean, well ventilated, properly controlled static environment.
- Always make sure that the assemblies and sub-assemblies are well supported and insulated when doing any repairs on the Tension Controller.
- Place small fasteners, connectors and electrical parts in closed containers so as not to lose parts during reassembly.
- Read all the disassembly instructions before any disassembly begins. Be sure that you are familiar with the procedures. If any of the instructions for disassembly are unclear, contact Hardy Instruments, Technical Support Department for additional information and assistance.
- Do not disconnect any electrical plug, connector or terminal unless an identification tag is present or one is attached. Always note where the connector or plug was attached to the electrical component or wiring harness.
- Always install complete hardware groups (Screws, Washers, Lock Washers, Spacers, Etc.) back to the original point of removal.
- Always replace broken or damaged modules or hardware immediately!
- Always check to be sure that no loose parts are sitting on printed circuit boards or electrical connectors or wires when disassembling or reassembling.
- Always protect printed circuit boards from electrostatic discharge (ESD). Always use approved ESD wrist straps and anti-static pads.
- Always perform a final inspection after completing any reassembly to be sure that all fasteners are tight, all connectors are secure and there are no loose parts on any of the printed circuit boards in the Tension Controller.
- Always follow proper safety procedures when working on or around the Tension Controller.

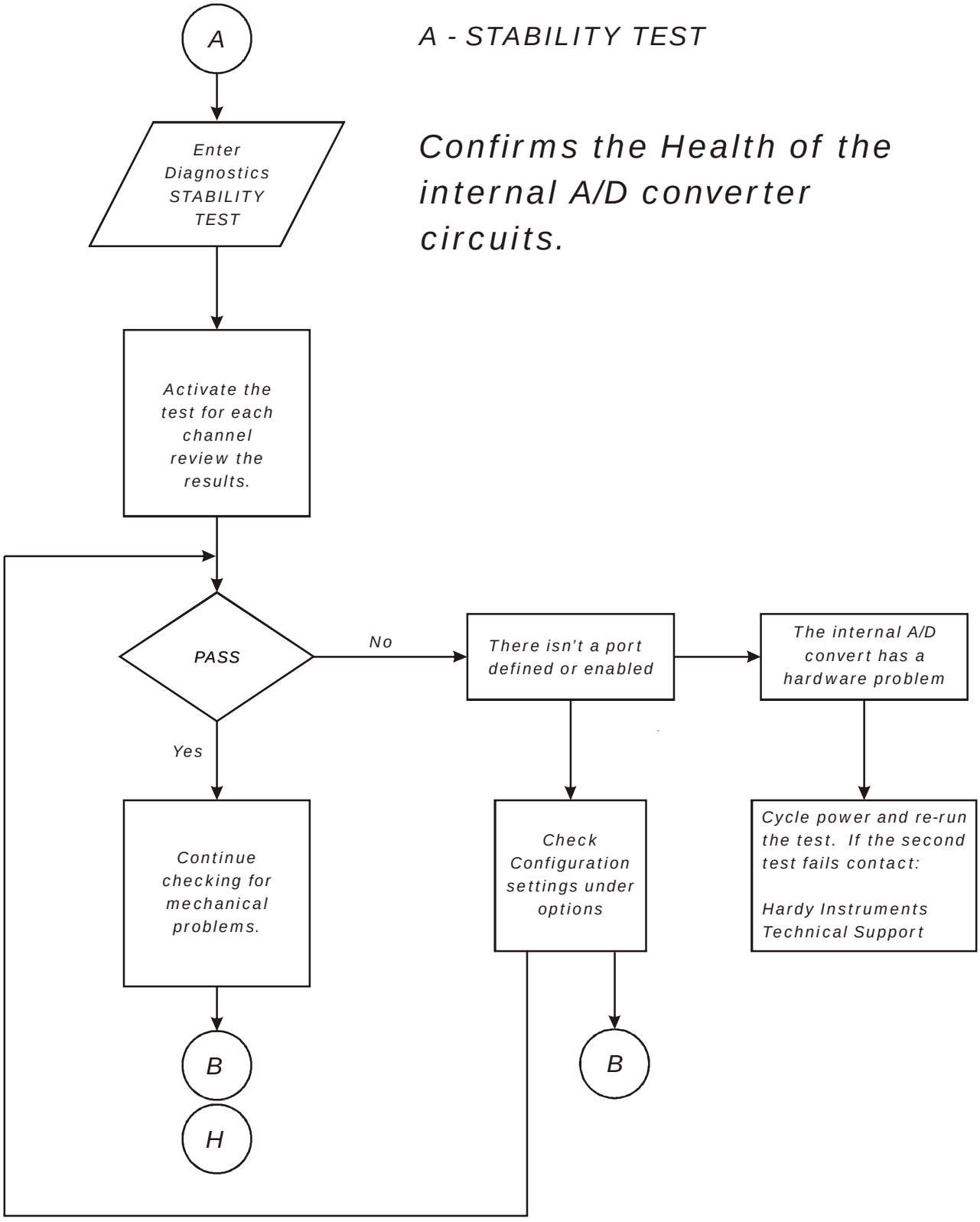
Error Messages

!A/D Failure Error! - Internal Electronics Error, Retry.
!A/D Conversion Error! - Load Cells input out of range.
!Low Tension Alarm! - Tension below the Low Tension Setting.
!High Tension Alarm! - Tension above the High Tension Setting.
!Error in Option Slot 0! - Card in that slot is not functioning.
!Error in Option Slot 1! - Card in that slot is not functioning.
!C2 Cal Error! - Error occurred during calibration, re-calibrate.
!Misalignment Alarm! - Roller is misaligned causing incorrect load sensor readings.
!Nonvolatile Memory Failure! - SMM failure or chipset failure.
!Control Lost! - Out of PID control.
!No C2 Sensor! - Instrument did not detect a C2 Load Sensor
!CAL Failed! - Not enough counts between Zero and Span. (Traditional Calibration)
!CAL Failed! - ADC Error (Soft Calibration)
DeviceNet communications status for nodes 0-63. A '1' indicates that communication with the node has failed.

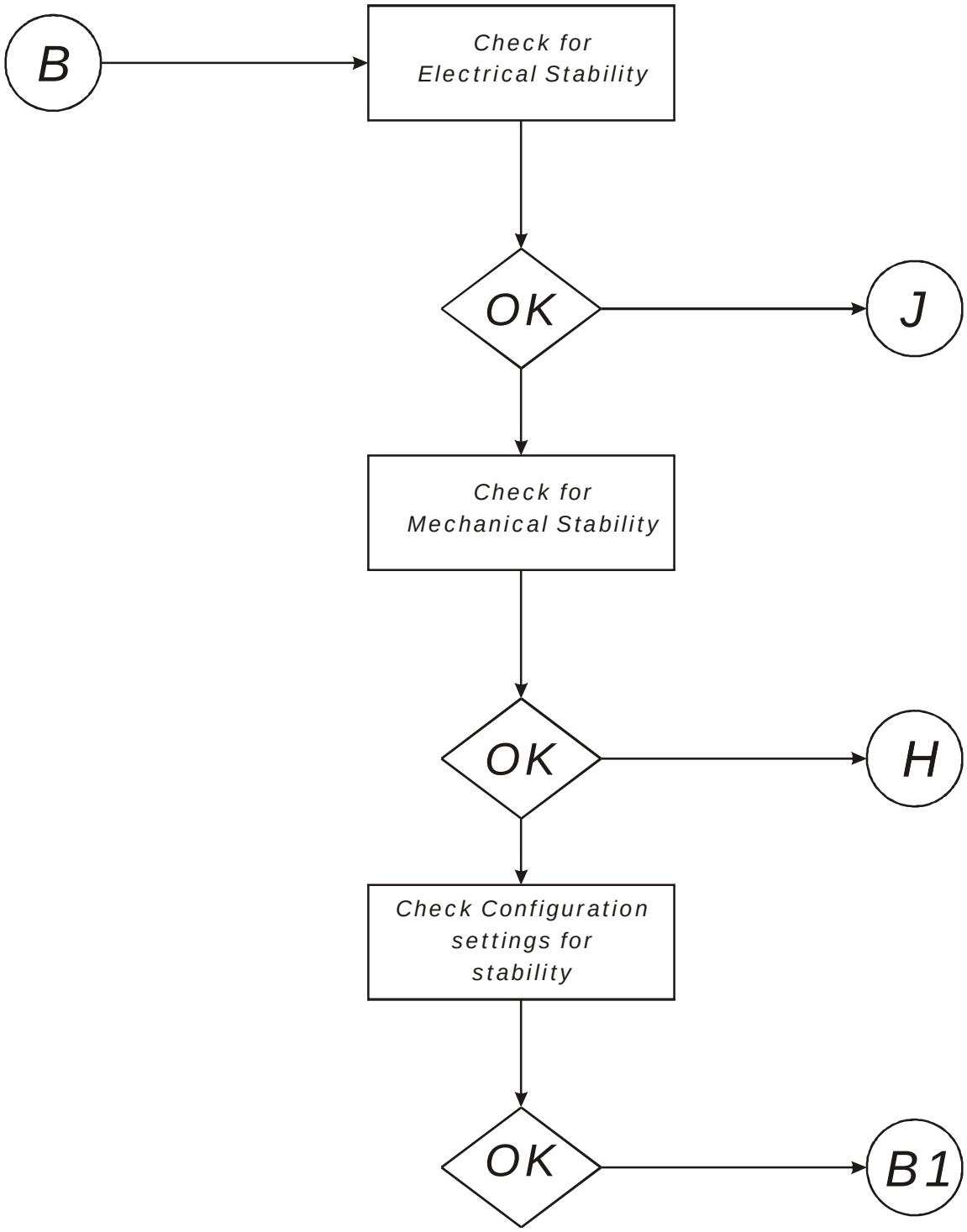
General Troubleshooting Flow Chart Index



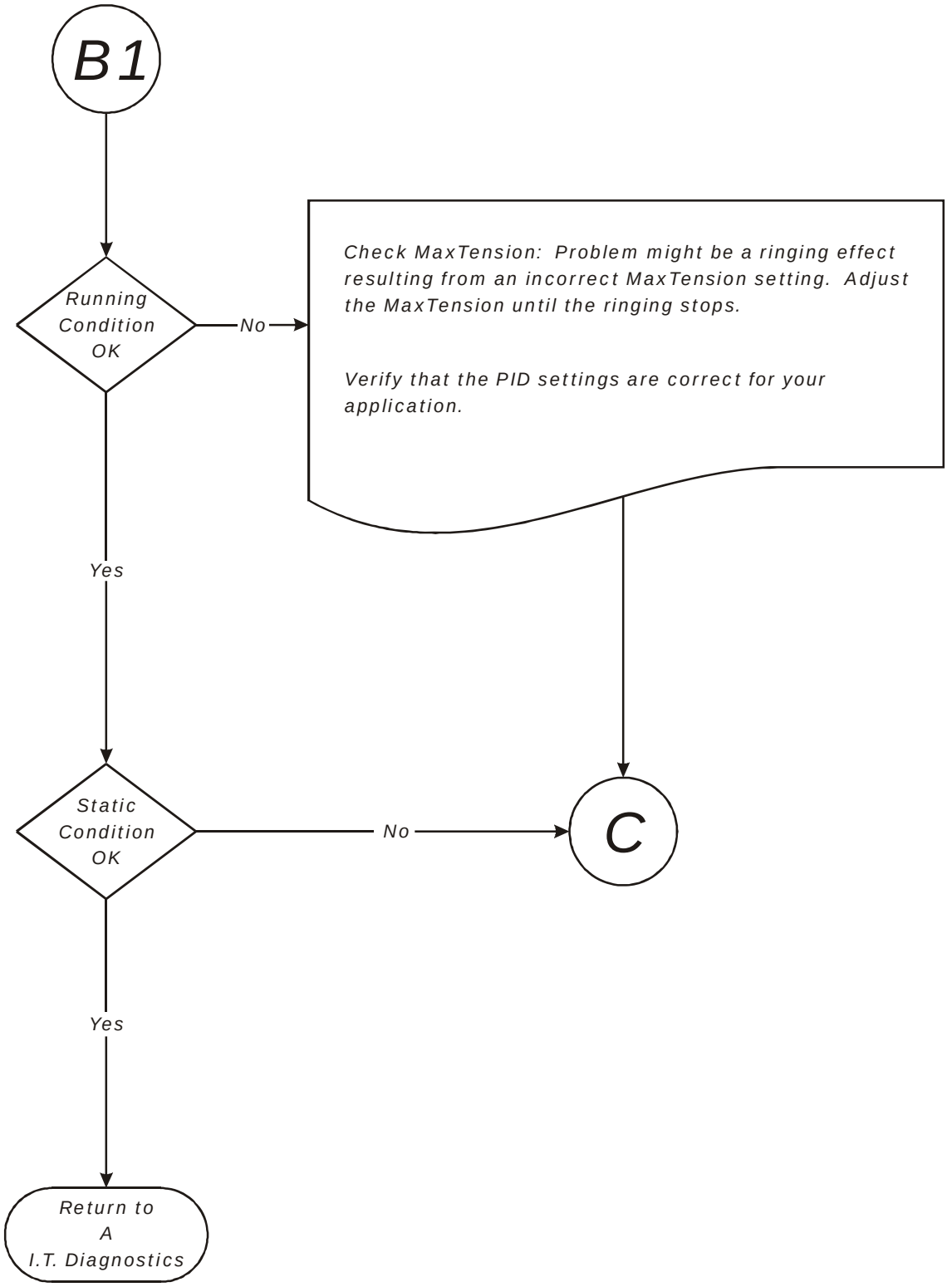
A - Guidelines for Instabilities on Formerly Operating Systems



