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Resolver Module

Model HM-571-RES (Original Version)
&
Model HM-571-E (Re-designed Version)

Instruction Manual

Force Measurement and Control Solutions

Revised 4 - 5 - 07

4 – 5 – 07 Revision Note:

As of 4-5-07, Helm Instrument Co. has 2 types of resolver input modules for the Allen Bradley SLC-500 PLC (#1746 I/O Platform. These include:

Module HM-571-RES (old style) Module

This is the "original" version of the resolver module that has been in the Helm product line for many years. All pages of this manual (7-97 Revision) apply, except for Appendix "C" at the back. The Appendix "C" pages apply only to the HM-571-E (new style) module.

Module HM-571-E (new style) Module

This is the "new" version of the resolver module that is being releases as of 4-5-07. The new version is a "re-engineered" version of the original module, and is a direct replacement for it. The new module has the same "Form/Function" as the original module, except that:

- **The Master/Slave dip switch is in a different location.**
- **The Forward/Reverse dip switch has been deleted.**
- **A Resolver Type dip switch has been added.**

It should be noted that everything else, including the ladder logic, remains unchanged from the original module.

Documentation and important information for the new module can be found as follows:

- **Appendix "C" at the very back of this manual (Note: Refer to these pages first)**
- **All pages from the original manual (7-97 Revision), except for:**
  - **Page 1-3 (Entire Page)**
  - **Page 4-1 (Entire Page)**
  - **Page 4-3 (Entire Page)**
  - **Page 4-4 (Step 4: Forward/Reverse Setting only)**

Important User Information

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

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

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

No patent liability is assumed by Allen-Bradley Company or Helm Instrument Company with respect to use of information, circuits, equipment, or software described in this manual.

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

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

Attentions help you:

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

Revised 7-97

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Preface

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

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

Who Should Use this Manual

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

You should have a basic understanding of SLC 500 products. You should understand electronic process control and be able to interpret the ladder logic instructions required to generate the electronic signals that control your application. If you do not, contact your local Allen-Bradley representative for the proper training before using this product.

Purpose of this Manual

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

Contents of this Manual

Chapter	Title	Content
	Preface	Describes the purpose, background, and scope of this manual. Also specifies the audience for whom this manual is intended and defines key terms and abbreviations used throughout this book.
1	Overview	Provides a hardware and system overview. Explains and illustrates the components of the system.
2	Installation and Wiring	Provides installation information and wiring guidelines.
3	Channel Configuration, Data and Status	Examines the channel configuration and the channel status word, and explains how the module uses configuration data and generates status during operation.
4	Ladder Programming Examples	Gives an example of the ladder logic required to define the module for operation. Also includes representative examples for unique requirements such as strokes per minute calculation and resolver offset.
5	Wiring Diagrams	
A	Specifications	Provides physical, electrical, environmental, and functional specifications for the module.
B	Ladder Program	
C	Model HM-571-E Resolver Module	Specific Details and Setup Instructions for Re-engineered Module

Related Documentation

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

For	Read this Document	Document Number
An overview for the SLC 500 family of products	SLC 500 System Overview	1747-2.30
A description on how to install and use your Modular SLC 500 programmable controller	Installation & Operation Manual for Modular Hardware Style Programmable Controllers	1747NI002
A description on how to install and use your Fixed SLC 500 programmable controller	Installation & Operation Manual for Fixed Hardware Style Programmable Controllers	1747-NI001
A procedural manual for technical personnel who use APS to develop control applications	Allen-Bradley Advanced Programming Software (APS) User's Manual	1747-NM002
A reference manual that contains status file date, instruction set, and troubleshooting information about APS	Allen-Bradley Advanced Programming Software (APS) Reference Manual	1747-NM001
A procedural and reference manual for technical personnel who use an HHT to develop control applications	Allen-Bradley Hand-Held Terminal User's Manual	1747-NP002
An introduction to HHT for first-time users, containing basic concepts but focusing on simple tasks and exercises, and allowing the reader to begin programming in the shortest time possible	Getting Started Guide for HHT	1747-NM009
A resource manual and user's guide containing information about the analog modules used in your SLC 500 system	SLC 500 Analog I/O Modules User's Manual	1746-NM003
A complete listing of current Automation Group documentation, including ordering instructions. Also indicates whether the documents are available on CD-ROM or in multi-languages	Automation Group Publication Index	SD499
A glossary of industrial automation terms and abbreviations	Allen-Bradley Industrial Automation Glossary	ICCG-7.1
An article on wire sizes and types for grounding electrical equipment	National Electrical Code	Published by the National Fire Protection Association of Boston, MA.

Terms and Abbreviations

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

Calibration - Procedure, performed by trained personnel, to set the RMS (mean square root) voltages of the resolver.

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

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

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

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

Master/Slave Operation - Selectable mode of module operation. Default is Master when module is wired to a Helm Model HR1101 resolver. Mode is Slave when module receives input by tapping off of an existing resolver. Slave mode requires a calibration procedure.

Monitor Mode - Normal run state.

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

Offset - A value represented in degrees to restore resolver to zero at the top of the stroke. Required when resolver has not been mechanically set to zero.

Remote Configuration - A control system where the chassis can be located several thousand feet from the processor chassis. Chassis communication is via the 1747-SN Scanner and 1747-ASB Remote I/O Adapter.

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

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

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

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

Terms and Abbreviations *(continued)*

Setup Mode - Status condition of module. Normally enabled to perform calibration and setup procedures.

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

Strokes per Minute (SPM) - Value calculated when a machine cycles through a complete rotation (0 to 360 degrees).

TSM - Acronym for Through-the-Stroke load monitoring. Resolver input is required for monitoring the load being developed during machine cycle.

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

Common Techniques Used in this Manual

The following conventions are used throughout this manual:

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

Product Support

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

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

Your Questions or Comments on this Manual

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

Chapter 1

Overview

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

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

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

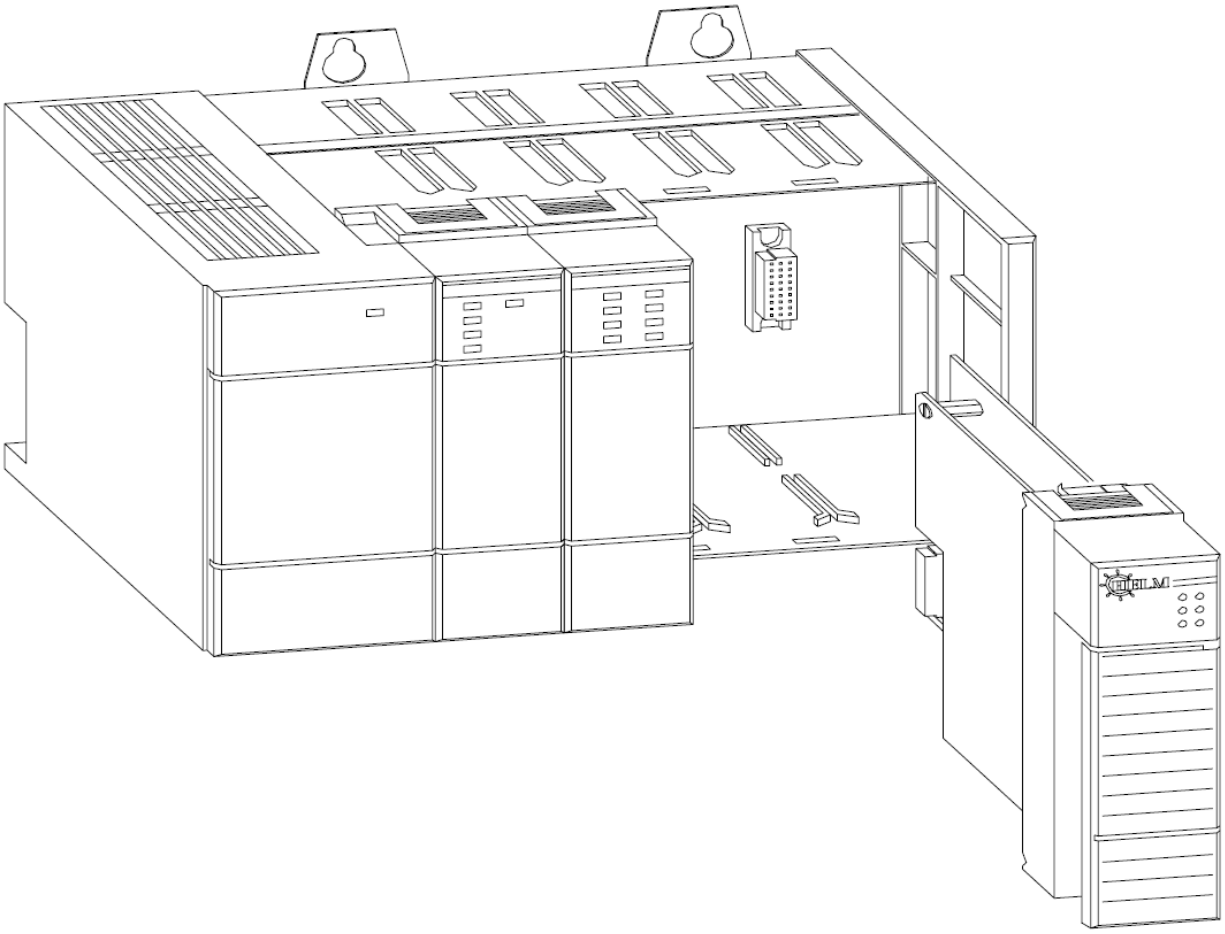
The Helm Resolver Input module provides intelligent absolute position feedback to the Allen-Bradley SLC family of programmable controllers. The module supplies A-B processors position and velocity data from ultra-reliable resolver based transducers. Each HM571-RES module occupies a single slot in the I/O rack. Position data is updated every 200 micro seconds. Up to 16 user programmable on/off states enable programmable limit switching to enhance control solutions.

