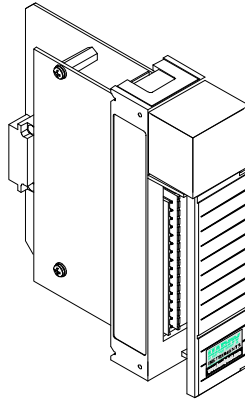


**HI 1746-WS
WEIGH SCALE MODULE**

**OPERATION AND INSTALLATION
MANUAL**

Series C



Corporate Headquarters

9440 Carroll Park Drive

San Diego, CA 92121

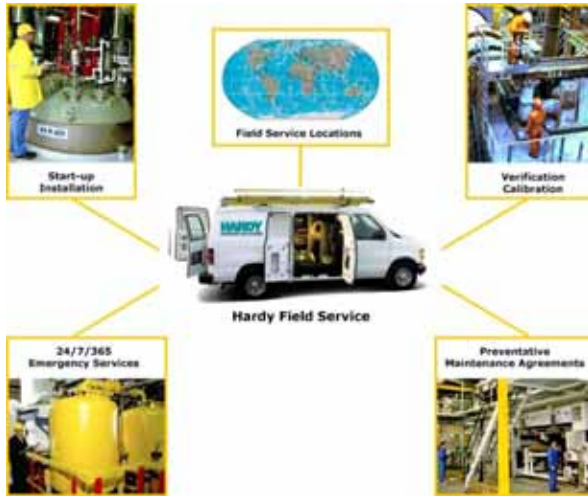
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Table of Contents

| | |
|---|-------------|
| TABLE OF CONTENTS | - I |
| TABLE OF ILLUSTRATIONS | - I |
| CHAPTER 1 - OVERVIEW | -1-1 |
| A Brief Description of Chapter 1 | -1-1 |
| About Hardy Manuals | -1-2 |
| Description | -1-2 |
| WAVERSAVER® | -1-3 |
| C2® Calibration | -1-4 |
| IT® | -1-4 |
| Excitation Monitor | -1-4 |
| Digital Volt Meter (DVM) - Optional | -1-5 |
| Return to Zero Test - Optional | -1-5 |
| Weighing System Tests - Optional | -1-5 |
| Auto Zero Tracking | -1-6 |
| Set Point TTL Outputs | -1-6 |
| CHAPTER 2 - SPECIFICATIONS | -2-1 |
| A Brief Description of Chapter 2 | -2-1 |
| Specifications for a Standard HI 1746-WS Weigh Scale Module | -2-1 |
| Modes of Operation | -2-1 |
| Conversion Rate | -2-1 |
| Averages | -2-1 |
| Resolution | -2-1 |
| Input | -2-1 |
| Non-Linearity | -2-1 |
| Maximum Zero Tolerance | -2-1 |
| WAVERSAVER® | -2-1 |
| Excitation Monitor | -2-1 |
| Common-Mode Rejection | -2-2 |
| Common-Mode Voltage Range | -2-2 |
| Backplane Input Voltage | -2-2 |
| Backplane Current Load | -2-2 |
| Power | -2-2 |
| C2 Calibration Input | -2-2 |
| Cable lengths | -2-2 |
| Load Cell Excitation | -2-2 |
| C2 Calibration Output | -2-2 |
| Set Point (1 & 2) Out | -2-2 |
| Environmental Requirements | -2-2 |

HI 1746-WS WEIGHT SCALE MODULE

| | |
|--|-------------|
| Temperature Coefficient | -2-2 |
| Operating Temperature Range | -2-2 |
| Storage Temperature Range | -2-2 |
| Humidity Range | -2-2 |
| Approvals | -2-3 |
| Digital Voltmeter | -2-3 |
| Optional Equipment HI 215IT Junction Box | -2-3 |
| IT Junction Box HI 215IT-SS or PS Series | -2-3 |
| Case Dimensions | -2-3 |
| Weight | -2-3 |
| Enclosure Ratings | -2-3 |
| IT Junction Box HI 215IT-FG Series | -2-3 |
| Case Dimensions | -2-3 |
| Weight | -2-3 |
| Enclosure Rating | -2-3 |
| Configuration Software for Windows | -2-3 |
| Default Parameters | -2-4 |
| CHAPTER 3 - INSTALLATION | -3-1 |
| A Brief Description of Chapter 3 | -3-1 |
| Unpacking | -3-1 |
| Installing the HI 1746-WS into an Allen-Bradley SLC 500 | |
| Processor or Allen-Bradley Remote Rack | -3-1 |
| Setting the Jumper for Local or Remote Mode of Operation | -3-2 |
| Installing the HI 1746-WS into the SLC 500 or Remote | |
| Chassis | -3-3 |
| Removing the Module from the SLC 500 or Remote Chassis | -3-5 |
| Installing the Module I/O Connector | -3-6 |
| About the Module I/O Connector | -3-6 |
| Load Cell Wiring Diagrams | -3-7 |
| Industry Standard Load Cells | -3-8 |
| Hardy Load Sensor with C2 | -3-9 |
| Hardy HI 215IT Junction Box | -3-9 |
| Installing the Hardy Configuration Software (Optional) | -3-10 |
| CHAPTER 4 - SETUP | -4-1 |
| A Brief Description of Chapter 4 | -4-1 |
| Power Check | -4-1 |
| LEDS | -4-2 |
| Run/Fault LED | -4-2 |
| Comm. LED | -4-2 |
| C2 LED | -4-2 |
| Setting Up Communications Between the SLC and the | |

| | |
|---|--------|
| HI 1746-WS Weigh Scale Module | - 4-2 |
| Local Mode of Operation | - 4-3 |
| Remote Mode of Operation | - 4-3 |
| About M Files | - 4-3 |
| Direct M File Mapping | - 4-3 |
| Local Mode of Operation | - 4-3 |
| Remote Mode of Operation | - 4-5 |
| M File Interface to Set Up for Local Mode of Operation | - 4-5 |
| M File Data Structure (Words 0 to 5) | - 4-5 |
| Logical File Interface to Set Up for Remote Mode of Operation (8 Word) | - 4-6 |
| About Logical Files | - 4-6 |
| Command Word Encoding | - 4-7 |
| Bits 15 & 14 | - 4-7 |
| Bits 8-13 | - 4-7 |
| Bits 0-7 | - 4-7 |
| Writing to the 32 Word Logical O and logical M0 files | - 4-8 |
| Command Word | - 4-8 |
| Writing to the M0 file | - 4-8 |
| For Example | - 4-8 |
| Writing to the O file | - 4-8 |
| For Example | - 4-8 |
| Words 1-7 | - 4-8 |
| Reading from the 32 Word Logical I and logical M1 files | - 4-9 |
| Command Word | - 4-9 |
| Bits 15-14 set to "10" | - 4-9 |
| For Example | - 4-9 |
| Bits 15-14 set to "11" | - 4-9 |
| For Example | - 4-9 |
| Bits 15-14 set to "01" | - 4-9 |
| Bits 15-14 set to "00" | - 4-9 |
| Executable Command List | - 4-10 |
| Zero Command (ZEROCMD) | - 4-10 |
| Tare Command (TARECMD) | - 4-10 |
| Write Non-Volatile Command (WRITENONVOLATILE) | - 4-11 |
| Reload Non-Volatile (RELOADNONVOLATILE) | - 4-11 |
| Float Integer to Integer Conversion Command (FLOAT2INT) | - 4-12 |
| Integer to Float Integer Conversion Command (INT2FLOAT) | - 4-12 |
| Cal Low Command (CALLOWCMD) | - 4-13 |
| Cal High Command (CALHIGHCMD) | - 4-13 |
| C2 Cal Command (C2CALCMD) | - 4-13 |
| Read C2 Serial Number Command (READC2SERIALNUM) | - 4-14 |
| Set Parameters Command (SETPARAM) | - 4-14 |

| | | |
|--|-----------|-------------|
| N10:61 | - - - - - | -5-7 |
| N10:62 | - - - - - | -5-7 |
| N10:63-64 | - - - - - | -5-7 |
| N10:65-66 | - - - - - | -5-7 |
| N10:67-68 | - - - - - | -5-7 |
| N10:69-70 | - - - - - | -5-7 |
| N10:71-72 | - - - - - | -5-7 |
| C2 Calibration Ladder Logic Explanation | - - - - - | -5-7 |
| C2 Calibration Ladder Logic Example (For Local Mode of Operation Only) | - - - - - | -5-8 |
| C2 Calibration Ladder Logic Example (For Remote Mode of Operation Only) | - - - - - | -5-11 |
| Hard Calibration | - - - - - | -5-12 |
| Hard Calibration Ladder Logic Example | - - - - - | -5-12 |
| CHAPTER 6 - OPERATING PROCEDURES | - - - - - | -6-1 |
| A Brief Description of Chapter 6 | - - - - - | -6-1 |
| Block Transfer, Read | - - - - - | -6-1 |
| Block Transfer, Read Example (For Local Mode Only) (READWEIGHT) | - - - - - | -6-5 |
| Explanation of the READWEIGHT Example | - - - - - | -6-5 |
| READWEIGHT Ladder Logic Example | - - - - - | -6-6 |
| Block Transfer, Read Ladder Logic Example for Remote Mode Operation | - - - - - | -6-6 |
| Block Transfer, Write | - - - - - | -6-7 |
| Block Transfer, Write Ladder Logic Example for Remote Mode Operation | - - - - - | -6-9 |

INDEX

HI 1746-WS WEIGHT SCALE MODULE

HI 1746-WS WEIGH SCALE MODULE

CHAPTER 1 - OVERVIEW

A BRIEF DESCRIPTION OF CHAPTER 1

This manual provides the user and service personnel with a description of the specifications, installation, setup, configuration, operation, communication, maintenance, and troubleshooting procedures for the Hardy Process Solutions HI 1746-WS Weigh Scale Module, designed for use in Allen-Bradley's SLC 5/02, 5/03, 5/04, 5/05 programmable controllers. The HI 1746-WS is equipped with WEVERSAVER[®], C2[®] Calibration, The Button, and INTEGRATED TECHNICIAN (*IT*) diagnostics. The module is configurable via Windows[®] 95/98/NT HI WS 100 Configuration Software or RS Logix 500[®] Industrial Programming Software. To get the maximum service life from this product, users should operate this module in accordance with recommended practices either implied or expressed in this manual. Before using the Weigh Scale Module, all users and maintenance personnel should read and understand all cautions, warnings, and safety procedures, referenced or explicitly stated in this manual, to ensure the safe operation of the module. Hardy Process Solutions appreciates your business. Should you not understand any information in this manual or experience any problems with the product, please contact our Customer Support Department at:

Phone: (858) 278-2900

FAX: (858) 278-6700

e-mail: hardysupport@hardysolutions.com

Web Address: <http://www.hardysolutions.com>

NOTE:

WEVERSAVER[®], C2[®], INTEGRATED TECHNICIAN[®] are registered trademarks of Hardy Process Solutions Inc. Windows[®] is a registered trademark of the Microsoft Corporation. RS Logix 500[®] is a Copyright of Rockwell Software Inc.

NOTE:

Hardy bases all procedures with the assumption that the user has an adequate understanding of all Allen-Bradley SLC 500 products. In addition the user

HI 1746-WS WEIGH SCALE MODULE

should understand process control and be able to interpret ladder logic instructions necessary to generate the electronic signals that control your application(s).

About Hardy Manuals

Every Hardy Installation and Operation manual is organized into easily referenced chapters, that are almost always the same:

- **Chapter 1** - Provides an introduction to the instrument and an **Overview** of the equipment and its capabilities.
- **Chapter 2** - Provides a complete list of **Specifications**.
- **Chapter 3** - Contains information needed to install the HI 1746-WS (both standard and optional equipment) and the HI 215IT series Junction Box.
- **Chapter 4** - Provides complete hardware **Configuration** instructions for setting dip switches and jumpers.
- **Chapter 5** - Pertains to the firmware/software **Setup** and preparation procedures to calibrate and operate the instrument.
- **Chapter 6** - Provides all **Calibration** instructions.
- **Chapter 7** - Pertains to the **Operating Procedures** of the HI 1746-WS.
- **Chapter 8** - Pertains to the **Troubleshooting** procedures for repair of the instrument.

Hardy Process Solutions hopes that this manual meets your needs for information and operation. All corrections or suggestions for improvements of this manual are welcome and can be sent to the Technical Publications Department or Customer Support Department at Hardy Process Solutions Inc.

Description

The HI 1746-WS Weigh Scale Module is a self contained microprocessor based I/O module with control inputs and outputs, that is designed to be easily plugged into the back plane of an Allen-Bradley SLC 5/02, 5/03, 5/04 or 5/05 programmable controller and/or Remote Rack. The HI 1746-WS Weigh Scale Module can be configured to operate as either a local or

remote module. The HI 1746-WS module can be used for a wide variety of process weighing applications such as batching, blending, filling/dispensing, check weighing, force measurement, level by weight and weight rate monitoring. The module can control two (2) relays via two (2) TTL level outputs and transmits data via the back plane to the SLC. The 20 bit analog to digital converter in the weigh module controller updates twenty (20) times per second and is capable of 985,000 counts of display resolution. This gives the instrument the ability to tolerate large “dead” loads, over sizing of load cells/sensors and still have sufficient resolution to provide accurate weight measurement and control. The HI 1746-WS module is set up by using the SLC 500 AI Series, RS Logix500[®] Industrial Programming Software for Windows[®] 95/98/NT or the optional Hardy Windows[®] 95/98/NT HI WS100 Configuration Software. The software configuration applications must be installed in a PC with either Ethernet, DH+, DH-485, or RS-232-C that can initiate communications with the SLC 5/02, 5/03, 5/04 or 5/05. To calibrate the module you can simply push “The Button” to effect a C2 calibration. C2, Hard (Traditional calibration with weights), and Soft calibration can be implemented from the SLC 500 AI Series DOS software, RS Logix500[®] Industrial Programming Software for Windows[®] 95/98/NT or from the optional Hardy WS 100 Configuration Software for Windows. The HI 1746-WS is IT (Integrated Technician) enabled which means the module has a built in IT excitation monitor to detect some load cell problems and with the addition of the optional HI 215IT Junction Box and the HI WS100 software, the operator can use the other IT functions for fault isolation troubleshooting of the weighing system.

WAVERSAVER[®]

Typically, mechanical noise (from other machinery in a plant environment) is present in forces larger than the weight forces trying to be detected by the module. The HI 1746-WS is fitted with WAVERSAVER[®] technology which eliminates the effects of vibratory forces present in all industrial weight control and

HI 1746-WS WEIGH SCALE MODULE

measurement applications. By eliminating the factor of vibratory forces the module is capable of identifying the actual weight data. **WAVERSAVER®** can be configured from the Configuration Software to ignore noise with frequencies as low as 0.25 Hz. One of five higher additional cut off frequencies may be selected to provide a faster instrument response time. The default factory configuration is 1.00 Hz vibration frequency immunity.

C2® Calibration

C2 Second Generation Calibration enables a scale 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 (8) C2 load sensors, a junction box, interconnect cable and an instrument with C2 capabilities such as the HI 1746-WS Weight Scale Module. All Hardy C2 certified load sensors contain digital information detailing its unique performance characteristics. The HI 1746-WS reads the performance characteristics of each individual load sensor and detects the quantity of load sensors in the system. C2 Calibration can be performed by pressing “The Button” located in the front of the module, or via Hardy’s Configuration Software or Allen-Bradley’s RS Logix 500 software.