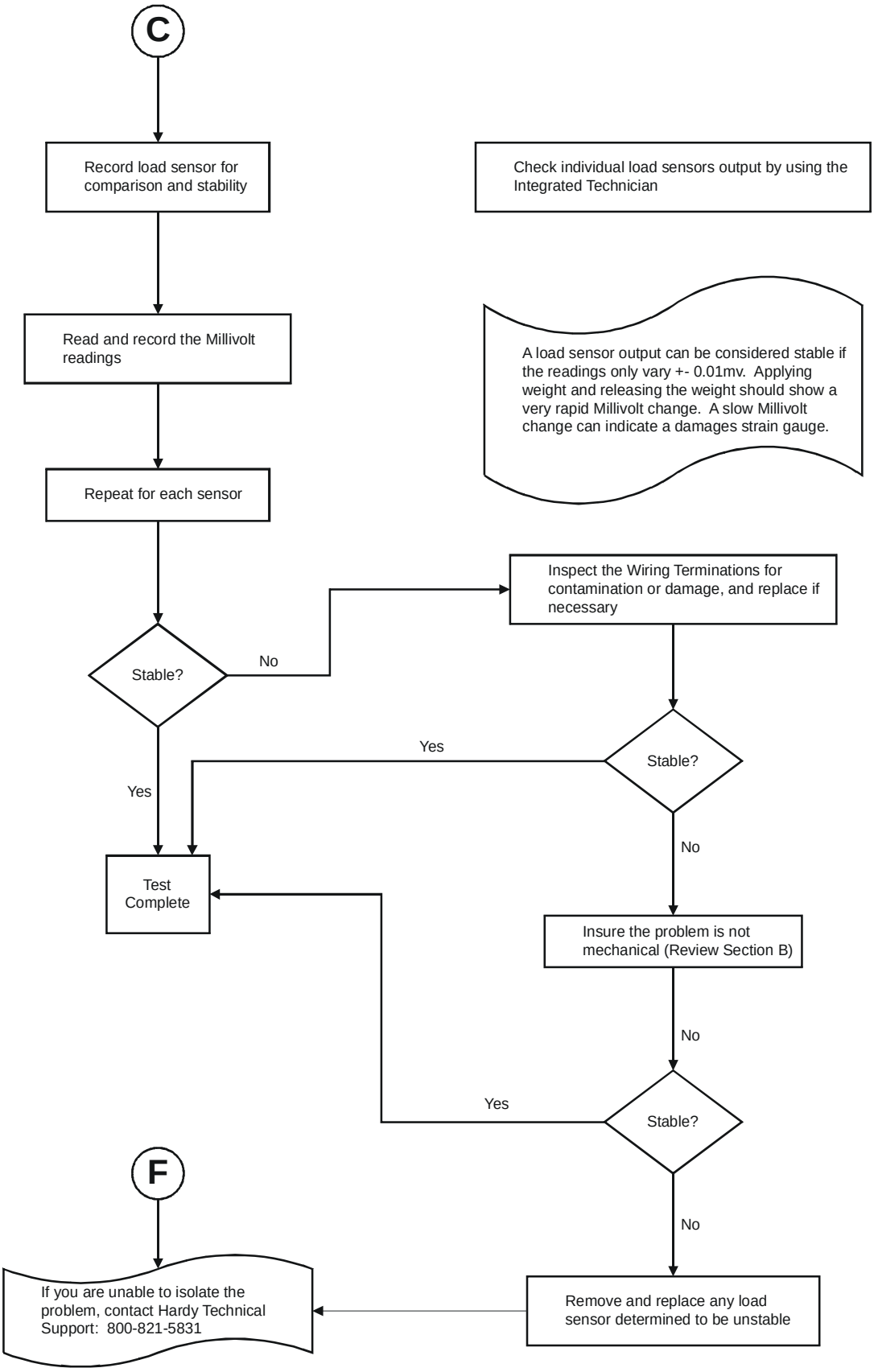
B - Guidelines for Instabilities on Formerly Operating Systems (Cont'd)



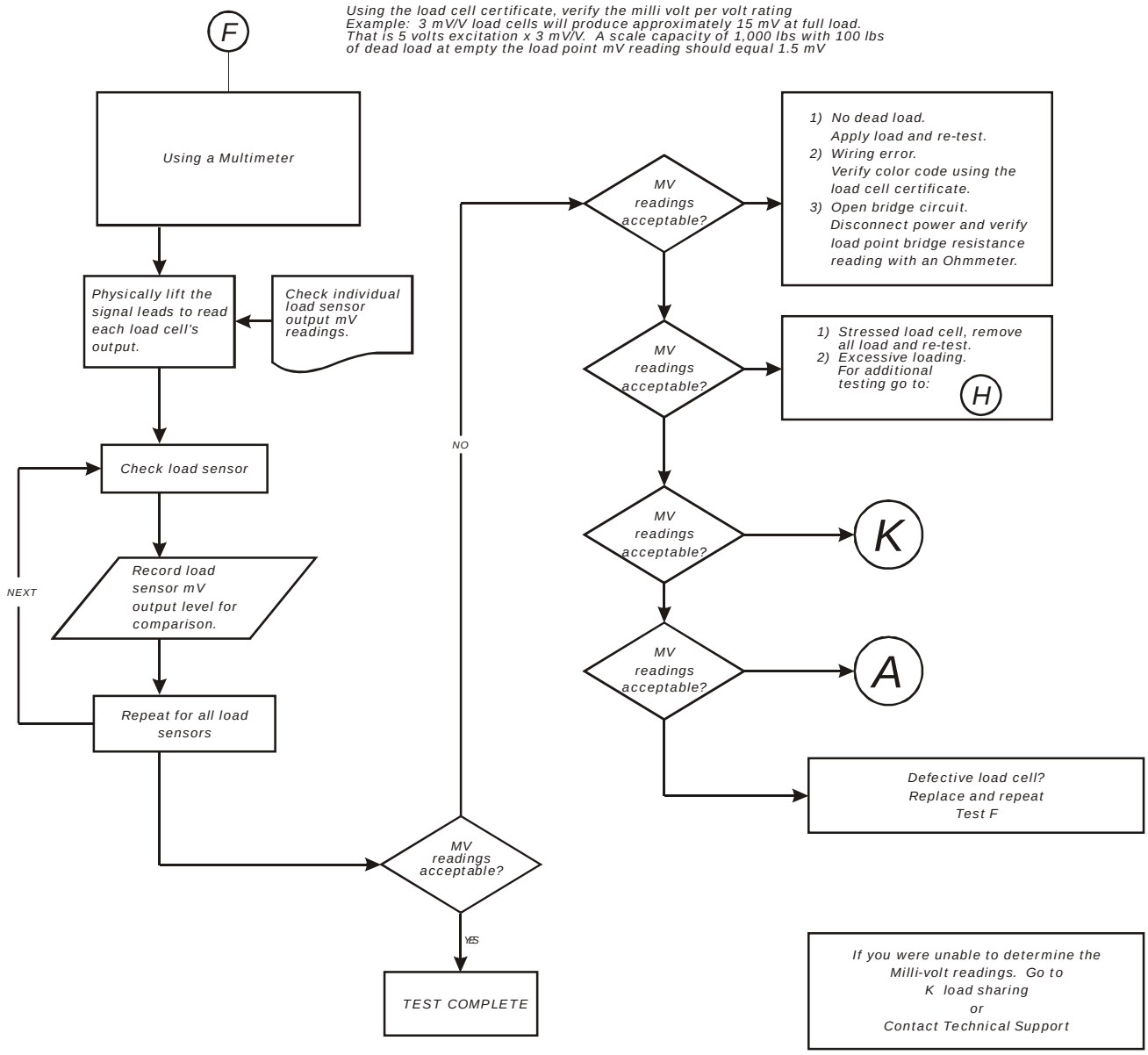
B1 - Guidelines for Instabilities on Formerly Operating Systems: Stability and Configuration Settings



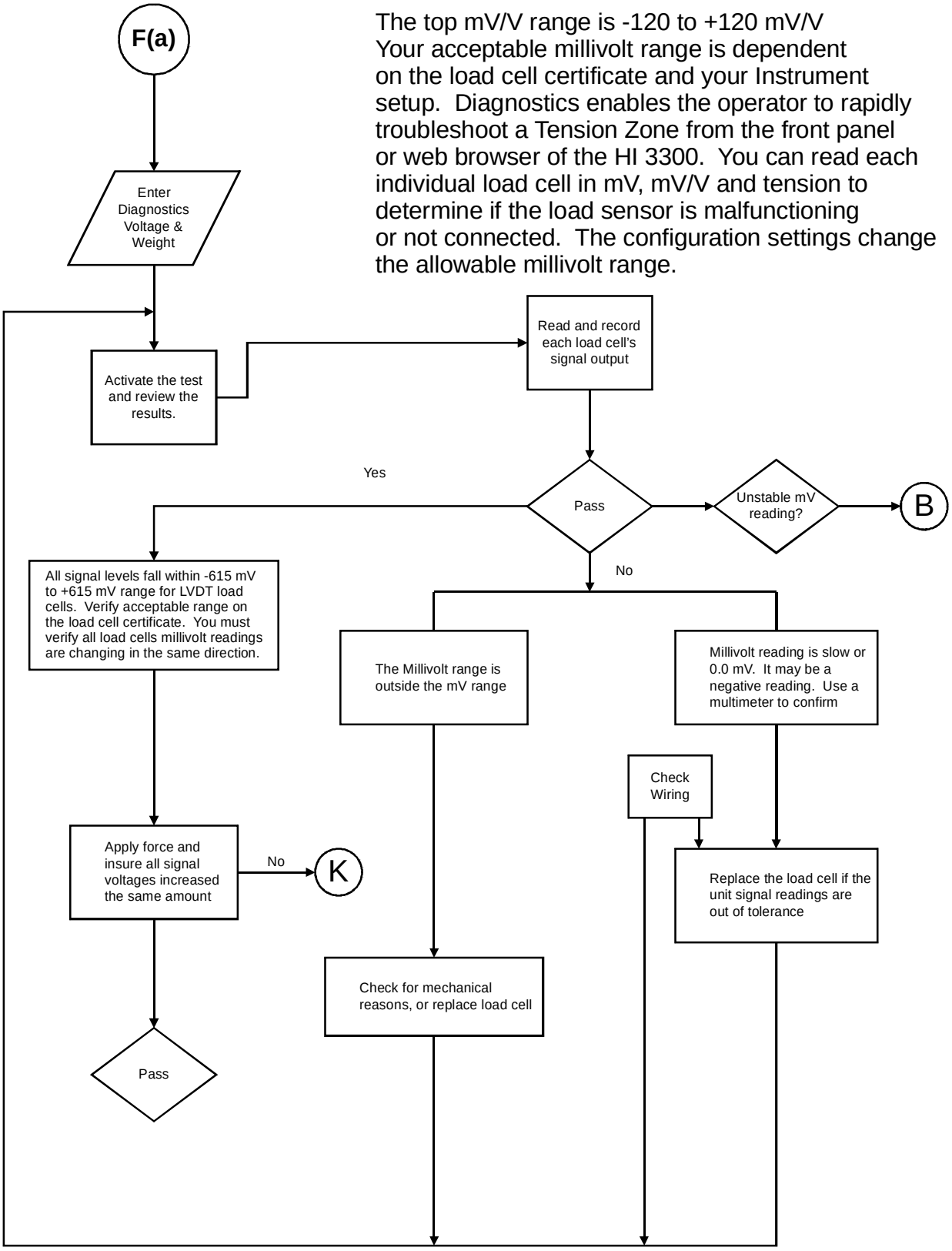
C - Guidelines for Instabilities on Formerly Operating Systems



