

EASYPack Genesis **Programmable Limit Switch**

GN3B1-01B-10



GENERAL INFORMATION

Important User Information

The products and application data described in this manual are useful in a wide variety of different applications. Therefore, the user and others responsible for applying these products described herein are responsible for determining the acceptability for each application. While efforts have been made to provide accurate information within this manual, AMCI assumes no responsibility for the application or the completeness of the information contained herein.

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Manuals at AMCI are constantly evolving entities. Your questions and comments on this manual are both welcomed and necessary if this manual is to be improved. Please direct all comments to: Technical Documentation, AMCI, 20 Gear Drive, Terryville CT 06786, or fax us at (860) 584-1973. You can also e-mail your questions and comments to techsupport@amci.com

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Notes

ABOUT THIS MANUAL

Read this chapter to learn how to navigate through the manual and familiarize yourself with the conventions used in it. The last section of this chapter highlights the manual's remaining chapters and their targeted audience.

Audience

This manual explains the operation, installation, and programming of AMCI's EASYPack Genesis standalone programmable limit switch (PLS), model number GN3B1-01B-10.

It is written for the engineer responsible for incorporating the EASYPack Genesis into a design, as well as the engineer or technician responsible for its actual installation.

Navigating this Manual

This manual is designed to be used in both printed and on-line formats. Its on-line form is a PDF document, which requires Adobe Acrobat Reader version 4.0+ to open it.

Bookmarks of all the chapter names, section headings, and sub-headings were created in the PDF file to help navigate it. The bookmarks should have appeared when you opened the file. If they didn't, press the F5 key on Windows platforms to bring them up.

Throughout this manual you will also find *green text that functions as a hyperlink* in HTML documents. Clicking on the text will immediately jump you to the referenced section of the manual. If you are reading a printed manual, most links include page numbers.

The PDF file is password protected to prevent changes to the document. You are allowed to select and copy sections for use in other documents and, if you own Adobe Acrobat version 4.05 or later, you are allowed to add notes and annotations.

Manual Conventions

Three icons are used to highlight important information in the manual:



NOTES highlight important concepts, decisions you must make, or the implications of those decisions.



CAUTIONS tell you when equipment may be damaged if the procedure is not followed properly.



WARNINGS tell you when people may be hurt or equipment may be damaged if the procedure is not followed properly.

The following table shows the text formatting conventions:

Format	Description
Normal Font	Font used throughout this manual.
<i>Emphasis Font</i>	Font used the first time a new term is introduced.
DI SPLAY	Highlights text shown on the EASYPack Genesis display.
[KEY]	Highlights a key to be pressed on the EASYPack Genesis.
<i>Cross Reference</i>	When viewing the PDF version of the manual, clicking on the cross reference text jumps you to referenced section.

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Revision Record

This manual, 940-0G010, is the first revision of the manual. It was initially released December 21st, 2001.

Revision History

940-0G010: 12/31/2001. Initial Release.

Where To Go From Here

This manual contains information that is of interest to everyone from engineers to operators. The table below gives a brief description of each chapter’s contents to help you find the information you need to do your job.

CHP Num.	Chapter Title	Intended Audience
1	INTRODUCING THE EASYPACK GENESIS	Anyone new to the EASYPack Genesis. This chapter gives a basic overview of the features available on the unit, typical applications, and compatible transducers.
2	QUICK START	Anyone already experienced in installing or using similar products and wants generalized information to get up and running quickly.
3	SYSTEM CHECKOUT	Anyone wanting to bench test their unit or troubleshoot an installation.
4	SPECIFICATIONS	Anyone that needs detailed information on the unit itself. This chapter describes all of the unit’s parameters, their defaults and ranges.
5	GENERAL INSTALLATION GUIDELINES	Anyone new to installing electronic controls in an industrial environment. The chapter includes general information on wiring, grounding, and surge suppression that is applicable to any controls installation.
6	INSTALLING THE EASYPACK GENESIS	Anyone that must install an EASYPack Genesis on a machine. Includes information on mounting, grounding, wiring, and surge suppression specific to the unit.
7	PROGRAMMING OVERVIEW	Anyone looking for information on navigating through the displays, creating, copying, or deleting programs, and using passwords to secure programs.
8	CONFIGURATION PROGRAMMING	Anyone that needs information on programming the transducer setup parameters.
9	BASIC LS PROGRAMMING	Anyone that needs information on programming limit switch ON/OFF Setpoints and ON/OFF Advances.
10	ADVANCED LS PROGRAMMING	Anyone that needs information on programming the PLS Group functionality.
11	MONITORING MACHINE OPERATION	Anyone that needs to know how to use the EASYPack Genesis while running the machine. The chapter includes information on monitoring I/O status and error messages you may encounter.

INTRODUCING THE EASYPACK GENESIS

This chapter is written for anyone that wants to familiarize themselves with the features of the EASYPack Genesis, the type of applications it was designed for, and other products available from AMCI you'll need to complete your system.

Overview

The EASYPack Genesis, part number is GN3B1-01B-10, is AMCI's latest addition to our growing line of standalone programmable limit switch controllers for packaging applications. It's a self contained unit that accepts a brushless resolver for position feedback, and provides eight solid state relay outputs and five opto-isolated DC inputs on its rear panel.

This unit is ideally suited for all limit switch applications that require eight or fewer outputs. Its small size makes it easy to integrate into packaging machines that don't have a large amount of panel space, while its built-in display and keypad makes it very simple to setup and operate.

Typical packaging applications include:

- Vertical Form, Fill & Seal
- Glue Gun Control
- Labelers
- Shrink Wrap machines.

Limit switches can be programmed to operate in one of two ways:

- **Position on / position off** (Equivalent to mechanical cams)
- **Position on / position off OR time off** (Similar to timer relays)

In addition to having two types of limit switch outputs, the EASYPack Genesis also includes:

- **Automatic Advances** that allow you to compensate for fixed delays in your system as your line speed changes. By programming in the fixed delays of each output load, the unit automatically adjusts when outputs fire. A typical use of Automatic Advances is glue gun control, which keeps the placement of glue consistent as line speed changes.
- **Motion Detector** that functions as a speed based limit switch. The state of the Motion Detector can be ANDed with any of the limit switches, so their outputs only fire when the machine is running at the desired speeds.
- **LS Enable input** is an AC/DC input. Any of the limit switches can be ANDed with this input. When associated with this input, the limit switches only fire when the input is active.

The features listed above make the EASYPack Genesis a programmable limit switch that is capable of handling many applications, but the unit's most powerful feature is *PLS Group Programming*.

PLS Group Programming

PLS Group Programming allows you to group together limit switches and condition them with one of five predefined logical functions. These logical functions are called *Modes*, and each Mode is designed to perform a specific function useful in packaging applications such as enabling the limits only when product is present and positioned correctly.

By incorporating these modes directly into the EASYPack Genesis, update time on conditioned limit switches is kept to 100 microseconds. This means there will be little variance in their actual turn on/off positions, so your machine can be run at a higher line speed and still produce high quality products.

Four separate Groups are available on the EASYPack Genesis controller which means one unit can control up to four different functions on your machine.



Figure 1.1 GN3B1-01B-10 PLS Controller



Basic/Advanced Features

AMCI knows that many of you will use the EASYPack Genesis as a basic programmable limit switch. In order to keep this manual simple for those that are using the unit in this way, but still explain all of the features of the unit in an orderly fashion, we decided to break down the features of the EASYPack Genesis into two areas.

- **Basic Features** are features needed to get the EASYPack Genesis operating as a position on / position off programmable limit switch with Automatic Advances.
- **Advanced Features** are features that add the position on / position off OR time off limits, Motion and LS Enable ANDing, and group functionality.



Where applicable, each chapter will cover Basic Features first, followed by Advanced Features. Notices throughout the chapter will alert you to the functionality about to be covered and tell you to go next if you're not interested in the feature.

Unit Description

Figure 1.2 shows the layout of the panels on the EASYPack Genesis controller. Note that the unit ships with mating connectors for the Power Input and the Transducer Input connectors. These connectors are not shown for clarity.

The EASYPack Genesis is designed to be mounted on a panel or enclosure door using its four #8-32 studs. A neoprene mounting gasket is included with the unit. The recommended panel cutout and mounting method is given in chapter 6, *INSTALLING THE EASYPACK GENESIS*, starting on page 45.

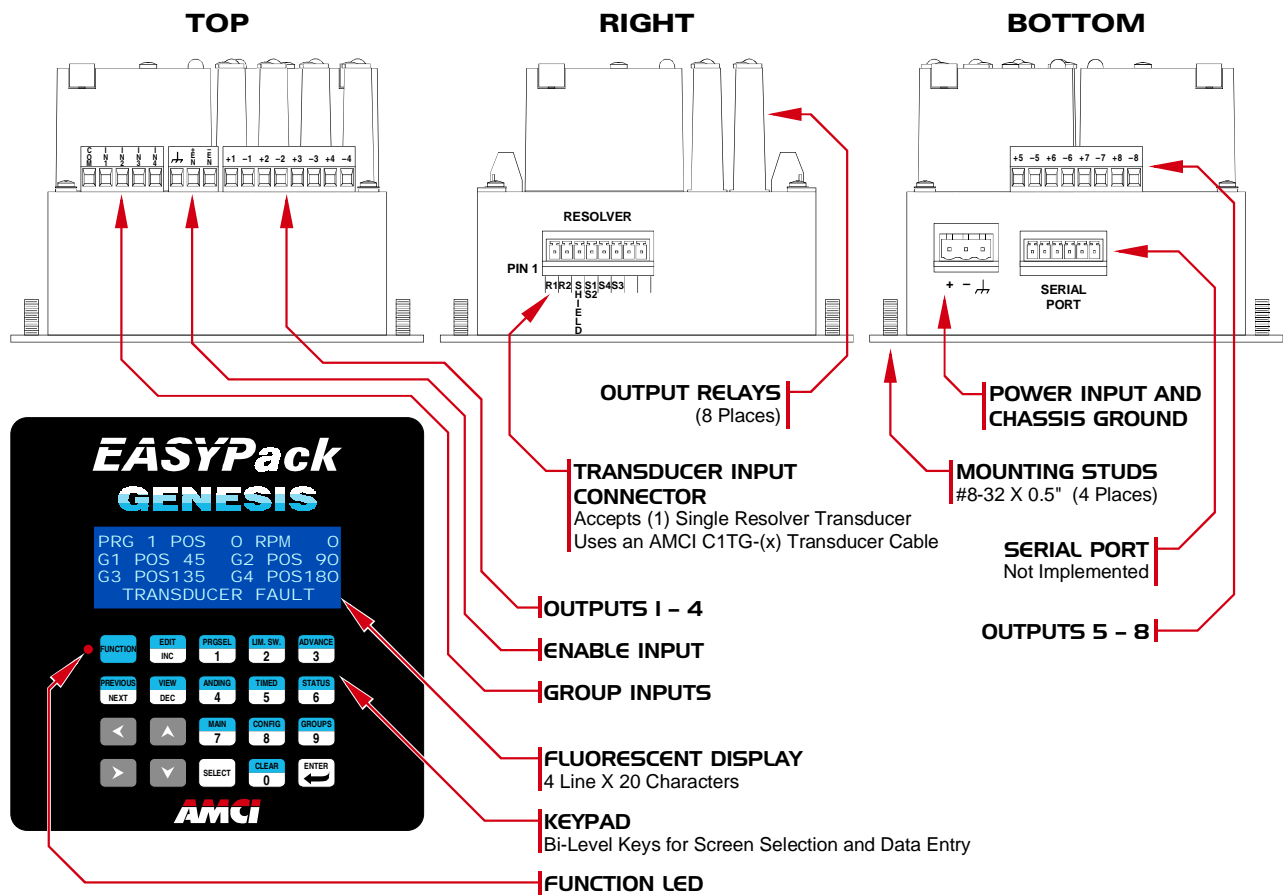


Figure 1.2 Genesis Layout



Unit Description (continued)

Operator Interface (Display and Keyboard)

The operator display provides four lines of text that are twenty characters long. Figure 1.3 shows a typical Genesis display.

- **Line 1:** Identifies the screen being displayed
- **Lines 2 and 3:** Shows parameters and their values
- **Line 4:** Displays the unit's status.

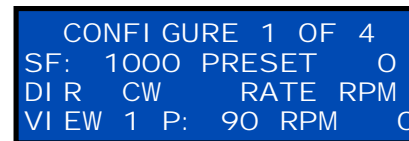


Figure 1.3 Sample Display

Usually, line 4 displays the current mode, (View or Edit), the number of the current program, and the machine's current position and speed. This information is replaced with an error message if a problem occurs.