IT®

INTEGRATED TECHNICIAN™ is a system diagnostics utility which continuously monitors the weighing system (with up to 4 load sensors) for possible malfunctions. For full functionality the HI 215IT junction box and Hardy’s Configuration Software for Windows should be used. Full **IT** functionality allows the operator to rapidly troubleshoot a weighing system from the Configuration Software, **INTEGRATED TECHNICIAN Display**.

Excitation Monitor

Continuously monitors a system’s excitation current to check for open or shorted load sensors or damaged or broken excitation wire(s), including the wires between the module and the **IT** Junction box. If the measured current deviates more than a +/- 10% tolerance, an “Excitation Error” bit (Module Status Word bit 9) is set to 1.

Digital Volt Meter (DVM) - Optional

Requires the HI 215IT Junction Box and Hardy Configuration Software to monitor both mV and mV/V readings per individual load sensor. Once a problem is detected by the operator the DVM readings help the operator to isolate the faulty component. Further, the DVM readings can be used to level a balanced system and to make corner adjustments to platform scales. Accuracy is +/- 2% or better of full scale.

NOTE:

If you do not have the HI 215IT Junction Box connected to the module, the mV/V reading as displayed in the Configuration Software, Test display is the total for all the load cells on the system.

Return to Zero Test - Optional

Requires the HI 215IT Junction Box to monitor individual load sensors. The Hardy configuration Software is required when using this option. This test compares the original voltage reading (saved at calibration) against the current voltage reading of an empty vessel. The test displays a “Passed Return to Zero Test” or a “Failed Return to Zero Test” statement when running the System Test from the Configuration Software, Test Display, depending on the outcome of the test. The test checks for damaged load sensors due to electrical zero shift or abnormal mechanical forces that cause binding on one or all of the load sensors in the system.

Weighing System Tests - Optional

Requires the HI 215IT Junction Box. This test is used to diagnose drifting or unstable weight reading problems. The Weighing System Test does the following:

1. Disconnects the controller and engages an internal reference signal to see if the problem is within the instrument.
1. Disconnects the load sensors and engages an internal (in the junction box) reference signal to see if the cable between the instrument and the Junction Box is causing the problem.
2. Reads the weight of each load sensor to see if the load sensor might be causing the problem.

The ability to read the weight seen by each individual load sensor allows use of this test to make cornering,

HI 1746-WS WEIGH SCALE MODULE

leveling and load sharing adjustments to the weighing system. The Hardy Configuration Software is highly recommended for use with this option.

Auto Zero

Auto Zero Tracking will indicate zero weight, as long as any “live weight” on the scale is below the set Auto Zero Tolerance and the scale is not motion. This capability allows the module to ignore material build-up in the weighing system within a pre-set auto zero tolerance.

Note

The amount of weight zeroed off is cumulative. The zero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance.

Set Point TTL Outputs

The HI 1746-WS is equipped with two (2) standard Digital TTL (Transistor - Transistor Logic) Level Outputs which can be connected to external solid state relays. Both outputs have individual set point, preact and deadband parameters. Both outputs are rated at 10 milliamps per line. Each can be programmed to respond to the standard Net, Gross, Rate of Change (ROC), Excitation Monitor, Force On or Force Off mode of operation.

CHAPTER 2 - SPECIFICATIONS

A Brief Description of Chapter 2

Chapter 2 lists the specifications for the HI 1746-WS Weigh Scale Module. Specifications are listed for the standard instrument and for optional equipment. The specifications listed are designed to assist in the installation, operation and troubleshooting of the instrument. All service personnel should be familiar with this section before attempting an installation or repair of this instrument.

Specifications for a Standard HI 1746-WS Weigh Scale Module

| | |
|-------------------------------|---|
| Modes of Operation | Local and Remote |
| Conversion Rate | 20 updates per second |
| Averages | 1-255 User Selectable in single increments |
| Resolution | Displayed: 1:985,000 (@ 3 mV/V) 1:656,000 (@ 2 mV/V) Internal: 1:1,048,576 |
| Input | Up to eight (8) 350 ohm Full Wheatstone Bridge, Strain Gauge Load Sensors/Cells (5 volt excitation) on one vessel. |
| Non-Linearity | 0.0015% of Full Scale |
| Maximum Zero Tolerance | 32766 |
| WAVERSAVER® | User Selectable <ul style="list-style-type: none">• 7.50 Hz• 3.50 Hz• 1.00 Hz (Default)• 0.50 Hz• 0.25 Hz |
| Excitation Monitor | Current less than +/- 10% expected |

HI 1746-WS WEIGH SCALE MODULE

| | |
|------------------------------------|---|
| Common-Mode Rejection | 110dB at or below 60 Hz |
| Common-Mode Voltage Range | 2.5VDC maximum (with respect to earth ground) |
| Backplane Input Voltage | 5 VDC maximum (with respect to earth ground) |
| Backplane Current Load | 0.250 Amps at 5 VDC |
| Power | +5 VDC +/- 5% |
| C2 Calibration Input | Isolation from digital section 1000 VDC minimum. |
| Cable lengths | 1000 feet maximum of C2 authorized cable 250 feet maximum of C2 authorized cable (Maximum of 4 load sensors) with IT Junction box. |
| Load Cell Excitation | 5 VDC +/- 1.15 W maximum. Isolation from digital section 1000 VDC minimum |
| C2 Calibration Output | Isolation from digital section 1000 VDC minimum |
| Set Point (1 & 2) Out | Discrete outputs (TTL) step function of 0 or +5 VDC to drive an SSR |
| Environmental Requirements | |
| Temperature Coefficient | Less than 0.005% of full scale per degree C for Cal-LO and Cal-HI reference points |
| Operating Temperature Range | 0° C to 60° C (32° F to 140° F) |
| Storage Temperature Range | -20° C to 85° C (-4° F to 185° F) |
| Humidity Range | 0-90% (non-condensing) |

Approvals

UL Certification
cUL Certification
CE Approval

Digital Voltmeter

Accuracy +/- 2% of full scale
Resolution

- mV/V 4 digits to the right of the decimal
- mV 1 digit to the right of the decimal

**Optional Equipment HI
215IT Junction Box**

**IT Junction Box
HI 215IT-SS or PS
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**

| | | |
|-----|----------------------|-------------|
| -SS | Stainless Steel | NEMA 4 & 4X |
| -PS | Painted Carbon Steel | NEMA 4 |

**IT Junction Box
HI 215IT-FG Series**

**Case
Dimensions**

6.50”H x 8.0”W x 4.46”D (165.1mmH x 203.2mmW
x 113.28mmD)

Weight

5 pounds (2.27 Kilograms)

**Enclosure
Rating**

| | | |
|-----|------------|-------------|
| -FG | Fiberglass | NEMA 4 & 4X |
|-----|------------|-------------|

**Configuration
Software for
Windows**

Hardy’s Configuration Software for Windows allows the user to configure, monitor, and troubleshoot an HI 1746-WS module and load points from any PC with an installed Windows® 95/98 or NT operating system.

HI 1746-WS WEIGH SCALE MODULE

Default Parameters

Table 2-1:

| Parameter | Default | Setting |
|----------------------------|---------------------|----------------|
| Tare Weight | 0.0 lbs | |
| WAVERSAVER® | 1 Hz | 2 |
| Weight Units | lbs | 0 |
| Span Weight | 10,000.0 lbs | |
| Averages | 10 | |
| Auto Zero Tracking Enabled | False | 0 |
| Tare Enabled | True | 1 |
| Zero Enabled | True | 1 |
| Calibration Type | No Calibration | -1 |
| Setpoint Mode 1&2 | Force Low, Gross | 0x12 |
| Setpoint Value 1&2 | 10000.0 lbs | |
| Setpoint Deadband 1&2 | 0.1 lbs | |
| Setpoint Preact 1&2 | 0.0 lbs | |
| Auto-zero Tolerance | 10.0 lbs | |
| Motion Tolerance | 5.0 lbs | |
| Zero Tolerance | 10 | |
| Rate of Change Time Base | 10 | |
| Cal Year | 0 | |
| Cal Month | 0 | |
| Cal Day | 0 | |
| Cal ID | 0 | |

CHAPTER 3 - INSTALLATION

A Brief Description of Chapter 3

All information contained in Chapter 3 pertains to unpacking, cabling, interconnecting, configuration and installing the HI 1746-WS Weigh Scale Module. Alternatives to any procedures contained or implied in this chapter 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 1746-WS module. Hardy Process Solutions appreciates your business. Should you experience any problems installing this equipment, contact Hardy Customer Support for assistance.

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 1746-WS Weigh Scale Module
 - Operation and Installation Manual
- Step 4. Write down the Model and Serial number of the module. Store this information in a convenient location for reference when contacting The Customer Support Department for parts or service.

Installing the HI 1746-WS into an Allen-Bradley SLC 500 Processor or Allen-Bradley Remote Rack

WARNING

ELECTROSTATIC DISCHARGE MAY DAMAGE SEMICONDUCTOR COMPONENTS IN THE MODULE. DO NOT TOUCH THE CONNECTOR PINS. PLEASE OBSERVE THE FOLLOWING HANDLING PRECAUTIONS:

HI 1746-WS WEIGH SCALE MODULE

- Wear an approved wrist-strap grounding device when handling the module.
- Touch a grounded object or surface to rid yourself of any electrostatic discharge prior to handling the module.
- Handle the module from the bezel in front away from the connector. Never, **NEVER** touch the connector pins.
- Never install, remove, or wire any module while the power is on. Always disconnect the power from the SLC when working on the module.
- Do not install the module right next to an AC or high voltage DC module.

Setting the Jumper for Local or Remote Mode of Operation

Step 1. Remove the module from its package by grasping the front cover. (See Fig. 3-1)

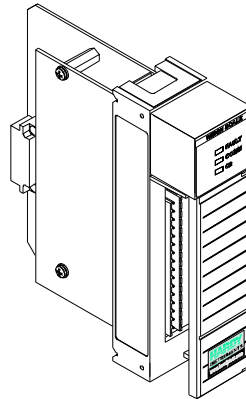
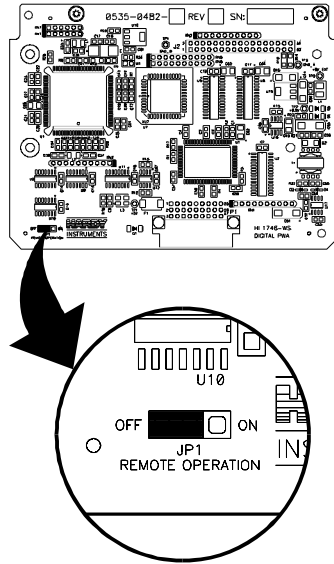


FIG. 3-1 HI 1746-WS WEIGH MODULE IN PROPER ORIENTATION

Step 2. Place the jumper either on OFF (Default) for Local or ON for Remote operation. (See Fig. 3-2)



**FIG. 3-2 JUMPER LOCATION/JUMPER SET
IN THE DEFAULT OFF (LOCAL MODE)
POSITION**

**Installing the HI
1746-WS into the
SLC 500 or
Remote Chassis**

- Step 1. Make sure that the module is oriented correctly for installation. (See Fig. 3-3)

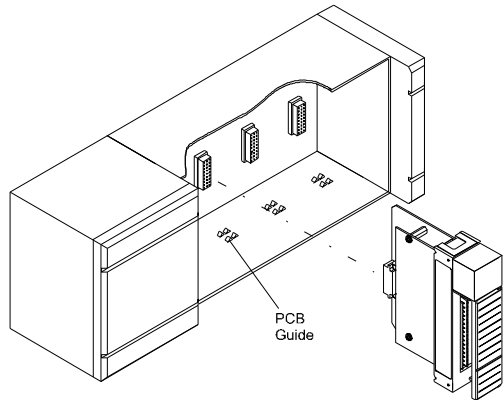


FIG. 3-3 POSITIONING THE MODULE FOR INSTALLATION

- Step 2. Gently slide the module into the SLC or Remote Chassis.
- Step 3. Slide the digital board between the PCB Guides on the top plate and bottom plate of the chassis to line up the module connector with the backplane connector.
- Step 4. When the module connector is touching the backplane connector, firmly but carefully push toward the chassis until the pins are plugged in and the Processor Releases (both top and bottom) are snapped into place. (See Fig. 3-4 & 3-5)
- Step 5. The installation is complete.

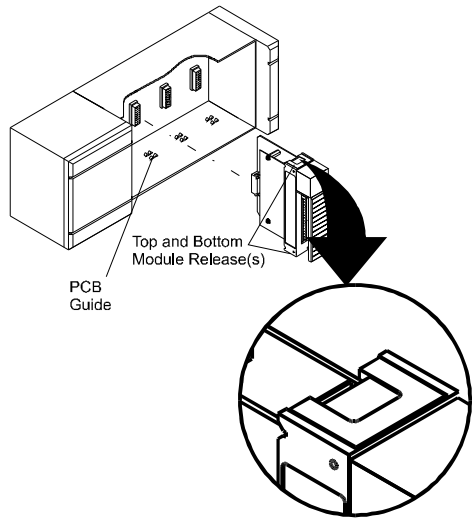


FIG. 3-4 MODULE RELEASE(S)

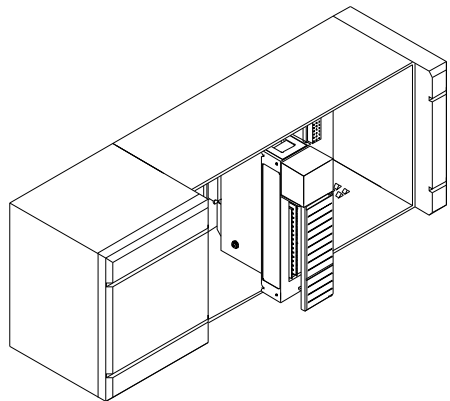


FIG. 3-5 MODULE INSTALLED IN SLC CHASSIS

Removing the Module from the SLC 500 or Remote Chassis

- Step 1. Press down on the top and bottom Processor Releases simultaneously until the module can be pulled away from the chassis. (See Fig. 3-4)

HI 1746-WS WEIGH SCALE MODULE

- Step 2. Pull the module out of the Chassis.
- Step 3. Store in a safe, secure location in an anti-static bag or the original enclosure.

Installing the Module I/O Connector

About the Module I/O Connector

The I/O Connector at the front of the module connects the module to the load sensors and relays, or the HI 215IT Junction Box depending on how many load sensors are installed in the weighing system. See below for the pin-out diagram. The pin-out diagram is located on the inside of the module door. (See Fig. 3-5)

| | |
|--------|---------|
| Pin 16 | Aux In |
| Pin 15 | N.C |
| Pin 14 | GND |
| Pin 13 | +V |
| Pin 12 | Relay 2 |
| Pin 11 | +V |
| Pin 10 | Relay 1 |
| Pin 9 | C2- |
| Pin 8 | C2+ |
| Pin 7 | -Exc |
| Pin 6 | -Sen |
| Pin 5 | -Sig |
| Pin 4 | +Sig |
| Pin 3 | +Sen |
| Pin 2 | +Exc |
| Pin 1 | Shield |

- Step 1. Open the Module door to gain access to the I/O connector. (See Fig. 3-5)

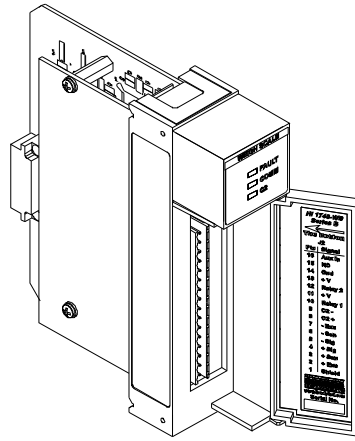


FIG. 3-6 MODULE WITH DOOR OPEN

- Step 2. Install the cable and connector so it allows the module door to be shut.
- Step 3. There is a bracket (not shown) that allows you to use a tie wrap to secure the cable to the module.
- Step 4. With the plug oriented correctly (See the pin-out diagram above), plug the I/O male connector into the I/O connector at the front of the module.
- Step 5. Check to be sure that the connector is completely plugged in before operating the module.