F - Verify Individual Load Cell Milli-Volt Readings

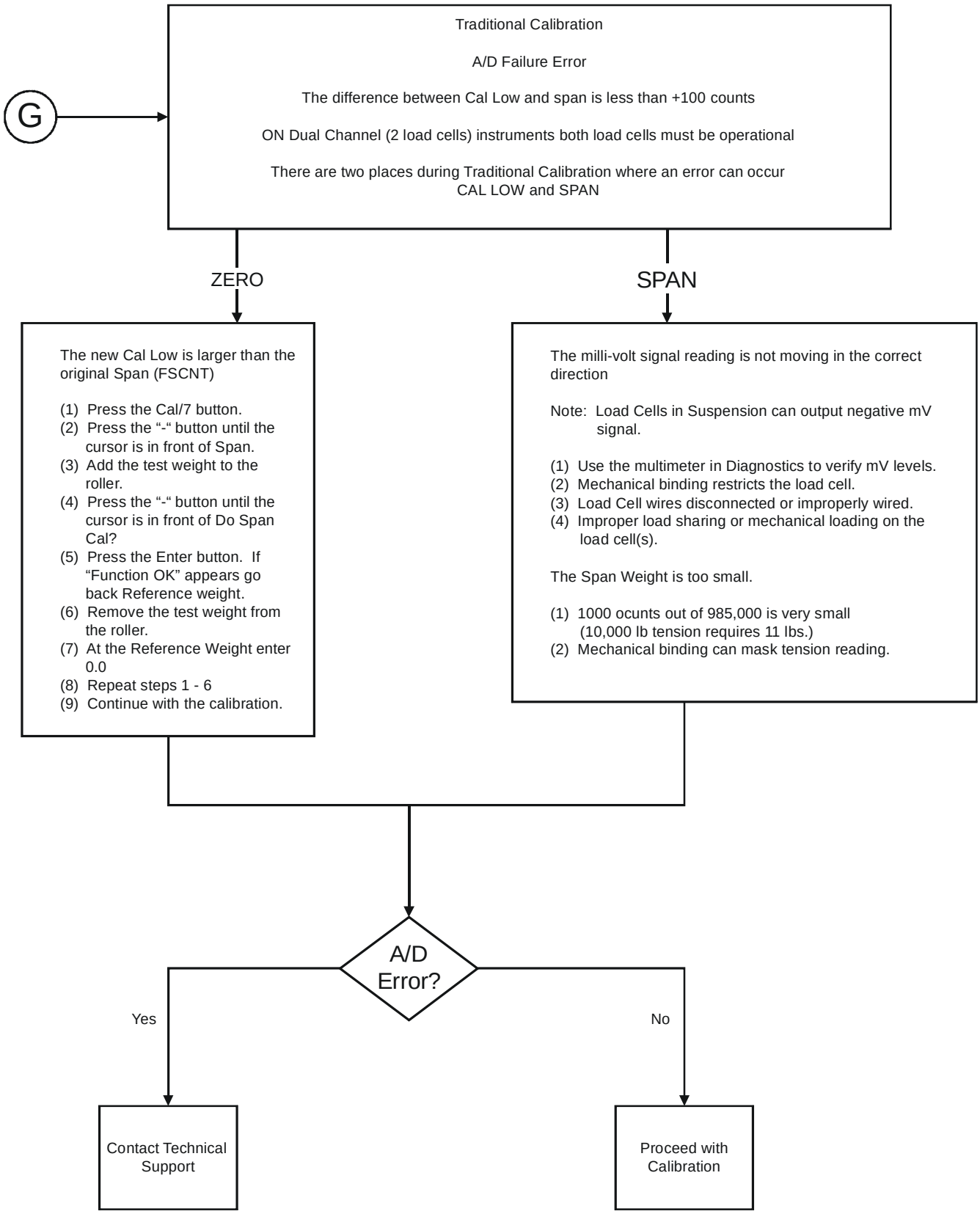


F(a) - Verify Individual Load Cell Readings Using Diagnostics

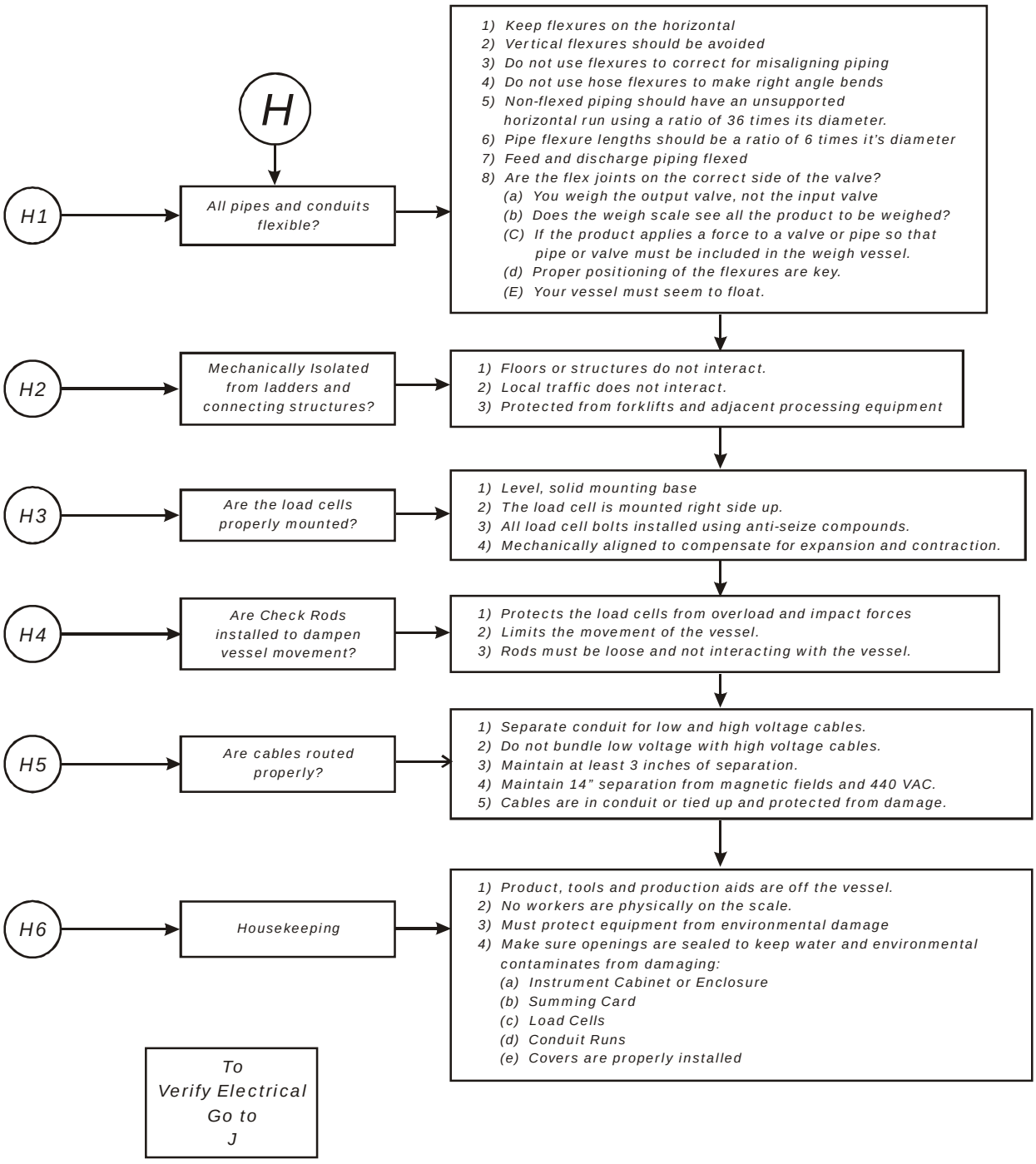


The top mV/V range is -120 to +120 mV/V Your acceptable millivolt range is dependent on the load cell certificate and your Instrument setup. Diagnostics enables the operator to rapidly troubleshoot a Tension Zone from the front panel or web browser of the HI 3300. You can read each individual load cell in mV, mV/V and tension to determine if the load sensor is malfunctioning or not connected. The configuration settings change the allowable millivolt range.