The keypad is made up of twenty keys that perform various functions. Thirteen of the keys are *bi-level*, with blue on the top and white on the bottom. When the red Function LED next to the [FUNCTION] Key is on, pressing one of these keys selects the function listed on the blue level, while pressing one of these keys when the Function LED is off selects the function, or enters the data, listed on the white level. The [FUNCTION] Key simple toggles the state of the Function LED.

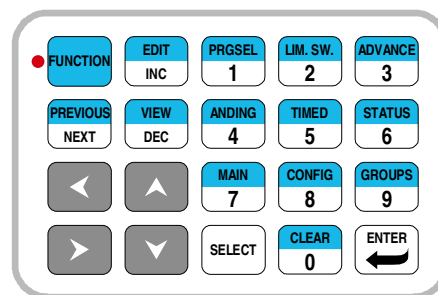


Figure 1.4 Genesis Keypad

Throughout this manual, the bi-level keys have two names, one for when the Function LED is on and one when it is off. For example, [PRGSEL] and [1] refer to the same key.



The instructions do not constantly remind you to make sure the Function LED is on or off before pressing a key. If the instructions give the name of the key that is on the blue level, the Function LED must be on before pressing the key.

The four arrow keys are used to navigate around the screens. The right and left arrows switch between parameters on the display while the up and down keys switch between limit switches when programming parameters for these outputs.

Some parameters, such a *Limit Switch Type*, have a limited number of values. The [SELECT] key is used to cycle through the values of these parameters.

The [ENTER] key works the way you'd expect. Changes to programming are not stored in memory until the [ENTER] key is pressed. If you change a parameter value and then switch to another parameter without pressing the [ENTER] key, the new value will not be stored and the parameter will revert back to its original value.

Power Input

The EASYPack Genesis requires +24Vdc to operate. The Power Input Connector is on the bottom of the unit. It has two contacts for power and a third for grounding the chassis.

Transducer Input Connector

When looking at the display, the eight pin Transducer Input Connector is located on the right side of the unit. The mating connector, AMCI part number MS-8P, ships with the unit. The EASYPack Genesis accepts a single resolver transducer for position feedback. Specifications for all of the AMCI transducers that work with the EASYPack Genesis are listed in the following section, *Compatible Transducers*, starting on page 13.

Limit Switch Outputs

Connectors for the limit switch outputs are the back of the unit. Outputs one through four come off the top connector on the back while outputs five through eight come off the bottom. Both DC and AC solid state relays can be plugged into the back of the EASYPack Genesis. The AMCI part number for the DC relay is KD-6, while the AC relay part number is KA-3. Full specifications of the relays is given in chapter 3 in the section *Output Relay Specifications*, on page 24.



Unit Description (continued)

Group Inputs



Group Inputs are only used if you are using the PLS Group Programming advanced feature. If you are not using this feature, then don't wire anything to the inputs.

There are a total of four Group Inputs, with one input assigned to each of the PLS Groups available on the EASYPack Genesis. The exact function of the input depends on the Mode the Group is running.

LS Enable Input

The LS Enable Input can be ANDed to any limit switch output, which prevents the output from firing unless input is active. If you are not using this feature, then do not wire anything to the input.

Compatible Relays

The EASYPack Genesis accepts solid-state relays that you must order separately. The relays must be compatible with Opto 22's G4 output relays that use 24Vdc as their logic voltage and have two input pins. AMCI sells Opto 22 or compatible relays under our part numbers KD-6 and KA-3. The KD-6 is a DC output relay while the KA-6 is an AC relay. Complete specifications of the relays are given in the section: *Output Relay Specifications* found on page 24.

	KD-6	KA-3
Type	Solid-state DC Output	Solid-state AC Output
Manufacturer	Opto 22	Opto 22
Manufacturer's Part#	G4ODC24	G4OAC24

Table 1.1 Output Relay Specifications



Compatible Transducers

Table 1.2 lists the AMCI single-resolver transducers that are compatible with the EASYPack Genesis unit.

Model	Shaft	Mount	Turns	Comments
R11X-J10/7	0.120"	Servo	1	NEMA 1, size 11 resolver. Leads only, no connector.
R11X-J12/7	0.188"	Servo	1	NEMA 1, size 11 resolver. Leads only, no connector.
HT-6	0.188"	Front/Side	1	NEMA 13 R11X-J12/7 transducer
HT-20	0.625"	Front/Side	1	NEMA 4 heavy duty transducer
HT-20S	0.625"	Front/Side	1	HT-20 with side connector
HT-20C	0.625"	Front/Side	1	NEMA 4X stainless steel HT-20 w/ Viton® shaft seal, and 0.5" NPT thread for conduit connection. Internal terminal plug for resolver connections.
HT-20K	0.625"	Front/Side	1	NEMA 4X hard coat anodized HT-20, stainless steel shaft w/ Viton shaft seal.
HT-20KS	0.625"	Front/Side	1	HT-20K with side connector.
HT-20L	0.625"	Front/Side	1	NEMA 4X hard coat anodized HT-20, stainless steel shaft w/ Nitrile shaft seal.
HT-20LS	0.625"	Front/Side	1	HT-20L with side connector.
H25-FE	0.375"	Flange	1	NEMA 4, size 25, end connector
H25-F1E	0.375"	Flange	1	NEMA 4, size 25, end connector. Bolt-in replacement for Namco/C&A HT-11B transducers.
H25-FS	0.375"	Flange	1	NEMA 4, size 25, side connector
H25-FL	0.375"	Flange	1	NEMA 4, size 25, integral 15 foot (3 meter) cable
H25-SE	0.375"	Servo/Front	1	NEMA 4, size 25, end connector
H25-SS	0.375"	Servo/Front	1	NEMA 4, size 25, side connector
H25-SL	0.375"	Servo/Front	1	NEMA 4, size 25, integral 15 foot (3 meter) cable
HT-400	0.625"	Front	1	NEMA 4, Bolt-in replacement for Autotech RL100 transducers. Also has HT-20 bolt pattern. 1" NPT thread for conduit connection. Internal terminal strip for resolver connections.
HT-400-1E	0.625"	Front	1	Same as HT-400 with an AMCI MS connector instead of a conduit connection.
HT-20-(x)	0.625"	Front	(x)†	HT-20 with internal (x):1 gear ratio
HTT-20-1	0.625"	Front	1‡	Redundant single turn resolvers, single MS connector
HTT-400-1	0.625"	Front	1‡	Redundant single turn resolvers. Bolt-in replacement for Autotech RL220 transducers. Dual AMCI MS connectors on back of transducer.

† Available gear ratios are: 2:1, 2.5:1, 2.77:1, 3:1, 4:1, 4.8:1, 5:1, 6:1, 7:1, 8:1, 9:1, 10:1, 12:1, 13:1, 15:1, 16:1, 18:1, 20:1, 24:1, 36:1, 40:1, 50:1, 60:1, 64:1, 100:1, 105:1, 150:1, 180:1, 250:1 and 256:1. Additional gear ratios may be available. Check our website, www.amci.com, for an up-to-date listing.

‡ This package contain two resolvers geared 1:1 with the input shaft. Most commonly used in systems that mandate redundant sensors, AMCI can install two different size 11 resolvers in the package per customer requirements. Contact AMCI for more information.

Table 1.2 Compatible AMCI Transducers



Other EASYPack Family Members

“EASYPack” is AMCI’s trademarked name for the line of products we designed to ease the task of packaging machine automation. The following table lists some of the other products in the EASYPack family, but the line is constantly growing, so the list may be incomplete. For the latest information on all of our products, browse through our website www.amci.com.

Model Number	Interface Type	Description
GN3A1-02C-10	Standalone	16 output EASYPack Genesis. Nearly identical to the 8 output EASYPack Genesis described in this manual, the 16 output version also includes 2 velocity based analog outputs and a 256 bit shift register.
8511	SLC 500 Module	The same functionality as the 8 output EASYPack Genesis in a plug-in module for the A-B SLC 500 controller. The 8511 has 16 limit switch outputs that are available to the processor over the backplane.
8512	SLC 500 Module	The same functionality as the 8 output EASYPack Genesis in a plug-in module for the A-B SLC 500 controller. The 8512 has 16 limit switch outputs which are available over the backplane and 8 available off a relay board attached to its front panel
8513	SLC 500 Module	The same functionality as the 8 output EASYPack Genesis in a plug-in module for the A-B SLC 500 controller. The 8513 has 16 limit switch outputs available over the backplane and 16 available off a relay board attached to its front panel. Two velocity based analog outputs are also available.
8523	SLC 500 Module	The same functionality as the 8513, but it uses a quadrature encoder for position feedback instead of a resolver.
8213	ControlLogix Module	A plug-in module for the ControlLogix backplane with the same functionality as the 8513.
2742-18	1771 I/O Module	This eight output PLS accepts 1 or 2 resolver inputs and conditions its outputs to fire only when an input is active.
NX3B1C	ControlNet	8513 functionality in a din-rail mounted product with a ControlNet interface.
NX3A1P	ProfiBus	NX3B1C with Profibus interface instead of ControlNet.
NX3A1E	Ethernet IP	NX3B1C with Ethernet interface instead of ControlNet.

Table 1.3 EASYPack Family Members

Other Products From AMCI

AMCI has been serving the industrial automation sector since 1985, and we have a broad range of other products that are used in the packaging machine market.

- **DURACODERS:** Absolute, Analog, or Incremental encoders that replace the fragile glass disk and sensitive optics with an industrial resolver. The size 25 DuraCoders are drop in replacements for similar sized optical encoders.
- **STEPPER MOTION:** Our line of stepper products that includes motors, drives, and indexers. Stepper motor systems offer low cost motion control for many packaging machines.
- **PLC PLUG-IN MODULES:** AMCI offers a broad range of PLC plug-in modules for most major PLC brands including A-B ControlLogix, SLC500 and 1771 I/O, GE Fanuc 90-70 and 90-30, and Modicon Quantum. Modules include resolver, LDT, and SSI interfaces, programmable limit switches, and registration control modules.
- **RESOLVER TRANSDUCERS:** AMCI is the only company in the market place to manufacturer its own resolvers. Not only do we make the resolvers for our own products, we also produce resolvers with different electrical specifications for other position feedback applications such as servo control.

For additional information on these items and the rest of our product lines, browse through our website www.amci.com, or contact AMCI or your local AMCI distributor.

CHAPTER 2

QUICK START

This chapter can help you get started using the EASYPack Genesis. It assumes you are an experienced user, with a solid understanding of programmable limit switch functionality, and proper installation techniques such as wiring, grounding, and surge suppression.

The chapter also contains references to the other sections in this manual where more information can be found. If you don't feel you have enough information or background to complete the steps listed here, *always read the referenced sections before attempting to complete a step.*

STEP 1: Decide On Needed Functionality

- 1.1) Passwords?
- 1.2) Number and type of outputs (position on/off or timed).
- 1.3) LS Enable ANDing for any of the outputs? (Output only fires when LS Enable input is active.)
- 1.4) Motion ANDing for any of the outputs? (Output only fires when machine is running at the correct speed.)
- 1.5) Do you want the machine speed reported in RPM or a different value such as inches per minute, cartons per minute, or boxes per minute? (If the machine speed is reported in RPM, you can leave the Rate Multiplier, Divisor, and Decimal Point parameters at their default values.)
- 1.6) Do you need PLS Group Programming functionality? If you are using the EASYPack Genesis as a basic programmable limit switch then the answer is no, and you can leave all of the Group Programmable Parameters at their defaults.

STEP 2: Determine Parameter Values

- 2.1) If you are using passwords to protect your programming, check off the Passwords Enabled box and note where the passwords are kept.
- 2.2) Determine the basic Transducer Setup Parameters: Scale Factor, Machine Preset Value, and Count Direction.
- 2.3) Determine the number of outputs you need and their type, either normal or timed. Determine the on/off setpoints for each output. If you are not using PLS Group Programming, assign all of the outputs to Group 1, Mode 0.
- 2.4) If you are using the advanced LS Enable ANDing feature, check off which outputs will be ANDed with the input.
- 2.5) If you are using the advanced Motion ANDing feature, determine you Motion Detector LOW/HIGH Setpoints and check off which outputs will be ANDed with the motion detector.
- 2.6) If you are using the advanced feature of machine speed scaling, determine the values for the Rate Multiplier, Divisor, and Decimal Point parameters as well as the Rate Value and Toggle Speed parameters.
- 2.7) If you are using the advanced PLS Group Programming feature, determine the number of groups you will need, their modes, and the number of outputs assigned to each group.