NOTE:

Most of the problems with modules are due to loose connections. Be sure to check the I/O connection first in the event you have a problem receiving information from the load cells or if the relays do not operate correctly.

Load Cell Wiring Diagrams

NOTE:

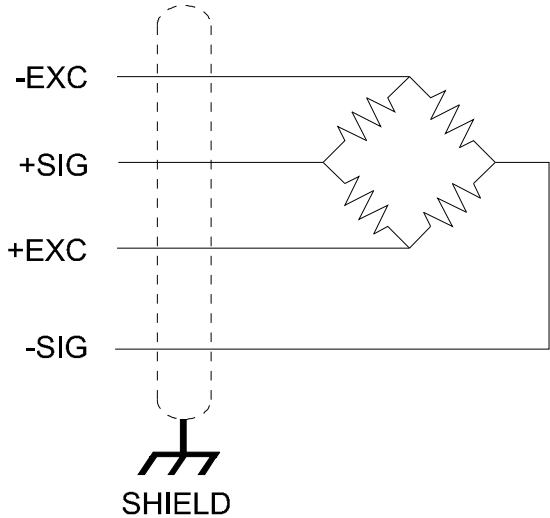
The HI 1746 has two factory installed jumpers. If your application is not using C2 load cells do not remove the factory installed jumpers. If your appli-

HI 1746-WS WEIGH SCALE MODULE

cation requires load cells cables that are less than 50 ft. you must leave the jumpers installed or connect the sense lines, one or the other. If your application calls for load cell cables over 50 ft. or you are using C2 load cells, remove the jumpers and connect the sense lines. The jumpers or sense lines must be installed at all times.

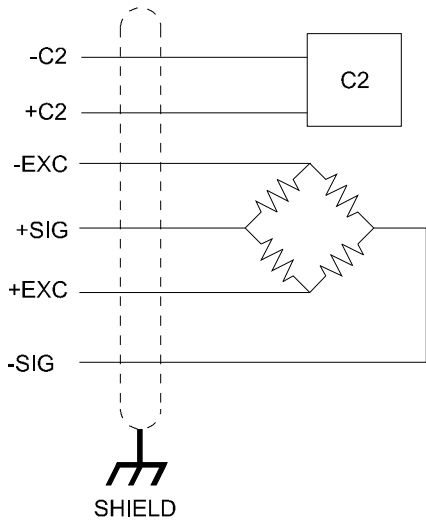
WARNING: Load cell cable length has been calculated into C2 calibration data. Hardy recommends that you **DO NOT CUT** your Advantage or Advantage Lite load sensor cable, as your C2 accuracy will be affected and the warranty will be voided.

Industry Standard Load Cells



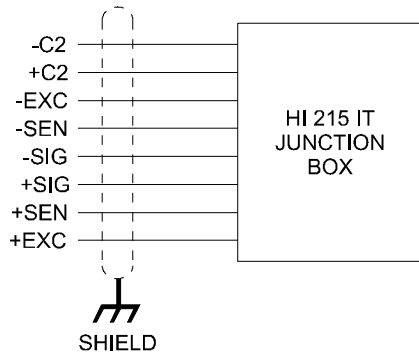
**FIG. 3-7 INDUSTRY STANDARD LOAD CELLS
WIRING DIAGRAM**

**Hardy Load
Sensor with C2**



**FIG. 3-8 HARDY LOAD SENSOR/C2 WIRING
DIAGRAM**

**Hardy HI 215IT
Junction Box**



**FIG. 3-9 HARDY HI 215IT JUNCTION BOX
WIRING DIAGRAM**

NOTE:

When connecting the Hardy HI 215IT Junction Box you must remove the two factory installed jumpers that are connected to contacts 2&3 and 6&7 on the module and install sense lines.

HI 1746-WS WEIGH SCALE MODULE

Installing the Hardy Configuration Software (Optional)

Contact your local Hardy Representative or Hardy Sales Department for information about how to purchase the Hardy WS 100 Configuration Software for Windows.

- Step 1. The SETUP program copies the required files to your hard disk.
- Step 2. Run Windows NT/95/98 and insert the Configuration Installation System Disk into the 3.5" floppy drive.
- Step 3. Click on START.
- Step 4. Click on Run.
- Step 5. In the Run field type the command:
a:setup. If your floppy drive is drive b
enter: b:setup.
- Step 6. Press the Enter key.
- Step 7. You can also use the Add/Remove Function in the Control Panel dialogue box.
 - a. Click on Start
 - b. Move the cursor to Settings.
 - c. Select Control Panel.
 - d. Double click on the Add/Remove Programs icon.
 - e. Click on the Install button.
- Step 8. The SETUP program will lead you through the installation process.

NOTE:

HI WS100 Configuration Software is an option. For Pricing and Information for this product contact your local Hardy Representative.

CHAPTER 4 - SETUP

A Brief Description of Chapter 4

All information contained in Chapter 4 pertains to firmware and software settings (Local and Remote modes of operation) to prepare the module controller for calibration and operation. Alternatives to these procedures explicit or implied, contained 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 going through the setup procedures. The Setup procedures require either Allen-Bradley DOS PLC 500 AI Series Ladder Logic Editor, Allen-Bradley RS Logix 500, Allen-Bradley RSLinx™ or RSLinx™ Lite. The Local Mode of Operation means the Module is installed in a SLC Chassis and Remote Mode of Operation means the Module is installed in a Remote Chassis.

Power Check

- Step 1. Check to see that there is power to the SLC and the module.
- Step 2. If there is power to the module, the LEDS should be lit. (See Fig. 4-1)
- Step 3. To make any settings the LED's should be lit as follows:
 - a. Run/Fault - Steady Green
 - b. Communication - Flashing Green
 - c. C2 - Steady Green if system has C2 load cells or off if there are no C2 load cells.

HI 1746-WS WEIGH SCALE MODULE

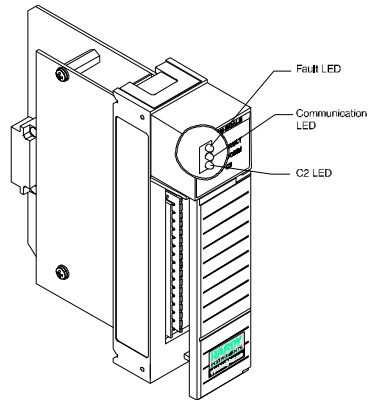


FIG. 4-1 MODULE LEDES

LEDS

| | | |
|----------------------|----------------|--|
| Run/Fault LED | Flashing Green | Self-Test is running. |
| | Flashing Green | (5Hz Flash Speed) - Self-Test Failed, or no calibration. |
| | Steady Green | Self-Test Passed |
| | Flashing Red | Weigh Scale Module has a fault. |
| | Steady Red | Module has a major problem.* |

NOTE:

* *Contact Hardy Customer Support for assistance.*

| | | |
|------------------|----------------|------------------------------------|
| Comm. LED | Steady Green | Normal Operation |
| | Flashing Green | Block transfer is being performed. |
| | LED is Off | No Communication |

| | | |
|---------------|--------------|--|
| C2 LED | Steady Green | A C2 load cell(s) has been found. |
| | LED is Off | No C2 load cells have been found. |
| | Steady Red | Unable to read loadcell data or the loadcell data is in error. |

Setting Up Communications Between the SLC 5XX and the HI 1746-WS Weigh Scale Module

To set up communication between the SLC 5XX and the HI 1746-WS Weigh Scale Module you will need to select or enter the following information into the I/O Configuration section of your software:

Local Mode of Operation

Type of Device Category: Other

I/O Card ID Code: 13635

M Files

M0 = 128 Words

M1 = 128 Words

There are no G files.

Remote Mode of Operation

Type of Device Category: Other

I/O Card ID Code: 3535

Input Words: 8

Output Words: 8

About M Files

The M File Interface consists of two files, M0 and M1. M0 and M1 files are data files that reside in the HI 1746-WS Weigh Scale Module. There is no image for these files in the processor memory. With respect to the SLC processor (SLC 5/02, 5/03, 5/04, 5/05) the M0 file is a module output file (a write only file) and the M1 file is a module input file (a read only file). With respect to the HI 1746-WS weigh module the M1 file is for output from the module to the processor and M0 file is for input from the processor to the module. The module writes replies in the M1 file to commands that the processor writes into the M0 file. The M files are used to control and monitor block transfer operations.

Direct M File Mapping

Local Mode of Operation

For the 1746 modules used in the local chassis, Hardy has available direct mapping of the parameters to the M files. This means that you can write to a specific location in the M0 file and the 1746 will pick up the change and apply it and reflect the change in the M1 file.

HI 1746-WS WEIGH SCALE MODULE

NOTE:

After making the change, you need to save the change to non-volatile memory.

Changes can be made one word at a time or up to 37 words (all parameters) at a time.

NOTE:

If multiple words written to the module at the same time, data must be in the same order and have the correct length for each parameter.

The mapping is as follows for all the parameters:

| <u>Parameter</u> | <u>Word</u> |
|-----------------------------|-------------|
| Tare Weight (float) | 28 |
| Span Weight (float) | 30 |
| CalLO Weight (float) | 32 |
| Set Point 1 (float) | 34 |
| Dead Band 1 (float) | 36 |
| Preact 1 (float) | 38 |
| Set Point 2 (float) | 40 |
| Dead Band 2 (float) | 42 |
| Preact 2 (float) | 44 |
| Zero Tolerance (float) | 46 |
| Auto Zero Tolerance (float) | 48 |
| Motion Tolerance (float) | 50 |

| <u>Parameter</u> | <u>Word</u> |
|-------------------------|-------------|
| Metric (int) | 52 |
| Waversaver (int) | 53 |
| Averages (int) | 54 |
| Zero Track Enable (int) | 55 |
| Tare Enable (int) | 56 |
| Zero Enable (int) | 57 |
| ROC Time Base (int) | 58 |
| Setpoint 1 Type (int) | 59 |
| Setpoint 2 Type (int) | 60 |
| Cal Year (int) | 61 |
| Cal Month (int) | 62 |
| Cal Day (int) | 63 |
| Cal ID (int) | 64 |

Remote Mode of Operation

For 1746 modules used in the remote chassis, direct mapping of the parameters to the M files is also available. You can write to a specific location in the M0 file, do a single Executable command, such as command 4 to write non-volatile, and the 1746 will pick up the change and apply it to the weigh module and reflect the change in the M1 file.

NOTE:

After making the change you need to save it to non-volatile memory.

The 1746 module is limited to 8 words total for any read or write at any time, so you are limited to changing a maximum of 7 words at a time. The mapping is the same as listed above for the local chassis.

M File Interface to Set Up for Local Mode of Operation

CAUTION:

THIS SETUP INFORMATION IS FOR THE LOCAL MODE OF OPERATION ONLY. BEFORE SETTING UP FOR LOCAL MODE OF OPERATION CHECK TO BE SURE THE JUMPER IS SET FOR LOCAL MODE AND THAT THE MODULE IS INSTALLED IN A LOCAL SLC CHASSIS. (SEE CHAPTER 3, PG 3-2 FOR MORE INFORMATION)

M File Data Structure (Words 0 to 5)

- 0 Sequence Number (sequenceNum) is used to control the flow of commands to the HI 1746-WS module in order to prevent duplicate or invalid commands. To write a command to the module, the processor must copy the current sequence number from the M1 file to the M0 file. When the module performs the requested command, it writes the response into the M1 file, incrementing the sequence number by 1. To get the sequence number from the module, a read command should be used before a write command to retrieve the next number from the module.
- 1 Command is used to select the command to be performed. Enter the command from the Command List.

- 2 Command Status indicates if the command succeeded or not. The module writes a value of zero (0) if the command succeeded. If the command failed, the module writes an error code value which indicates the reason for the command failure. (See the Error Code List.) The Error Code table also lists the commands where the error code is the sum of possible error bits.
- 3 Offset specifies which parameter will be read or written.
- 4 Length is the number of bytes in a data string field (32 bytes maximum or 16 words)
- 5 Datastring field is where the actual data is entered you want to send to the module, or to receive from the module. Example: To set the value of one of the module's parameters, the value of the parameter is written in the Datastring field.

Logical File Interface to Set Up for Remote Mode of Operation (8 Word)

CAUTION:

**THIS SETUP INFORMATION IS FOR THE
REMOTE MODE OF OPERATION ONLY.
BEFORE SETTING UP FOR REMOTE MODE
OF OPERATION, CHECK TO BE SURE THE
JUMPER IS SET FOR REMOTE MODE AND
THAT THE MODULE IS INSTALLED IN A
REMOTE CHASSIS. (SEE CHAPTER 3, PG 3-2
FOR MORE INFORMATION)**

About Logical Files

For the remote mode of operation, the HI 1746-WS has no M files. Instead, the module contains files that correspond to the 32 word I and O files used when the module is in the local mode of operation. These files are referred to as "Logical MFiles". Logical MFiles perform the function of the I, O, and M files used in the local mode of operation but are not directly accessible through the SLC backplane. (See Fig. 4-2)

- O = Output
- I = Input referenced to the CPU.

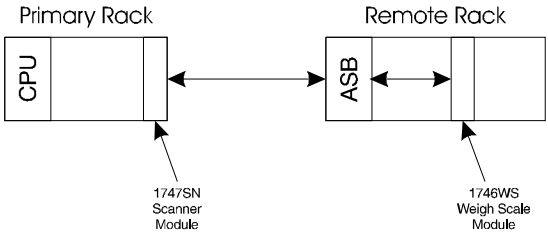


FIG. 4-2 PRIMARY AND REMOTE COMMUNICATION DIAGRAM

Command Word Encoding

You may write up to 7 words at a time to either the Logical O file or the Logical M0 file. Word #0 of the 8 word output file is used to specify where words 1-7 go in either the logical O or M0 file, is called the “Command Word”. Word #0 of the I file will always be a copy of the “Command Word”.

Bits 15 & 14

11 = write 0 to 7 words to the logical M0 file, Read 7 words from the M1 file.

NOTE:

You need to run any command through M files before previous writes take effect.

01 = write 0 to 7 words to the logical O file, Read (configured) I

10 = configure 0 to 7 words for the I file return, configure 7 words to read from Logical I file.

00 = the configured I file returned.

Bits 8-13

Number of words to write to the logical M0 or logical O file.

Bits 0-7

Offset (in words) in the logical M0 or logical O file where the write begins.

| Command Word - 16 bits | | |
|------------------------|-----------|----------|
| Bits 15-14 | Bits 13-8 | Bits 7-0 |

| Command Word - 16 bits | | |
|-------------------------------|--|--|
| Configure the Read and Write | Binary value indicating number of words to write | Binary value indicating starting offset for write/read to begin. |

Writing to the 32 Word Logical O and logical M0 files

You must Decide whether you are going to write to the M0 or O file.

Command Word

Writing to the M0 file

- Bits 15-14 set to “11”, will specify a write to the logical M0 file.
- Bits 13-8 set as a binary value indicating number of words to write (e.g. 2 would be “000010”).
- Bits 7-0 set as a binary value indicating offset word to start writer at (e.g. 28 would be “00011100”).