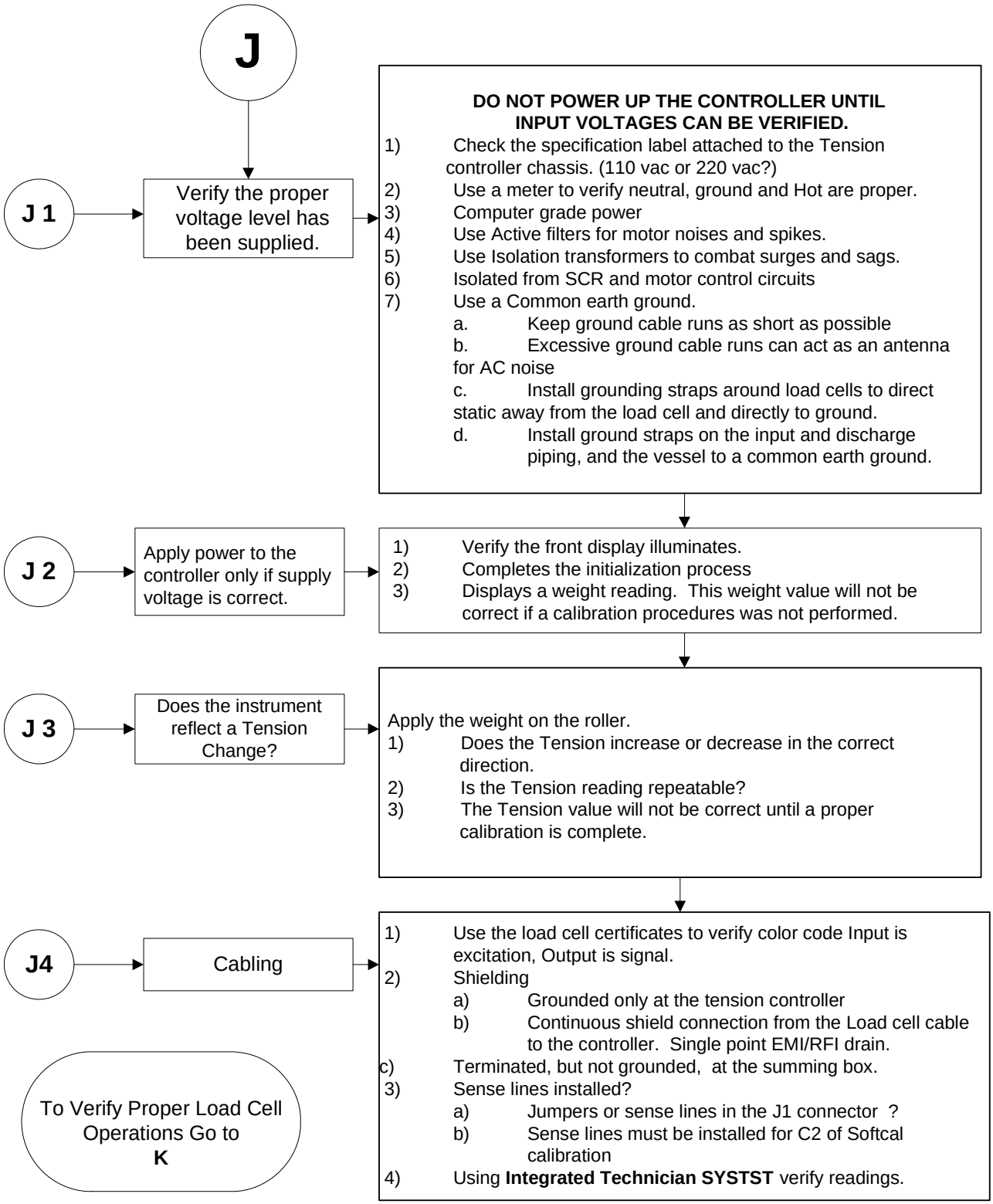
G - A/D Failure Error



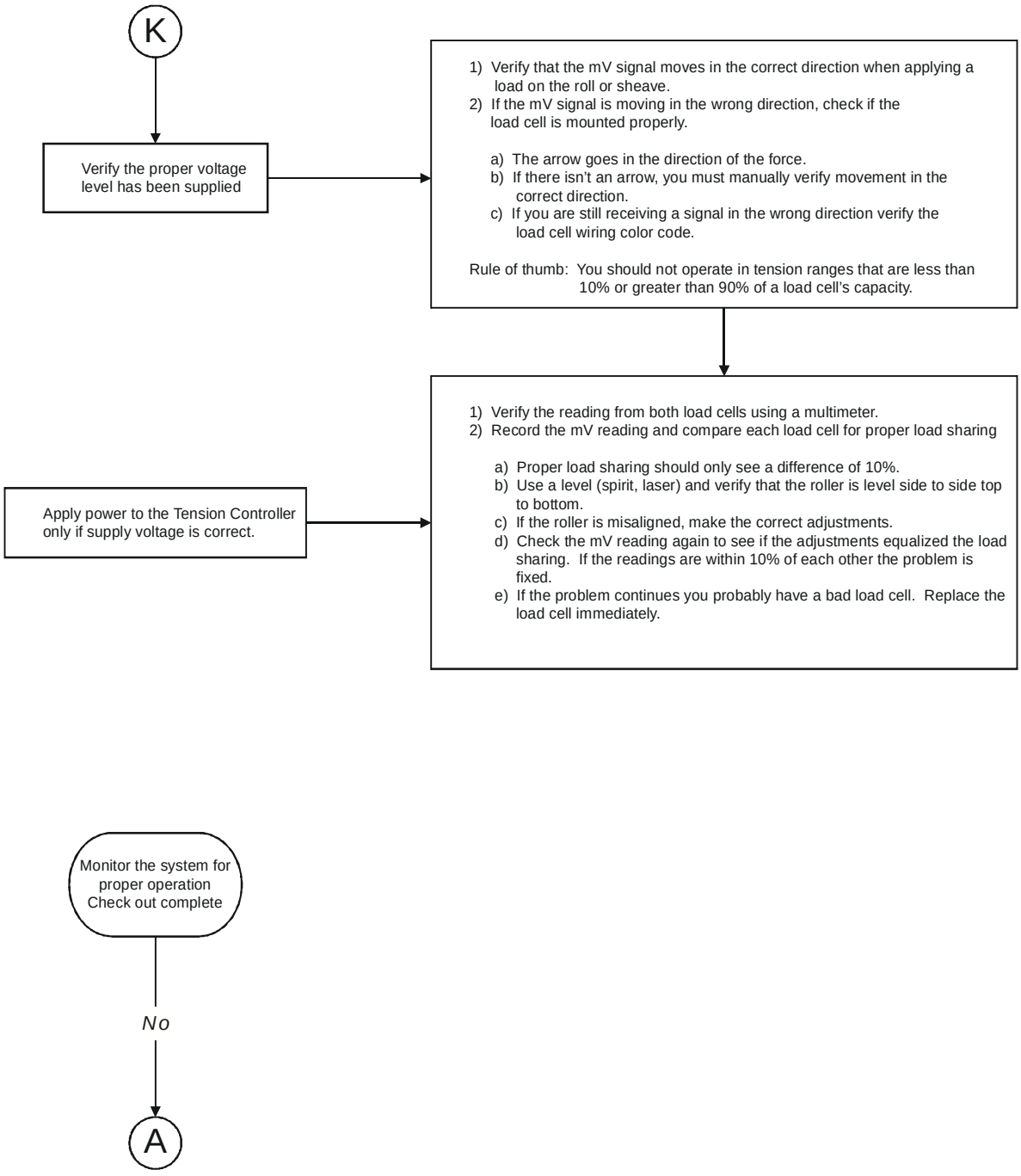
H - Mechanical Inspection



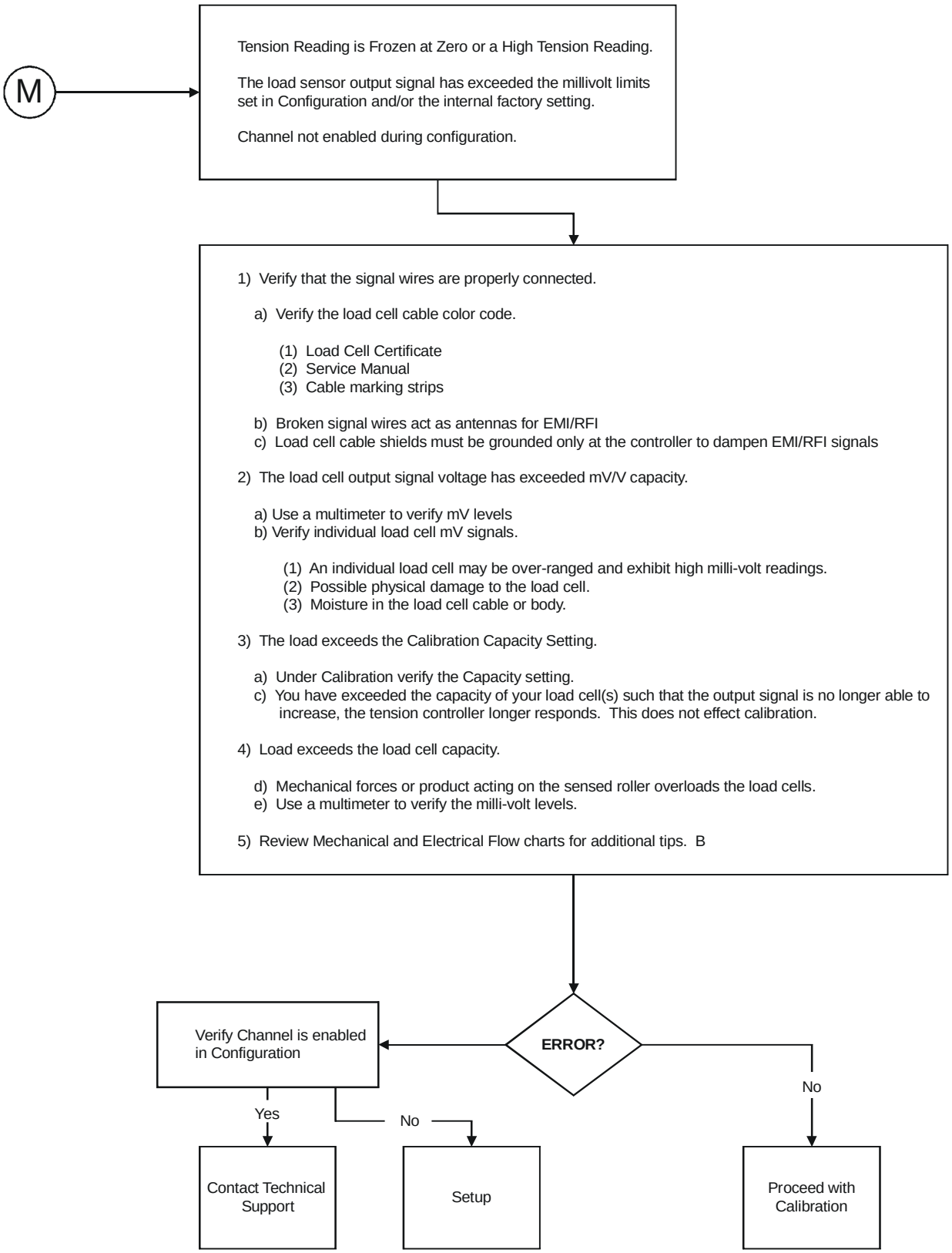
J - Electrical Inspection



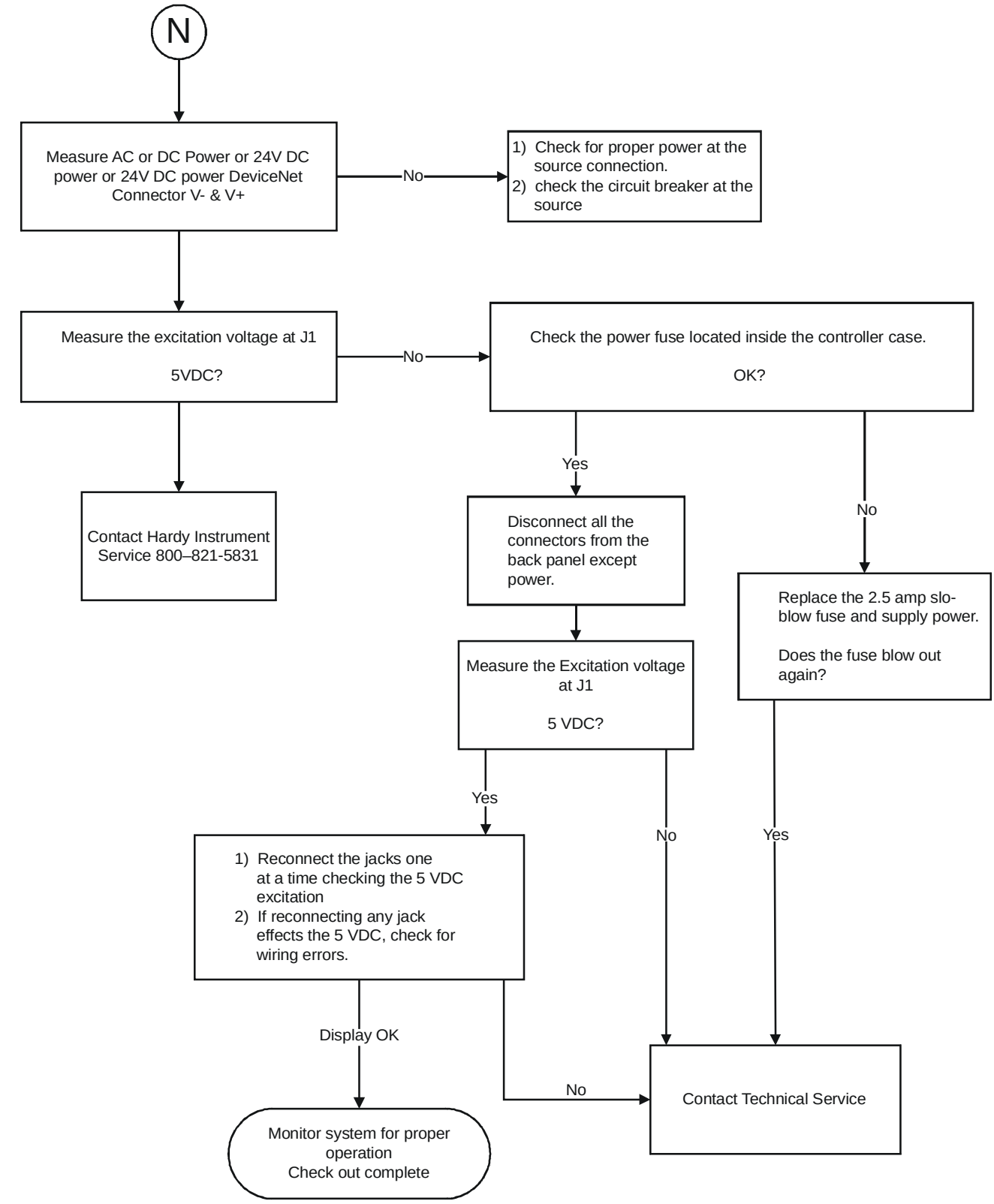
K - Load Sharing and Load Sensor Checkout