Features include: velocity data acquired at up to 2000 RPM, programmable position resolution up to 4096 counts per turn and a programmable resolver offset value.

When used with the Helm ForceGard strain gage input module, the resolver module provides for real time signature analysis.

Components

The Helm Resolver module resides on the backplane of the Allen-Bradley 1746 SLC-5/03. The system is comprised of two parts; the input module and a sine/cosine based resolver such as the Helm Model HR-1101 resolver. The HR-1101 sine/co-sine Resolver is housed in a rugged enclosure designed especially for industrial applications. The resolver is a very accurate absolute position shaft encoder known for it's extreme durability. Helm resolvers are passive devices which consist of brushless rotary transformers with one rotor and two stator windings. These windings are positioned at 90 degrees apart from one another thus providing a sine and cosine analog output signal corresponding to the shaft position.



Hardware Overview

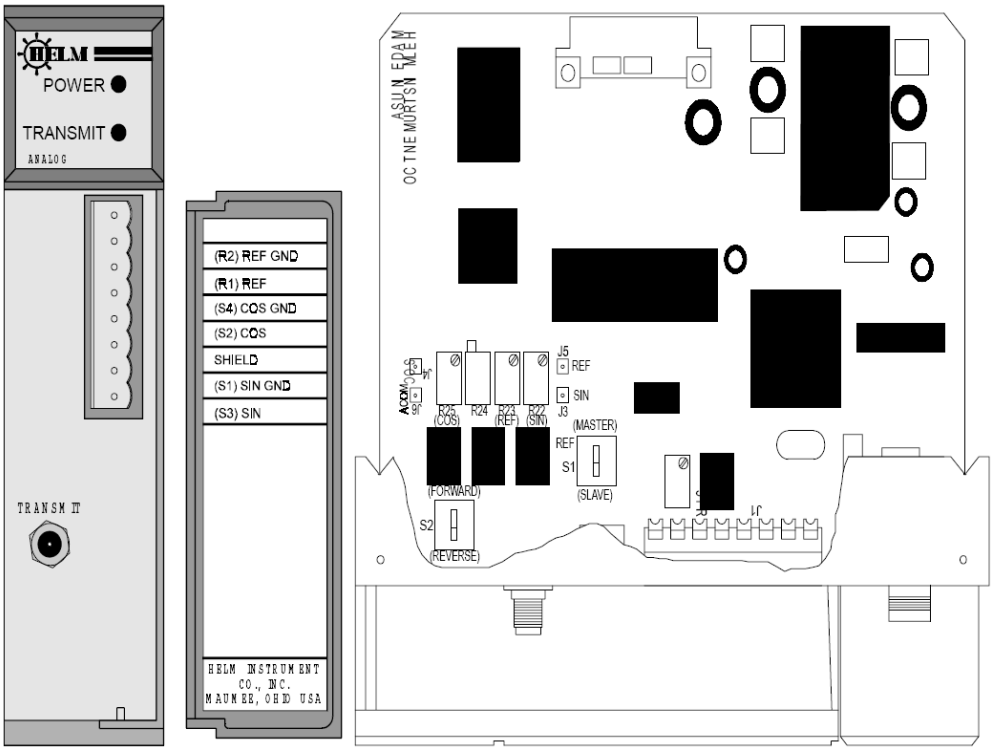
The resolver module fits into any single-slot, except the processor slot(0). It is a Class 1 module (uses eight input words and eight output words).

The Helm Resolver input module can accept input from one resolver. Multiple Helm HR-1101 resolvers can be wired in paralleled to one resolver input module.

The module has no output channels. Module configuration requires manual and user programmable setup.

The resolver module receives and stores digitally converted analog data into its image table for retrieval by modular SLC 500 processors.

Hardware Features



Power LED	Indicates 5 volts is supplied.
Transmit LED	Indicates module is communicating to processor.
Door Label	Resolver wiring diagram
Transmit Connector	Connector for communication with Helm ForceGard module via Receive IN jack.
8-Pin Connector	For resolver input wiring.
Dip Switches	S1- Adjustment for Master/Slave operation. S2- Adjustment for Forward/Reverse resolver rotation.
Potentiometers	Three of the four pots are used for calibrating the resolver, a sine adjust, a cosine adjust and a reference adjust for slave operation.
Voltage Test Points	Used with voltage meter when adjusting sine/ cosine potentiometers.

Chapter **2**

Getting Started

This chapter can help you to get started using the Helm Resolver input module. The procedures included here assume that you have a basic understanding of SLC 500 products. You should understand electronic process control and be able to interpret the ladder logic instructions required to generate the electronic signals that control your application.

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

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

This chapter will:

- tell you what equipment you need
- explain how to install and wire the module
- show you how to set look windows for resolver input

Required Tools and Equipment

Have the following tools and equipment ready:

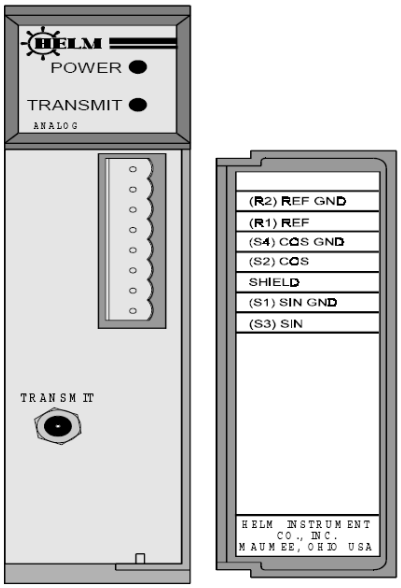
- small blade screwdriver
- voltage meter
- potentiometer trimmer (tweeker)
- appropriate resolver cable
- programming equipment (All programming examples shown in this manual demonstrate the use of Allen-Bradley's Advanced Programming Software [APS] for personal computers.)