STEP 3: Install Your System Hardware

- 3.1) Panel cutout and clearance dimensions are given on page 45.
- 3.2) Install the EASYPack Genesis. Bond the enclosure and unit to your ground bus. Bond all other components as you install them.
- 3.3) If you are using a separate supply for the EASYPack Genesis, install and bond it now.
- 3.4) Install the transducer and transducer wiring. Transducer dimensional drawings are on our website and the C1TG-(x) transducer cable drawing is given on page 49. The transducer cable is type CM under the national electrical code. Do not install it in conduit with any conductor of electrical light or power circuits, Class 1 circuits, Non-power limited fire protective signaling circuits, or other high power wiring.
- 3.5) Wire the outputs. Refer to figure 6.9 *I/O Connector Placement*, on page 50 for connector pinout. Do not run output wiring in the same conduit as the transducer cable.
- 3.6) Install surge suppression on any load switched by a relay in the system. This includes loads that are not attached to the EASYPack Genesis.
- 3.7) If you are using the advanced LS Enable ANDing or PLS Group Programming features, wire the appropriate inputs. Shielded cable is required on all inputs. Do not install this wiring in conduit with a branch circuit, lighting, or other high power wiring.

STEP 4: Program Your EASYPack Genesis

- 4.1) If needed, create a new program with the [PRGSEL] key.
- 4.2) Program all of the needed parameters under the [CONFIG] key. Use the [NEXT] key to cycle through the four configuration screens.
- 4.3) Program the limit switch setpoints using the [LIM.SW.] key. Use the four arrow keys to move between parameter values and limit switch numbers. Each limit switch has four setpoint pairs. Unused pairs are displayed as On 0 / Off 0. It's possible to switch to the ON/OFF Advances screen or ANDing screen with the left or right arrow keys. If you do this, use the other arrow key to switch back to the setpoint screens. If you are not using the PLS Group Programming advanced feature, leave the group number at its default of 1.
- 4.4) If you are using the ON/OFF Advances feature, you can program them now with the [ADVANCE] key or later determine their values when the machine is being setup.
- 4.5) If you are using the LS Enable ANDing or Motion ANDing advanced features, program them using the [ANDING] key.
- 4.6) If you are using the PLS Group advanced feature, program their parameters using the [GROUPS] key.

STEP 5: Verify Your System Setup

- 5.1) Run your machine to verify basic operation.

STEP 6: Fine Tune Your Programming

- 6.1) The [INC] and [DEC] keys can be used to fine tune limit switch setpoints and advances while the machine is running.
- 6.2) Changing all other parameter requires the machine to be stopped.

CHAPTER 3

SYSTEM CHECKOUT

This chapter is for new users that want to bench test the EASYPack Genesis to become familiar with it. Because it assumes you're bench testing the unit, installation practices such as grounding a surge suppression are not covered.

Needed Equipment

The following is all you need to walk through the system checkout.

- The EASYPack Genesis, including the Transducer and Power connectors that shipped with the unit.
- A 24Vdc power supply that can deliver 0.5A+
- A pair of wire cutters and strippers
- Enough wire to connect the supply and unit together, fake a transducer connection, and power an input.

A transducer and C1TG-(x) cable from AMCI will make some steps easier, but they're not required. Output Relays make it easier to check the state of the outputs, but again, they are not required.

Optional Relays

Even though you don't need them for the bench test, install the relays now if you have them. Figure 3.1 shows the relay placement on the back of the EASYPack Genesis.

Faking a Transducer, or Attaching a Real One

If you don't have an AMCI transducer and C1TG-(x) cable, you can put wire jumpers on the transducer input connector as shown in figure 3.2 below. After it's wired, plug the connector back into the EASYPack Genesis. When you power the unit, it will think that the transducer is at 90°.

If you have a transducer and cable, plug the cable into the transducer and the EASYPack Genesis now.

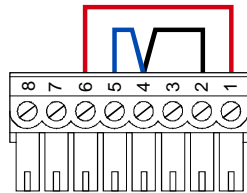


Figure 3.2 Faking a Transducer Connection

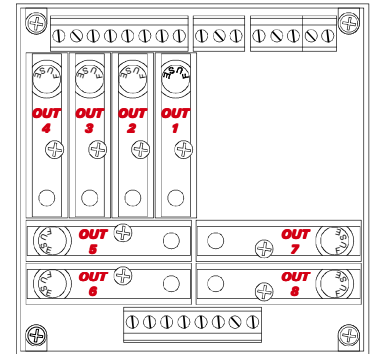


Figure 3.1 Relay Placement

Applying Power

The power connector is on the bottom of the unit. With the power supply turned off, wire the supply to the “+” and “-” pins on the unit's power connector. Don't attach a wire to the earth ground pin. This pin is for grounding the unit when you install it on your machine.

Once you've check over your wiring, power up the supply. The display should light up in a few seconds. If it doesn't, remove power immediately and check your wiring again.

Initial Display

The display should be the same as the picture on the right if its a new unit. If the unit has been previously programmed, your display could be different.

With none of the limits programmed, the display only shows the running program, “PRG 1”, the present position, “POS 89”, and the present speed “RPM 0”.

If you have a transducer attached, you can rotate it to see the position and speed change.

If you see “TRANSDUCER FAULT” on the bottom line of the display, check your connections and cycle power to the unit.

```
PRG 1 POS 89 RPM 0
```

Selecting Different Functions

Start by pressing the [FUNCTION] key. You will see the red Function LED next to the key come on. Repeatedly pressing the [FUNCTION] key toggles the state of the Function LED.

When the Function LED is on, pressing any of the keys that are both blue and white selects the function on the blue part of the key. Pressing any of these keys when the Function LED is off selects the white part of the key. This gives the keys the ability to enter data like [1], [2], and [3], or select a new function, like [PRGSEL], [LIM.SW.], and [ADVANCE].

Throughout this manual, when the instructions tell you to do something like “press the [PRGSEL] key”, it means “press the [FUNCTION] key so the red LED is on and then press key number 1”.

Creating a New Program

Press the [PRGSEL] key, and the display changes to the one shown on the right with the word “SELECT” blinking. This is the *Program Select Screen*, where you select, create, copy and delete programs.

Note the bottom line. “VI EW 1” means that you are running program 1, but not editing it. The other two numbers are the transducer position and tachometer value.

Press the [EDIT] key, (remember to turn on the Function LED first), and note that “VI EW 1” changes to “EDI T 1”. You are now in *Edit Mode*, so you can change programmed values.

Press the [SELECT] key and note that “SELECT” changed to “NEW”. Press [ENTER], followed by [2], [ENTER]. You’ll now see two program numbers on the second line and “EDI T 2” on the bottom line. You just created program 2 and are now editing it.

```
SELECT PROGRAM 1
1
VI EW 1 P: 89 RPM 0
```

Programming a Limit Switch

Press the [LIM.SW.] key. The display changes to the *LS Setpoint Screen*. Note that the bottom line still displays the status information. This is true for most screen displays.

The top line is the headings for the data shown on the second line. Because limit switch 1 doesn’t have any setpoints programmed into it, the second line shows “CH. NOT USED”. The third line shows some status information for the limit switch.

You’ll see that channel number one is blinking. Press the up and down arrow keys and cycle through the eight limit switches. When you get back to channel 1, press [ENTER] and note that the blinking cursor moves to the LS Type field. You can also use the [▶] key to move the cursor.

Now press [SELECT] several times and you’ll see the value change between three values:

- “ - ”: Channel not used
- “ N ”: Normal limit switch (position on / position off)
- “ T ”: Timed limit switch (Position on / Position or time off)

```
CH GROUP FROM1 TO1
1 - CH. NOT USED
MODE: GROUP POS:
EDI T 2 P: 89 RPM 0
```

Programming a Limit Switch (continued)

When the display shows “N”, press [ENTER]. The display changes to the one on the right.

```
CH  GROUP FROM1 TO1
1  N    1    0-   0
MODE: 0 GROUP POS: 89
EDI T 2 P: 89 RPM  0
```

Now the PLS Group Number is blinking. PLS Group Programming is an advanced feature that we’re not going to use right now. If you’re using the EASYPack Genesis as a basic limit switch, you probably won’t be using it either. In a nutshell, PLS Group Programming lets you combine limit switch outputs into groups and then further condition their outputs with additional logic. For now we’ll just leave all of the limit switches in *Group 1*. Note on the third line “MODE: 0”. This is the value of the Group Mode parameter for Group 1. Mode 0 does not apply any additional logic to the group, and the outputs fire based only on their on/off setpoints.

Press the [▶] key to move to the first setpoint. Enter a value of 30 by pressing [3],[0],[ENTER]. The cursor is now on the dash between the On and Off Setpoints. With the cursor at this position, you can use [INC] and [DEC] to change the value of both setpoints, which changes where the output fires, but not the size of its on window. For now, press [ENTER] to move to the second setpoint. When you press [7],[0], the display will be the same as the one on the right.

```
CH  GROUP FROM1 TO1
1  N    1    30-  70
MODE: 0 GROUP POS: 89
EDI T 2 P: 89 RPM  0
```

Press [ENTER], and the display changes to display the second setpoint pair “FROM2 TO2”. Normal limit switches can have up to four setpoint pairs.

Press the [▼] key to switch to limit switch channel 2. Press [ENTER] twice, once to select the channel and once to jump to the LS Type field. Using the same basic keystrokes you used to program limit switch 1, program channel 2 as:

- LS Type: *Normal*
- Group Number: *1*
- From1: *50*
- To1: *110*

If you have a transducer, rotate it until the position equals 90.

If you have the relays installed, the LED on relay 2 should now be on, showing that the limit switch is active.

Viewing I/O Status

Press the [STATUS] key and the display changes to the one shown on the right. This is the *I/O Status Screen* and it does exactly what its name implies. The top line gives the I/O numbers, line 2 is the status of the outputs and line 3 is the status of the inputs. Output 2 equals “1” because its presently active.

```
STATUS 87654321
OUTPUT 00000010
INPUT  0000
EDI T 2 P: 89 RPM  0
```

Presetting the Position

The Machine Preset Value allows you to change the position value without rotating the transducer shaft. The function is located on *Configuration Screen 1*, so press [CONFIG] to switch to that display. As shown on the right, the screen contains more than just the preset feature.

```
CONFIGURE 1 OF 4
SF: 360 PRESET 0
DI R CW RATE RPM
EDI T 2 P: 89 RPM  0
```

There are four Configuration Screens, and you cycle through them with the [PREVIOUS/NEXT] key. The first three Configuration Screens configure the position and tachometer data calculated from the resolver transducer. Scale Factor, Count Direction, Motion Detector, and Rate Multipliers are examples of these parameters. The fourth Configuration Screen is for passwords. From this screen you enable or disable the three different passwords as well as set their actual values.

Right now the Scale Factor value is blinking, but we don’t want to change the number of counts per turn, so press [▶] to move to the “PRESET” field.

Presetting the Position (continued)

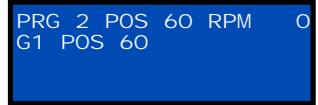
NOTE Get in the habit of using the [◀] and [▶] keys to switch between fields on the display. Using [ENTER] can cause problems. For example, if you want to change the Count Direction “DI R” value and you press [ENTER] right now, you’ll get there, but you’ll also preset your position value to zero. Try it if you want, and then press [◀] to get back to the Preset field.

Preset the position to 60 by pressing [6],[0],[ENTER]. Three things happen when you press [ENTER].

- 1) The cursor moves to the Count Direction field.
- 2) The Preset field goes back to its default value of zero.
- 3) As shown on the last line of the display, your position value changes to 60. “P: 60”

Right now, both of the limit switches should be on. Press the [STATUS] key to verify this.

As a final step, press [MAIN] to bring up the main display screen again. It should be the same as the one on the right.



You’ll notice it has changed a little since we started the system checkout. Line two now contains “G1 POS 60”. This is the Group 1 Position value. If you’re using the EASYPack Genesis as a basic limit switch without the PLS Group Programming feature, you can safely ignore this value, it should always be the same as the machine position shown on the top line.

If you are using PLS Group Programming, each group that has at least one limit switch assigned to it will have its position shown on the display. The EASYPack Genesis has the ability to offset the group positions from each other, so they may be different from the machine position shown on the top line, and from each other.

NOTE If you do not press a key for ten minutes, the EASYPack Genesis switches to the main display and enters View Mode.

The rest of this chapter introduces some EASYPack Genesis Advanced features, specifically LS Enable ANDing and Group Modes. If you’re not interested in these features, you can stop the system checkout now.

Wiring the Inputs

In order to continue the system checkout, you’ll have to wire up two inputs as shown in figure 3.3. One is the LS Enable input and the other is the input for Group 2. Turn off power before wiring the inputs and use the same supply that powers the unit. As you wire, remember that you will be applying and removing power from the inputs to see how they affect the outputs, so make it easy to disconnect power from them later.