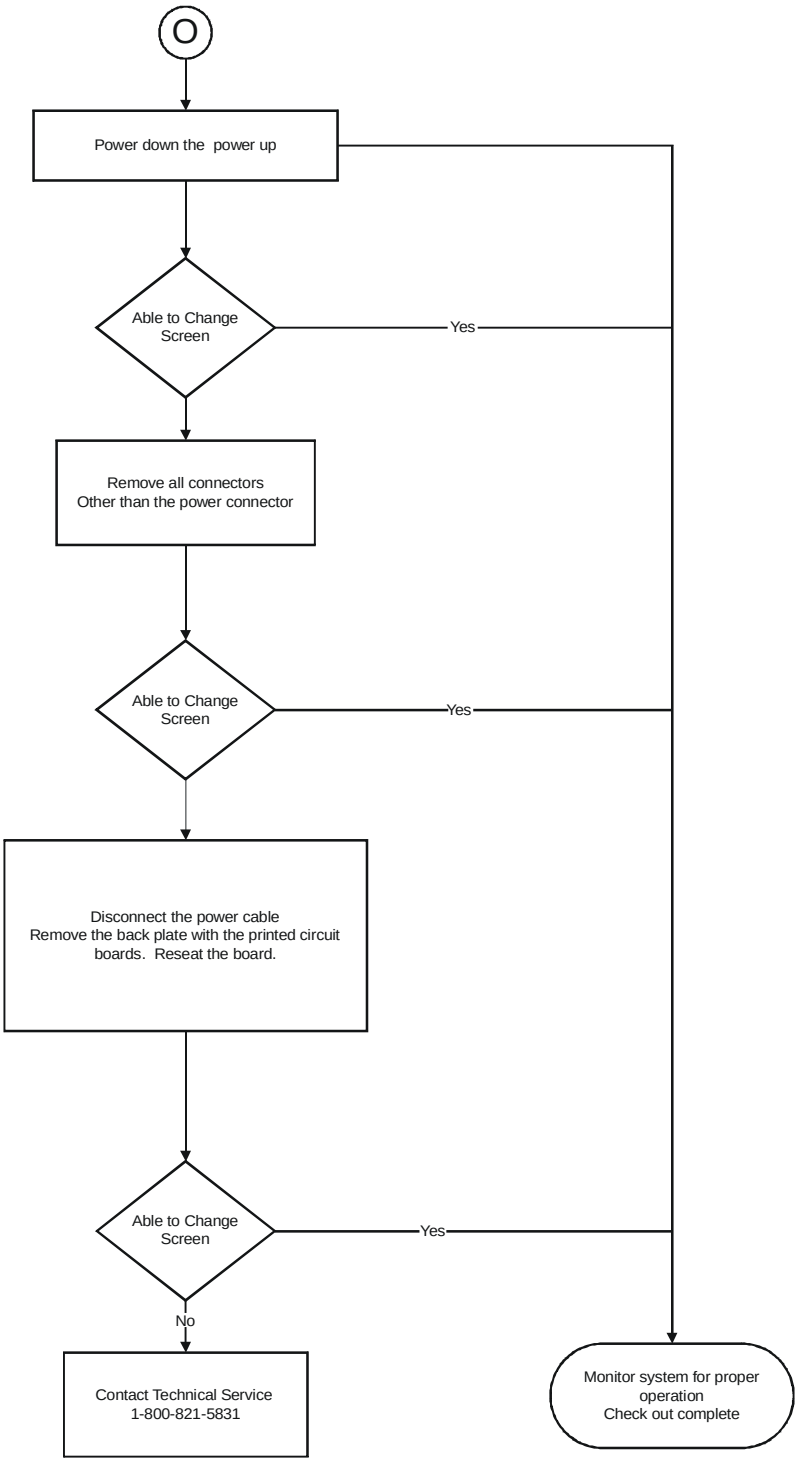
M - Tension Reading Stops Incrementing



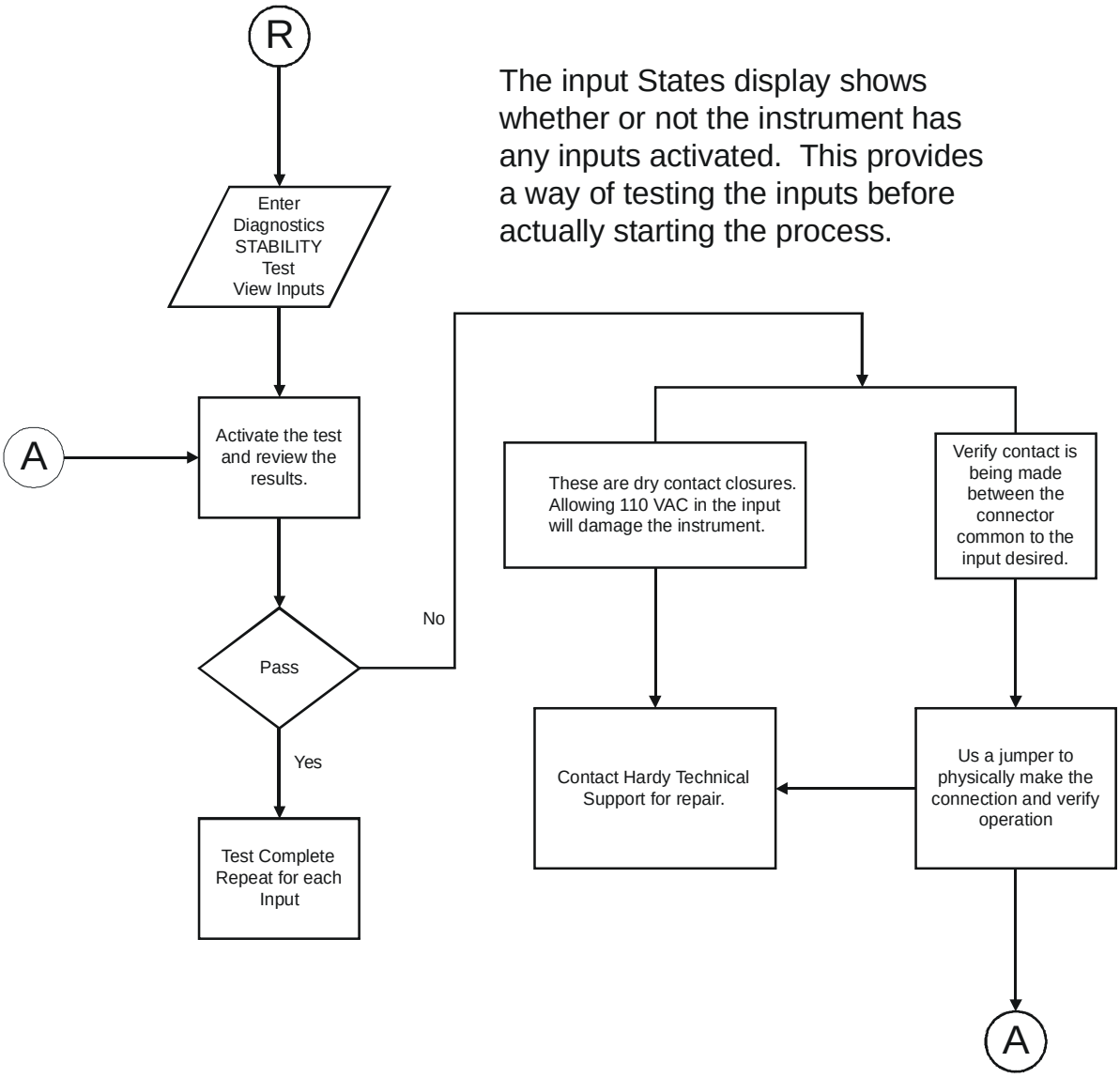
N - Blank Screen



O - Display Stuck on a Screen

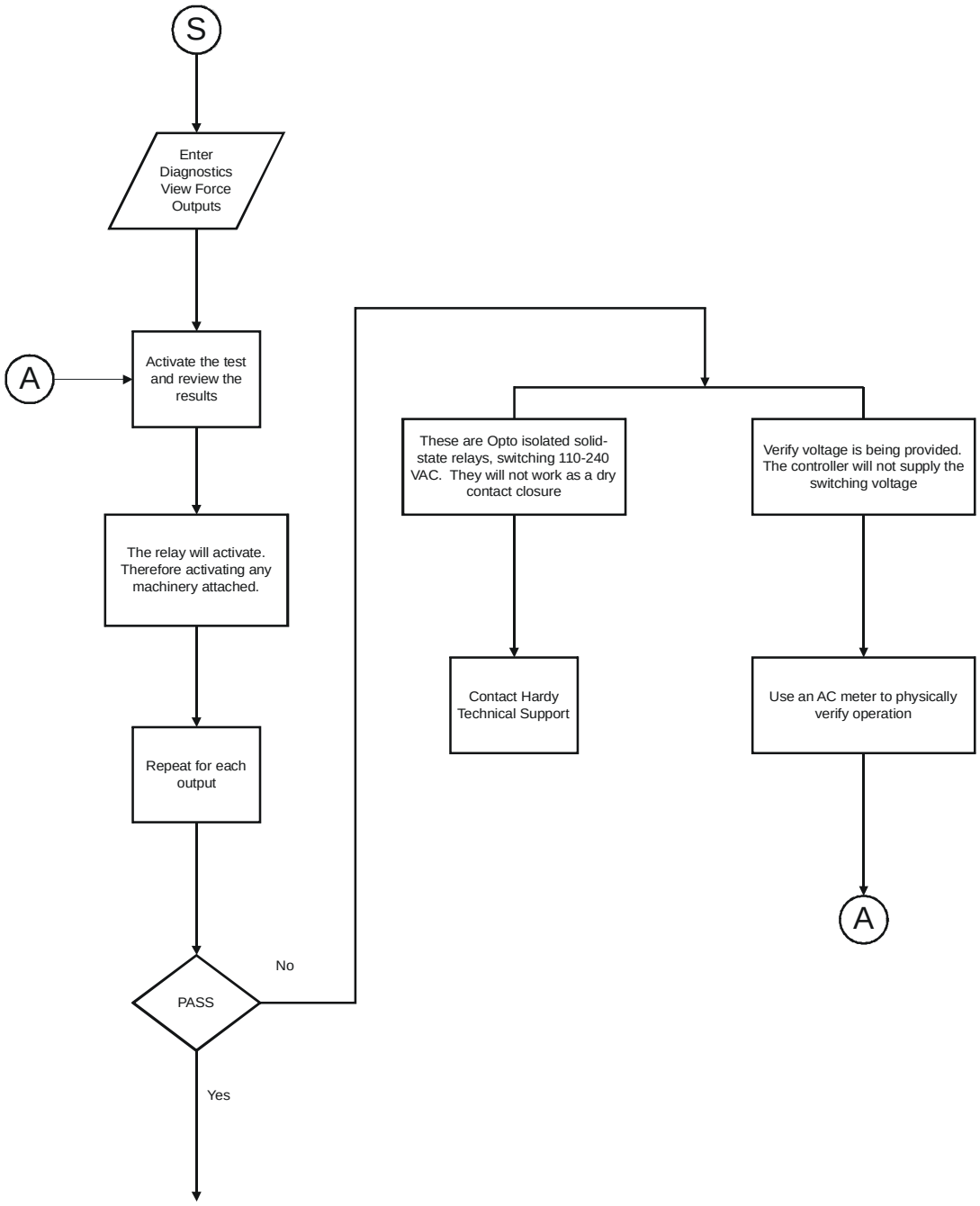


R - View Input States



The input States display shows whether or not the instrument has any inputs activated. This provides a way of testing the inputs before actually starting the process.

S - Forcing Outputs



System Integrity Check and Fault Determination From the Front Panel

To determine if an instrument or cabling problem exists, verify the basic operation of the system by performing the following system checks.

Diagnostics

About Diagnostics

The Diagnostics menus enable the technician to get a more complete view of how the Tension Control system is working. For example you can check to see the last Calibration, the type of calibration and when the last Calibration was performed. You can view the Data List Display for the Serial Number assigned to the instrument or Program Part Number. You can also check the last graduation size, Units selected, Operator ID, Analog Options and more information about the configuration of the instrument you are checking. You can get information about the Load Sensors such as Output Sensitivity, Hysteresis, Sensitivity of each individual Load Sensor. The Diagnostic Menus allow you to perform a Self Test which provides the total scale input to the instrument such as mV and Force, mV/V and Force and mV/V for the units selected (i.e. lbs, kg, oz, g).

Checking the Device Data List

The Device Data List is a list of all the parameters that were set for the ingredient you are currently using and the instrument parameters that have been set for this instrument.

Step 1. From the Standby Display press the Test/9 button. The Test and Data Menu appears with the cursor in front of Device Data List. (See Fig. 7-1)

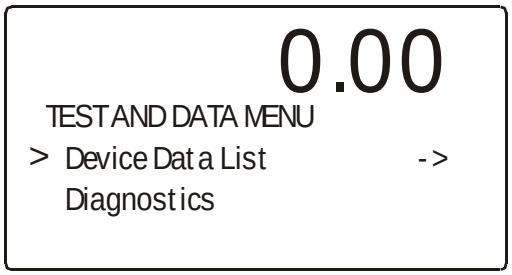


FIG. 7-1 TEST AND DATA MENU/SELECTING DEVICE DATA LIST

Step 2. Press the Enter button. The Device Data List Display appears with the cursor in front of Instrument ID. (See Fig. 7-2)

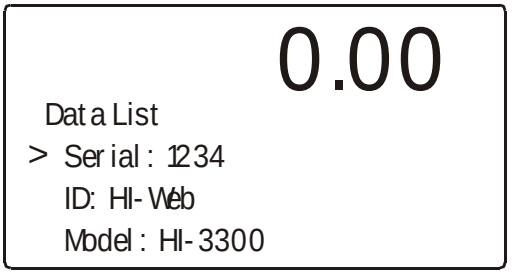


FIG. 7-2 TEST DATA DISPLAY/INSTRUMENT ID - MODEL NUMBER - S/N

Step 3. Here you can view the Instrument ID, Model Number and Serial Number of the instrument. This is a read only display. To change any of the parameters you will have to go to the Instrument Setup Menu/ Instrument ID.

Step 4. Press the down arrow button until the next three parameters appears. (See Fig. 7-3)

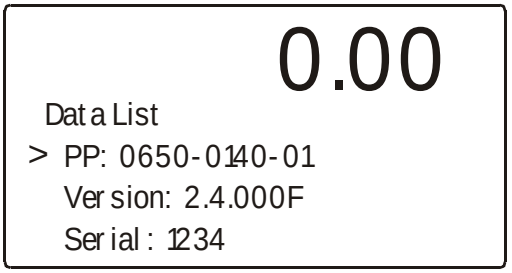


FIG. 7-3 TEST DATA DISPLAY/PART NUMBER/ PROGRAM VERSION

Step 5. These are read only displays. The information is important:

- PP# = Program Part Number. This is the part number of the firmware. To order additional copies of the firmware you will need this number. This is also additional information available to a service technician for troubleshooting.
- Often a technician needs to know the program version to determine if the correct version is being used. A Hardy Technical Support Technician will ask what version of software you are currently using to determine the source of a problem. You can find the version here.

Step 6. Press the Exit button to return to the Test and Data Menu.

Step 7. Press on the “-” button until the cursor is in front of

Diagnostics

Voltage & Weight Displays

Step 1. Press the down arrow until the cursor is in front of Diagnostics. (See Fig. 7-4)

FIG. 7-4 TEST AND DATA MENU/SELECTING DIAGNOSTICS

Step 2. Press the Enter button. The Diagnostics Display appears with the cursor in front of Network Card. This is a read only display and indicates the network card that is currently installed. In this case the installed Network Card is the ControlNet Network card. If there is no network card installed it will read “No Network Card”. (See Fig. 7-5)

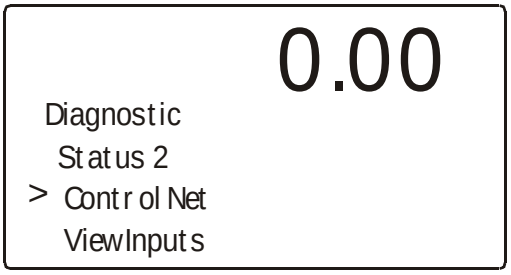


FIG. 7-5 DIAGNOSTICS DISPLAY/SELECTING VOLTAGE & WEIGHT

Step 3. Press the “-” button until the cursor is in front of View Inputs. (See Fig. 7-6)

View Inputs

The View Inputs enables the user to view the status of each of the 5 inputs to the instrument to see which ones are active or inactive.

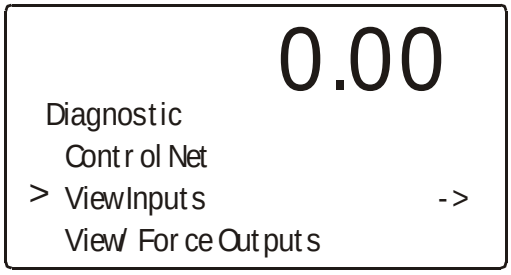


FIG. 7-6 DIAGNOSTIC MENU/VIEW INPUTS

Step 4. To see the current state of each input press the Enter button. The View Inputs menu appears. (See Fig. 7-7)

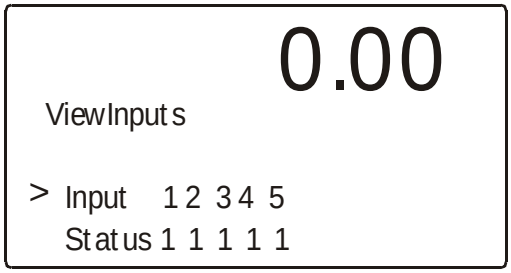


FIG. 7-7 INPUTS MENU

Step 5. The input status is a 1 or 0.

- 1 = Active
- 0 = Inactive

View/Force Outputs

WARNING: FORCING THE OUTPUT RELAY MAY CAUSE DAMAGE OR PERSONAL INJURY. MAKE ABSOLUTELY SURE THAT YOU KNOW WHAT THE RELAY IS CONNECTED TO BEFORE ACTIVATING. IF NECESSARY DO A PHYSICAL CHECK TO DETERMINE WHAT THE SELECTED OUTPUT RELAY IS CONNECTED TO BEFORE ACTIVATING.

The Force Outputs function individually activates each of the 4 Output relays in the instrument. Useful in pre-startup to determine if all the relays are connected to the correct auxiliary devices.

Step 1. Press the up or down arrow buttons until the cursor is in front of View/Force Outputs. (See Fig. 7-8)

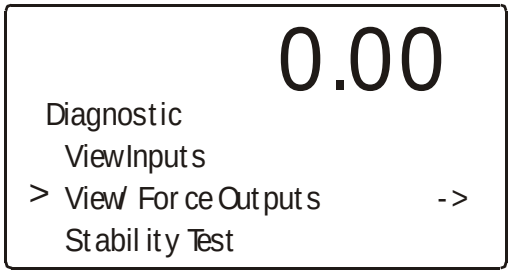


FIG. 7-8 DIAGNOSTICS VIEW/FORCE OUTPUTS

Step 2. Press the Enter button. The Force Outputs menu appears with the cursor in front of the Output Relay list. The Output Relay List is a read only list. (See Fig. 7-9)

- The State list indicates if the Output Relay is activated or not.
- All the output relays on the instrument are Normally Open so activation will close the relay.