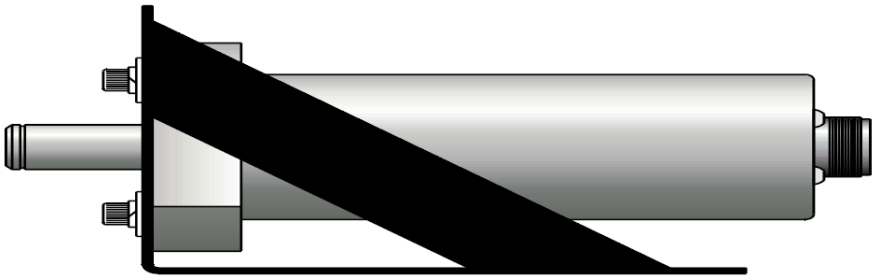
System Operation

The Resolver module communicates to the SLC processor through the parallel backplane interface and receives +5Vdc and +24Vdc power from the SLC power supply through the backplane. No external power supply is required. You may install as many Resolver modules in your system as the power supply can support.

Resolver Wiring

The module contains an 8-pin orange connector for wiring resolver. The pin-out is shown below.





To ensure proper operation and high immunity to electrical noise, always use Helm resolver cable. (Part Number 6117).

To limit noise, keep resolver cable as far away as possible from power and load lines.

Chapter **3**

Channel Configuration, Data and Status

This chapter explains how the Resolver Input module and the SLC processor communicate through the module's input and output image. It lists the preliminary setup and operation required before the module can function in a 1746 I/O system.

Module Addressing

The module identification code is a unique number encoded for each 1746 I/O module. This code defines for the processor the type of specialty I/O module residing in a specific slot in the chassis. With APS software, manually enter the module ID code.

ForceGard Module ID Code 3535

No special I/O configuration (SPIO CONFIG) information is required. The module ID code automatically assigns the correct number of input and output words. The following memory map shows how the output and input image tables are defined.

Output Image

The 8 word output image (output from the CPU to the module) contains information that you configure for your application. Example - If you want to set the value of the SLC data pointer on the module located in slot 4 in the SLC chassis, your address would be O:4.2. (O = file type : =element delimiter 4 =slot . =word delimiter 2 =word)

Bit	SETUP MODE BIT	O:e/0
Bit	RUN MODE BIT	O:e/1
Bit	DOWNLOAD BIT	O:e/2
Integer	DEGREE OFFSET	O:e.1

Setup Mode Bit (O:e/0)
When set on (1) module is in calibrate mode.

Run Mode Bit (O:e/1)
When set on (1) module is in run mode.

Download Bit (O:e/2)
Enabled during system power-up to download settings to processor.

Degree Offset (O:e.1)
Number of degrees required to zero balance the resolver. Offset is required when the resolver is not mechanically set.

SPM Timing Value (O:e.3)
Used for internal calculation of Strokes Per Minute.

Data Table Input Image

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

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

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

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

Integer	DEGREE VALUE	I:e.1
Integer	SPM Timing Value	I:e.3

SPM - Strokes per Minute (I:e.3)
Integer word, calculation register based on machine cycle, resolver rotation from 0-360 degrees.

Data Table Integer File

Using APS software, reserve an entire Integer file (128 words).

For illustration purposes in this manual, we have reserved Integer file N12:0 - N12:128.

Data	Description	Address
Bit	RESOLVER RUN/SETUP MAINTAINED BUTTON FROM OPERATOR INTERFACE	N12:0/0
Bit	SEND OFFSET MOMENTARY BUTTON FROM OPERATOR INTERFACE	N12:0/1
Bit	CLEAR OFFSET MOMENTARY BUTTON FROM OPERATOR INTERFACE	N12:0/2
Bit	PRESS IN MOTION INDICATOR	N12:0/4
Integer	OFFSET VALUE (0-3599)	N12:1
Integer	REGISTER USED FOR COMPARING TWO ANGLES	N12:2
Integer	SPM TIMING VALUE	N12:3
Integer	PASSWORD FOR CLEARING OR SENDING OFFSET (VALUE IS ENTERED IN LADDER LOGIC TO COMPARE TO ENTERED VALUE)	N12:4
Integer	TEMPORARY CALCULATION REGISTER FOR SPM	N12:5
Integer	STORED OFFSET FOR USE ON POWER-UP	N12:6
Integer	CURRENT RESOLVER ANGLE (0-359)	N12:7
Integer	OLD RESOLVER ANGLE	N12:8
Integer	PASSWORD FOR CLEARING OR SENDING OFFSET (ENTERED FROM OPERATOR INTERFACE)	N12:9

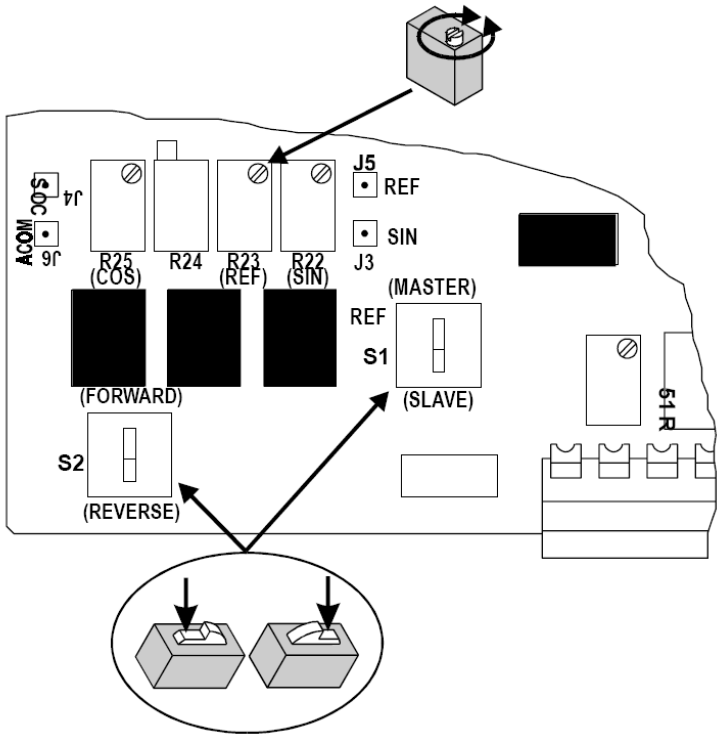
Initial Setup Procedures

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

All values are 0 (default) on initial start-up. This means that all limit switch settings are disabled. Once established, values reside in memory and are downloaded at system power-up.

Make the following adjustments to initialize module for proper operation:

- **set master/slave mode status**
- **calibrate resolver (required if module will operate in Slave mode - e.g. input tapped off of an existing resolver)**
- **set start and stop degrees for up to 16 look windows**

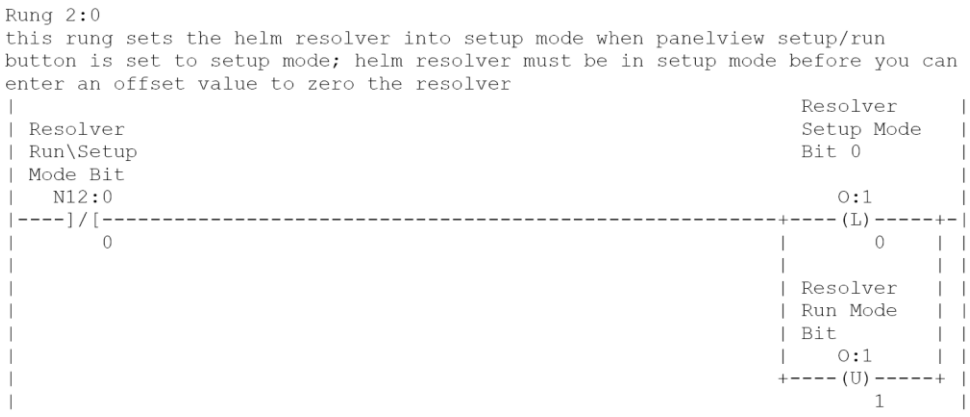


Step 1. Set dip switch (S1) to Master (On) position or Slave (Off) position.

Initial Setup Procedures

Step 2. Set the Run mode bit to Setup.

You can do this with either an operator interface such as a PanelView or by running APS software and forcing the setup mode bit to "1". The setup mode bit is 0:e.0/0 where “e” refers to the slot number where the resolver input module is located.



→ If you are using Helm Panel Software, select Setup Mode (toggle F3 until display reads Setup Mode).