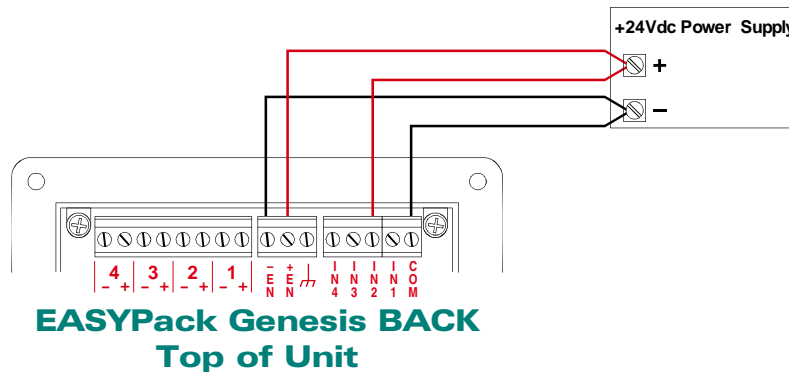


Figure 3.3 Wiring Inputs for System Checkout

When you’re done, re-apply power to the unit. The *Configuration 1 Screen* will come back again but you are now in View mode “VI EW 2”. (The unit always powers up in View mode.) Press the [EDIT] key to get back into Edit mode.

LS Enable ANDing

In addition to PLS Group Programming, the EASYPack Genesis can condition limit switches by logically anding them with one or two conditions:

- ▶ **Motion ANDing:** The state of the output is ANDed with the state of the *Motion Detector*. The Motion Detector is a speed based limit switch. It's on between two speeds that you program into the unit. Motion ANDing prevents the outputs from firing unless the machine is running at its correct speed.
- ▶ **LS Enable ANDing:** The state of the output is ANDed with the state of the LS Enable Input. A typical packaging application wires the input to a material sensor. This prevents the outputs from firing unless material is present.

Press [ANDING] and you'll see the screen shown on the right. This screen doesn't show the status of the inputs, but instead shows whether or not the limit switch is affected by the input. Right now, limit switch 1 is not tied to either of the ANDing inputs.

CH	MOTI ON	ENABLE
1	OFF	OFF
MODE: 0	GROUP	POS: 60
EDIT 2	P: 60	RPM 0

Press [▶] twice to move the cursor to the LS Enable field. Press [SELECT] to change its value to "ON" and press [ENTER]. The display changes to the *LS Setpoint Screen*.

NOTE When you're on the last field of the screen and press [ENTER], the display automatically switches to the next screen. It may seem confusing now, but it makes data entry much faster when you start entering a full program.

With the LS Enable input now tied to LS1, the limit switch will not be on unless the input is powered. Switch to the *Status Screen* with the [STATUS] key and look at the state of output 1. Toggle power to the LS Enable input and note that the output is off unless the LS Enable input is powered.

This is not to say the output is on whenever the input is powered. With the limit switch programmed to be on between the positions of 30 and 70, the output will only be on when the position is between these two values *and* the LS Enable input is active.

PLS Group Programming

So far, the manual has only told you two things about PLS Groups.

- 1) They allow you to group together limit switches and condition them with specific functions useful in packaging applications.
- 2) If you're using the EASYPack Genesis as a basic limit switch, leave all the limit switches in Group 1: Mode 0 (which are the defaults when you create a limit switch), and ignore the feature.

To explain the power of PLS Group Programming, consider a Form, Fill, and Seal machine as an example. As the name implies, the machine performs three operations.

- 1) The machine forms a container, such as a pouch, bag, or box.
- 2) It fills the container with product, such as juice, breakfast cereal, or pens.
- 3) It seals the container.

The EASYPack Genesis can control all three functions by creating three PLS Groups. Group 1 contains the limit switches for the form operation, Group 2 contains the limit switches for the fill, and Group 3 contains the limit switches for the seal.

Each Group has its own position value, which is typically the same as the Machine Position. (Machine Position is set by the Scale Factor and Machine Preset parameters.) However, with separate positions, you can adjust the limit switches of each Group independently of the others.

Consider the fill operation on our machine, which is controlled by Group 2. If there is any variance in the position of the containers when they enter the fill area, each container may not fill properly. The solution to this problem is sensing the leading edge of the container and synchronizing the fill limit switches to this edge.

PLS Group Programming (continued)

You can accomplish this with the EASYPack Genesis by wiring the material sensor to the Group 2 Input and assigning Modes 1 or 2 to the group. These Modes differ slightly in the ways they operate, but basically they preset the group's position value when the sensor detects material. In our example, this synchronizes the limit switches for the fill operation to the position of the box. While the machine is operating, the Group 2's position will be adjusted to every new container, *without affecting the position values of the other two groups*.

With the exception of Mode 0, which doesn't do anything, Mode 3 is the easiest to understand. When the Group is in Mode 3, the group's input works exactly like the LS Enable Input. For the System Checkout, we'll put Group 2 in Mode 3, offset the group's position by 30° and view the status of the limit.

Mode 4 requires the input to become active, (transition from off to on), within a pre-programmed window. When this occurs, the outputs assigned to the group are activated for one cycle.

Start by pressing **[GROUPS]** to bring up the *PLS Groups Screen* which is shown on the right.

```
GROUP NUMBER 1 MODE0
WI NDO W ON 0 OFF 0
GRP OFFSET/PRESET 0
EDI T 2 P: 60 RPM 0
```

The top line shows the Group Number and the Mode it's presently in.

The second line allows you to program a Group Window. The Group Window is only used in Modes 1, 2 and 4 so we won't be using it in the System Checkout. The uses of the Group Window is described starting on page 34 when Group Modes are explained in detail.

The third line allows you to program the Groups Offset or Preset Value. Modes 0, 3, and 4 use this as an offset value while Modes 1 and 2 use it as a preset value.

The fourth line is the usual status information.

Press **[2]**, **[ENTER]** to switch to Group 2. With the cursor now in the Mode field, Press **[3]**, **[ENTER]** to place the group in Mode 3.

Pressing **[▶]** twice skips the Group Window on/off setpoints and brings you to the Group Offset field. Press **[3]**, **[0]**, **[ENTER]** to enter an offset of thirty degrees.

Switch to the *Status Screen* with the **[STATUS]** key and look at the state of output 2. Toggle power to the Group 2 Input and note that the output is off unless the Group Input input is powered.

Finally, press **[MAIN]** to bring up the main display screen again. You'll now see that Group 2 position has been added to the screen. (If you assign limits to Groups 3 and 4 their positions will be shown on line 3.)

```
PRG 2 POS 60 RPM 0
G1 POS 60 G2 POS 90
```

The Group 2 position equals 90 while the Machine Position and Group 1 position equals 60. This is due to the thirty degree offset you entered above.

CHAPTER 4

SPECIFICATIONS

This chapter contains the full specifications of the eight output EASYPack Genesis. Included in it are mechanical, electrical, and environmental specifications of the unit as well as the specifications of the compatible AMCI transducers and output relays. This chapter concludes with descriptions of the programmable parameters, their defaults and range of values.

System Location

NEMA 12 enclosure recommended.

NEMA Rating

Front panel is washdown tight (NEMA 4) when properly mounted. The rest of the unit is NEMA 1.

Required Panel Space

Front panel dimensions are 5.00" square.

Behind the panel, unit requires a clearance area of 6.00" square to a minimum depth of 4.00" for installation and removal of connectors and output relays.

Power Requirements

+18 to +30Vdc @ 10 watts
(+24Vdc @ 400 mA nominal)

Compatible Transducers

Any AMCI single resolver transducer.

Position Resolution

Programmable from 2 to 1,000 counts per turn.
Position can be preset to any value within its range from the keyboard.

Tachometer Range

0 to 2,000 RPM. Speed value can be scaled to any other engineering unit such as boxes per minute, inches per minute, etc.

Limit Switch Update Time

100 microseconds

Limit Switch On/Off Resolution

1 part in 1,000 counts per turn. (0.36°, independent of programmed position resolution)

Program Input

Built-in keyboard and display

Program Storage

EEPROM memory. 100,000 write cycles minimum.

Number of Available Programs (Recipes)

35. Number of available programs is independent of the size of the programs.

Available Output Type

Position on / Position off (Up to 4 on/off dwells per output)

Position on / Position off *OR* time off. (Single on/off dwell and on time programmable from 1 to 9,999 milliseconds.)

Automatic Advances

Separate On/Off Advances available for each output. Advance can be programmed from 0 to 999 milliseconds.

Number of Outputs

Eight. Each output requires a solid state AC or DC relay. Output fuse integral to relay.

Compatible Output Relays

DC: AMCI KD-6 (Opto 22 G4ODC24 or equ.)
AC: AMCI KA-3 (Opto 22 G4OAC24 or equ.)

Number of Inputs

Five Total. Four Group Inputs and One LS Enable input.

Group Inputs: DC only. Each requires 10 to 30Vdc @ 10mA to activate.

LS Enable Input: AC/DC. Requires 110Vac @ 8 mA_{rms} *OR* 10 to 30Vdc @ 10mA to activate.

Environmental Conditions

Operating Temperature: 0 to 60°C

Relative Humidity 5 to 95%
(without condensation)

Storage Temperature: -40 to 85°C

Transducer Specifications

The following table contains mechanical and environmental specifications for all of AMCI's single-resolver transducers that are compatible with the EASYPack Genesis. Table 1.2, *Compatible AMCI Transducers* found on page 13 gives complete part numbers and descriptions of all compatible transducers.

Specification	All HT-20's	All HT-20-(x), HT-400, HTT-20-1, & HTT-400-1	All H25's	HT-6	All R11's
Shaft Diameter	0.625"	0.625"	0.375"	0.188"	0.120" or 0.188"
Radial Shaft Loading	400 lbs. max.	400 lbs. max.	40 lbs. max.	8 lbs. max.	2 lbs. max.
Axial Shaft Loading	200 lbs. max.	200 lbs. max.	20 lbs. max.	4 lbs. max.	1 lb. max.
Starting Torque	8 oz.-in @ 25°C	8 oz.-in @ 25°C	1.5 oz.-in @ 25°C	0.5 oz.-in @ 25°C	0.1 oz.-in @ 25°C
Moment of Inertia (oz.-in-sec. ²)	6.25 X 10 ⁻⁴	8.75 X 10 ⁻⁴	6.00 X 10 ⁻⁴	2.10 X 10 ⁻⁴	0.51 X 10 ⁻⁴
Weight	4 lbs.	4 lbs.	1 lb.	0.7 lb.	0.25 lb.
Enclosure	NEMA 4 or 4X	NEMA 4	NEMA 4	NEMA 13	NEMA 1
Environmental (All Transducers)					
Operating Temp -20 to 125°C	Shock 50 G's for 11 milliseconds		Vibration 5 to 2000 Hz @ 20 G's		

Table 4.1 Single-Turn Transducer Specifications

Outline drawings of our transducers, and full spec sheets for our most popular models, are available on our website, www.amci.com. If you do not have internet access, contact AMCI and we'll fax you the information.

Output Relay Specifications

	KD-6	KA-3
Type	Solid-state DC Output	Solid-state AC Output
Manufacturer	Opto 22 G4ODC24	Opto 22 G4OAC24
Voltage Range	5 - 60 Vdc	12 - 140 Vac
Peak Repetitive Voltage	60 Vdc	500 Vac
Nominal Current @ 45°C	3 Adc	3 Aac
Nominal Current @ 70°C	2 Adc	2 Aac
Minimum Load Current	0 mAdc	20 mAac
Surge Current	5 Adc for 1 sec.	80 Apk for 1 cycle
Isolation Rating	4000 Vrms	4000 Vrms
Leakage Current	1 mA	5 mArms
Output Voltage Drop	1.6 Vdc max.	1.6Vac max.
ON Time	50 microseconds	1/2 cycle max. - zero voltage [†]
Off Time	50 microseconds	1/2 cycle max. - zero current [†]

Table 4.2 Output Relay Specifications

[†] The AC relays used by the EASYPack Genesis will only turn on when the instantaneous line voltage passes through zero volts and will only turn off when the instantaneous line current passes through zero amps. This occurs twice per cycle, or every 8.3 milliseconds when the line frequency is 60 Hz. This characteristic may cause a problem in high speed applications by introducing a random delay of 0 to 8.3 milliseconds, but it also effectively eliminates most of the noise that can be generated by switching an AC load.

The remainder of this chapter describes the programmable parameters of the EASYPack Genesis. Tables at the end of each section summarize defaults and ranges for each parameter.

Programmable Parameters

An EASYPack Genesis is configured by setting its *Programmable Parameters*. Parameters are broken down into four broad categories.

- **Password and Display Parameters** – Parameters that set the passwords or only affect the unit's display.
- **Transducer Setup Parameters** – Parameters that affect the position and rate values calculated by the unit.
- **Limit Switch Parameters** – Parameters that affect the limits switch outputs generated by the unit.
- **Group Setup Parameters** – Parameters that set the Mode and other values for each of the four groups.