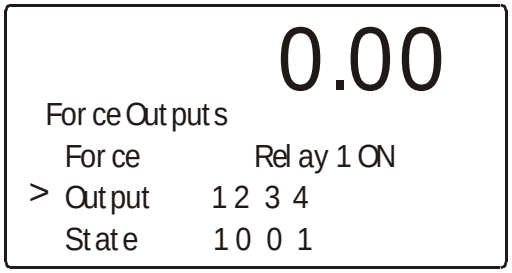


FIG. 7-9 FORCE OUTPUTS MENU/READING OUTPUT 1234

Step 3. Press the "-" button until the cursor is in front of "Force Relay 1 ON". (See Fig. 7-10)

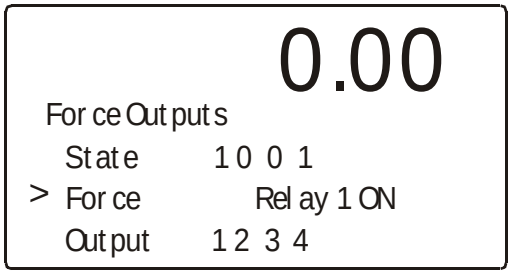


FIG. 7-10 OUTPUT RELAY DISPLAY/SELECTING OUTPUT RELAY #1

Step 4. To select another Output Relay, press the left or right arrow buttons until you have selected the Output Relay and state you want. (See Fig. 7-10)

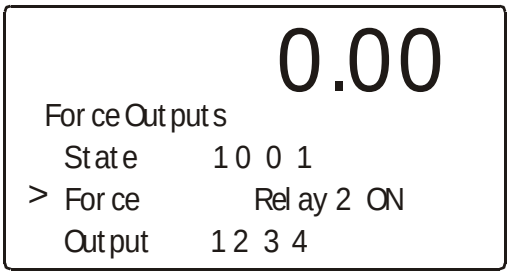


FIG. 7-11 FORCE OUTPUTS MENU/SELECTING OUTPUT RELAY #2/ON

Step 5. Press the Enter button to activate the output relay you have chosen. "Entry Accepted" briefly, (See Fig. 7-12) than the State for Output 2 changes to "1". (See Fig. 7-13)

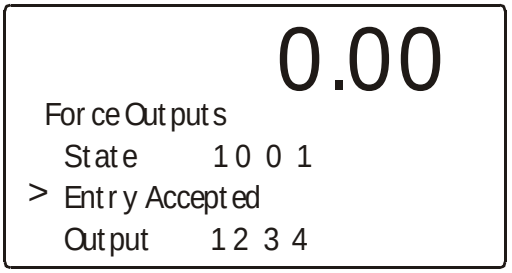


FIG. 7-12 FORCE OUTPUTS/ENTRY ACCEPTED

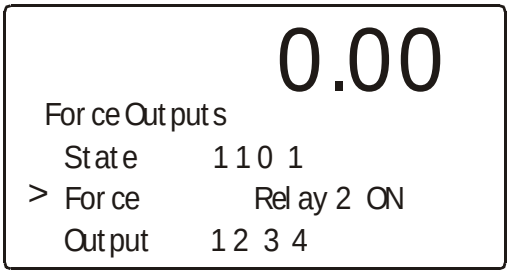


FIG. 7-13 OUTPUT RELAY #2 FORCED CLOSED DISPLAY

Step 6. Press the Exit button to return to the Diagnostics Menu.

Stability Test

The Stability Test switches a fixed signal into the analog to digital convertor, and calculates the mean squared variation from the average reading, using 100 samples.

The test passes if the mean squared variation is less than 5.0, and the average reading is between 30237 and 36955.

Step 1. Press the"-" button until the cursor is in front of Stability Test. (See Fig.7-14)

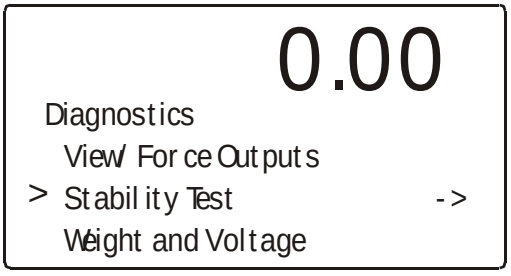


FIG. 7-14 DIAGNOSTICS DISPLAY/SELECTING STABILITY TEST

Step 2. Press the Enter button. The Information display appears with a "!!!DANGER!!! warning you. (See Fig. 7-15)

WARNING: DO NOT PERFORM THE STABILITY TEST WITH PRODUCT ON THE ROLLER OR SHEAVE OR WHILE THE SYSTEM IS RUNNING. TO DO SO CAN RESULT IN PROPERTY DAMAGE, PRODUCT DAMAGE AND/OR PERSONAL INJURY. MAKE SURE THE SYSTEM IS COMPLETELY STOPPED BEFORE PERFORMING THE STABILITY TEST.

FIG. 7-15 STABILITY TEST DISPLAY

Step 3. **WHEN YOU ARE COMPLETELY SURE THE PROCESS IS STOPPED**, press the ENTER button to perform the stability test. The display indicates that the Test is in Progress. (See Fig. 7-16) The results of the Stability Test are displayed. (See Figs. 7-17 & 18)

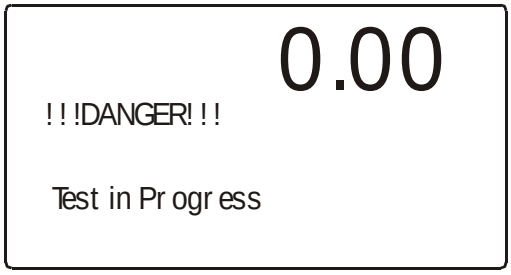


FIG. 7-16 STABILITY TEST/TEST IN PROGRESS

- If the instrument passes the Stability Test the Pass display appears. (See Fig. 7-17) This means that the Mean Squared Variation is less than 5.0 and the average reading is between 30237 and 36955. In short the instrument is working fine.

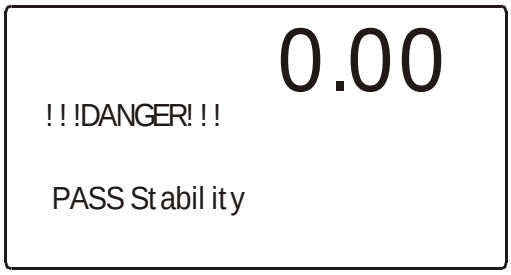


FIG. 7-17 SYSTEM STABILITY TEST DISPLAY/ PASS

- If the instrument does not pass the Stability Test the Fail display appears. (See Fig. 7-18) This means that the Mean Squared Variation is greater than 5.0 and/or the average reading is not between 30237 and 36955. This test examines the internal electronics and not the load cells input signal.

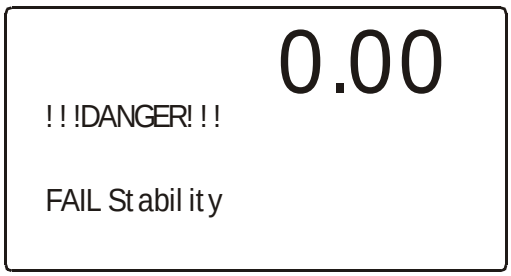


FIG. 7-18 SYSTEM STABILITY TEST DISPLAY/FAIL

1. Disconnect the power cord and reconnect the power cord to cycle power to the instrument.
2. Repeat the Stability test.
3. If the instrument Fails the Stability Test again, contact Hardy Instruments Inc., Technical Support for assistance.

Step 4. Press the Exit button to return to the Diagnostics display.

Step 5. Press the "-" button until the cursor is in front of Weight and Voltage. (See Fig. 7-19)

Weight and Voltage

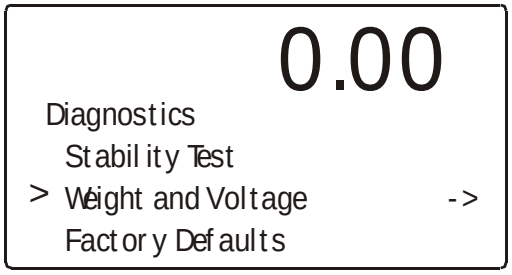


FIG. 7-19 DIAGNOSTICS DISPLAY/WEIGHT AND VOLTAGE

Step 1. Press the Enter button. The Weight and Voltage Menu appears with the cursor in front of Channel 1 Tension. (See Fig. 7-20)

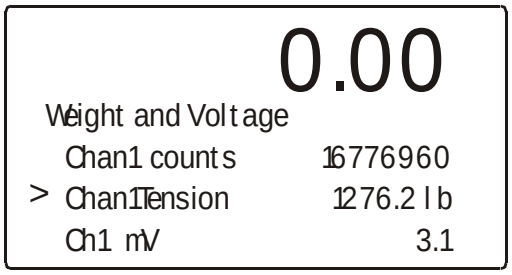


FIG. 7-20 WEIGHT AND VOLTAGE/TENSION READING

Step 2. Press on the "+" or "-" buttons to move to the item you want to see.

- The mV is a coarser reading than the mV/V. However the reading is sufficient to balance the load share between the two load cells.
- Additionally, this reading allows you to determine if the problem is in the instrument (internal) or in a load sensor(s) (external). The specification range for the Tension Controller is 0-15 mV. If you are getting a reading outside this range the problem is probably the load cell (electrical). If you are getting a reading between 0-15 mV the reading is normal.

Step 3. If you are using both channels the display will show each channel weight reading, mV reading, mV/V reading and so on. (See Fig. 7-21)

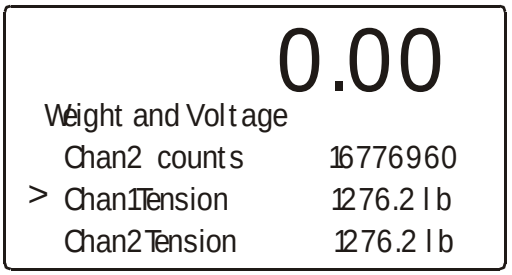


FIG. 7-21 TWO CHANNEL WEIGHT AND VOLTAGE DISPLAY

Step 4. Press the up or down arrow buttons until the cursor is in front of Chan1mV/V.

Step 5. The mV/V and Weight Display appears. (See Fig. 7-22)

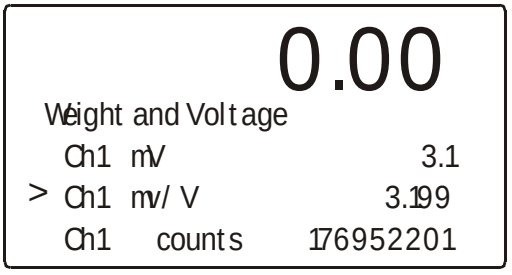


FIG. 7-22 WEIGHT AND VOLTAGE MENU/CHANNEL 1 MV/V DISPLAY

- This reading is a higher resolution reading to a 10th of a microvolt. Use this reading to determine if the load cell is working correctly.
- You can also use this reading to determine which load sensor is malfunctioning by looking at each load sensor to determine any problems (e.g. creep) in the millivolt reading. Multiply the mV/V reading by the sense voltage to get a mV reading with 3 decimals points.
- Converting mV/V to mV use this formula:

5 x mV/V = mV

Step 6. Press the Exit button to return to the Diagnostics Display.

Factory Defaults

CAUTION: IF YOU CHOOSE FACTORY DEFAULTS ALL DATA WILL BE LOST! MAKE ABSOLUTELY SURE THAT THIS IS WHAT YOU WANT TO DO BEFORE CHOOSING THIS OPTION. DO NOT USE THIS FUNCTION IN AN EFFORT TO CORRECT ANY MALFUNCTIONS IN THE OPERATION OF THE INSTRUMENT.

Step 1. Press the "-" button until the cursor is in front of Factory Defaults. (See Fig. 7-23)

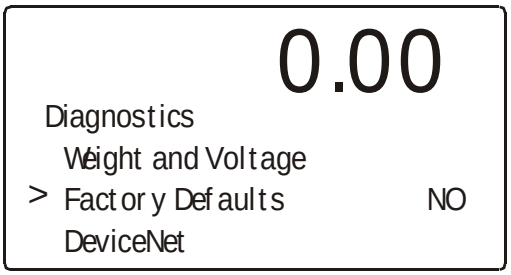


FIG. 7-23 DIAGNOSTICS MENU/FACTORY DEFAULTS

- Resetting the Default Parameters is used when you want to return the instrument to a factory default condition.
- It is required that the security access to this menu be High (HI).

Step 2. Press the left or right arrow button to select Yes if you want to return the instrument to Factory Defaults. (See Fig. 7-24)

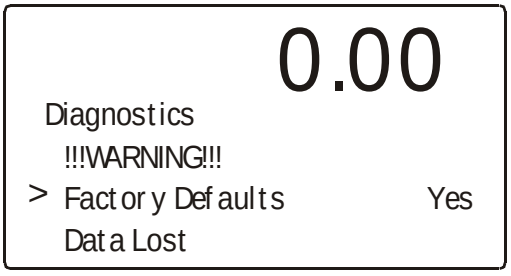


FIG. 7-24 FACTORY DEFAULTS DISPLAY

Step 3. Press the Exit button if you do not want to set the Factory Defaults. The Diagnostics menu reappears.

Step 4. Press the Enter button if you want to set the Factory Defaults.

Step 5. Press the Exit button to return to the Diagnostics display.

System Integrity Check and Fault Determination From the Web Browser

Diagnostics

Diagnostics is used to troubleshoot the Tension Control System. A complete Troubleshooting Guide is available in the Service Manual. What is important for Operational purposes is to be able to see the information about this instrument. (See fig. 7-99) Setting Default Settings is also useful to operators.