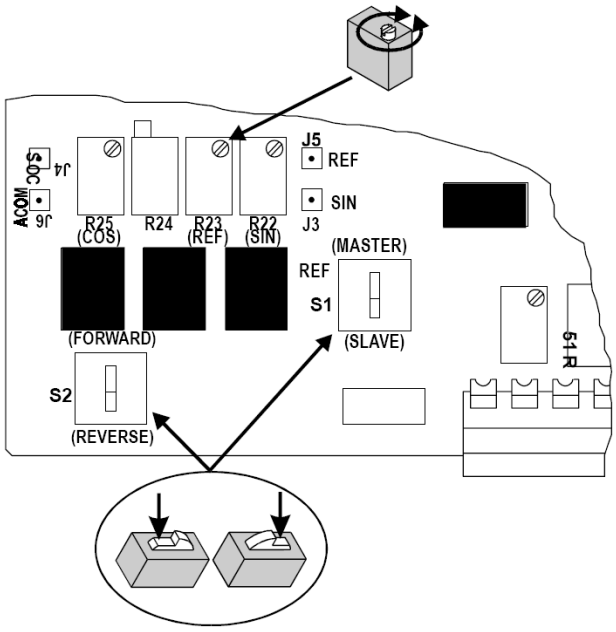
Step 3. Calibrate Resolver (Required for Slave Operation Only)

[a]Turn power off to the SLC500 PLC rack and remove the resolver board.

[b]Plug the extender card into a slot in the PLC rack and plug the resolver board into the extender card. (Any slot except slot 0).

[c]Turn power back on to the PLC. Setup the resolver board for Slave operation by setting switch S1.

[d]Plug the cable from the resolver into the resolver module 8 pin connector according to the tag on the module door.



NOTE: For all measurements, use testpoint J6 for ground connection and make sure you are using a true rms meter.

[f]Adjust R23 (Ref input) for 2 Vrms (2.8Vp) measured at testpoint J5.

[g]With the meter on testpoint J4, advance the press until the meter reads zero.

[h]Adjust R22 for 2 Vrms measured at testpoint J3. (Calibrates Sine signal).

[i]With the meter on testpoint J3, advance the press until the meter reads zero.

[j]Adjust R25 for 2 Vrms measured at testpoint J4. (Calibrates Cosine signal).

End of calibration, check display readings, verify degree readout is same on all units and that readings increment correctly as press is advanced.

Turn the power off to the PLC, remove the card extender, and plug the resolver board back into the slot. Turn power back on and verify that the resolver counts from 0 to 359.9.

Reset the setup mode bit to 0.
You can either change this bit using an operator interface or APS software. You must change 0:e.0/0 to 0 to exit setup mode for the resolver. The "e" refers to the slot number where the resolver input module is located.

Troubleshooting Notes:

Re-check operations [f] through [j].

If reading decrements as press is advanced, check S1, S3, or R1, R2 for reversed connections.

If reading is off 180 degrees from desired reading, check S2, S4 for reversed connection.

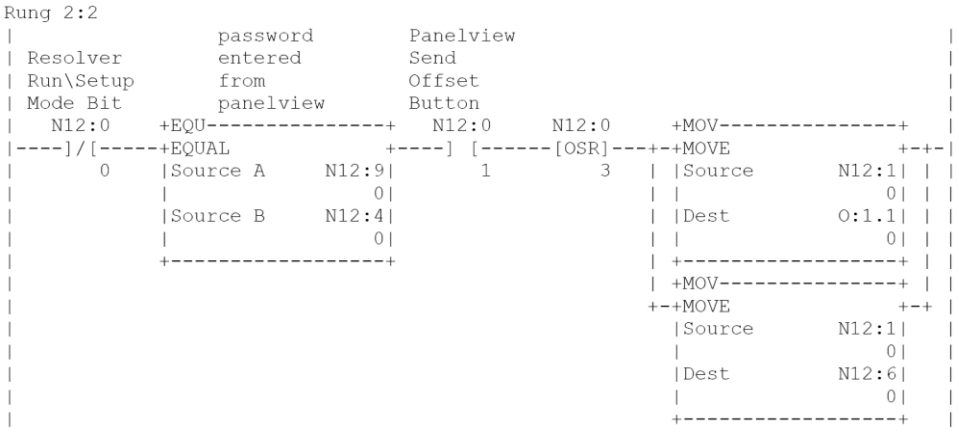
If reading is off a few degrees from desired reading, check calibration.

Step 4. Forward/Reverse Setting

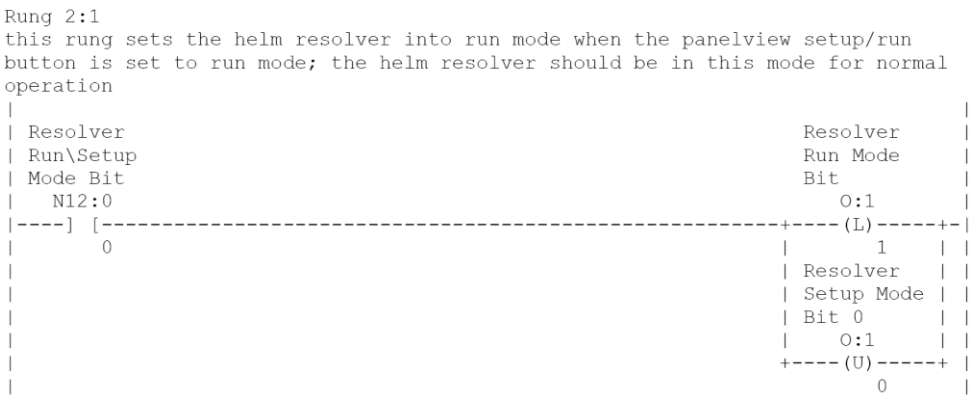
1. Factory default setting is for Forward. Adjust S2 to Off position for reverse mode.

Step 5. Set Resolver Offset

To enter offset 2 conditions must be met: 1.) resolver must be in setup mode and 2.) password - one stored in integer file N12:4. Password entered from operator interface must equal integer stored in N12:4.



Step 6. Set the Run mode bit to Run



Additional Application Notes

Strokes per Minute Conversion

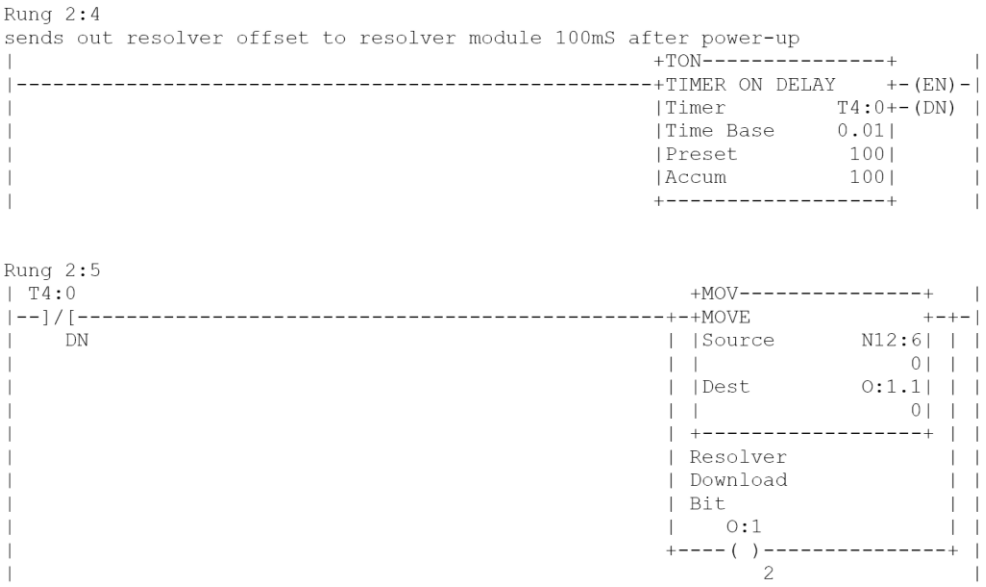
The following ladder example details the SPM conversion logic.

```
Program Listing          Processor File: RESOLVER.ACH                Rung 2:13

Rung 2:13
checks to see if press is in motion, if not it moves 0 into the SPM field

|                                                                              |
|                                                                              |
| press in                                                                     |
| motion bit                                                                   |
|                                                                              |
|   N12:0                                                  +MOV---------------+ |
|----]/[---------------------------------------------------+MOVE              +-|
|       4                                                  |Source           0| |
|                                                          |                  | |
|                                                          |Dest         N12:3| |
|                                                          |                 0| |
|                                                          +------------------+ |

Rung 2:14
as long as press is running,allows the calculation of press speed
|                                                                              |
|                                                                              |
| press in                                                                     |
| motion bit                                                                   |
|                                                                              |
|   N12:0    +NEQ---------------+                      +DIV---------------+    |
|----] [-----+NOT EQUAL         +----------------------+-+DIVIDE            +-+-|
|       4    |Source A     I:1.3|                      | |Source A     30000| | |
|            |                 0|                      | |                  | | |
|            |Source B         0|                      | |Source B     I:1.3| | |
|            |                  |                      | |                 0| | |
|            +------------------+                      | |Dest         N12:5| | |
|                                                      | |                 0| | |
|                                                      | +------------------+ | |
|                                                      |      final spm       | |
|                                                      |      conversion      | |
|                                                      |                      | |
|                                                      | +MUL---------------+ | |
|                                                      +-+MULTIPLY          +-+ |
|                                                        |Source A     N12:5|   |
|                                                        |                 0|   |
|                                                        |Source B         2|   |
|                                                        |                  |   |
|                                                        |Dest         N12:3|   |
|                                                        |                 0|   |
|                                                        +------------------+   |
```