Password and Display Parameters

All of the password and display parameters are available under the Configuration Screens. These screens are accessed with [CONFIG] key and cycled through with the [PREVIOUS/NEXT] key.

Password Enable

This parameter is found on Configuration Screen 4, which is only displayed under the following conditions:

- Passwords are disabled and the unit is in *Edit Mode*.
- Passwords are enabled and the user has entered the Master level password to enter Edit Mode.

This parameter globally enables or disables the three passwords available on the EASYPack Genesis. By default, the passwords are disabled.

Operator, Set Up, & Master Passwords

These parameters are found on Configuration Screen 4, which is only displayed under the following conditions:

- Passwords are disabled and the unit is in *Edit Mode*.
- Passwords are enabled and the user has entered the Master level password to enter Edit Mode.

When passwords are enabled, the EASYPack Genesis has three levels of password access. Passwords are four digits long and range from 0000 to 9999. They have the defaults listed below, which should be changed if they are used.

- **Operator** – (Default 1111) Operators can select the running program and fine-tune limit switch set-points with the increment/decrement function.
- **Set Up** – (Default 2222) Set up personnel have all of the access rights of an Operator, and can program all of the limit switch parameters. The *Limit Switch Parameters* are defined starting on page 30.
- **Master** – (Default 1234) Personnel with Master access can create new programs and program any parameter on the unit.

Password and Display Parameters (continued)**Rate Value**

This parameter is found on Configuration Screen 1.

By default, the speed of the machine is reported in RPM, but it can be scaled to any unit of measure you want. (See *Rate Multiplier, Divisor, and Decimal Point* on page 28 for more information.) This parameter simply allows you to select what rate units will be shown on the display. It does not actually affect any values calculated by the unit. The choices are:

- RPM (revolutions per minute)
- IPM (inches per minute)
- CPM (cartons per minute)
- BPM (boxes per minute)

Toggle Speed

This parameter is found on Configuration Screen 2.

The Toggle Speed parameter only affects the display. It does not affect any of the outputs. When the speed of the machine exceeds the value of the Toggle Speed parameter, the position value on the display changes from rapidly changing numbers to “XXX”. The value of the Toggle Speed is affected by the *Rate Multiplier, Divisor, and Decimal Point* parameters. (See how these parameters affect the reported machine speed starting on page 28.) The default value of 0 disables this feature. The range of this parameter is 0 to 2,000.

Summary Table

Parameter	Default	Range
Password Enable	Disabled	Disabled / Enabled
Operator Password	1111	0000 to 9999
Setup Password	2222	0000 to 9999
Master Password	1234	0000 to 9999
Rate Value	RPM	RPM, IPM, CPM, BPM
Toggle Speed	0	0 to 2,000

Table 4.3 Password and Display Parameters

Transducer Setup Parameters

The Transducer Setup Parameters define the *Machine Position* and *Machine Speed*. These two values are used by the limit switches to determine their on/off state.

All Transducer Setup Parameters are found under the Configuration Screens. Access these screen with [CONFIG] key and cycle through them with the [PREVIOUS/NEXT] key.

Scale Factor

This parameter is found on Configuration Screen 1. Its range is 2 to 1,000 and defaults to 360.

This parameter allows you to program the position resolution of the transducer by setting the number of counts per turn. Setting the Scale Factor to 360 yields one count per degree of rotation. The *Machine Position* is defined by the Scale Factor and the *Machine Preset Value*. (see below)

The position data ranges from 000 to (Scale Factor – 1).

A well thought out Scale Factor value can greatly simplify the rest of your programming. For example, consider a machine that moves product along at 7.750 inches per turn and the application require a position resolution of 0.025 inches. This translates into a Scale Factor of:

$$\text{SCALE FACTOR} = \frac{7.750 \text{ inches}}{1 \text{ Turn}} \times \frac{1 \text{ Count}}{0.025 \text{ inches}} = 310 \text{ Counts/Turn}$$

However, programming a Scale Factor of 775 translates into 100 counts per inch of travel (0.01"/count). Even though 0.01" resolution is overkill for the application, the convenience of being able to program other parameters directly in inches may be well worth it.

Machine Preset Value

This parameter is found on Configuration Screen 1. Its range is 0 to (Scale Factor - 1) and defaults to zero.

The Machine Preset Value allows you to adjust the position value without physically rotating the transducer's shaft. It's most commonly used to zero the transducer position to the physical zero of the machine.

NOTE

Many packaging machines reset the position to zero when the leading edge of the product passes a sensor. The Machine Preset Value cannot be used to adjust the machine position "on-the-fly".

If your machine falls into this category, consider learning how to use the advanced PLS Programming feature. Group Modes 1 and 2 were designed for these types of applications and can simplify your machine design. *PLS Group Setup Parameters* are described starting on page 33.

Count Direction

This parameter is found on Configuration Screen 1. Its default is *clockwise* (CW) and can also be set to *counter-clockwise* (CCW)

The Count Direction parameter sets the direction the transducer shaft must rotate in order to produce increasing counts. The default is CW, which means that the position count will increase if the transducer shaft is rotating clockwise when looking at the shaft. This parameter accurately reflects the count direction if the cable is wired to the *CITG-(x) Wiring Diagram* found on page 49 of this manual.

NOTE

It is possible to reverse count direction by reversing the connections of the green/black pair in the transducer cable.

Transducer Setup Parameters (continued)

Rate Multiplier, Divisor, and Decimal Point

These parameters are available on Configuration Screen 3. The default value for all three parameters is 1. Their ranges are given below.

These three parameters allow you to scale the machine speed reported by the EASYPack Genesis. When they are left at their defaults of 1, the Genesis reports the machine speed in RPM. By programming these parameters, you can have the machine speed value scaled to boxes per minute, inches per minute, or any other meaningful value.

The EASYPack Genesis reports the machine speed based on the following formula:

$$\text{MACHINE SPEED} = \frac{\left(\frac{\text{Speed (RPM)} \times \text{RATE MULTIPLIER}}{\text{RATE DIVISOR}} \right)}{\text{RATE DECIMAL POINT}}$$

The ranges of the three parameters are:

- **Rate Multiplier:** 1 to 1,100
- **Rate Divisor:** 1 to 63
- **Rate Decimal Point:** 1, 10, 100, or 1,000.

The unit reports the machine rounded off to the nearest whole number. As an example of how the Rate Decimal Point affects the data, assume a speed of 100 RPM, a multiplier of 2, a divisor of 3. The table below shows the different machine speeds based on the Rate Decimal Point value.

	RATE DECIMAL POINT VALUE			
	1	10	100	1,000
Calculated Machine Speed	66.67	6.67	0.67	0.067
Reported Machine Speed	67	7	1	0

Table 4.4 Effect of Rate Decimal Point Values

Motion Detector LOW/HIGH Setpoints

These parameters are available on Configuration Screen 2. They default to zero and each has a range of zero to 2,000.

The EASYPack Genesis has a motion detector that functions as a speed based limit switch. The motion detector setpoints are always programmed in RPM, regardless of the values of the *Rate Multiplier, Divisor, and Decimal Point*. The setpoints default to zero, which disables the motion detector.

Transducer Setup Parameters (continued)

Motion Detector LOW/HIGH Setpoints (continued)

As shown in the figure below, if the low speed setpoint is less than the high speed setpoint, the motion detector will be *on* when the velocity is between the two setpoints and *off* at all other speeds. If the low speed setpoint is greater than the high speed setpoint, the motion detector will be *off* when the velocity is between the two setpoints and *on* at all other speeds. You can logically AND any limit switch with the state of the motion detector. This disables the limit switch output unless the Motion Detector is *on*.

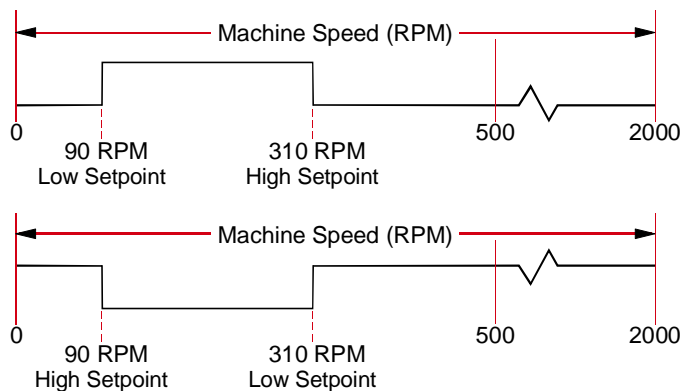


Figure 4.1 Motion Detector Output

Summary Table

Parameter	Default	Range
Scale Factor	360	2 to 1,000
Machine Preset Value	0	0 to (Scale Factor - 1)
Count Direction	CW	CW / CCW (clockwise / counter-clockwise)
Rate Multiplier	1	1 to 1,100
Rate Divisor	1	1 to 63
Rate Decimal Point	1	1, 10, 100, or 1,000
Motion Detector Low/High Setpoints	0	0 to 2,000

Table 4.5 Transducer Setup Parameters

Limit Switch Parameters

The Limit Switch Parameters are distributed across four different screens. They are the *LS Setpoint Screen*, [LIM.SW.], *LS Advances Screen*, [ADVANCE], *LS ANDing Screen*, [ANDING], and *LS Timed Screen*, [TIMED]. When programming a limit switch, the unit will automatically switch between these screens while you program. Having the functions on separate keys also allows you to quickly jump to the parameter you wish to program.

Limit Switch Type

This parameter is available on the LS Setpoint Screen.

By default, each limit switch is disabled. This is shown by setting the Limit Switch Type parameter to “ - ” on the display, which is the symbol for disabled.

Two types of limit switch outputs are available. The first type is *Normal*, and as shown in figure 4.2, the limit switch turns on and off based on programmed positions called *Setpoints*. The figure shows an output that turns on at 45° and off at 225°. You have four *Setpoint Pairs* available when the output is configured as a Normal limit switch, so each Normal limit switch can turn on and off up to four times per turn. See *LS ON/OFF Setpoint Pairs* on the following page for a full description of programming the setpoints.

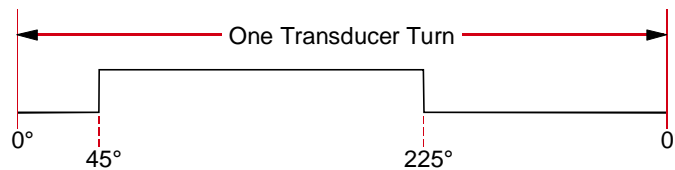


Figure 4.2 Normal Limit Switch Output

The second type of limit switch is *Timed*, and as the name implies, it makes the limit switch act much like a timing relay. Figure 4.3 below shows the output of a timed limit switch. The limit switch is programmed with a single setpoint pair and a *Time Out* value. In the figure, the setpoint pair turns the output on at 45° and off at 225°, and the Time Out value is set to 185 milliseconds.

NOTE A timed limit switch has one *on* condition and two *off* conditions. The on condition is the first setpoint and the off conditions are the Time Out value and the second setpoint. The first of the two off condition that is met turns off the output.

Example: On Setpoint: 45°
Off Setpoint: 225°
Time Out: 185 ms.

At 150 RPM, the output turns on at 45° and turns off 185 milliseconds later at 212°.

At 200 RPM, the output turns on at 45° and off at 225° because the off setpoint was reached before 185 milliseconds expired.

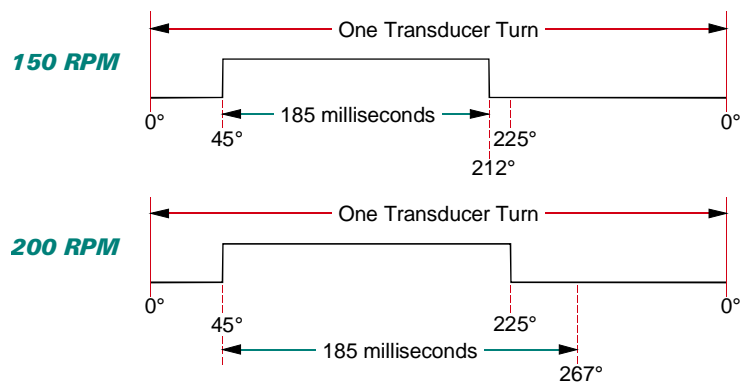


Figure 4.3 Timed Limit Switch Output

Limit Switch Parameters (continued)

LS ON/OFF Setpoint Pairs

The ON/OFF Setpoint parameters are available on the LS Setpoint Screen. The Time Out parameters are available on the LS Timed Screen.

As implied in the previous section, the output is defined by an *ON Setpoint* and an *OFF Setpoint* which are together called a *Setpoint Pair*.

When the ON Setpoint is less than the OFF Setpoint, the output is on between the two points. When programmed this way, the output acts as a normally open relay.

When the ON Setpoint is greater than the OFF Setpoint, the output is off between the two points. When programmed this way, the output acts as a normally closed relay.