Step 1. From the Home page click on Operation. (See Fig. 7-25) The Operations Page appears. (See Fig. 7-26)

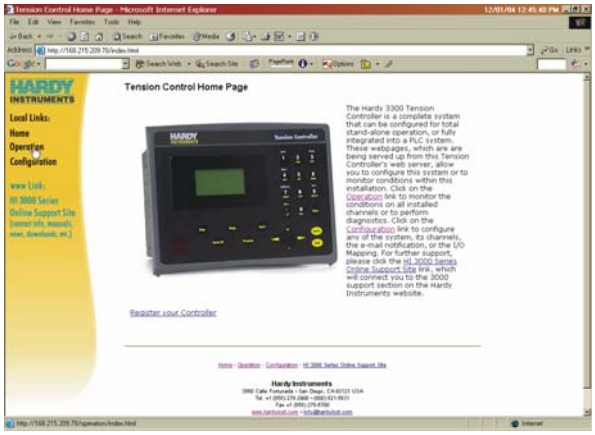


FIG. 7-25 TENSION CONTROLLER HOME PAGE/ SELECTING OPERATION

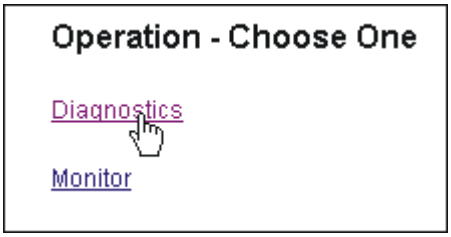


FIG. 7-26 OPERATION PAGE/SELECTING DIAGNOSTICS

Step 2. Click on Diagnostics. The Diagnostics Page appears. (See Fig;. 7-27)

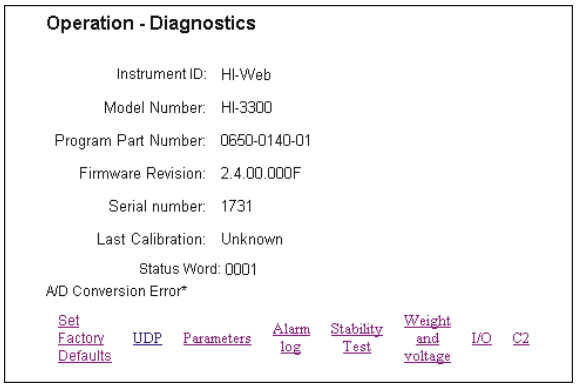


FIG. 7-27 OPERATION/DIAGNOSTICS PAGE

Step 3. To Set the Factory Defaults click on Set Factory Defaults

NOTE: There is a warning that should be read first before setting Factory Defaults.

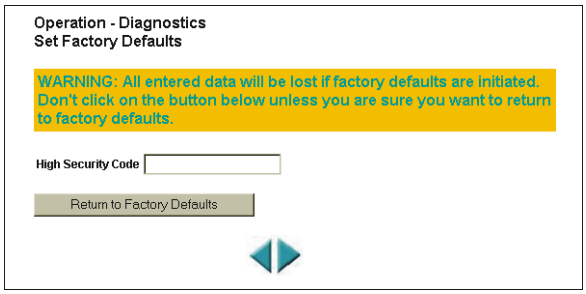


FIG. 7-28 DIAGNOSTICS/FACTORY DEFAULTS PAGE

Step 4. Click in the High Security Code field. (See Fig. 7-28)

Step 5. Enter the High Security Code for this instrument.

- If the High Security Code is not correct, when you press the Return to Factory Default button a message appears informing you that the password is not valid, Defaults are not set. (See Fig. 7-29)

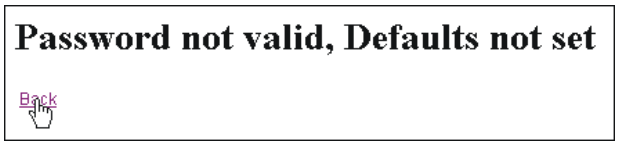


FIG. 7-29 HIGH SECURITY PASSWORD INVALID

- Enter the password again and click on the Default button.
- If you still cannot set the defaults, contact you network administrator for the correct password.

Step 6. Click on the Return to Factory Defaults button. A message appears informing you that the Factory Defaults are set. (See Fig. 7-30)

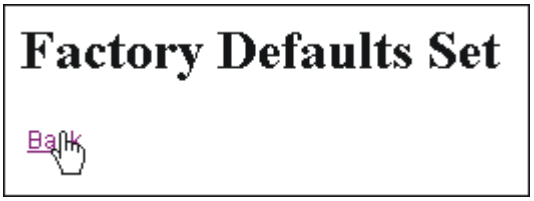


FIG. 7-30 FACTORY DEFAULTS SET

Step 7. Click on Back to return to the Diagnostics page.

Step 8. Click on "UDP". The UDP pages appears with the number of packets received from other nodes on your network. (See Fig. 7-31) This information is useful to determine if you are communicating with other nodes.

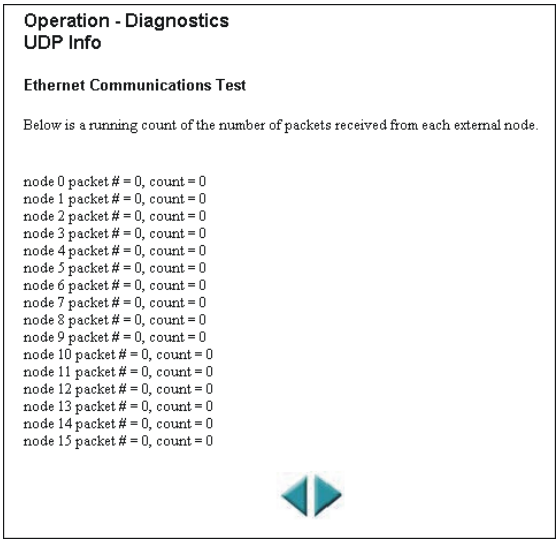


FIG. 7-31 COUNT OF UDP PACKETS RECEIVED FROM EACH EXTERNAL NODE ON YOUR NETWORK

Step 9. Click on Parameters. The Parameters page appears with a list of all the parameter settings you entered for the instrument. (See Fig. 7-32)

NOTE: It is a good idea to save these parameters. You should also highlight all the parameters and paste them in a text editor so you have a hard

copy for repair and configuration purposes. This feature allows you to save the parameter settings for future use or reference.

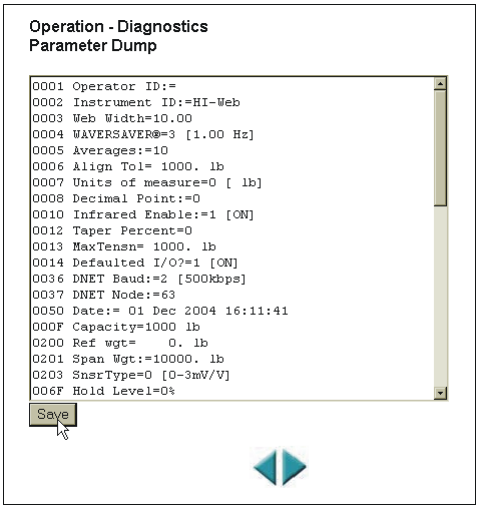


FIG. 7-32 DIAGNOSTICS/PARAMETER DUMP

Step 10. Click on the left arrow to return to the Diagnostics page.

Step 11. Click on Alarm Log. The Alarm Log page appears with a list of the Alarms that have been recorded since you last cycled the power. (See Fig. 7-33)

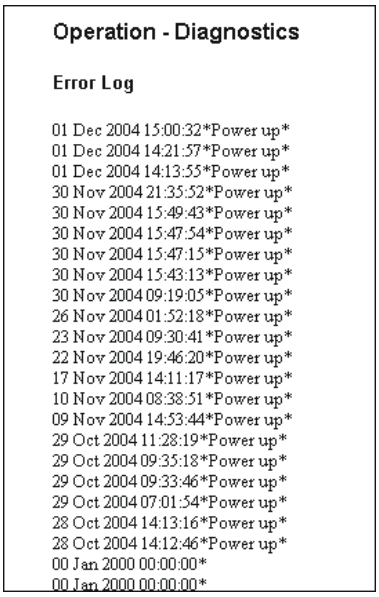


FIG. 7-33 DIAGNOSTICS/ALARM LOG

Step 12. The Alarm Log gives you a picture of the alarms and date and time when they occurred. Useful information to troubleshoot the tension system over time.

Step 13. To perform the Stability Test click on Stability Test. the

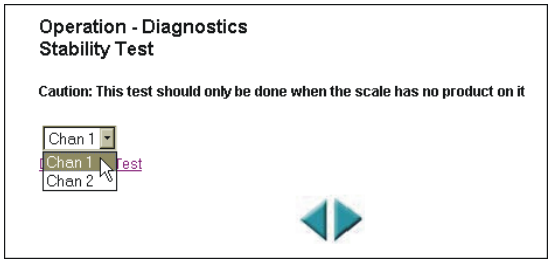


FIG. 7-34 DIAGNOSTICS/STABILITY TEST

WARNING: DO NOT PERFORM THE STABILITY TEST WITH PRODUCT ON THE ROLLER OR SHEAVE OR WHILE THE SYSTEM IS RUNNING. TO DO SO CAN RESULT IN PROPERTY DAMAGE, PRODUCT DAMAGE AND/OR PERSONAL INJURY. MAKE SURE THE SYSTEM IS COMPLETELY STOPPED BEFORE PERFORMING THE STABILITY TEST.

Step 14. Click on the Channel pull down menu. (See Fig. 7-34)

Step 15. Click on the Channel you want.

Step 16. Click on Test.

Step 17. The Instrument goes through the Stability test, then the Results page and an explanation of the test appears. (See Fig. 7-35)

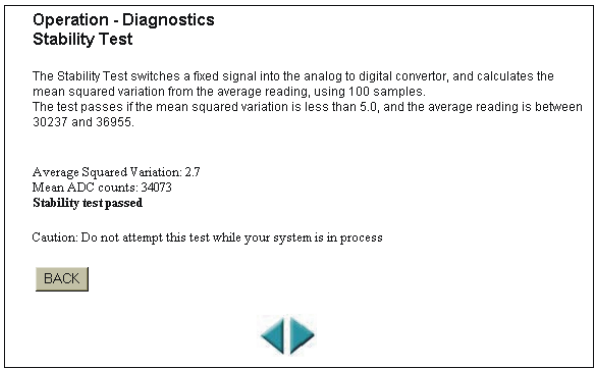


FIG. 7-35 STABILITY TEST RESULTS PAGE

Step 18. Click on the BACK button to return to the Diagnostics page.

Step 19. To See the force, mV, mV/V and ADC counts for each load cell click on Weight and Voltage. The Weight and Voltage page appears. (See Fig. 7-36)

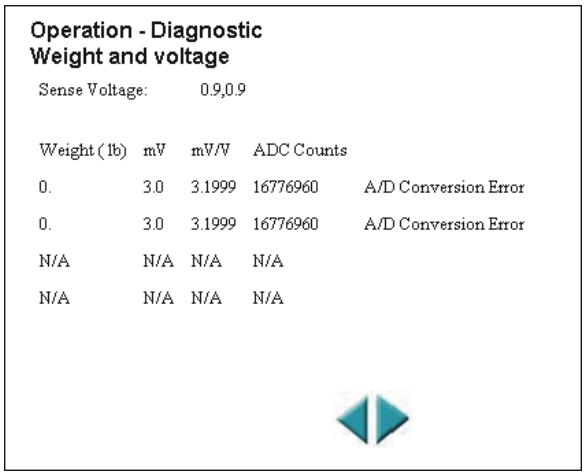


FIG. 7-36 DIAGNOSTICS PAGE/WEIGHTS AND VOLTAGE

Step 20. This page provides a snapshot of the load cells and cables. For example if you see an A/D conversion Error it means that a load cell is not connected. The information on this page is excellent for determining if a problem is in the load cell/cable or the instrument.

Step 21. Click on I/O to see the status of each of the Inputs and Relay Outputs for this instrument. (See Fig. 7-37)

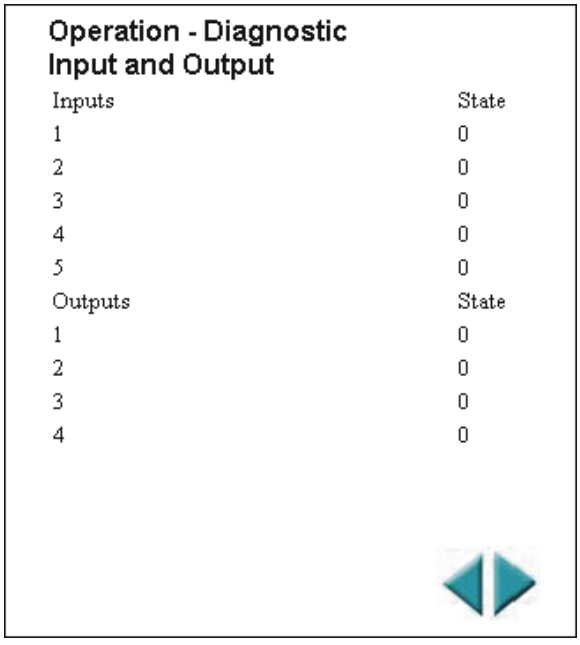


FIG. 7-37 DIAGNOSTIC PAGE/INPUT AND OUTPUT LIST AND STATUS

Step 22. To see if you have any C2 load cells connected to the Tension Controller, click on C2. The C2 Data page appears with the number of C2 Sensors in your system. In our example there are none connected to the instrument. (See Fig. 7-38)

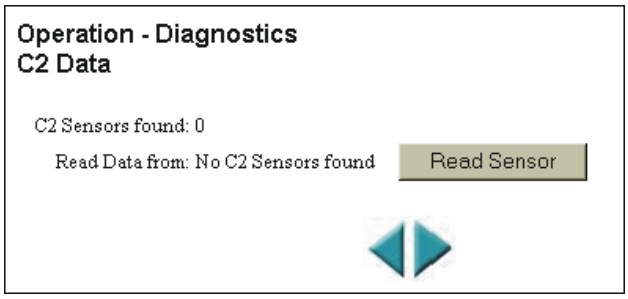


FIG. 7-38 DIAGNOSTICS PAGE/C2 DATA

Step 23. Click on the Read Sensor button to get the data from the C2 sensor.