For Example

A command word set to binary value “1100 0010 0001 1100” would indicate a write of 2 words to the logical M0 file starting at offset word 28.

Writing to the O file

- Bits 15-14 set to “01”, will specify a write to the logical O file.
- Bits 13-8 set as a binary value indicating number of words to write (e.g. 2 would be “000010”).
- Bits 7-0 set as a binary value indicating offset word to start write at (e.g. 7 would be “00000111”).

For Example

A command word set to binary value “0100 0010 0000 0111” would indicate a write of 2 words to the logical O file starting at offset word 7.

Words 1-7

Data to be written to the M0 or O files. Number of words determined by setup of “Command Word

Reading from the 32 Word Logical I and logical M1 files

Reads are all done in the I file (not to be confused with the “logical I file”). Word #0 will always be a copy of the “Command Word”. Words 1-7 of the I file can be configured to read up to 7 words from either the Logical M1 or the Logical I file (you cannot read from both at the same time).

Command Word

Bits 15-14 set to “10”

Allows the user to specify what words (up to 7) from the logical I file to appear in words 1-7 in the I file.

For Example

If bits 15-14 are set to 10 in “Command Word” and words 1-7 of the O file are: 18,19, 20, 21, 16, 15, 24. The return in the I file words 0-7 would be (in order): “Command Word”, gross weight (MSW), gross weight (LSW), net weight (MSW), net weight (LSW), relay status, module status, and ROC evaluation period.

Bits 15-14 set to “11”

When written to the logical M0 file, will cause the I file to reflect the words at the same starting offset in the logical M1 file as specified in bits 7-0.

For Example

If 2 words are written to the logical M0 file starting at offset word 28, then offset words 28 and 29 of the logical M1 file would appear in words 1 and 2 of the I file.

Bits 15-14 set to “01”

For a write will cause the I file to reflect the words previously selected to read using the “10” setting.

NOTE:

The selected words to read are not necessarily the ones being written to using the “01” setting.

Bits 15-14 set to “00”

Returns the configuration set up with the “10” command.

NOTE:

After an input byte is configured, the 1746 will remember the configuration as long as it has power. The Configuration is lost after you power down.

HI 1746-WS WEIGH SCALE MODULE

Executable Command List

CAUTION:

ALWAYS PERFORM A READ COMMAND FIRST BEFORE THE WRITE COMMAND EVERYTIME, TO GET THE CORRECT SEQUENCE NUMBER. (SEE THE SET-PARAMS EXAMPLE, RUNG 0 FOR THE LADDER LOGIC)

Zero Command (ZEROCMD)

The Zero Command requests that the current gross weight be set to zero.

Error Return Values:

- NOTALLOWED - the ZeroEnable parameter is not set to TRUE (1),
- OUTOFTOLERANCE - the current weight value is beyond the limits set by the zero tolerance parameter.
- “STATUSWORD” - the command failed because the weight was not stable (in motion), or that there was an A/D error of some kind.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 1 | | | | |

Tare Command (TARECMD)

The Tare Command requests the current net weight be set to zero.

Error Return Values:

- NOTALLOWED - the TareEnable parameter is not set to true
- “STATUSWORD” - means the command failed because the weight was not stable (in motion) or there was an A./D error.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 2 | | | | |

Write Non-Volatile Command (WRITENONVOLTILE)

The Write Non-Volatile Command - causes all parameters (including calibration constants) to be saved to the non-volatile memory.

Error Return Values: None

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 4 | | | | |

Reload Non-Volatile Command (RELOADNONVOLATILE)

The Reload Non-Volatile Command - causes the weigh module to re-read the values stored in its non-volatile memory. Any parameters changed since the last write non-volatile command are overwritten. this command can be used to abort a calibration or parameter entry session.

Error Return Values: None

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 0x10 | | | | |

HI 1746-WS WEIGH SCALE MODULE

Float Integer to Integer Conversion Command (FLOAT2INT)

The Float Integer Conversion Command - converts a floating point number into an integer format. (For use with the SLC 5/02)

Data Input Values: 6 bytes (a four byte float, and a two byte integer)

Return Value: 4 byte long integer, equal to the float multiplied by the integer.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|------------------------|----------------------------|--------------------|--------------------|--------------------|---------------------|
| From M1 File | 0x96 | | | | |

Integer to Float Integer Conversion Command (INT2FLOAT)

The Integer to Float Integer Conversion Command - Converts a Float integer to an integer. (For use with the SLC 5/02)

Data Input Value: A four byte long integer, and a two byte integer.

Return Value: A four byte float, equal to the long divided by the two byte integer.

Error Return Value:

- NOTALLOWED - returned if the two byte integer is zero.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5 |
|------------------------|----------------------------|--------------------|--------------------|--------------------|------------------|
| From M1 File | 0x97 | | | | Integer Dividend |

| DATA 6 | DATA 7 | DATA 8-16 |
|------------------|------------------|---------------------|
| Integer Dividend | int2 Divisor | |

**Cal Low Command
(CALLOWCMD)**

The Cal Low Command - sets the “calLowCount” parameter to the current A/D average counts when doing a hard calibration.

Error Return Values:

- STATUSWORD - there was a conversion error, weight in motion or an A/D error or all three.
- HARDCALFAILCOUNTS - there is less than 100 counts between the zero and the span weights.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 0x64 | | | | |

**Cal High Command
(CALHIGHCMD)**

The Cal High Command - Sets the Span Weight parameter to the current A/D average counts when doing Hard CAL.

Error Return Values:

- STATUSWORD - there was a conversion error, weight in motion or an A/D error or all three.
- HARDCALFAILCOUNTS - there is less than 100 counts between the zero and the span weights.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 0x65 | | | | |

**C2 Cal Command
(C2CALCMD)**

The C2 Cal Command - Performs a C2 Calibration.

HI 1746-WS WEIGH SCALE MODULE

Error Return Values:

- STATUSWORD - there was a conversion error, weight in motion or an A/D error or all three.
- C2FAILNODEVS - did not detect any C2 load cells.
- C2FAILCAPEQ - detected two load cells with different capacities.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 0x66 | | | | |

Read C2 Serial Number Command (READC2SERIALNUM)

The Read C2 Serial Number Command - Reads the 9 byte serial number from a C2 chip located on every C2 load cell. Specify the index of the C2 chip to read in commandData.offset of the Mfile. The index should be a number of 0 to C2RomX-1 (-1 is a minus one not a dash one), where C2RomX is the number of C2 chips. The "serial number" will be 8 bytes of ASCII text, followed by a 0 terminator.

Error Return Values:

- OUTOFTOLERANCE - specified chip is not found.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------|------------------------|-------------|-------------|-------------|--------------|
| From M1 File | 0x70 | | | | |

Set Parameters Command (SETPARAM)

Sets a parameter in the module. (See Setting the Process Weighing Parameters below for more detailed information.)

Error Return Values:

- OUTOFTOLERANCE - is returned if an incorrect value is entered to a parameter.
- INDEXOUTOFRANGE - is returned if no parameter corresponds to the offset specified.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------------------|---------------------------------|---------------------|---|---------------------|-------------------------------------|
| From M1 File | 0x100 | | Use Parameter Offset Value from Table 4-1 | | See Weight Multiplier Section Below |

**Get Parameters
Command
(GETPARAM)**

Reads a parameter, from the module. (See Setting the Process Weighing Parameters below for more detailed information.)

Error Return Values:

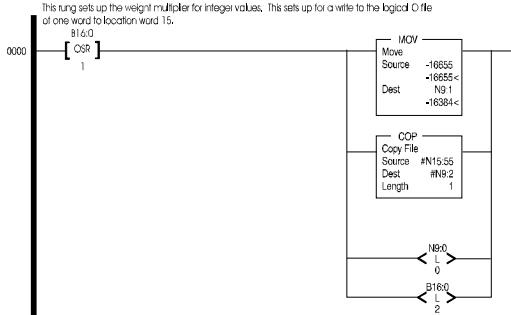
- OUTOFTOLERANCE - is returned if an incorrect value is entered to a parameter.
- INDEXOUTOFRANGE - is returned if no parameter corresponds to the offset specified.

| SEQ NUMBER 0 | COMMAND# (Hex) 1 | STATUS 2 | OFFSET 3 | LENGTH 4 | DATA 5-16 |
|-----------------------------|---------------------------------|---------------------|---|---------------------|----------------------|
| From M1 File | 0x101 | | Use Parameter Offset Value from Table 4-1 | | |

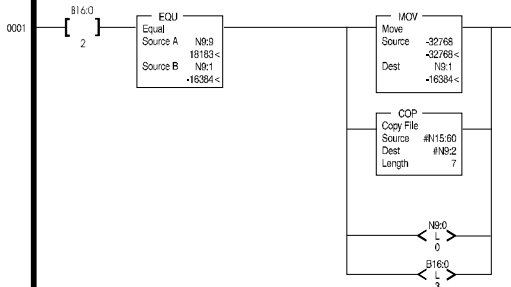
HI 1746-WS WEIGH SCALE MODULE

I/O Setup Ladder Logic for Remote Mode Operation

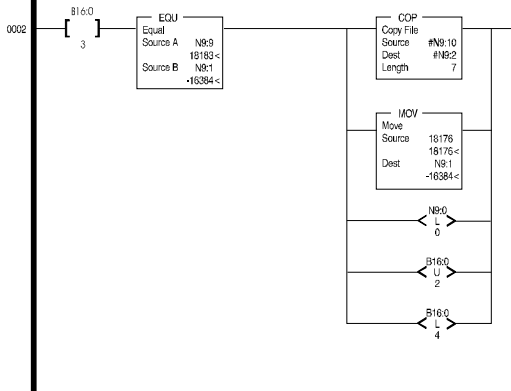
This file reads the logical I file and writes it back to the logical O file. All B16 bits are control to insure sequencing of runs. Bit N9:0 initiates the transfer.



This rung sets up a read of the first 7 words of the logical I file to transfer to the logical O file data locations. Data locations N1 5:60 through N15:73 are being used as constant values (0-13 respectively) for setting up words to read. The first MOV is setting up the command word for bit 15-14 = 10, N9:2 to N9:8 will use values 0 to 7, for the first 7 words of the logical I file.

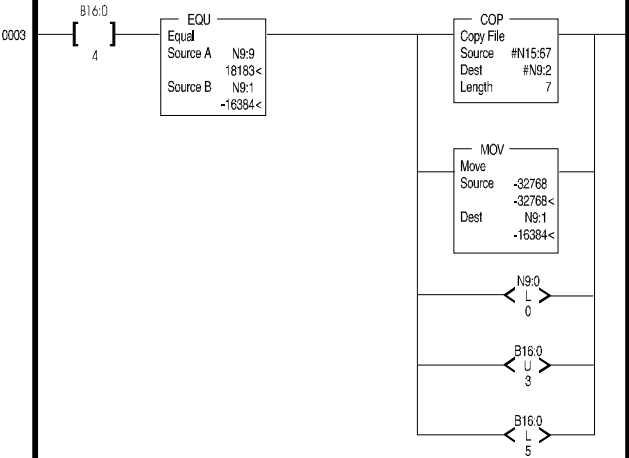


This rung copies the data from the read to the logical O data table location. These are words 0-6. Command word set up: bits 15-14 = 01, bits 13-8 = 7, bits 7-0 = 0. This will write 7 words to logical O file starting at word 0.

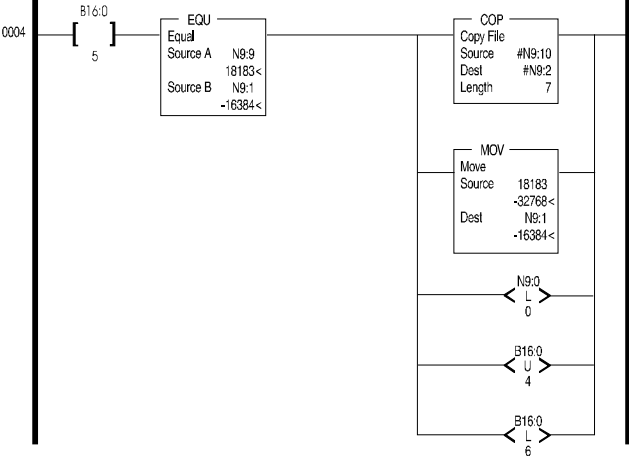


This rung sets up the weight multiplier for integer values. This sets up for a write to the logical O file of one word to location word 15.

This rung sets up a read of the second 7 words of the logical I file to transfer to the logical O file data locations. Data locations N15:0 through N15:7 are being used as constant values (0-3 respectively) for setting up words to read. The first MOV is setting up the command word for bits 15-14 = 10. N9:2 to N9:8 will be values 8 to 13, for the second 7 words of the logical I file.



This rung copies the data from the read to the logical O data table location. This are words 7-13. Command word set up: bits 15-14 = 01, bits 13-8 = 7, bits 7-0 = 7. This will write 7 words to the logical O file starting of word 7.



HI 1746-WS WEIGH SCALE MODULE

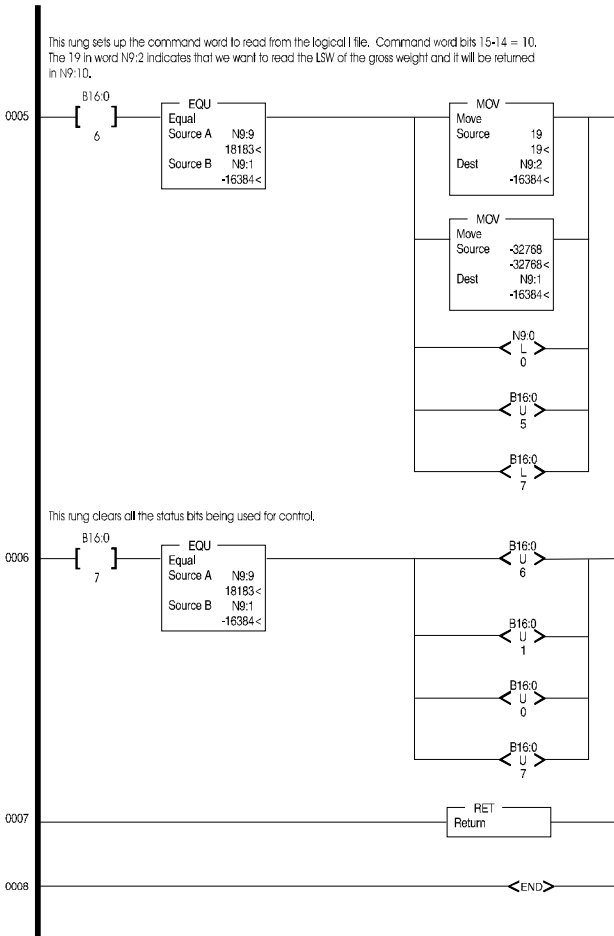


FIG. 4-3 SETUP I/O FOR REMOTE MODE OF OPERATION

HI WS100 Configuration Software Interface (Remote Mode of Operation)

The HI WS100 program communicates with the remote HI 1746-WS module via an integer (N7, N8, etc.) file, as specified in the "Comm Setup Section of the HI WS100 Configuration Software Manual Prt. #0596-0241-01) HI WS100 and requires 17 contiguous words.

A version of the ladder logic is contained in the HI WS 100 Configuration Software Manual. All addresses are arbitrary in the ladder logic example and may need to be changed to match the hardware configuration of your system and to prevent conflicts in addressing.