Additional Application Notes

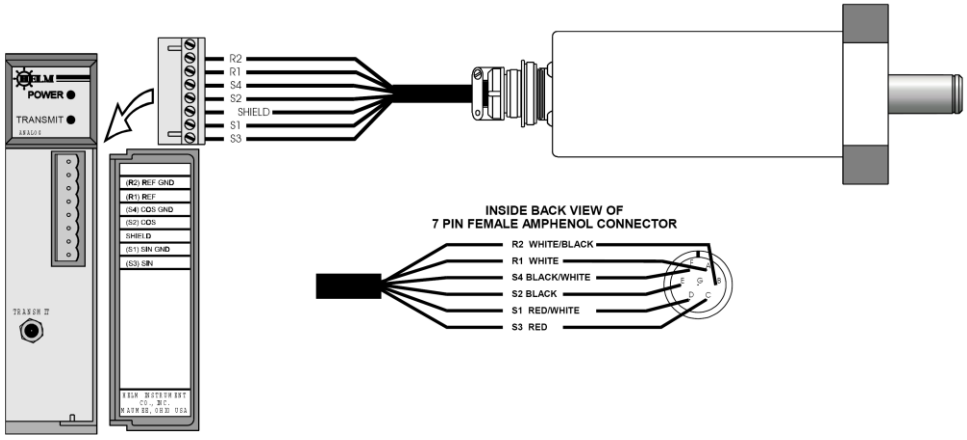
Download Bits

These two rungs will automatically send out resolver offset every time on power-up.



Chapter **5**

Wiring Diagrams



Appendix A

Electrical Specifications

Backplane Current Consumption	49m@5VDC 57m@24VDC
Backplane Power Consumption	2W
Number of Channels	1
I/O Chassis Location	Any I/O module slot except 0
Calibration	Manual Calibration
Isolation	500 VDC continuous between inputs and chassis ground, and between inputs and backplane

Physical Specifications

LED Indicators	1 Power Indicator 1 Communications Indicator
Module ID Code	3535
Recommended Cable	Resolver Cable #27081
Terminal Strip	8-pin removable

Environmental Specifications

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

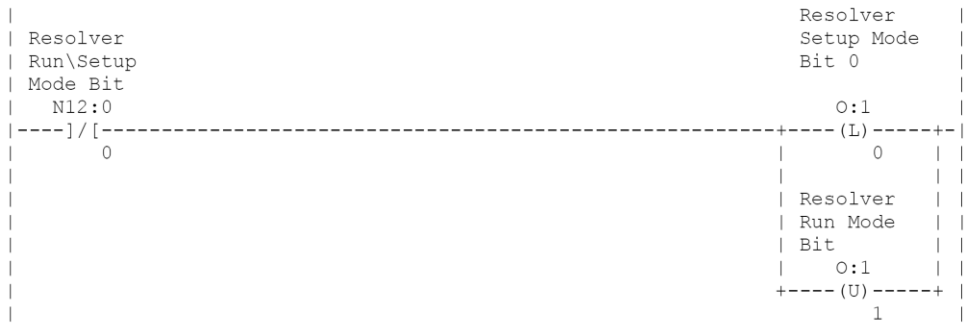
Input Specifications

Type of Input	Resolver
Display Resolution	0.1º
Overall Module Accuracy	/- 8+ 1 LSB arc mins.
Module Update Time	200µsec

Appendix B

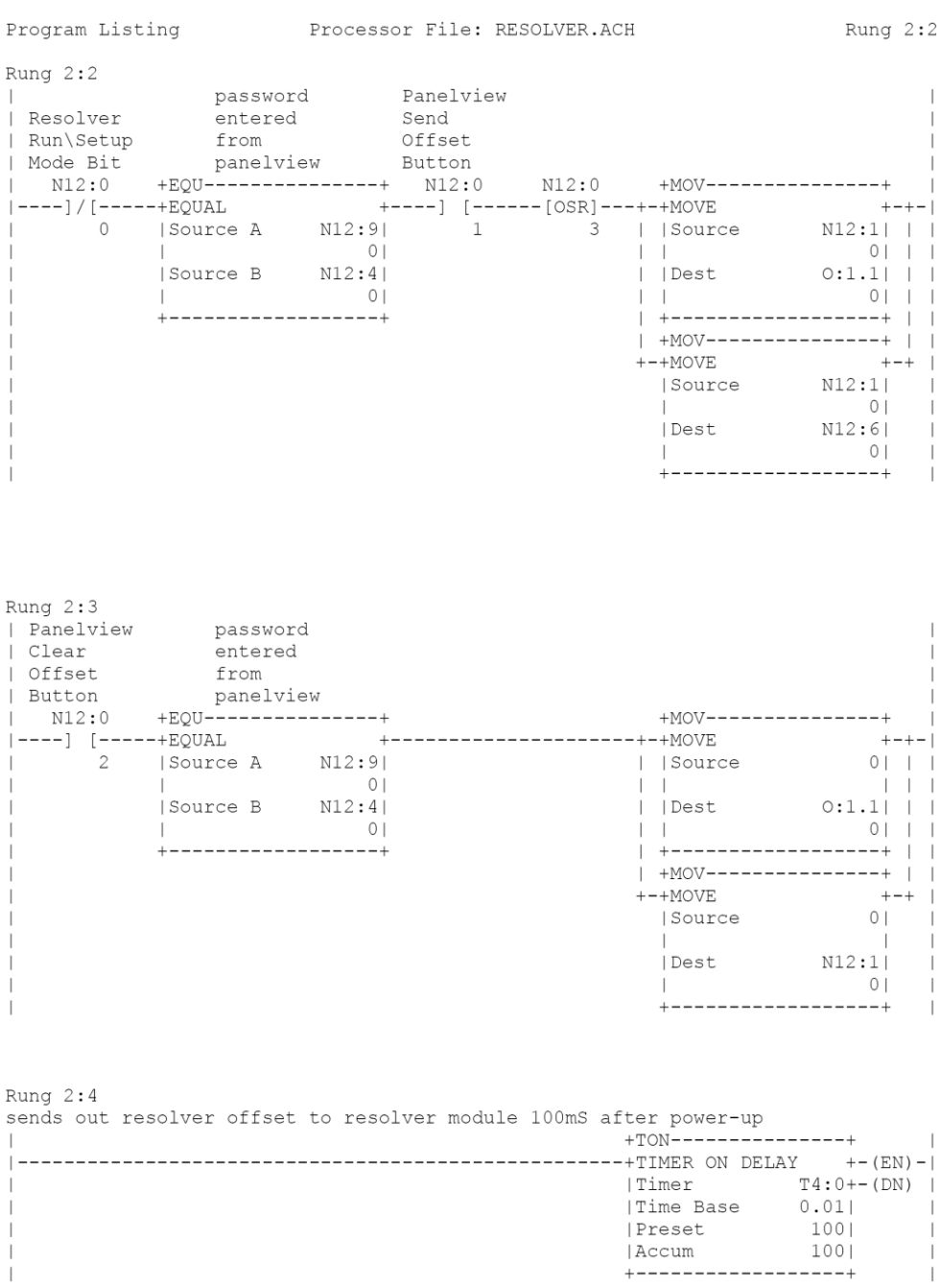
Ladder Programming

Rung 2:0
this rung sets the helm resolver into setup mode when panelview setup/run button is set to setup mode; helm resolver must be in setup mode before you can enter an offset value to zero the resolver