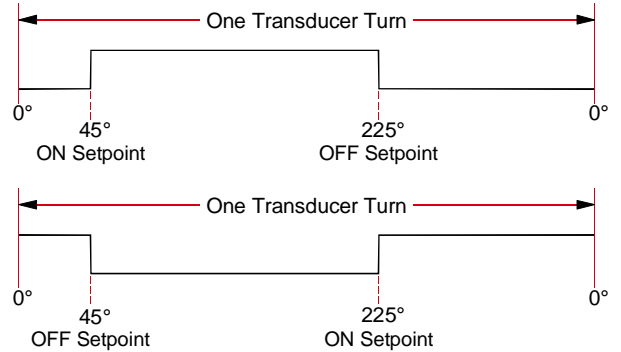


Figure 4.4 ON/OFF Setpoints

- ▶ Setpoints can be programmed to any value between zero and (Scale Factor – 1). The *Scale Factor* parameter is described on page 27.
- ▶ *Normal Limit Switches* have four setpoint pairs. They can be programmed to turn on and off up to four times per turn.
- ▶ *Timed Limit Switches* have one setpoint pair and a Time Out value. The Time Out value has a default of zero milliseconds, a range of zero to 9,999 milliseconds, and a resolution of one millisecond.

LS ON/OFF Advances

These parameters are available on the LS Advances Screen. They default to zero, have a range of 0 to 999 milliseconds, and a resolution of one millisecond.

Limit Switch ON/OFF Advances compensate for fixed delays in the system by turning the outputs on or off in advance of their programmed setpoints as a function of shaft speed. An example on the following page shows how ON/OFF Advances are used.

ON/OFF Advances are programmed in milliseconds. With the default value of zero milliseconds, the limits turn on and off based solely on shaft position.

Each limit switch has a separate ON Advance and OFF advance. Two advances are available for those cases when a load takes a different amount of time to activate than to deactivate.

AMCI is aware of some companies that use two values to specify their speed compensation values. These two values are typically called something similar to *Lead Speed* and *Lead Distance*. Their controllers use the ratio of these values (Lead Distance / Lead Speed) to determine the amount of advance by multiplying the actual machine speed by this ratio. $(\text{Lead Distance} / \text{Lead Speed}) * \text{Machine Speed} = \text{Distance}$.

AMCI determines the amount of advance with only one parameter by using the fact that speed is the ratio of (Distance / Time). Multiplying (Distance / Time) by the ON/OFF Advance in milliseconds yields Distance, which is the same value calculated by using the two parameter method.

NOTE When programming the ON/OFF Advances, total all of the delays associated with the load. In the glue gun control example on the following page, the ON/OFF Advances compensate not only for the activation delay in the glue gun, but also for the time it takes the glue to reach the box.

Limit Switch Parameters (continued)

LS ON/OFF Advances (continued)

In order to illustrate how the LS Advances can be used in a packaging application, consider the glue gun application below.

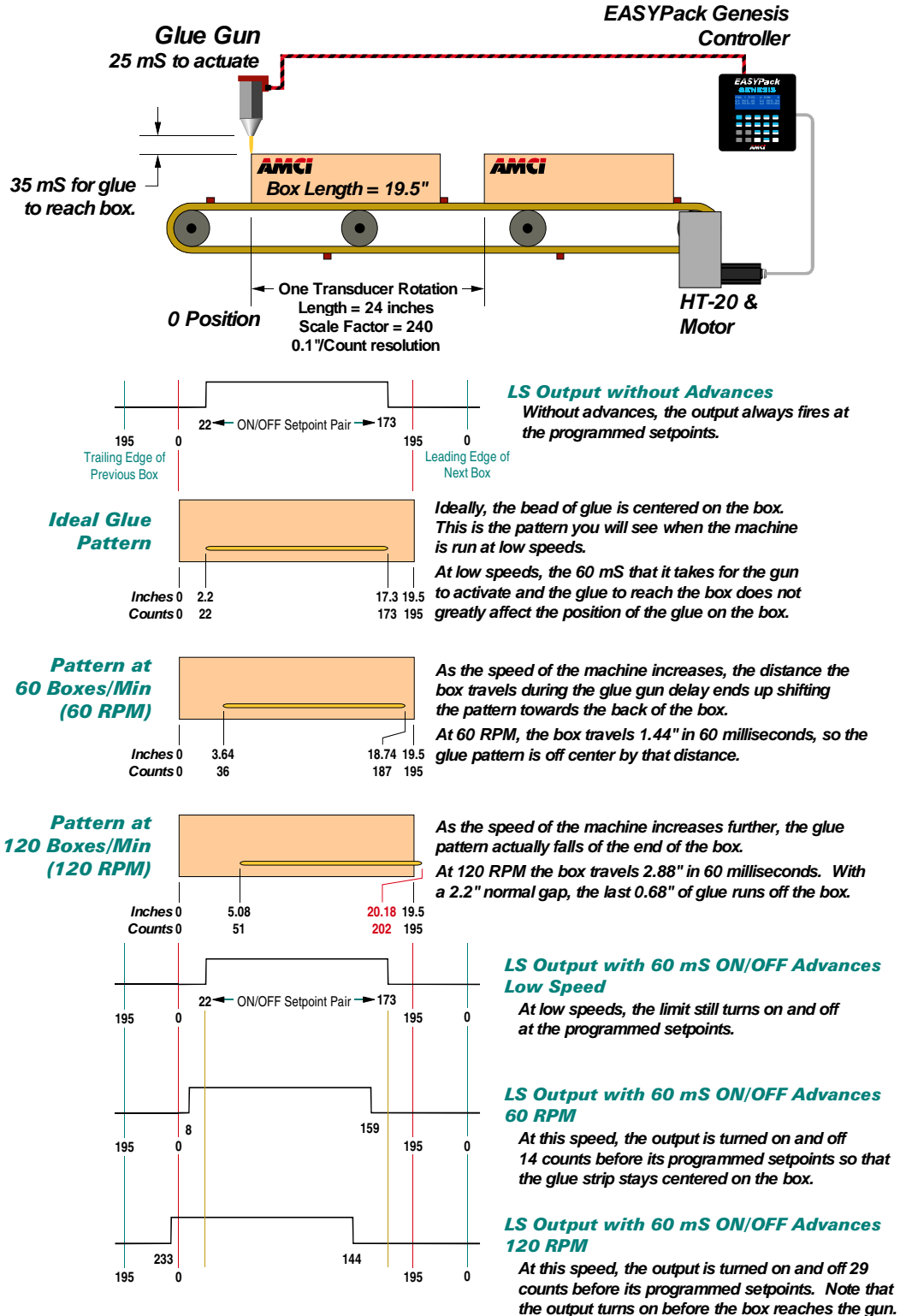


Figure 4.5 Automatic Advance Application

Limit Switch Parameters (continued)

LS Motion ANDing

These parameters are available on the LS Anding Screen.

The output of each limit switch can be logically ANDed with the state of the Motion Detector. (See *Motion Detector LOW/HIGH Setpoints* on page 28 for a description of the Motion Detector.) Each limit switch has a Motion ANDing parameter. Motion ANDing prevents associated outputs from firing unless the machine is running at the correct speed. The default value of these parameters is *off*, which means that the limit switch is unaffected by the state of the Motion Detector.

Enable ANDing

These parameters are available on the LS Anding Screen.

The output of each limit switch can be logically ANDed with the state of the LS Enable Input. (See *LS Enable Input* on page 12 for a description this input.) Each limit switch has an Enable ANDing parameter. Attaching a sensor to the LS Enable Input for detecting the presence of material and preventing the outputs from firing if the material is not present is a typical use of LS Enable ANDing. The default value of these parameters is *off*, which means that the limit switch is unaffected by the state of the Enable Input.

Summary Table

Parameter	Default	Range
Limit Switch Type	Disabled	Disabled, Normal, Timed
ON/OFF Setpoints	0	0 to (Scale Factor - 1)
LS Time Out Value	0	0 to 9,999 milliseconds. 1 millisecond resolution. Limit Switch Type must be set to <i>Timed</i> .
ON/OFF Advances	0	0 to 999 milliseconds. 1 millisecond resolution
LS Motion ANDing	Off	Off / On. “On” means that the state of the output is affected by the state of the Motion Detector.
LS Enable ANDing	Off	Off / On. “On” means that the state of the output is affected by the state of the LS Enable Input.

Table 4.6 Limit Switch Setup Parameters

The rest of this chapter describes PLS Group Programming and its Modes. If you are not using this feature, set all limit switches to Group 1, Mode 0.

PLS Group Setup Parameters

All PLS Group Parameters are found under the PLS Group Screen. Access this screen with **[GROUPS]** key.


Group Mode

This parameter defines the function of the Group. There are five modes, numbered zero through four, and they are explained in the next section. The Group Mode parameter defaults to zero.

PLS Group Setup Parameters (continued)

Group Window

Groups that are in Modes 1, 2 or 4 make use of a *Group Window*. The window is programmed with a pair of ON/OFF Setpoints just like a limit switch output, but the Group Window is not an output. As explained in the next section, Modes 1 and 2 use the Group Window to enable the Group Input, and when a group is in Mode 4, the Group Input must be active within the window before the outputs are enabled.

NOTE  The Group Window parameter is shown on the “Groups” programming screen regardless of the group’s programmed mode. Only groups in Modes 1, 2, or 4 actually use the window.

The default values for the Group Window ON/OFF Setpoints are zero. They can range from zero to (Scale Factor -1).

Group Offset/Preset

Groups that are in Modes 0, 3, or 4 have a *Group Offset*, which allows you to offset the Group Position from the Machine Position. If the Group Offset equals zero then the Group Position will equal the Machine Position.

Groups in Modes 1 or 2 have a *Group Preset*. When the proper conditions on the input are met, a group in one of these two modes will set its group position equal to the value of the Group Preset. It does this by generating an internal offset that is applied to the Machine Position.

The Group Offset/Preset parameter has a default of zero and range of zero to (Scale Factor – 1).

Summary Table

Parameter	Default	Range
Group Mode	0	0 to 4.
Group Window ON/OFF Setpoints	0	0 to (Scale Factor - 1). Only Modes 1, 2, and 4 use the Group Window.
Group Offset/Preset	0	0 to (Scale Factor - 1). Modes 0, 3, and 4 use it as a position offset value. Modes 1 and 2 use it as a position preset value.

Table 4.7 PLS Group Parameters

Mode 0

Mode 0 does not have any of the additional functionality of the other modes. If you only need basic programmable limit switch functionality from some of your outputs, assign them all to one group and assign Mode 0 to the group. The Group Input for the group is not used and the Group Channel need not be programmed. Outputs in the group can still be conditioned by tying them to the LS Enable Input and/or the Motion Detector. Limit Switches will cycle once per transducer rotation.

The group’s *Group Offset/Preset* value is used as an offset value. When the Group Offset equals zero, the Group Position equals the Machine Position.

Mode 1

Outputs that are assigned to a Group in Mode 1 are always enabled to fire. This is the primary difference between Modes 1 and 2. Outputs in Mode 2 are normally disabled, and fire for only one cycle when the input transitions.

Mode 1 uses the Group Input to preset the group’s position to the value programmed into the *Group Offset/Preset* parameter. Typically, the Group Input is tied to a sensor that detects an edge or registration mark on the product. This synchronizes the outputs in the group to the product. Once the Group Input forces a preset action, its state is ignored until the programmed dwell on the Group Window is reached.

The outputs can be further conditioned by tying them to the LS Enable Inputs and/or the Motion Detector.

The timing diagram below shows how the Group Input and Group Window are used. It shows the Group Position being preset to zero. However, it can be preset to any value between zero and (Scale Factor -1).