In the Ladder Logic example provided in the HI WS100 manual note the following:

- N9 is the data file for the data written to and read from the module and the trigger bit.
- The ladder logic program needs 17 contiguous words in the data file, which are:
 1. N9:0 is the write trigger
 2. N9:1 to N9:8 are write data locations.
 3. N9:9 to N9:17 are read data locations.

NOTE:

These can be from an integer file with 17 contiguous words available.

4. N10 is the data file for setting up sections of the M files.
5. N10:0 sets a section of the M file as read.
6. N10:1 sets the length
7. N10:2 sets the address.
8. N10:5 sets a section of the M file as write
9. N10:6 sets the length
10. N10:7 sets the address
11. N10:10 to N10:19 are locations used for checking status

NOTE:

Refer to Allen-Bradley 1747 Scanner module manual for more information on the setup of M files.

12. M0:x.yy and M1:x.yyy (where x = slot scanner module is in and yyy = location within the M file) are the M files being written to or read from.
 13. M0 is from the processor to the scanner
 14. M1 is from the scanner to the processor
 15. B11:0 is used for program control bits.
- Insure the following:
 1. Data file (i.e. N9) has 17 contiguous words and the file number and first word are listed in the appropriate fields in the “COMM SETUP” screen in WS100 and the “Remote” box is checked.
 2. Proper driver is selected. This should be the same driver that RS Logix 500 would use.
 3. Station number of the processor is correct which can be found in the driver configuration.
 4. M file setup data (i.e. N10:0 to N10:2) is correct for your setup.
 5. Slot location is correct in the M file references.

Setting The Process Weighing Parameters

About the Ladder Logic Example

We have provided a Ladder Logic example explaining how to set the weigh process parameters. The Ladder Logic example is meant to provide a ladder logic model only. Your application may vary and the example may or may not meet your requirements.

Weight Multiplier

To use one of the commands, place the offset of a parameter, from Table 4-1, into the command-Data.offset of the M0file. If you are setting a parame-

ter, place the 4 bytes for a float, or two bytes for an integer into the dataString.

If you have set the WEIGHTMULTIPLIER in the output data file to a non-zero value, and you are setting a parameter of type float, the parameter will be set to the 4 byte integer value you place in the dataString, divided by the WEIGHTMULTIPLIER. The parameter will be interpreted as pounds or kilograms, depending on the value of the Metric parameter.

If you are reading a type float parameter, and the WEIGHTMULTIPLIER is non-zero, the value of the parameter returned in dataString will be a 4 byte integer, equal to the parameter multiplied by the WEIGHTMULTIPLIER. The value returned will be pounds or kilograms, depending on the value of the Metric Parameter.

If the WEIGHTMULTIPLIER is zero, the dataString value returned will be a floating point integer.

NOTE:

Using a multiplier, setpoint data to and from the I/O tables is limited to three (3) decimal places.

**SETPARAM -
GETPARAM
Command and
Non Volatile
Memory**

The parameters set using the SETPARAM command are not automatically saved to non-volatile memory. A separate command is required (WRITENONVOLATILE 4).

Some parameters are not automatically used by the weigh module, because they are normally used only at start up. The command to save parameters to non-volatile memory does cause a re-initialization, so that the parameters will then be active.

**Possible Error
Returns**

OUTOFTOLERANCE - is returned if an incorrect value is entered to a parameter.

INDEXOUTOFRANGE - is returned if no parameter corresponds to the offset specified.

HI 1746-WS WEIGH SCALE MODULE

Setting Parameters Ladder Logic Explanation

- Rung #0 Does an initial read of the M1 file. This is necessary to get the sequence number for future writes.
- Rung #1 Loads data into the write location ready to write. The data required is:
- Sequence Number
 - Command Number
 - Parameter Offset
 - Parameter Value
- Rung #2 Checks to see if the data was loaded from the previous rung, then writes to the M0 file.
- Rung #3 Reads the M1 file for the response.
- Rung #4 Checks the results of the read to make sure that the sequence number was incremented (write complete) and that the status is zero (no error). If the check is good, it latches a bit for the next parameter.
- Rung #5 Checks the results of the read and if the status is not zero (error occurred) restarts the process of writing this parameter.
- Rungs #6-30 Duplicate the same process as rungs #1 to #5 for the remaining parameters.
- Rungs #1-5 - Units
 - Rungs #6-10 - Number of Averages
 - Rungs #11-15 - WEVERSAVER Setting
 - Rungs #16-20 - Zero Tolerance
 - Rungs #21-25 - Auto Zero Tolerance
 - Rungs #26-30 - Motion Tolerance

SETPARAMS Local Mode of Operation

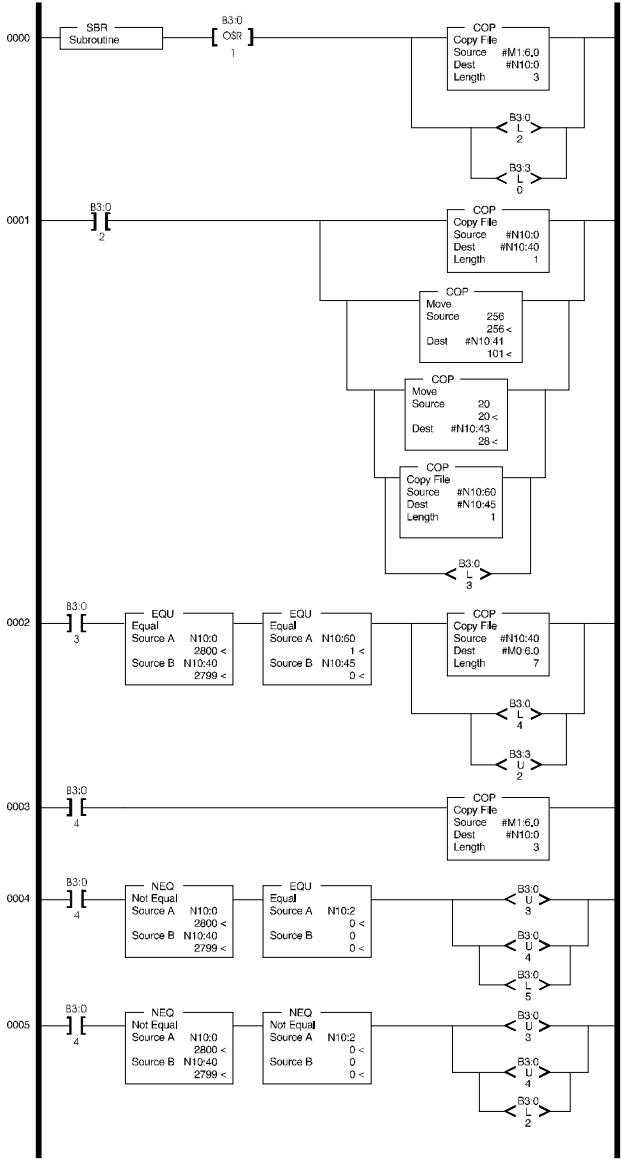
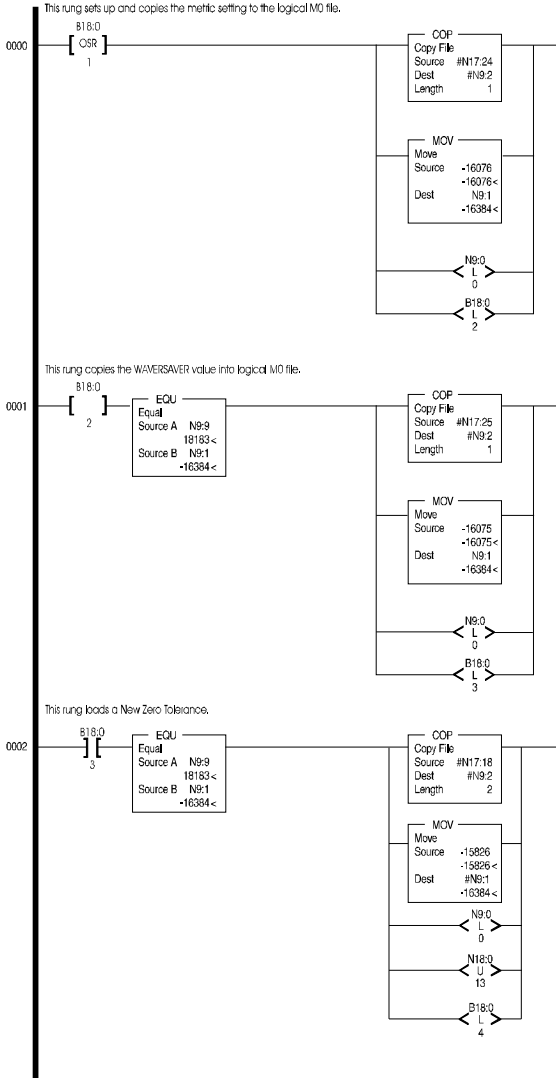
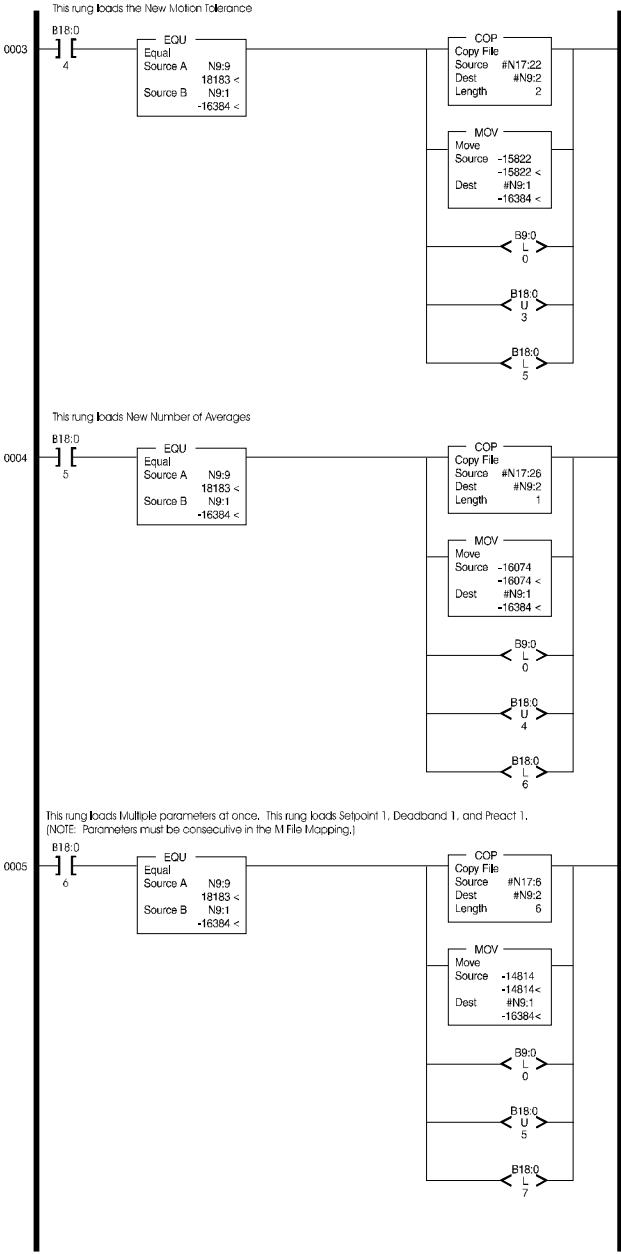


FIG. 4-4 SETPARAMS LADDER LOGIC EXAMPLE/LOCAL MODE

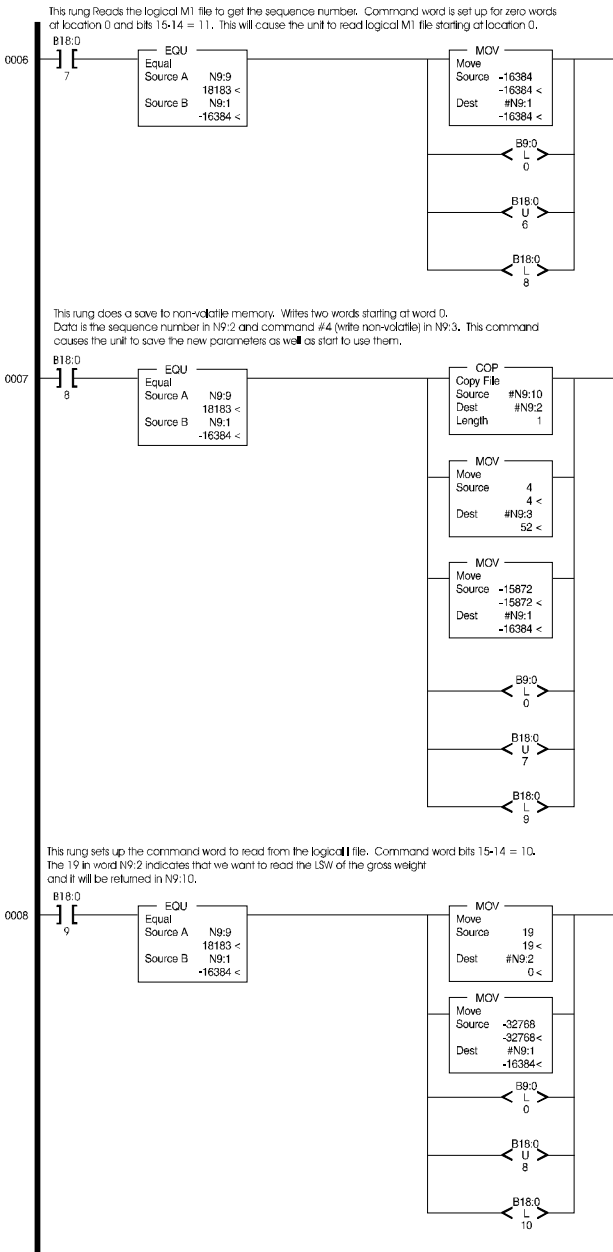
SETPARAMS Remote Mode of Operation

This file downloads single as well as multiple parameters to the logical M0 file. It does a save at the end that causes the unit to utilize the new parameters. For all writes to the logical M file, bits 15-4 of command word will be 11. Bits 13-8 will indicate the number of words, bits 7-0 will indicate the offset location in the M file for that parameter.





HI 1746-WS WEIGH SCALE MODULE



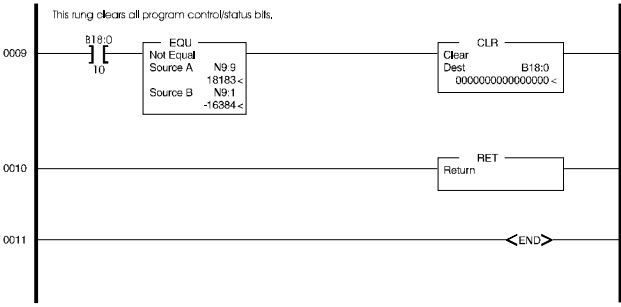


FIG. 4-5 SETPARAMS LADDER LOGIC EXAMPLE/REMOTE MODE

| Parameter (type) | Offset (Hex) |
|-------------------------------------|--------------|
| SpanWeight (float) | 0x1C |
| CalLoWeight (float) | 0x20 |
| ZeroTolerance (float) | 0x4C |
| AutoZeroTolerance (float) | 0x50 |
| MotionTolerance (float) | 0x54 |
| Metric (int) 0=LBS | 0x14 |
| WAVERSAVER (int) limits = 0 - 4 | 0x16 |
| NumAverages (int) limits = 1 - 255 | 0x24 |
| ZeroTrackEnable (int) | 0x26 |
| TareEnable (int) | 0x28 |
| ZeroEnable (int) | 0x2A |
| RoctimeBase (int) limits = 1 - 1800 | 0x2E |
| Tareweight (float) | 0x10 |
| Calyear (int) | 0x9C |
| Calmonth (int) | 0x9E |
| Calday (int) | 0xA0 |

Table 4-1: Parameters and Offsets

| Parameter (type) | Offset (Hex) |
|------------------|--------------|
| Calid (int) | 0xA2 |

Table 4-1: Parameters and Offsets

Error Code List

| | | |
|------------------|----|--|
| SUCCESS | 0 | |
| NOTALLOWED | -1 | |
| OUTOFTOLERANCE | -3 | |
| INDEXOUTOFRANGE | -4 | |
| NOSUCHCMD | -5 | |
| C2FAILNODEVS | -6 | |
| C2FAILCAPEQ | -7 | (failure, capacities not equal) |
| HARCALFAILCOUNTS | -8 | (failure, not enough ADC counts between high, low) |

NOTE:

For a complete ladder logic example for downloading all the parameters please go to the Hardy Process Solutions Inc. Web Site at: www.hardysolutions.com. Select Support then click on Sample Programs. If you do not have access to the Internet contact your local Hardy Representative or Hardy Customer Support and we will be glad to fax or mail you a hard copy.