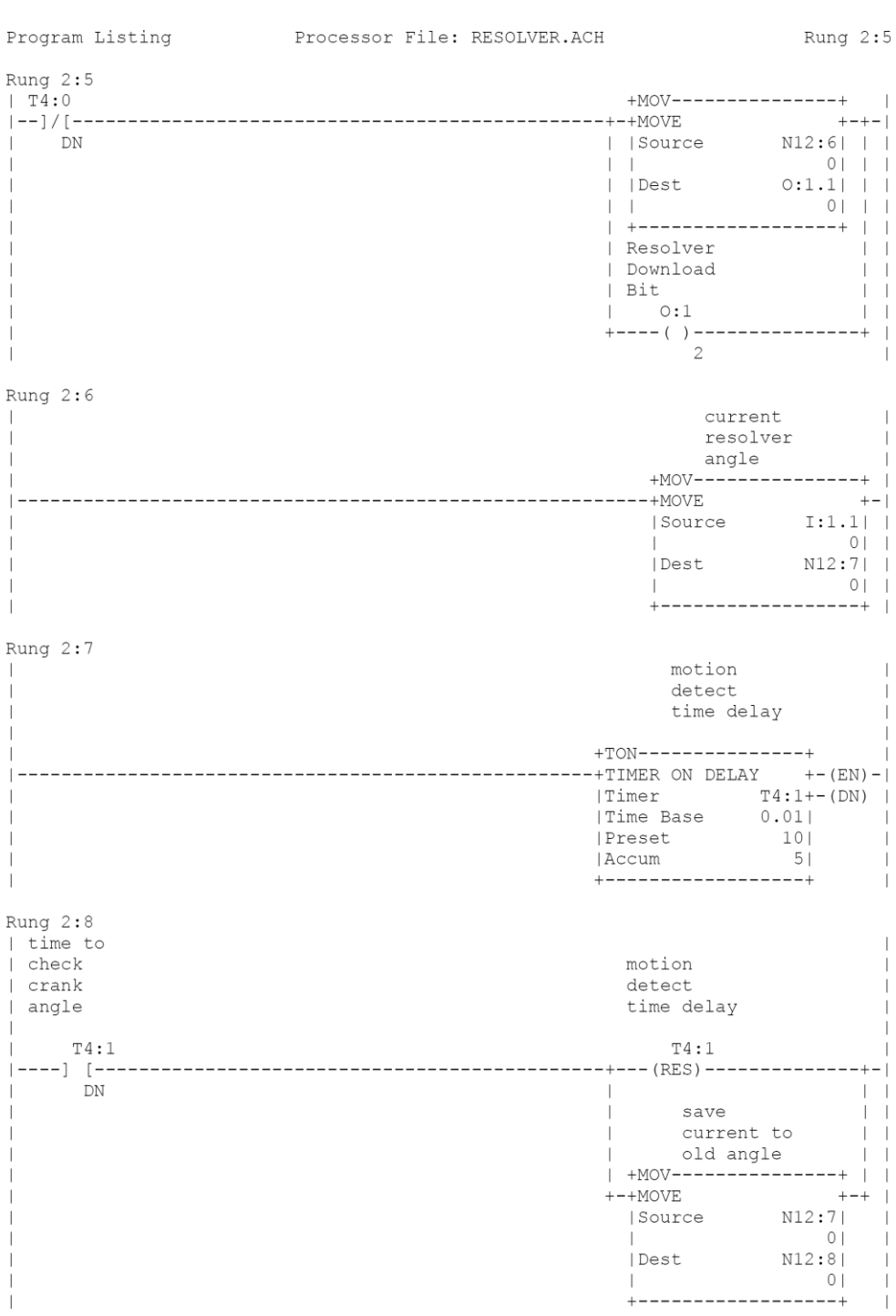


Rung 2:1
this rung sets the helm resolver into run mode when the panelview setup/run button is set to run mode; the helm resolver should be in this mode for normal operation