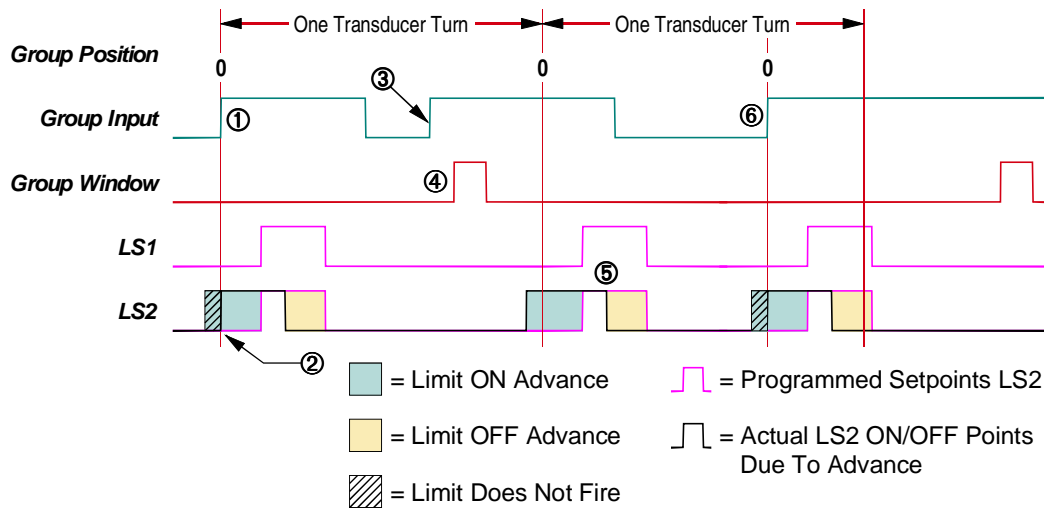


Figure 4.6 Mode 1 Functional Diagram

- ① When the Group Input makes a positive transition, (current begins to flow through the input), the Group Position is set equal to the value of the Group Offset/Preset parameter. Once the position is preset, the Group Input is ignored until the Group Window becomes active.
- ② Limit Switch 2 turns on immediately because of its ON Advance. Note that LS2 cannot fire correctly at this speed when the position is preset because of its advance.
- ③ This edge on the Group Input is ignored because the Group Window dwell has not been reached.
- ④ The Group Input is enabled once the Group window dwell is reached. The next positive edge on the Group Input will preset the Group Position.
- ⑤ Outputs continue to cycle at a rate of once per transducer rotation.
- ⑥ This Group Input transition presets the Group Position and the cycle starts again.

NOTE You can preset the Group Position multiple times per transducer rotation by programming the Group Window appropriately.

Mode 2

Mode 2 is nearly identical to Mode 1. The difference between the two modes is that the outputs assigned to a group in Mode 2 are normally disabled.

Mode 2 uses the Group Input to preset the group's position to the value programmed into the *Group Offset/Preset* parameter and enable the outputs in the group. Typically, the Group Input is tied to a sensor that detects the edge of, or registration mark on, the product. This synchronizes the outputs in the group to the product. Once the Group Input forces a preset action, its state is ignored until the programmed dwell on the Group Window is reached. Reaching the programmed dwell on the Group Window also disables the outputs until the Group Input is re-activated.

The outputs can be further conditioned with the LS Enable Input and/or the Motion Detector.

The timing diagram below shows how the Group Input and Group Window are used. It shows the Group Position being preset to zero. However, it can be preset to any value between zero and (Scale Factor -1)

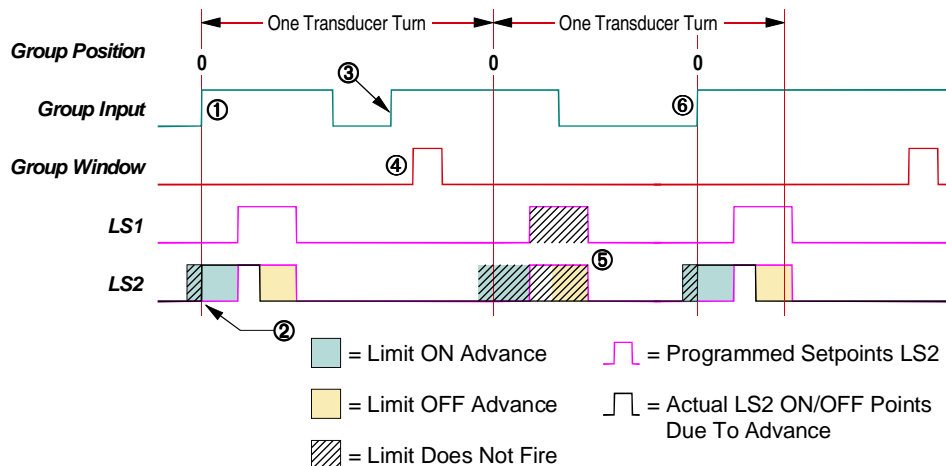


Figure 4.7 Mode 2 Functional Diagram

- ① When the Group Input makes a positive transition, (current begins to flow through the input), the Group Position is set equal to the value of the Group Offset/Preset parameter. Once the position is preset, the Group Input is ignored until the Group Window becomes active at its programmed dwell.
- ② Limit Switch 2 turns on immediately because of its ON Advance. Note that LS2 cannot fire correctly at this speed when the position is preset because of its advance.
- ③ This edge on the Group Input is ignored because the Group Window dwell has not been reached.
- ④ The Group Input is enabled and the group's outputs are disabled once the Group Window dwell is reached. The next positive edge on the Group Input will preset the Group Position.
- ⑤ Outputs do not cycle because they have been disabled by the dwell on the Group Window.
- ⑥ This Group Input transition presets the Group Position and the cycle starts again.

NOTE You can preset the Group Position multiple times per transducer rotation by programming the Group Window appropriately.

The figure to the right shows how Mode 2 could be used in a gluing application. The gun's output is in a group in Mode 2 and the prox sensor is wired to the group's input. When the front of the box passes under the sensor, the group's position is set the preset value (zero in this example), and the output is enabled for one box. Note that the gun will not fire during the missing box. (Condition ⑤ above.)

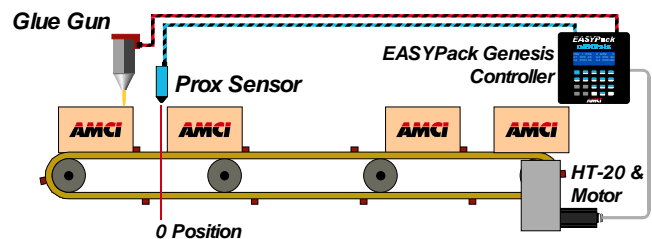


Figure 4.8 Mode 2 Example

Mode 3

Mode 3 uses the Group Input to enable the outputs in the group. The Group Window has no effect and need not be programmed. The Group Input is typically tied to a sensor that detect the presence of material. The outputs only fire when material is present. The outputs assigned to the group will cycle once per transducer rotation and can be further conditioned with the LS Enable Input and/or the Motion Detector.

A group in Mode 3 uses the Group Offset/Preset parameter as an offset. When the Group Offset/Preset equals its default of zero, the Group Position equals the Machine Position.

The timing diagram shows how the Group Input affects the outputs in the group.

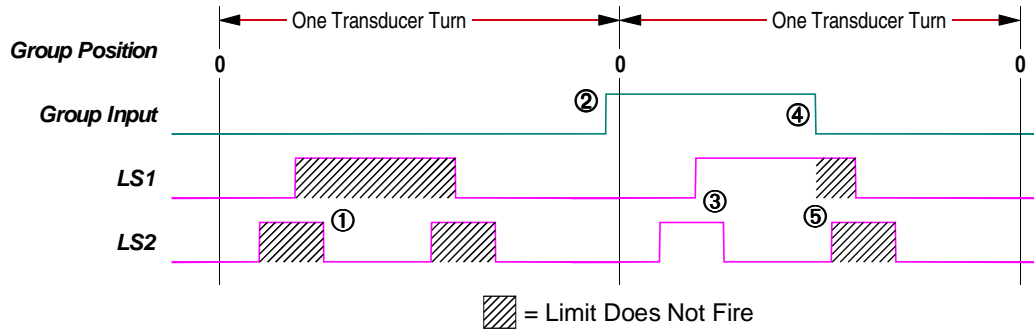


Figure 4.9 Mode 3 Functional Diagram

- ① Outputs do not fire because the Group Input is not active.
- ② The Group Input detects the presence of material and goes active. (Current begins to flow through the input.)
- ③ The outputs begin to cycle.
- ④ A break in the material occurs and the Group Input turns off.
- ⑤ The outputs are disabled within one millisecond of the transition on the Group Input.

NOTE

Mode 3 performs the same function as ANDing the output with the LS Enable Input. Mode 3 is most commonly used in two instances:

- 1) The outputs need to be assigned to a group anyway, so it's easier to assign Mode 3 to the group and wire the sensor to the Group Input then it is to assign Mode 0 to the group, enable the ANDing function for each output, and wire the sensor to the LS Enable Input.
- 2) Two sensors are needed to detect the material. One input is wired to the Group Input and one to the LS Enable Input. In this case, the group is placed in Mode 3 and each output is ANDed with the LS Enable Input.

Mode 4

Mode 4 uses the Group Input to enable the outputs for one cycle. In order for the outputs to be enabled, a positive transition, (inactive state to active), on the Group Input must occur during the dwell programmed into the Group Window. The outputs are then enabled until the dwell on the Group Window is again reached. The Group Input is typically tied to a sensor that detects the presence of material or a registration mark on it. In these applications, the outputs will only fire when the material is present and positioned correctly. The outputs assigned to the group will cycle once per transducer rotation and can be further conditioned with the LS Enable Input or the Motion Detector.

A group in Mode 4 uses the Group Offset/Preset parameter as an offset. When the Group Offset/Preset equals its default of zero, the Group Position equals the Machine Position.

The timing diagram shows how the Group Input affects the outputs in the group.

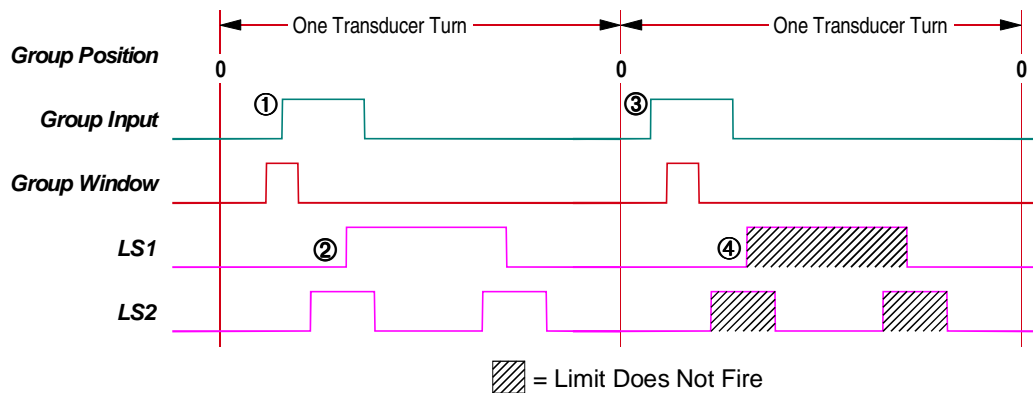


Figure 4.10 Mode 4 Functional Diagram

- ① A positive transition on the Group Input occurs during the Group Window dwell.
- ② The outputs are enabled for this one cycle. The outputs are disabled on the positive transition on the Group Window during the next turn.
- ③ A positive transition on the Group Input occurs before the dwell on the Group Window.
- ④ The outputs are disabled for this cycle because the material is not correctly positioned.

GENERAL INSTALLATION GUIDELINES

This chapter gives general information on installing electronic controls in an industrial environment including the importance of proper wiring, grounding, and surge suppression. If you are responsible for installing the EASYPack Genesis, make sure you are familiar with these practices and follow them when installing the unit.

WARNING

This chapter is presented as a tool in the hopes of avoiding common installation problems. It is not a substitute for the safety practices called out in local electrical codes or, in the United States, the National Electrical Code published by the National Fire Protection Association. If *any* conflicts exist, local and national codes must be followed. *It is the responsibility of the user* to determine what installation practices must be followed to conform to all local and national codes.

Background

AMCI has extensively tested the EASYPack Genesis, both in the lab and in the field, under a wide range of conditions to see how the unit reacts to an adverse environment. This includes testing the unit after intentionally installing it incorrectly. The results of our testing is the following list of areas that must be addressed when engineering your system. The order of the list shows the areas that have the largest impact on system operation first.

- 1) Surge Suppression
- 2) Grounding
- 3) Wiring
- 4) Power Supply Wattage and Filtering

This list also shows the first areas that should be investigated if your installation experiences problems.

Surge (EMI) Suppression

NOTE

All inductive devices in the system, such as motors, motor starters, contactors, relays and solenoids, must have surge suppression devices installed across their coils.

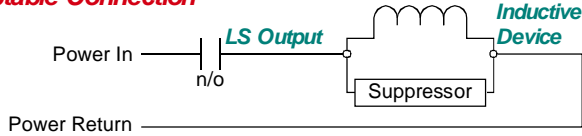
This includes all devices that share a power supply with the EASYPack Genesis, have wiring in the unit's enclosure, or wiring that is run in the same conduit as wiring connected to the unit. DC loads are typically suppressed with a flyback diode, while AC loads are typically suppressed with a RC network or varistor.

- **RC Networks are the preferred suppressor for AC loads**

Surge (EMI) Suppression (continued)

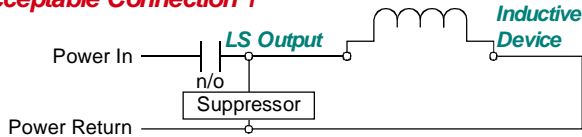
The figure below show where surge suppression devices should be placed in the circuit.