Calibration Setup Procedures

Setting the Unit of Measure

The Unit of measure (Metric - See Table 4-1) can be set to either kilograms or pounds. Any weight value input to the module (e.g. CAL-LO, CAL-HI setpoints) are in the currently selected units. The unit of measure can be set at any time, not just at calibration. Setting the unit of measure before calibrating reminds the user what unit of measure is being displayed. It is important to note that the weigh scale module does not need to be calibrated again after changing the unit of measure.

Setting the Motion Tolerance Value

The motion tolerance is the tolerance value used to determine if the scale is in motion.

Setting the Zero Tolerance Value

Sets the range of weights so that the Zero Command works, as an offset of the calibrated Zero.

Setting the Auto Zero Tolerance Value

When the Auto Zero Tolerance is entered, and Auto Zero Tracking is enabled, any weight within the entered tolerance of zero and within the Auto Zero Tolerance of the calibrated zero point, with the scale not in motion, will cause the display to automatically read zero.

NOTE:

There is a short time delay (at least 1 second) before the Auto Zero Triggers.

The amount of weight zeroed off is cumulative. The zero command will fail if the current gross weight plus any previously zeroed amount exceeds the zero tolerance.

Setting the Number of Readings Averages

The Number of Averages sets the number of weight readings which will be used to compute the displayed weight. The average is a sliding average so that a new average reading is available for display at every reading.

Setting the Span Weight Value

The Span Weight is a reference point derived from an actual measured weight. This should not be confused with the Scale Capacity. If you have a 100 pound weight and you place it on the scale, the Span Weight would be 100 pounds.

Setting the WAVERSAVER Value

There are 5 selectable levels. 0 provides the least vibration immunity with the fastest response time. 4 provides the most vibration immunity with the slowest response time. Default setting is 2.

| Immunity | Setting |
|----------|---------|
| 7.5 Hz | 0 |
| 3.5 Hz | 1 |
| 1.0 Hz | 2 |
| 0.5 Hz | 3 |
| 0.25 Hz | 4 |

HI 1746-WS WEIGH SCALE MODULE

CHAPTER 5 - CALIBRATION

A Brief Description of Chapter 5

Chapter 5 pertains to the calibration procedures for the HI 1746-WS Weigh Scale Module. Alternatives to any procedures either implied or explicitly contained in this chapter are not recommended. In order for the Weigh Module to work properly, it must be calibrated prior to operation. Calibration procedures require an understanding of the M File interface. It is recommended that the module be re-calibrated periodically or when not in use for extended periods of time. Be sure to follow all the procedures completely to insure that the weights read by the module 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 1746-WS Weigh Module.

Pre-Calibration Procedures

- Step 1. Check to determine if the load cells have been properly installed.
 - a. Refer to your load cell I&M manual for proper installation instructions.
 - b. On some single and double ended shear beam load cells there is an arrow that indicates the direction of the applied load. If the arrow is pointing in the wrong direction, change the position of the load cell so that it is mounted in the direction of the applied load.

- Step 2. Check for Binding on the Load Cell or other parts of the weighing system.

CAUTION:

BINDING ON A SCALE/VESSEL OR LOAD CELL DOES NOT ALLOW THE LOAD CELL FREE VERTICAL MOVEMENT AND MAY PREVENT THE INSTRUMENT FROM RETURNING TO THE ORIGINAL ZERO REFERENCE POINT.

- a. A load cell must be mounted in such a way that 100% of the load (Vessel w/

Contents) is vertically passed through a load cell. (See Fig. 5-1)

- b. Check to see that nothing is binding the load cell. This means that nothing is draped across the scale/vessel or the load cell, such as a hose, electrical cord, tubes, or other objects.
- c. Check to see that nothing is coming in contact with the scale/vessel other than service wires and piping that have been properly mounted with flexible connectors.

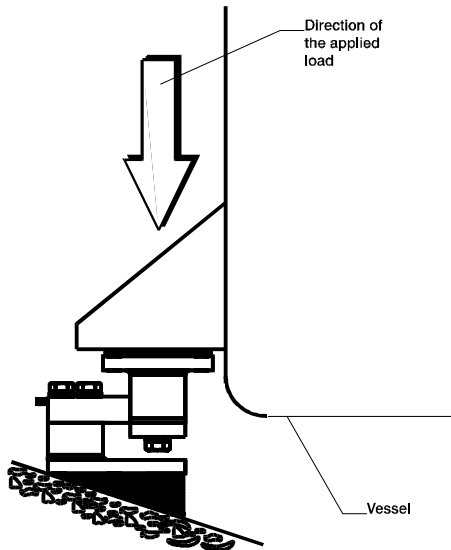


FIG. 5-1 PROPERLY INSTALLED LOAD CELL W/NO BINDING

**Electrical Check
Procedures**

**Load Cell/Point
Input/Output
Measurements**

Step 3. Typical Load Cell/Point Input/Output Measurements (EXC & SIG Outputs)

- a. The HI 1746-WS is designed to supply 5 VDC excitation to as many as eight 350 Ohm load cells/points.

- b. The expected output from each load cell/point depends on the mV/V rating of the load cell/point and the weight.
- c. For example, a 2mV/V load cell/point will respond with a maximum of 10 mVDC at full weight capacity of the system which includes the weight of the vessel and the weight of the product as measured by the load cell/point.
- d. If the load cell/point weight capacity is rated at 1000 pounds, the load cell/point will be 10 mVDC at 1000 pounds, 7.5 mVDC at 750 pounds, 5 mVDC at 500 pounds and so on.
- e. A zero reference point will vary from system to system depending on the “Dead Load” of the vessel. “Dead Load” is the weight of the vessel and appurtenances only, with no product loaded. In our example we will assume the dead load to be 500 pounds. (See Fig. 5-2)

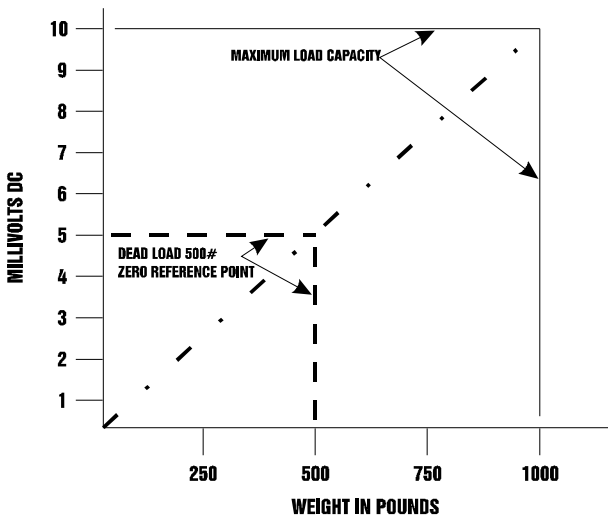


FIG. 5-2 MILLIVOLTS/WEIGHT SCALE

HI 1746-WS WEIGH SCALE MODULE

- f. Based on the example, the operating range for this scale is 5-10 mVDC with a 500 pound weight range. Understand that after zeroing the instrument, the 0 reading refers to the zero reference point and not absolute 0 mVDC or absolute 0 weight.

NOTE:

Load cell/point measurements are checked with a digital volt meter at the J2 connector on the front of the module or by using INTEGRATED TECHNICIAN with the HI 215IT Junction Box.

Load Check

- Step 1. Place a load (weight) on the scale or vessel.
- Step 2. Check to see if the weight reading changes on the ladder logic display in the proper direction.
 - For example: If the ladder logic display reads 100 pounds and a 20 pound weight is placed on the vessel or scale, the ladder logic display should read 120 or some value over 100.
 - If the ladder logic display reads 100 pounds and a 20 pound load is placed on the vessel or scale and the reading is 80 pounds, the reading is going in the wrong direction and indicates some problem with the system.
 - If the ladder logic display is reading improperly or shows no change there is something wrong with the setup.
- Step 3. If the ladder logic display changed weight in the proper direction, remove the weight and proceed to calibrate the module.

C2 Calibration

About C2 Calibration

C2 calibration requires C2 load sensors. If you do not have C2 load sensors you must perform a Hard Calibration. The HI 1746-WS reads the performance characteristics of each individual load cell and detects the

quantity of load cell in the system. C2 Calibration can be performed by pressing “The Button” located in the front of the module, or via Allen-Bradley DOS PLC 500 AI Series Ladder Logic Editor, Allen-Bradley RS Logix 500 or clicking the C2 selection in Hardy’s Configuration Software.

“THE BUTTON” C2 Calibration

- Step 1. Check to be sure that the parameters have been setup for your weighing process. (See Chapter 4, Setup)
- Step 2. Open the front door of the HI 1746-WS module. (See Fig. 5-3)

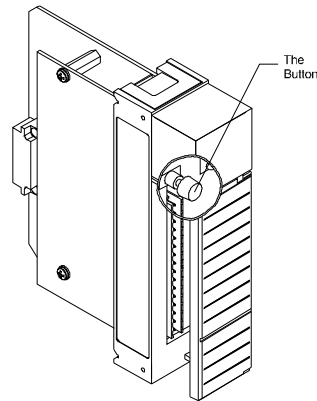


FIG. 5-3 “THE BUTTON” C2 CALIBRATION

NOTE:

If the module is being calibrated for the first time and your not sure what parameters to set, use the default parameters which are set by the module at power up. Once the calibration is successful, feel free to change the parameters to meet the requirements of your weighing process. (See Chapter 4 - Setup) “The Button” can be used for calibration at any time after the weighing process parameters have been set.

- Step 3. Press and hold “The Button” until the C2 LED goes off. (See Fig. 5-4)

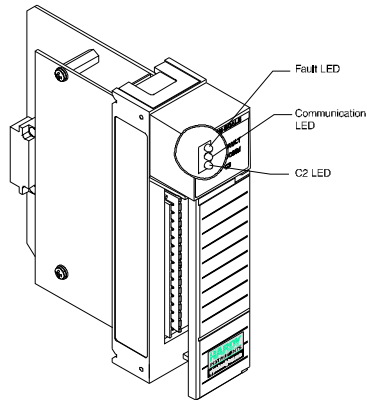


FIG. 5-4 C2 LED

C2 LED

Green Off/On Button Calibration was successful
Red then Green C2 Cal failed, scale in motion.

**C2 Calibration
Using Ladder
Logic**

- Step 1. Check to be sure that the parameters have been setup for your weighing process. (See Chapter 4, Setup)
- Step 2. We have provided a Ladder Logic (for both the local and remote mode of operation) example explaining how to perform the C2 Calibration.

**Data Locations Used
for Ladder Logic
Examples (For Local
Mode of Operation
Only)**

B3 - All the B3 locations are used as status bits for program control.

N9:0 - 24

Input Data (READWEIGHT Example)

N9:50

Weight Multiplier

N9:51

ROC Multiplier

N10:0 - 2

Input Read from M1 File. (Sequence number, command number and status)

N10:40 - 46 Location of data being written to M0 File.

N10:60 - 72 Locations of Parameters Values

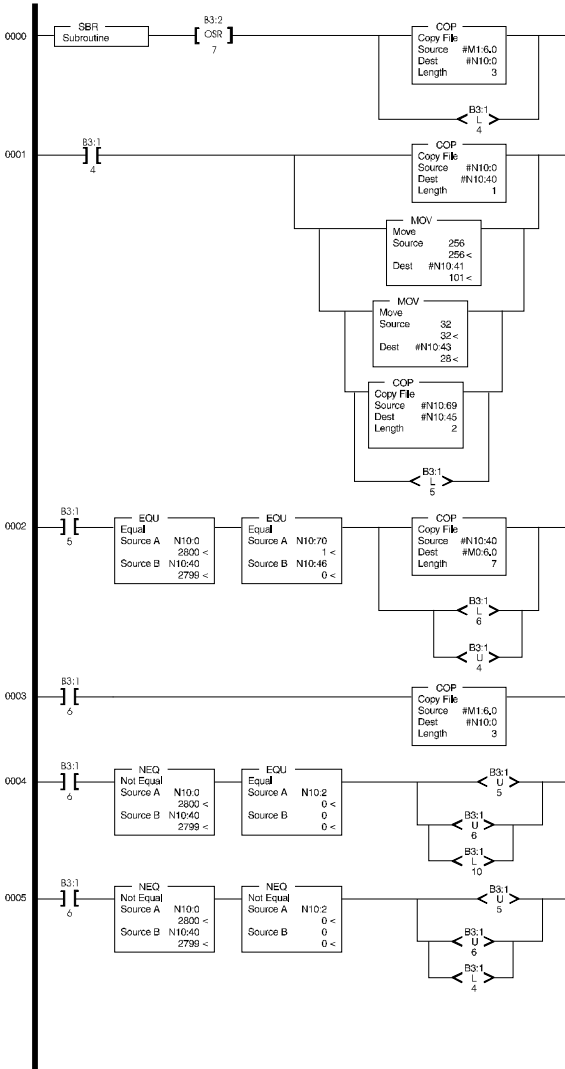
| | |
|------------------|--------------------|
| N10:60 | Units |
| N10:61 | Number of Averages |
| N10:62 | WAVERSAVER Setting |
| N10:63-64 | 0 Tolerance |
| N10:65-66 | A0 Tolerance |
| N10:67-68 | Motion |
| N10:69-70 | CalLo |
| N10:71-72 | Span |

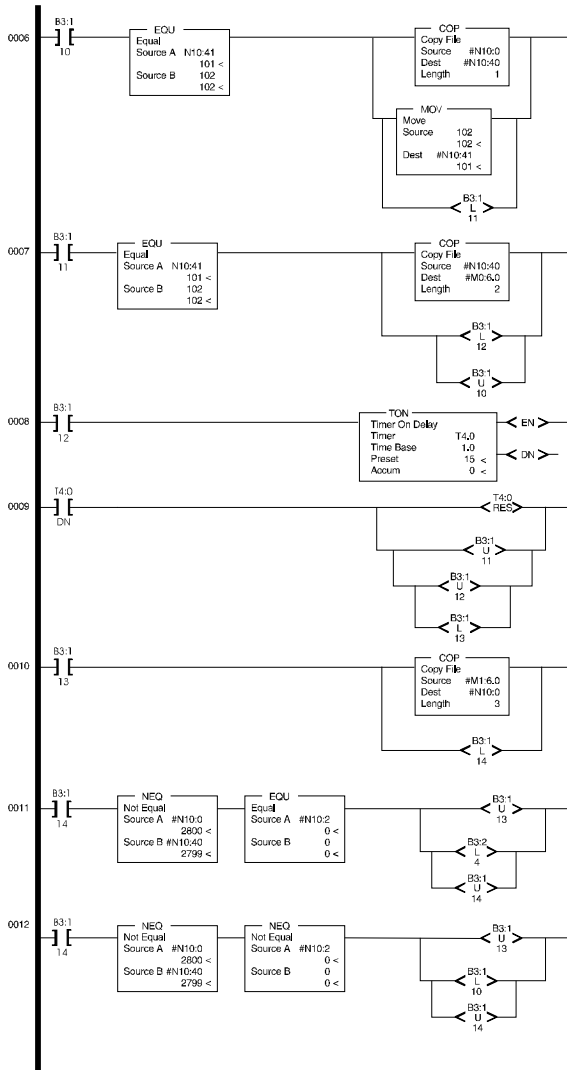
**C2 Calibration
Ladder Logic
Explanation**