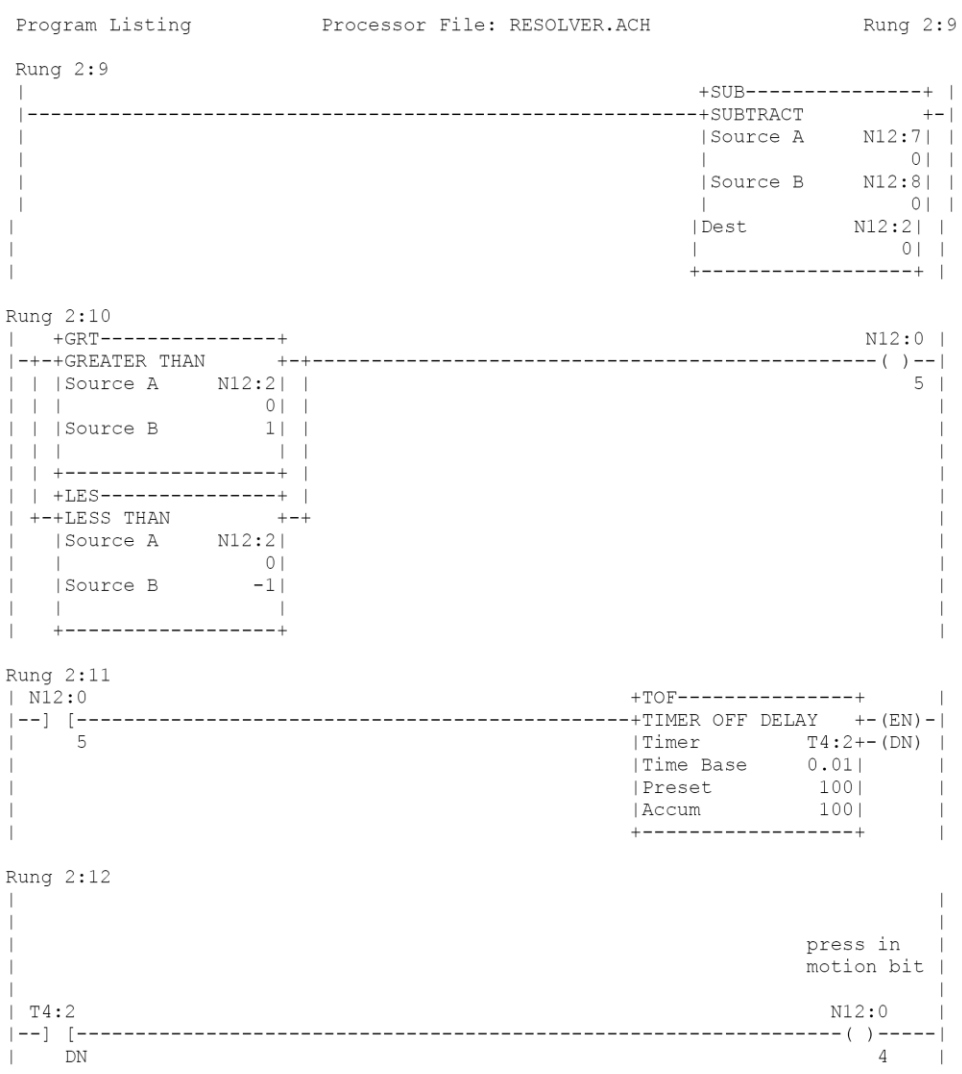
Ladder Programming



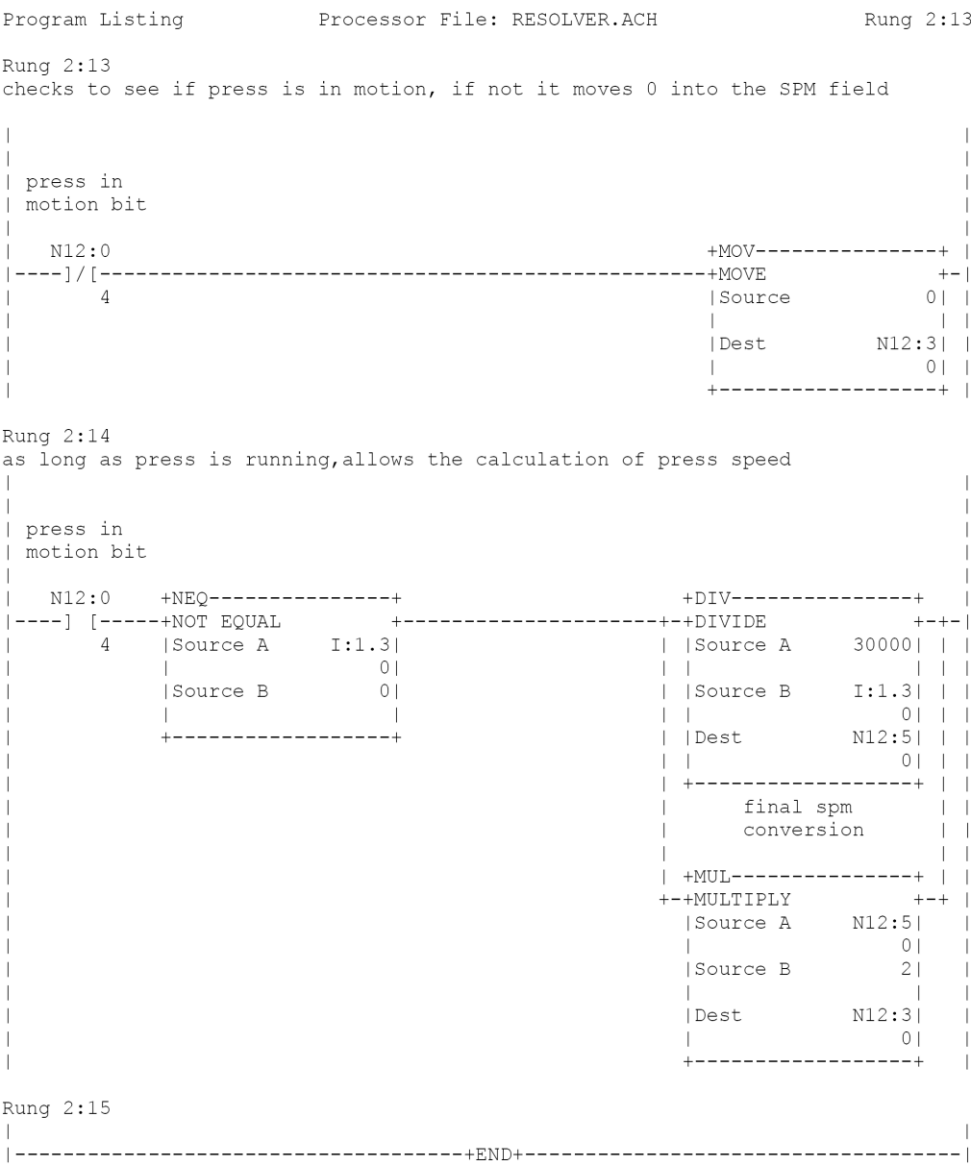
Ladder Programming



Ladder Programming



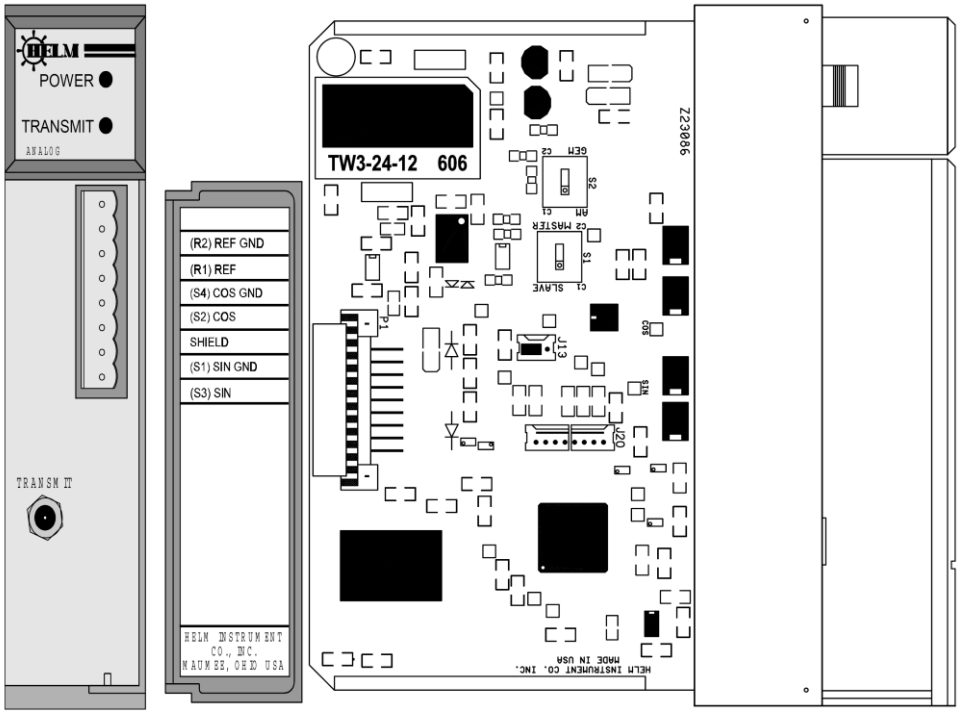
Ladder Programming



Appendix **C**

"NEW" MODEL HM-571-E RESOLVER MODULE

Hardware Features



Power LED	Indicates 5 volts is supplied.
Transmit LED	Indicates module is communicating to processor.
Door Label	Resolver wiring diagram
Transmit Connector	Connector for communication with Helm ForceGard module via Receive IN jack.
8-Pin Connector	For resolver input wiring.
Dip Switches	S1 –Adjustment for Master/Slave operation. S2 – Adjustment for Resolver Type setting.
Potentiometer	R3 – One pot is used for reference adjust (Factory Setting).
Voltage Test Points	Used with voltage meter when adjusting sine/cosine potentiometers.

"NEW" MODEL HM-571-E RESOLVER MODULE

Appendix **C**

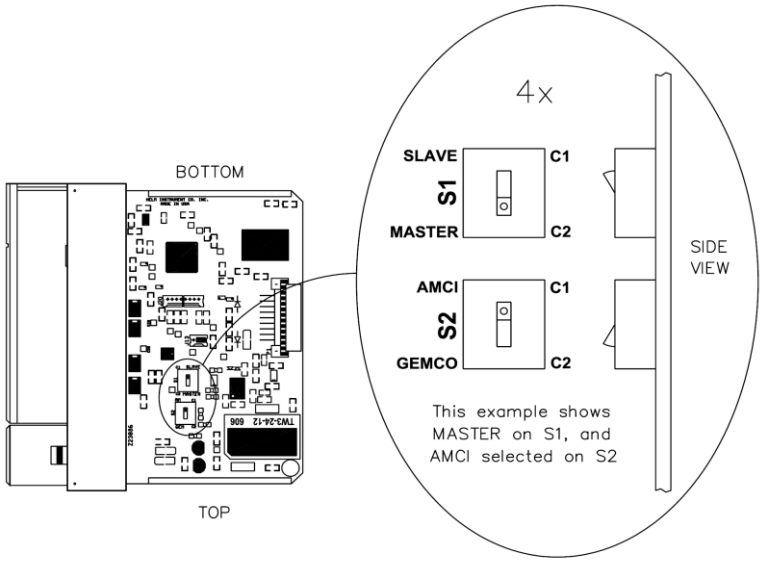
Initial Setup Procedures

A complete listing of a sample ladder logic program is included in this manual. Examples shown are for reference.