Step 24. Click on the left arrow to return to the Diagnostic page.

Step 25. Click on Home to return to the Home page.

Troubleshooting The Network Connections and Configuration with the "Ping" Tool

Step 1. The Ping Tool is used from the root directory of the PC. Get to the Root directory. The Root Directory is the “C:/” Prompt.

Step 2. Click on the Start Button of the Windows Task Bar.

Step 3. Click on Run. (See Fig. 7-39)

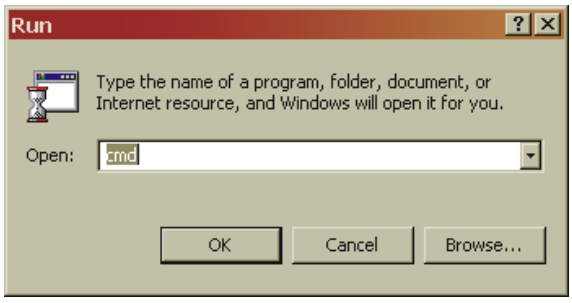


FIG. 7-39 RUN/CMD ENTERED

Step 4. In the Run field type “cmd” without the quotation marks.

Step 5. Click on the OK button. The Command Window appears. (See Fig. 7-40)

FIG. 7-40 COMMAND WINDOW

Selecting the module by number for Testing

NOTE: You can only ping from the PC you cannot ping from an instrument.

Step 1. Type PING <space>IP address of the instrument you want to test. For Example:

C:\>PING 168.215.209.78

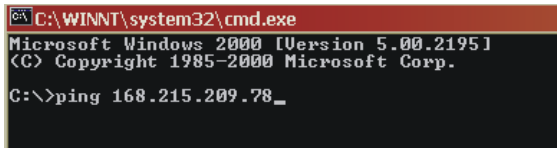


FIG. 7-41 ENTERING IP ADDRESS

NOTE: The IP address entered is for the test module which is available to the outside world. You IP Address will vary.

Step 2. Press the Enter key on the PC.
Step 3. The PING utility starts sending out 56 signals and 64 signals should return if the unit is functioning correctly.

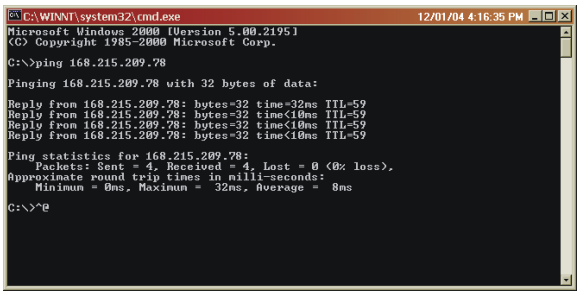


FIG. 7-42 SUCCESSFUL PING

- If the instrument or network are configured incorrectly and cables are loose or not connected correctly, nothing prints out after the first line. Do the following:

  1. Check the Network cables and connectors to be sure they are tightly fastened and the correct cables for this application.
  2. Check the configuration to be sure that the instrument is configured correctly. (See Configuration IP Address in Chapter 6)
  3. Check the Ethernet card to be sure that is securely seated and that it is functioning correctly.

- If the unit is configured correctly and the Ethernet card is functioning correctly and the cables are the correct ones for this application and are securely fastened, 64 signals should be returned and the print out will reflect this fact.

NOTE: NOTE: The Ping utility continues to send out signals (pings) until you exit the Ping Tool.

- Simultaneously press the <Ctrl> key and the letter <C> key to stop the signals.

Exiting the Root Directory

Step 1. Type exit at the root directory prompt.
C:/exit
Step 2. Press the Enter key.

About Solid State Relays With Light Loads

There have been installations where solid state relays have been used and failed to shut off a solenoid or relay when de-energized. The actual problem comes from the internal snubbing network in parallel with the Silicon Controlled Rectifier (SCR) which does the actual switching. This network presents an impedance of 30K ohms, which means with 120 volts across, it will pass 4mA of AC current.

SCR SWITCHING LOAD CIRCUIT

The SCR itself presents no leakage current. Some solid state relay manufactures specify 20mA minimum load. This is based on the presumption a relay or solenoid will drop out with only 4mA through it, which is not always true. That may not be true. When switching a light load with a solid state relay across the line, you must look at the rated drop-out current of the load, and if it is less than 4mA it may not turn off. The solution is to put a loading resistor in parallel with the light load, to be sure leakage current is sufficiently shunted away from the coil.

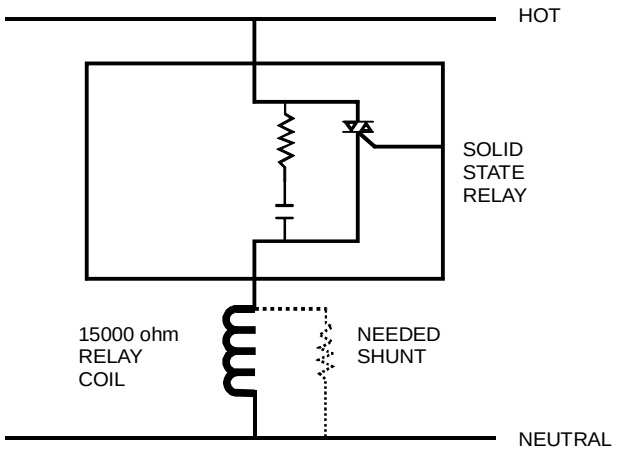


FIG. 7-43 SCR SWITCHING LOAD CIRCUIT

Assume a load like a relay with a coil of 15,000 ohms and of 5% of nominal drop-out. When the solid state relay is off, there will still be 1/3 of the line voltages across the relay, so it will not drop out. For the relay to have 5% of the line across it, it and a parallel shunt resistor must be 20 times less resistance than the 30K snubbing network, or 1.5K ohms. Use less than a 1.67K ohm parallel resistor and now total load is below 1.5K ohm or 80mA.

General Policies and Information

With over 70 years of industrial weighing experience and products in the field, Hardy Instruments continues to design, manufacture, install and support Hardy products worldwide. The following paragraphs describe Hardy's customer support services and equipment warranty.

NOTE: Before returning any product to Hardy Instruments, call the Technical Service Department listed below for a Return Authorization Number. Have your company name, address, telephone, equipment model number, S/N, and a brief description of the problem ready to give to him. In addition, please have Appendix A completed and ready to FAX to us before calling.

FOR FURTHER INFORMATION CONTACT:

Technical Service Manager
Hardy Instruments, Inc.
9440 Carroll Park Drive, Suite 150
San Diego, CA 92121
Telephone: (858) 278-2900
FAX: (858) 278-6700
Web Site: http://www.hardyinst.com
E-Mail: hardysupport@hardyinst.com

Ordering Replacement Parts

Contact the Hardy Instruments Sales Department to order replacement parts and option boards. Have your equipment model number and serial number ready.

System Support

Technical Service is provided as follows:

- New system start-up: Ensure that the installation is checked and correct; instruments are calibrated, and operators trained.

1. Service: Engineers are trained and qualified to provide on-site installation, calibration, and maintenance.
2. On-site training: A Hardy Support Representative can be scheduled to train your operations and maintenance personnel. This can be as simple as basic load cell theory or as complete as troubleshooting techniques which allow you to service your equipment.

Warranty

A warranty problem may be handled by returning the product to the factory for repair or replacement under warranty.

GLOSSARY OF TERMS

BASIS WEIGHT The mass per unit area of a web. Common metric units are in g/m 2. English units for the paper industry are often lb/3000ft 2. (Need to enter the symbol.)

CD Abbreviation for Cross (machine) Direction, sometimes also abbreviated as XMD, which is the direction perpendicular to the material flow and material plane in a machine. In many plants, this is referred to as TDE or Transverse Direction.

CALIPER (THICKNESS) The thickness of a web usually expressed in micrometers or mils (thousandths of an inch).

CALIPER (BRAKE TYPE) A disc brake pad or baking mechanism involving opposing brake pads that grip a rotating disc.

CONVERTING The process of a web material from one form to another. Converting processes include calendaring, coating, die cutting, embossing, laminating, printing, punching, sheeting, slitting, treating, winding and unwinding.

CORE A hollow tube, often of fiber, plastic or metal, upon which a roll is wound.

CORE SHAFT A mandrel upon which rolls are wound.

DANCER A moving roller sensor used for feedback control of web tension.

FEEDBACK Output from a sensor which is input to a controller for maintaining a control setpoint.

FEEDFORWARD A control technique to improve responsiveness of controls by letting the actuator know a change is need even before its sensor detects it.

FILM A thin polymer (plastic) web such as found in stretch wrap or garbage bags. Also a thin liquid.

FRICTION A force resisting motion. Friction between webs and rolls is important because it determines whether the web will track or lose traction. Friction between web and web is important because it determines how stable a stack or wound roll will be. Friction on machines is important because it may compromise the sensitivity of measurement or control.

HOOKE'S LAW A law that states that stresses equal the product of a material constant call modulus (or Young's modulus) and strains.

IDLER ROLLER A roller which is driven by the web rather than by an electric motor, belt or other external means.

INTERMEDIATE ZONE An independent tension zone typically created between two driven nip points on a converting line. Also referred to as a Mid-Process Zone.

LOAD CELL An electronic sensor that measures force. On converting machinery, load cells under the ends of an undriven roller are often used to measure web tension.

MANDREL A cylinder upon which a roll is wound.

MD Abbreviation for Machine Direction, which is the direction of material flow through a machine.

NIP	Two parallel rolls pressed together on converting machinery between which the web passes
PID CONTROL	An abbreviation for Proportional, Integral and Derivative control. A common three-function algorithm found in closed-loop controllers for automatically matching the control output to a set value of interest. Most tension controllers on the market that use a tension measurement input from transducers or load cells use PID for tension control. DFE uses the terms “Gain”, “Stability” and “Response” to describe each component of PID control because they are more descriptive of each.
PLI	An abbreviation for Pounds per Lineal Inch. A unit of tension measurement expressed as the total force (in pounds) on the web in the machine direction (MD) divided by the width (in inches) of the web. Expressing tension in PLI allows comparison of typical tensions between various width webs or various web substrates.
RATIO	An output feature on a tension controller that multiplies (for unwind applications) or divides (for rewind applications) the sampled control output by a factor adjustable between 1 and 10. The feature allows an instantaneous change i control output to correspond to the roll diameter change that takes place during a flying splice.
REWIND ZONE	A tension zone, typically on converting machinery, created between a driven nip roll or other tensioning point and the driven core onto which the web is wound.
ROLL	A web in wound roll form. This term is also used in the converting industry for rollers.
ROLLER	A rotating cylinder used for web transport. Aliases include, idler rolls, idler rollers, drums, rolls, pipe rollers.
SAMPLE AND HOLD	A control feature that locks the tension controller output at whatever level it is at when an external contact closes. The lock is maintained until the contact opens. Used in flying splice applications to prevent instability during the splice. Also actuated by the Ration function.
SOFT START	A tension controller feature used in unwinds zones; soft start causes the controller output to drop to a preset low level to prevent brake lockup when the machine start; the feature is actuated automatically upon loss of tension below a preset trip point, by a change in machine speed or by an external contact closure.
STRAIN GAUGE	A thin flat electrical transducer for measuring strain that is bonded to a body of interest.
SUBSTRATE	The material composition of a web.
TENSION TRANSDUCER	A tension sensor and variation of a load cell specifically designed to measure exact web or filament tension in processing industry.
TENSION LIMIT SWITCH (TLS)	A controller feature that provides a relay contact closure at preset tension levels, either high or low. TLS is often used as a web break detector or web break deterrent.
TAPER TENSION	A means of decreasing web tension as roll diameter increases in a rewind zone. Taper tension helps produce a roll of better quality by eliminating telescoping, crushed cores, and overly tight or loose rolls.
TENSION ZONE	A length of machine in which the web is under nominally the same tension, usually between driven roller.

TRACTION One of the three possible web/roller interactions where there is no relative movement between web and roller or between roll and roller. Also refers to the maximum tension differential that can exist across a roller without slippage.

UNWIND ZONE A tension zone created between a driven roll or driven nip and the core from which a roll is unwound. Tension is often created by torque applied to the unwind shaft by a pneumatic brake.

WEB a long, thin, flexible structure. Common web materials include paper, film, foil, non-wovens and textiles.

WRAP ANGLE The angle between the ingoing and outgoing tangent of a web on a roller, or equivalently, the angle the web deflects as it goes over a roller. High wrap angles help ensure web/roller traction.

Index

Symbols

Numerics

A

B

C

D

E

F

G

H

I

J

K

L

M

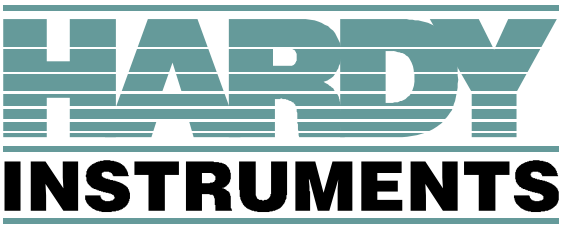
N

O

P

R

S



9440 Carroll Park Drive Suite 150, San Diego, CA 92121
Telephone: 1-800-821-5831 FAX: (858) 278-6700
Web Address: http://www.hardyinstruments.com

Hard Instruments Document Number: 0596-0287-01 Rev. E