This file will download and set a reference point for C2 calibration and then save data to non-volatile memory.

| | |
|--------------|---|
| Rung #0 | Does an initial read of the M1 file. this is necessary to get the sequence number for future writes. |
| Rungs #1-5 | Downloads a reference point value. These rungs follow the same pattern as the SETPARAMS example in Chapter 4. |
| Rungs #6-12 | Writes the C2CALCMD to set the reference point. These rungs follow the same pattern as setting a parameter in the SETPARAMS example in Chapter 4. |
| Rungs #13-17 | Writes the WRITENONVOLATILE command. This will save the new calibration to the non-volatile memory. These rungs follow the same pattern as setting a parameter in the SETPARAMS example in Chapter 4. |

**C2 Calibration
Ladder Logic
Example (For
Local Mode of
Operation
Only)**





HI 1746-WS WEIGH SCALE MODULE

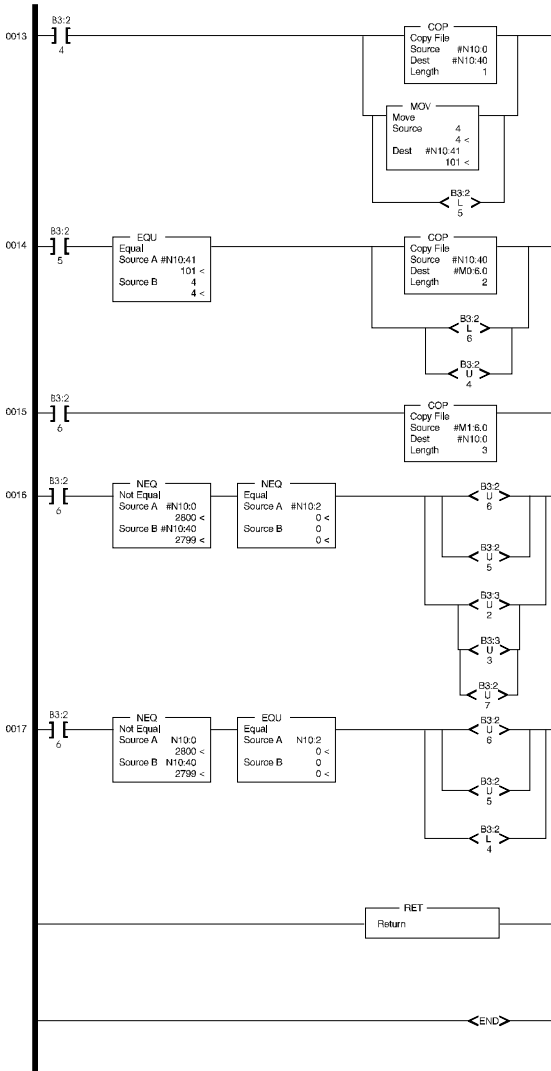
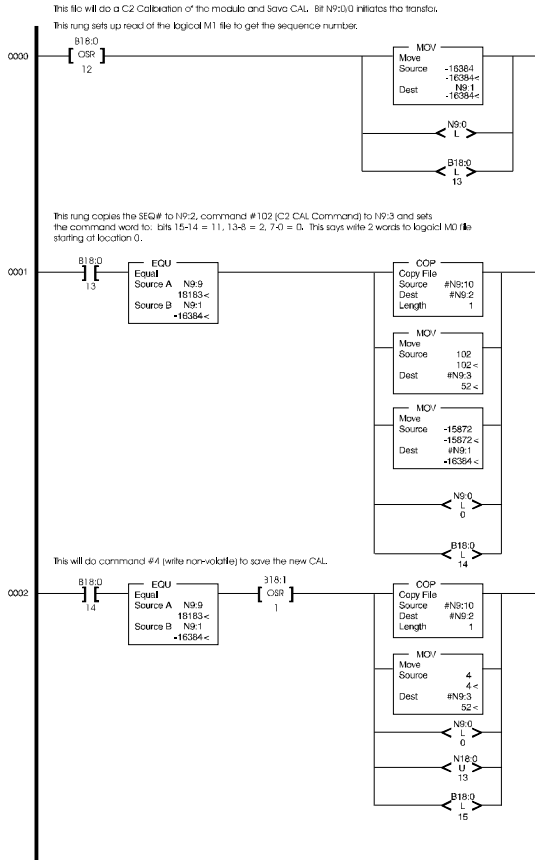


FIG. 5-5 C2 LADDER LOGIC EXAMPLE/LOCAL MODE OF OPERATION

**C2 Calibration
Ladder Logic
Example (For
Remote Mode
of Operation
Only)**



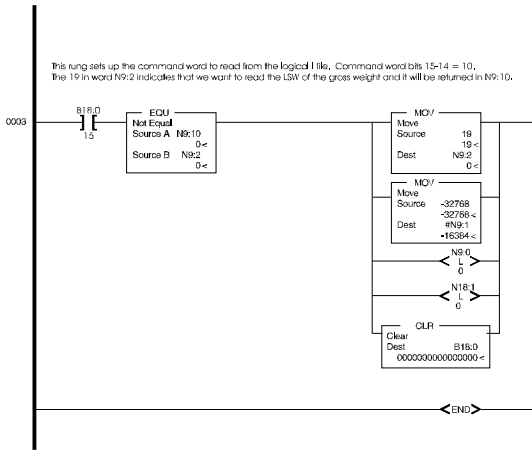


FIG. 5-6 C2 LADDER LOGIC EXAMPLE/REMOTE MODE OF OPERATION

Hard Calibration

Hard Calibration is the traditional method of calibration that uses test weights. Hardy recommends that the test weights total 80 to 100% of the scale capacity.

Hard Calibration Ladder Logic Example

- Step 1. Check to be sure that the parameters have been setup for your weighing process. (See Chapter 4, Setup)
- Step 2. We have provided a Ladder Logic example explaining how to set the weigh process parameters. The Ladder Logic example is meant to provide a ladder logic model only. Your application may vary and the example may or may not meet your requirements.
- Step 3. The Hard Calibration Ladder Logic Example is located at the Hardy Web Site. If you have access to the Internet:

- a. Type the following URL: www.hardy-solutions.com
- b. Click on the Support button.
- c. Click on Sample Programs.

- d. Click on the pull down menu for the product you are calibrating.
- e. Click on the Ladder Logic Example for the HI 1746-WS Weigh Module, Hard Calibration.

Step 4. If you do not have access to the Internet, call your local Hardy representative or Hardy Customer Support and we will forward you a hard copy of the calibration ladder logic explanation and ladder logic example.

HI 1746-WS WEIGH SCALE MODULE

CHAPTER 6 - OPERATING PROCEDURES

A Brief Description of Chapter 6

All information contained in Chapter 6 pertains to the operation of the HI 1746-WS Weigh Scale Module. The Operating Procedures include Writing and Reading data transferred between the ControlLogix PLC and the weigh scale module. The data is defined as either Read Data (including Module Status words indicating the current state of the module) from the weigh scale module or Write Data sent to the module. It is very important that the user be familiar with this chapter before operating the weight scale module.

CAUTION:

THE OPERATING PARAMETERS ARE DIFFERENT FOR THE LOCAL MODE AND THE REMOTE MODE. BE SURE YOU LOOK IN THE CORRECT SECTION FOR THE CORRECT PARAMETERS

Block Transfer, Read

| WORD | PARAMETER | |
|------|--|-------|
| 0 | Setpoint Value (32 bit float, or integer) | 1 MSW |
| 1 | Setpoint Value (32 bit float, or integer) | 1 LSW |
| 2 | Setpoint Deadband (32 bit float, or integer) | 1 MSW |
| 3 | Setpoint Deadband (32 bit float, or integer) | 1 LSW |
| 4 | Setpoint Preact (32 bit float, or integer) | 1 MSW |
| 5 | Setpoint Preact (32 bit float, or integer) | 1 LSW |

TABLE 6-1: BLOCK TRANSFER, READ

HI 1746-WS WEIGH SCALE MODULE

| WORD | PARAMETER | |
|-------------|--|-----|
| 6 | Setpoint 1 Mode <u>Bit</u> <u>Setpoint Mode</u> 0 ROC (Rate of Change) 1 Gross 2 Net 3 Gain Mode (0 = gain in wght) (1 = loss in wght) 4 force low 5 force high 6 Excitation Error 7 No Excitation Error 8-15 Currently Not Used | |
| 7 | Setpoint 2 Value (32 bit float, or integer) | MSW |
| 8 | Setpoint 2 Value (32 bit float, or integer) | LSW |
| 9 | Setpoint 2 Deadband (32 bit float, or integer) | MSW |
| 10 | Setpoint 2 Deadband (32 bit float, or integer) | LSW |
| 11 | Setpoint 2 Preact (32 bit float, or integer) | MSW |
| 12 | Setpoint 2 Preact (32 bit float, or integer) | LSW |

TABLE 6-1: BLOCK TRANSFER, READ

| WORD | PARAMETER | | | | | | | | | | | | | | | | | | | | |
|-------------|---|------------|-------------------------|---|----------------------|---|-------|---|--------------------|---|--|---|---------------------|---|-------------|---|------------------|---|---------------------|--------|--------------------|
| 13 | <p>Setpoint 2 Mode</p> <table><thead><tr><th><u>Bit</u></th><th><u>Setpoint Mode</u></th></tr></thead><tbody><tr><td>0</td><td>ROC (Rate of Change)</td></tr><tr><td>1</td><td>Gross</td></tr><tr><td>2</td><td>Net</td></tr><tr><td>3</td><td>Gain Mode (0 = gain in wght) (1 = loss in wght)</td></tr><tr><td>4</td><td>Force low</td></tr><tr><td>5</td><td>Force high</td></tr><tr><td>6</td><td>Excitation Error</td></tr><tr><td>7</td><td>No Excitation Error</td></tr><tr><td>8-15</td><td>Currently Not Used</td></tr></tbody></table> | <u>Bit</u> | <u>Setpoint Mode</u> | 0 | ROC (Rate of Change) | 1 | Gross | 2 | Net | 3 | Gain Mode (0 = gain in wght) (1 = loss in wght) | 4 | Force low | 5 | Force high | 6 | Excitation Error | 7 | No Excitation Error | 8-15 | Currently Not Used |
| <u>Bit</u> | <u>Setpoint Mode</u> | | | | | | | | | | | | | | | | | | | | |
| 0 | ROC (Rate of Change) | | | | | | | | | | | | | | | | | | | | |
| 1 | Gross | | | | | | | | | | | | | | | | | | | | |
| 2 | Net | | | | | | | | | | | | | | | | | | | | |
| 3 | Gain Mode (0 = gain in wght) (1 = loss in wght) | | | | | | | | | | | | | | | | | | | | |
| 4 | Force low | | | | | | | | | | | | | | | | | | | | |
| 5 | Force high | | | | | | | | | | | | | | | | | | | | |
| 6 | Excitation Error | | | | | | | | | | | | | | | | | | | | |
| 7 | No Excitation Error | | | | | | | | | | | | | | | | | | | | |
| 8-15 | Currently Not Used | | | | | | | | | | | | | | | | | | | | |
| 14 | <p>Weight Functions</p> <table><thead><tr><th><u>Bit</u></th><th><u>Weight Functions</u></th></tr></thead><tbody><tr><td>0</td><td>Zero</td></tr><tr><td>1</td><td>Tare</td></tr><tr><td>2</td><td>Write Non-Volatile</td></tr><tr><td>3</td><td>Apply Settings</td></tr><tr><td>4</td><td>Reload Non-Volatile</td></tr><tr><td>5</td><td>Cal Low Cmd</td></tr><tr><td>6</td><td>Cal High Cmd</td></tr><tr><td>7</td><td>C2 Cal Cmd</td></tr><tr><td>8 - 15</td><td>Currently Not Used</td></tr></tbody></table> | <u>Bit</u> | <u>Weight Functions</u> | 0 | Zero | 1 | Tare | 2 | Write Non-Volatile | 3 | Apply Settings | 4 | Reload Non-Volatile | 5 | Cal Low Cmd | 6 | Cal High Cmd | 7 | C2 Cal Cmd | 8 - 15 | Currently Not Used |
| <u>Bit</u> | <u>Weight Functions</u> | | | | | | | | | | | | | | | | | | | | |
| 0 | Zero | | | | | | | | | | | | | | | | | | | | |
| 1 | Tare | | | | | | | | | | | | | | | | | | | | |
| 2 | Write Non-Volatile | | | | | | | | | | | | | | | | | | | | |
| 3 | Apply Settings | | | | | | | | | | | | | | | | | | | | |
| 4 | Reload Non-Volatile | | | | | | | | | | | | | | | | | | | | |
| 5 | Cal Low Cmd | | | | | | | | | | | | | | | | | | | | |
| 6 | Cal High Cmd | | | | | | | | | | | | | | | | | | | | |
| 7 | C2 Cal Cmd | | | | | | | | | | | | | | | | | | | | |
| 8 - 15 | Currently Not Used | | | | | | | | | | | | | | | | | | | | |

TABLE 6-1: BLOCK TRANSFER, READ

HI 1746-WS WEIGH SCALE MODULE

| WORD | PARAMETER | |
|-------------|---|-----|
| 15 | Module Status Word <u>Bit</u> <u>Module Status Bit</u> 0 A/D Conversion Error 1 A/D Failure 2 Weight in lbs (0 = kgs) 3 Zero Tracking Enabled 4 Tare Enabled 5 Zero Enabled 6 Weight in Motion 7 No Calibration 8 Non-Volatile RAM Failure 9 Excitation Monitor 10 Communication Timeout Error 11-13 Currently Not Used 14 Command Error 14 & 15 Currently Not Used | |
| 16 | Relay Status | |
| 17 | Firmware Revision | |
| 18 | Gross Weight (32 bit float, or integer) | MSW |
| 19 | Gross Weight (32 bit float, or integer) | LSW |
| 20 | Net Weight (32 bit float, or integer) | MSW |
| 21 | Net Weight (32 bit float, or integer) | LSW |
| 22 | RoC (Rate of Change) (32 bit float, or integer) | MSW |
| 23 | RoC (Rate of Change) (32 bit float, or integer) | LSW |
| 24 | RoC Evaluation Period | |

TABLE 6-1: BLOCK TRANSFER, READ

| WORD | PARAMETER | |
|-------|---|--|
| 25 | Increments on each weight update (about 110 times a second) | |
| 26-31 | Currently Not Used | |

TABLE 6-1: BLOCK TRANSFER, READ

**Block Transfer, Read
Example (For Local
Mode Only)
(READWEIGHT)**

**Explanation of the
READWEIGHT
Example**

- Rung #0 Downloads the weight and rate multipliers one time.
- Rung #1 Setpoint, Status, Weight and Rate of Change are copied from the input file for access.