All values are 0 (default) on initial start-up. This means that all limit switch settings are disabled. Once established, values reside in memory and are downloaded at system power-up.

Make the following adjustments to initialize module for proper operation:

- **Set Master/Slave (Dip Switch S1) mode status**
- **Set Resolver Type selection (Dip Switch S2)**



Step 1 (Master/Slave Selection) → Set dip switch (S1) to Master (On) position or Slave (Off) position.

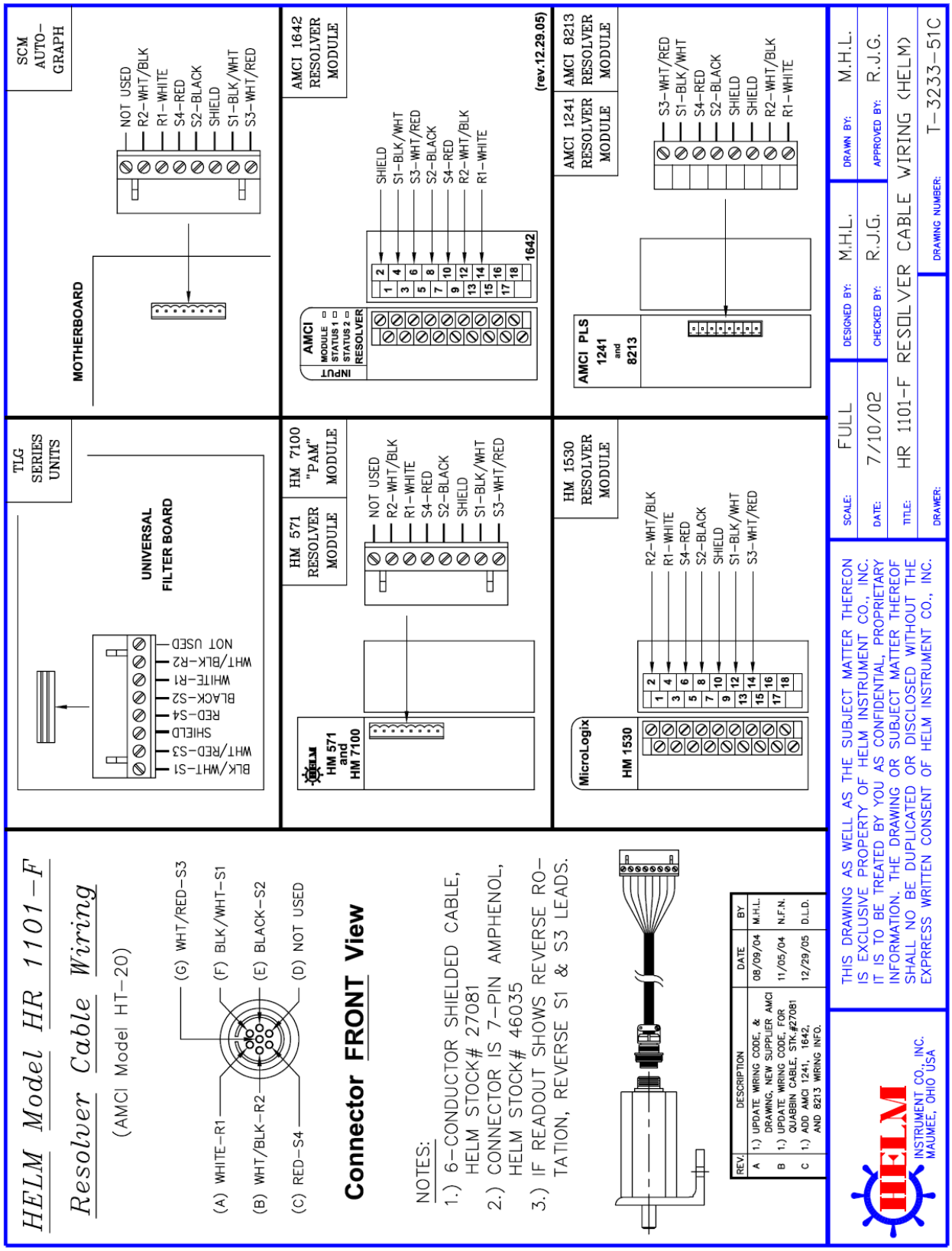
Please note that the "New" module must <u>always</u> be in Master mode, when used in the same PLC system with an "Old" Helm Model HM-571-RES resolver module, or when used with a Helm Model HM-7100 resolver module. For any other system configuration, the new module may be used in Slave mode, if needed.

Step 2 (Resolver Type Selection) → Set dip switch (S2) to AMCI position or Ametek-Gemco position.

Step 3 (Forward/Reverse Change) → There is no setting or adjustment switch on the "New" module for Forward/Reverse resolver operation. If the original resolver wiring connections produce an improper Reverse Rotation signal, the (S1) Sin Ground and (S3) Sin connections should be reversed. This will give a proper Forward Rotation signal.

"NEW" MODEL HM-571-E
RESOLVER MODULE

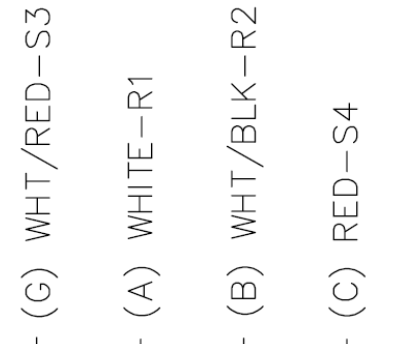
Appendix **C**



HELM Model HR 1101–F, Resolver Cable Wiring

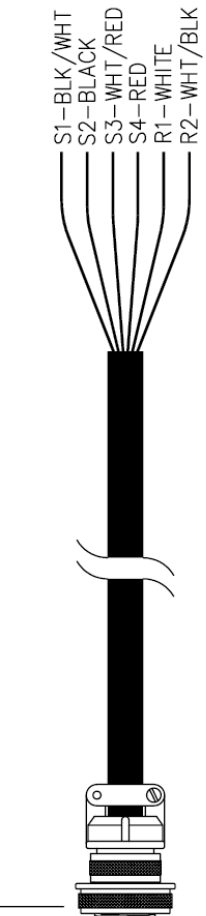
(AMCI Model HT–20)

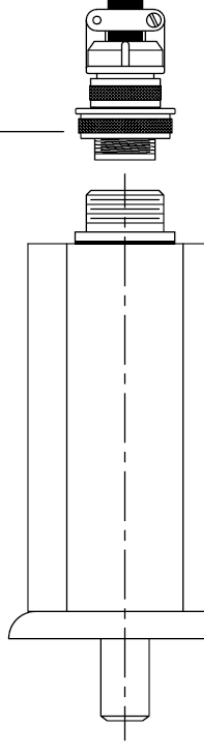
NOTES:
1.) 6–CONDUCTOR SHIELDED CABLE, HELM STOCK# 27081.
2.) CONNECTOR IS 7–PIN AMPHENOL, HELM STOCK# 46035.
3.) IF READOUT SHOWS REVERSE ROTATION, REVERSE S1 & S3 LEADS.
4.) THIS WIRING IS CURRENT AS OF 11/05/04, WHEN WE SWITCHED TO QUABBIN CABLE STK# 27081.



Connector REAR View

(for Assembly of a New Cable)





HELM INSTRUMENT CO., INC. MAUMEE, OHIO USA

SCALE:	NONE	DESIGNED BY:	N.F.N.
DATE:	12/29/05	CHECKED BY:	R.J.G.
TITLE:	RESOLVER CABLE WIRING, REAR VIEW (HELM)	DRAWN BY:	M.H.L.
DRAWER:		APPROVED BY:	R.J.G.
		DRAWING NUMBER:	T–3233–52