**READWEIGHT
Ladder Logic
Example**

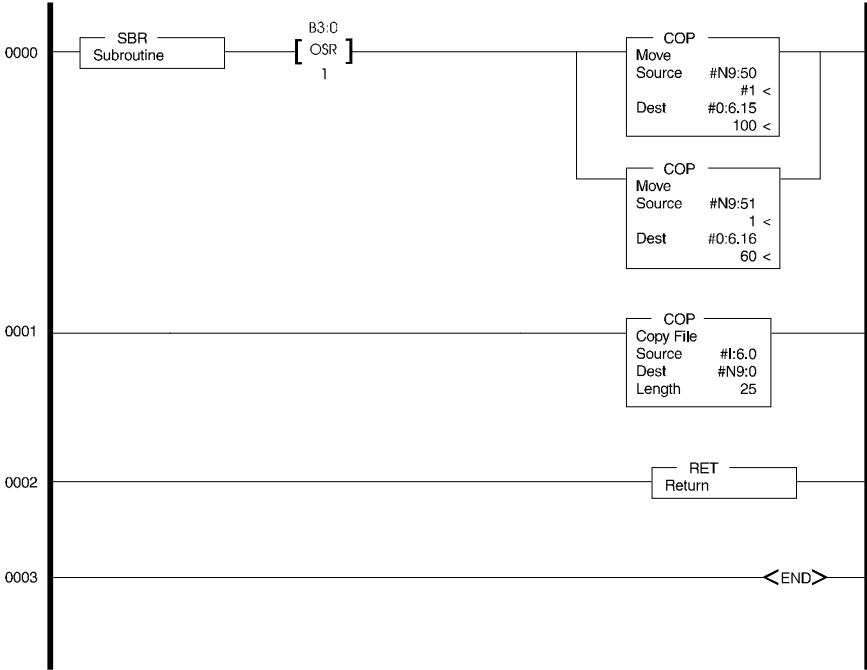


FIG. 6-1 READWEIGHT LADDER LOGIC EXAMPLE/LOCAL MODE OF OPERATION

**Block Transfer, Read
Ladder Logic Example
for Remote Mode
Operation**

For Remote Mode Operation Block Transfer, Read Examples go to the Hardy Website (<http://www.hardysolutions.com>) and Click on Support.

Block Transfer, Write

| WORD | PARAMETER | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|-------|------------|----------------------|---|----------------------|---|-------|---|-----|---|--|---|-----------|---|------------|---|------------------|---|---------------------|------|--------------------|
| 0 | Setpoint Value (32 bit float, or integer) | 1 MSW | | | | | | | | | | | | | | | | | | | | |
| 1 | Setpoint Value (32 bit float, or integer) | 1 LSW | | | | | | | | | | | | | | | | | | | | |
| 2 | Setpoint Deadband (32 bit float, or integer) | 1 MSW | | | | | | | | | | | | | | | | | | | | |
| 3 | Setpoint Deadband (32 bit float, or integer) | 1 LSW | | | | | | | | | | | | | | | | | | | | |
| 4 | Setpoint Preact (32 bit float, or integer) | 1 MSW | | | | | | | | | | | | | | | | | | | | |
| 5 | Setpoint Preact (32 bit float, or integer) | 1 LSW | | | | | | | | | | | | | | | | | | | | |
| 6 | Setpoint 1 Mode <table border="0"> <tr> <td><u>Bit</u></td> <td><u>Setpoint Mode</u></td> </tr> <tr> <td>0</td> <td>ROC (Rate of Change)</td> </tr> <tr> <td>1</td> <td>Gross</td> </tr> <tr> <td>2</td> <td>Net</td> </tr> <tr> <td>3</td> <td>Gain Mode (0 = gain in wght) (1 = loss in wght)</td> </tr> <tr> <td>4</td> <td>Force Low</td> </tr> <tr> <td>5</td> <td>Force High</td> </tr> <tr> <td>6</td> <td>Excitation Error</td> </tr> <tr> <td>7</td> <td>No Excitation Error</td> </tr> <tr> <td>8-15</td> <td>Currently Not Used</td> </tr> </table> | | <u>Bit</u> | <u>Setpoint Mode</u> | 0 | ROC (Rate of Change) | 1 | Gross | 2 | Net | 3 | Gain Mode (0 = gain in wght) (1 = loss in wght) | 4 | Force Low | 5 | Force High | 6 | Excitation Error | 7 | No Excitation Error | 8-15 | Currently Not Used |
| <u>Bit</u> | <u>Setpoint Mode</u> | | | | | | | | | | | | | | | | | | | | | |
| 0 | ROC (Rate of Change) | | | | | | | | | | | | | | | | | | | | | |
| 1 | Gross | | | | | | | | | | | | | | | | | | | | | |
| 2 | Net | | | | | | | | | | | | | | | | | | | | | |
| 3 | Gain Mode (0 = gain in wght) (1 = loss in wght) | | | | | | | | | | | | | | | | | | | | | |
| 4 | Force Low | | | | | | | | | | | | | | | | | | | | | |
| 5 | Force High | | | | | | | | | | | | | | | | | | | | | |
| 6 | Excitation Error | | | | | | | | | | | | | | | | | | | | | |
| 7 | No Excitation Error | | | | | | | | | | | | | | | | | | | | | |
| 8-15 | Currently Not Used | | | | | | | | | | | | | | | | | | | | | |
| 7 | Setpoint Value (32 bit float, or integer) | 2 MSW | | | | | | | | | | | | | | | | | | | | |
| 8 | Setpoint Value (32 bit float, or integer) | 2 LSW | | | | | | | | | | | | | | | | | | | | |

TABLE 6-2: BLOCK TRANSFER, WRITE

HI 1746-WS WEIGH SCALE MODULE

| WORD | PARAMETER | |
|-------------|---|-----|
| 9 | Setpoint 2 Deadband (32 bit float, or integer) | MSW |
| 10 | Setpoint 2 Deadband (32 bit float, or integer) | LSW |
| 11 | Setpoint 2 Preact (32 bit float, or integer) | MSW |
| 12 | Setpoint 2 Preact (32 bit float, or integer) | LSW |
| 13 | Setpoint 2 Mode <u>Bit</u> <u>Setpoint Mode</u> 0 ROC (Rate of Change) 1 Gross 2 Net 3 Gain Mode (0 = gain in wght) (1 = loss in wght) 4 force low 5 force high 6 - 15 Currently Not Used | |
| 14 | Weight Functions <u>Bit</u> <u>Weight Functions</u> 0 Zero 1 Tare 2 Write Non-Volatile 3 Apply Settings 4 Reload Non-Volatile 5 Cal Low Cmd 6 Cal High Cmd 7 C2 Cal Cmd 8- 15 Currently Not Used | |
| 15 | Weight Multiplier | |
| 16 | ROC Multiplier | |
| 17-31 | Currently Not Used | |

TABLE 6-2: BLOCK TRANSFER, WRITE

**Block Transfer, Write
Ladder Logic Example
for Remote Mode
Operation**

For Remote Mode Operation Block Transfer, Write Examples go to the Hardy Website (<http://www.hardysolutions.com>) and Click on Support.

HI 1746-WS WEIGH SCALE MODULE

Index

Symbols

“THE BUTTON” C2 Calibration 5-5

Numerics

32 Word I and O Files 4-6

A

A Brief Description of Chapter 1 1-1

A Brief Description of Chapter 2 2-1

A Brief Description of Chapter 3 3-1

A Brief Description of Chapter 4 4-1

A Brief Description of Chapter 5 5-1

A Brief Description of Chapter 6 6-1

About C2 Calibration 5-4

About Hardy Manuals 1-2

About Logical Files 4-6

About M Files 4-3

About the Ladder Logic Example 4-20

About the Module I/O Connector 3-6

Add/Remove Function 3-10

Allen-Bradley DOS PLC 500 AI Series 4-1

Allen-Bradley’s SLC 5/02 1-1

Approvals 2-3

Auto Zero Tolerance 1-6

Auto Zero Tracking 1-6

Averages 2-1

B

B3 Locations 5-6

Backplane Current Load 2-2

Backplane Input Voltage 2-2

Batching 1-3

Bits 0-7 4-7

Bits 15 & 14 4-7

Bits 15-14 set to “00” 4-9

HI 1756-WS MANUAL

Bits 15-14 set to “01” 4-9

Bits 15-14 set to “10” 4-9

Bits 15-14 set to “11” 4-9

Bits 8-13 4-7

Blending 1-3

Block Transfer, Read 6-1

Block Transfer, Read Example (For Local Mode Only) (READ-WEIGHT) 6-5

Block Transfer, Read Ladder Logic Example for Remote Mode Operation 6-6

Block Transfer, Write 6-7

Block Transfer, Write Ladder Logic Example for Remote Mode Operation 6-9

C

C2 Cal Command (C2CALCMD) 4-13

C2 Calibration 5-4

C2 Calibration Input 2-2

C2 Calibration Ladder Logic Example (For Local Mode of Operation Only) 5-8

C2 Calibration Ladder Logic Example (For Remote Mode of Operation Only) 5-11

C2 Calibration Ladder Logic Explanation 5-7

C2 Calibration Output 2-2

C2 Calibration Using Ladder Logic 5-6

C2 LED 4-2, 5-6

C2[®] 1-1

Cable lengths 2-2

Cal High Command (CALHIGHCMD) 4-13

Cal Low Command (CALLOWCMD) 4-12

Calibration Setup Procedures 4-28

Case Dimensions 2-3

Comm Setup Section of the HI WS100 Configuration Software Manual 4-18

Comm. LED 4-2

Command Word 4-8, 4-9

Command Word Encoding 4-7

Common-Mode Rejection 2-2
Common-Mode Voltage Range 2-2
Configuration Software for Windows 2-3
Conversion Rate 2-1
Customer Support Department 1-2

D

Data Locations Used for Ladder Logic Examples (For Local Mode of Operation Only) 5-6
Default Parameters 2-4
Description 1-2
DH+ 1-3
DH-485 1-3
Digital TTL (Transistor - Transistor Logic) Level Outputs 1-6
Digital Volt Meter (DVM) 1-5
Digital Voltmeter 2-3
Direct M File Mapping 4-3
DVM Readings 1-5

E

Electrical Check Procedures 5-2
Enclosure Rating 2-3
Enclosure Ratings 2-3
Environmental Requirements 2-2
Error Code List 4-28
Ethernet 1-3
Excitation Monitor 1-4, 1-6, 2-1
Executable Command 4-5
Executable Command List 4-9
Explanation of the READWEIGHT Example 6-5

F

Failed Return to Zero Test 1-5
Filling/Dispensing 1-3
Float Integer to Integer Conversion Command (FLOAT2INT) 4-11
For Example 4-8, 4-9
Force Off 1-6

HI 1756-WS MANUAL

Force On 1-6

G

Get Parameters Command (GETPARAM) 4-15

Gross 1-6

H

Hard Calibration 5-12

Hard Calibration Ladder Logic Example 5-12

Hardy HI 215IT Junction Box 3-9

Hardy Instruments Website (<http://www.hardyinst.com>) 6-9

Hardy Load Sensor with C2 3-9

Hardy WS 100 Configuration Software 3-10

HI 215IT Junction Box 3-6

HI WS 100 Configuration Software 1-1

HI WS100 Configuration Software Interface (Remote Mode of Operation) 4-18

Humidity Range 2-2

I

I/O Setup Ladder Logic for Remote Mode Operation 4-16

Industry Standard Load Cells 3-8

Input 2-1

Installing the Hardy Instruments Configuration Software 3-10

Installing the Module I/O Connector 3-6

Integer to Float Integer Conversion Command (INT2FLOAT) 4-12

IT 1-4

IT Junction Box 1-4

IT Junction Box HI 215IT-FG Series 2-3

IT Junction Box HI 215IT-SS or PS Series 2-3

L

Ladder Logic 4-19

Ladder Logic Editor 4-1

Ladder Logic Example 4-19

LEDS 4-1, 4-2

Load Cell Excitation 2-2

Load Cell I&M Manual 5-1
Load Cell Wiring Diagrams 3-7
Load Cell/Point Input/Output Measurements 5-2
Load Check 5-4
Local Mode of Operation 4-1, 4-3
Logical File Interface 4-6

M

M File Data Structure (Words 0 to 5) 4-5
M File Interface 5-1
M File Interface to Set Up for Local Mode of Operation 4-5
M files 4-5
M0 File 4-3, 4-5
M1 File 4-3, 4-5
Mapping 4-4
Maximum Zero Tolerance 2-1
Modes of Operation 2-1
Module Connector 3-4
Module Door 3-6

N

Net 1-6
Non-Linearity 2-1

O

OFF (Default) 3-2
ON for Remote 3-2
Operating Temperature Range 2-2

P

Passed Return to Zero Test 1-5
Pin-Out Diagram 3-6
Possible Error Returns 4-21
Power 2-2
Power Check 4-1
Pre-Calibration Procedures 5-1

R

- Rate of Change (ROC) 1-6
- Read C2 Serial Number Command (READC2SERIALNUM) 4-14
- Read Data 6-1
- Reading from the 32 Word Logical I and logical M1 files 4-8
- READWEIGHT Ladder Logic Example 6-6
- Relays 3-6
- Reload Non-Volatile (RELOADNONVOLATILE) 4-11
- Remote Mode of Operation 4-1, 4-3, 4-5
- Removing the Module from the SLC 500 or Remote Chassis 3-5
- Resolution 2-1
- Return to Zero Test 1-5
- RS Logix 500[®] 1-1
- RS-232-C 1-3
- Run/Fault LED 4-2

S

- Sequence Number (SEQUENCENUM) 4-5
- Set Parameters Command (SETPARAM) 4-14
- Set Point (1 & 2) Out 2-2
- Set Point TTL Outputs 1-6
- SETPARAM - GETPARAM Command and Non Volatile Memory 4-21
- SETPARAMS Local Mode of Operation 4-23
- SETPARAMS Remote Mode of Operation 4-24
- Setting Parameters Ladder Logic Explanation 4-22
- Setting the Auto Zero Tolerance Value 4-29
- Setting the Jumper for Local or Remote Mode of Operation 3-2
- Setting the Motion Tolerance Value 4-28
- Setting the Number of Readings Averages 4-29
- Setting The Process Weighing Parameters 4-20
- Setting the Span Weight Value 4-29
- Setting the Unit of Measure 4-28
- Setting the WAVERSAVER Value 4-29
- Setting the Zero Tolerance Value 4-29
- SETUP Program 3-10
- SLC 500 AI Series 1-3
- SLC Chassis 4-1

Storage Temperature Range 2-2

System Test 1-5

T

Tare Command (TARECMD) 4-10

Technical Publications Department 1-2

Temperature Coefficient 2-2

TTL Level Outputs 1-3

U

Unit of Measure 4-28

Unpacking 3-1

W

WAVERSAVER 2-1

WAVERSAVER[®] 1-1

Weighing System Tests 1-5

Weight 2-3

Weight Multiplier 4-20

Windows NT/95/98 3-10

Windows[®] 95/98/NT 1-3

Words 1-7 4-8

Write Data 6-1

Write Non-Volatile Command (WRITENONVOLATILE) 4-10

Writing to the 32 Word Logical O and Logical M0 Files 4-8

Writing to the M0 File 4-8

Writing to the O File 4-8

WS 100 Configuration Software Manual 4-19

Z

Zero Command (ZEROCMD) 4-10

Zero Weight 1-6

HI 1756-WS MANUAL