Acceptable Connection



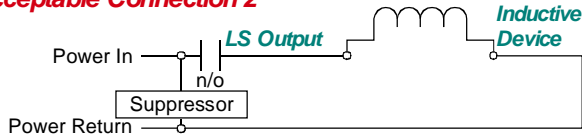
The acceptable connection suppresses noise at its source. The wiring that connects the load to the power supply and contacts will not radiate noise when the load is switched and noise will not be coupled into the power supply.

Un-Acceptable Connection 1



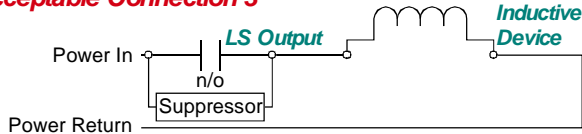
This connection protects the power supply and LS output, but allows noise to radiate through the load's wiring where it can be coupled into other cables around it.

Un-Acceptable Connection 2



This connection protects the power supply but nothing else. Noise can radiate through the load's wiring where it can be coupled into other cables around it and the LS Output relay may eventually be damaged by high voltage inductive spikes.

Un-Acceptable Connection 3



This connection protects the LS Output but nothing else. Noise can radiate through the load's wiring where it can be coupled into other cables or into the power supply. Noise in the supply may affect any device powered by it. Also, if the suppressor shorts out, the load will always receive power.

Figure 5.1 Installing Surge Suppression Devices

Surge Suppression: DC Outputs

All inductive DC loads require a commutating, or “fly-back” diode across the load. Inductive DC loads include relays, solenoids, and DC motors.

Unlike resistors, diodes have a polarity and only conduct current in one direction. Therefore, care must be taken when installing diodes. As shown in the figure below, the *cathode* of the diode, which is denoted by the white or black band on one end of the diode, must be installed on the positive side of the load. If you install the diode backwards, it will most likely destroy itself as soon as you apply power to the load.

DC Load Connection

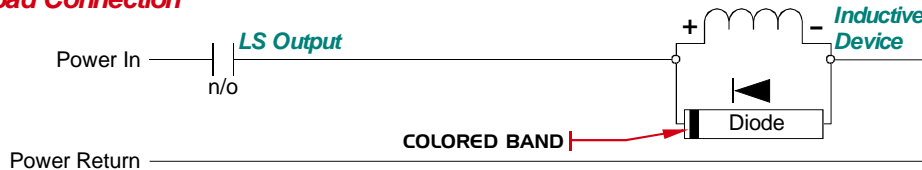


Figure 5.2 DC Output Surge Suppression

- The diode must be sized to handle the inductive surge of the load when it turns off.
- Some devices can be ordered with built in fly-back diodes, or the device manufacturer will offer suppressors designed specifically for the device. These types of devices are strongly recommended.
- The fly-back diode will slightly increase the device's turn off time by maintaining the magnetic field while it shunts energy back into the device. If needed, this additional delay can be compensated for by adjusting the *LS OFF Advance* parameter available on the EASYPack Genesis.

I/O Wiring (continued)

Surge Suppression: AC Outputs

The AC relays used by the EASYPack Genesis will only turn on when the instantaneous line voltage passes through zero volts and will only turn off when the instantaneous line current passes through zero amps. This occurs twice per cycle, or every 8.3 milliseconds when the line frequency is 60 Hz. This characteristic may cause a problem in high speed applications but it also effectively eliminates most of the noise that can be generated by switching an AC load.

However, if you are also switching AC loads with hard contacts such as mechanical relays or contactors, then you must install a suppression network on the load switched by the hard contacts. The two most common suppressors for AC loads are varistors and R-C networks.

➤ **AMCI strongly suggests R-C networks for all AC applications.**

A varistor is a solid state device that turns on and conducts when the voltage across its terminals exceeds its rated value. Herein lies the problem with using a varistor as an AC suppressor. The voltage (problem) must be generated before the varistor responds. In our testing we have found that hard contacts will still arc when a varistor is placed across the AC load. This arcing is due to the fact that the breakdown voltage of the air between the contacts when they first open can be less than the rated voltage of the varistor. If the instantaneous AC voltage applied to the contacts is above the breakdown voltage of air, but less than the rated voltage of the varistor, the contacts will arc.

On the other hand, an R-C network acts as a low-pass filter, instantaneously dampening fast transients when they occur. The main drawback of R-C networks is that they are harder to correctly specify than varistors. Varistors only require you to specify breakdown voltage and power dissipation ratings. R-C networks require you to balance the need of suppression when the contacts open against the amount of surge current the relay can tolerate when the contacts close. Table 5.1 shows the trade-offs you must be aware of when specifying R-C networks.

	When Contacts Close	When Contacts Open
Low Resistance, High Capacitance	Higher surge current through relay contacts to charge capacitor. (Negative)	Lower transient voltage spike. (Positive)
High Resistance, Low Capacitance	Lower surge current through relay contacts to charge capacitor. (Positive)	Higher transient voltage spike. (Negative)

Table 5.1 R-C Network Trade-offs

In general, capacitor values range from 0.1 to 1.0 μ F and resistor values range from 150 to 680 ohms.

The easiest way to specify a R-C network is by following the recommendations of the load's manufacturer. Most manufacturers have tested and specify standard R-C networks, and many sell networks that are designed to integrate with their products. If you cannot get help from your load's manufacturer, feel free to contact AMCI for assistance.

Grounding

Proper grounding is the single most important consideration for a safe installation. Proper grounding also ensures that unwanted electrical currents, such as those induced by electromagnetic noise, will be quickly shunted to ground instead of flowing throughout the machine.

- All ground connections must be permanent and continuous to provide a low-impedance path to earth ground for induced noise currents.
- The chassis of the EASYPack Genesis must be connected to chassis ground through its mounting in an enclosure, and with a grounding wire connected to the CHASSIS pin of the power supply connector.
- Any non-isolated power supply or sensor attached to the EASY-Pack Genesis must be connected to the same chassis ground as the unit to avoid ground loops.
- All isolation transformer secondary windings that are grounded to conform to local or national codes must be grounded to the same earth ground as the machine ground.

AMCI strongly suggests the use of a ground bus in the enclosure that houses the EASYPack Genesis. As shown in figure 5.3, The ground bus becomes the central grounding point for the enclosure and its equipment. The ground bus is directly connected to your grounding electrode system.

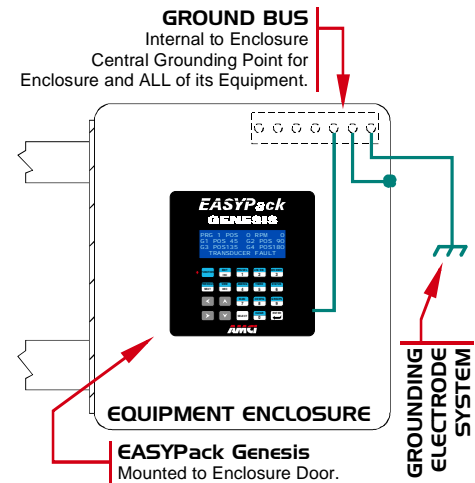


Figure 5.3 Ground Bus System

Wiring

The most important aspect of wiring is determining the amount of voltage and power carried by the cable and separating low power cabling from high power cabling. Inside of an enclosure, separate the two types of cabling with a much physical distance as possible and keep the wiring neat. Outside of the enclosure, low and high power cabling must be run in separate conduits.

➤ Transducer Cabling (Low Power)

- 1) Transducer signals are of low voltage and low power. Transducer cable can be installed in conduit along with other low power cabling such as communication cables and low power ac/dc I/O lines. It cannot be installed in conduit with ac power lines or high power ac/dc I/O lines.
- 2) The shield of the cable must be grounded at the unit only. If you must splice the transducer cable, it must be done in a grounded junction box. When splicing, treat the shield as a signal-carrying conductor. Do not connect the shield to earth ground at the junction box or transducer. Ideally, the three shields in the cable are also kept isolated from each other in the junction box as well.

➤ Input Cabling (Low Power DC & AC)

- 1) The Group Inputs are low power DC inputs and cabling from the sensor to the input must be shielded. Follow the two guidelines given above for Transducer Cabling. DC Input cabling and the transducer cable can be installed in the same conduit.
- 2) The LS Enable Input can be powered with 120 Vac or 12 - 24Vdc. Follow the two guidelines given above for Transducer Cabling. If it's AC powered, it must, without exception, be shielded.

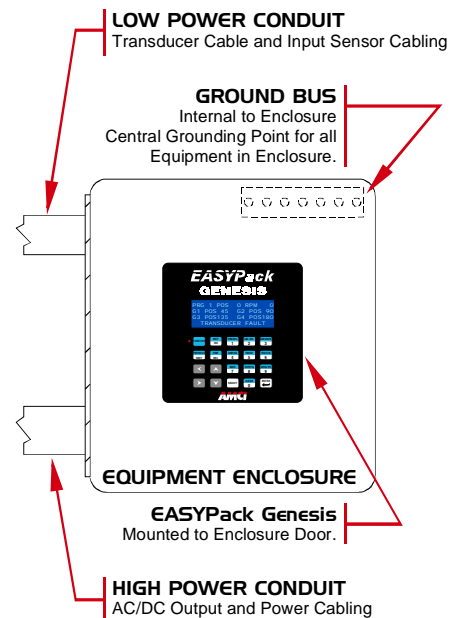


Figure 5.4 Typical Enclosure

Wiring (continued)

➤ Output Wiring (High Power AC & DC)

- 1) Output Wiring must be kept separate from the transducer and input wiring in order to lessen the possibility of coupling transient noise into the low power cabling.
- 2) If a conduit containing the transducer cable or input wiring must cross conduit that contains Output Wiring, they must cross at right angles.

➤ Power Supply Wiring (24Vdc)

- 1) If you have a separate DC supply for the EASYPack Genesis, and possibly its sensors, then it is most likely a small one that is mounted in the enclosure with the Genesis. In this case, AC power for the supply can be routed with the output wiring. AC power should never be routed with the transducer or input cabling.
- 2) If you are using a system supply to power the Genesis and the power supply is outside of the enclosure, then the +24Vdc supply lines should be run with the output lines if local codes permit.

➤ Other Power Wiring (High Power AC & DC)

- 1) Power Wiring must be kept separate from the transducer and input wiring in order to lessen the possibility of coupling transient noise into the low power cabling.
- 2) If a conduit containing the transducer cable or input wiring must cross conduit that contains Power Wiring, they must cross at right angles.
- 3) Whenever possible, conduit that contains transducer or input cabling must be kept 1 foot (30 cm) away from 120Vac conductors, 2 feet (61 cm) from 240Vac conductors, and 3 feet (91 cm) from 480+ Vac conductors.

Power Supply Wattage and Filtering

A properly sized power supply is vital to system operation. The best guideline that we can give you is to buy the best supply your budget allows.

When sizing system supplies, take into consideration the surge requirements of the components you are attaching to the supply. Most devices draw a “surge” current for a brief time when they power up. If your supply cannot accommodate these surge currents, the output voltage may momentarily drop when a device turns on, causing the EASYPack Genesis and other electronic devices to reset.

The other thing to consider when choosing a supply is output filtering. The better the supply’s filtering, the better it can absorb noise that may be induced into the power supply wiring.

Notes

INSTALLING THE EASYPACK GENESIS

Required Power Supply

The EASYPack Genesis draws its power from an external DC supply. The output voltage of the supply must be between 18 and 30 Vdc and it must be able to provide a minimum of ten watts of power. This translates into roughly 0.4Adc @ 24Vdc. If you are using the supply to power sensors attached to the Group and LS Enable Inputs, add in these current requirements before sizing the supply. A dedicated power supply can be used for the unit, or power can be drawn from a larger system supply.

NOTE If a dedicated supply is used, it should be mounted relatively close to the unit. If a system supply is used, this supply *must* not be used to switch large inductive loads such as relays or solenoids without proper surge suppression devices installed on these loads. See *Surge (EMI) Suppression* on page 39 for additional information on installing surge suppression devices.

Some customers have contacted us to request a power supply recommendation. We're hesitant to make such a recommendation because there are many reputable power supply vendors and we don't want to imply that a specific supply must be used with our products. With that said, AMCI has used the SOLA SDN 5-24-100 power supply in most of its testing. It is a small, DIN rail mountable 24Vdc 5A supply.

Panel Cutout for the EASYPack Genesis

The EASYPack Genesis is designed to be mounted on a panel or the door of an enclosure. Figure 6.1 shows the required panel cutout to mount the unit.

- Maximum panel thickness is 0.150 inches.
- Behind the panel, the unit requires a clearance area of 6.00" square to a minimum depth of 4.00" for installation and removal of connectors and output relays.
- All edges must be deburred before installing the unit.

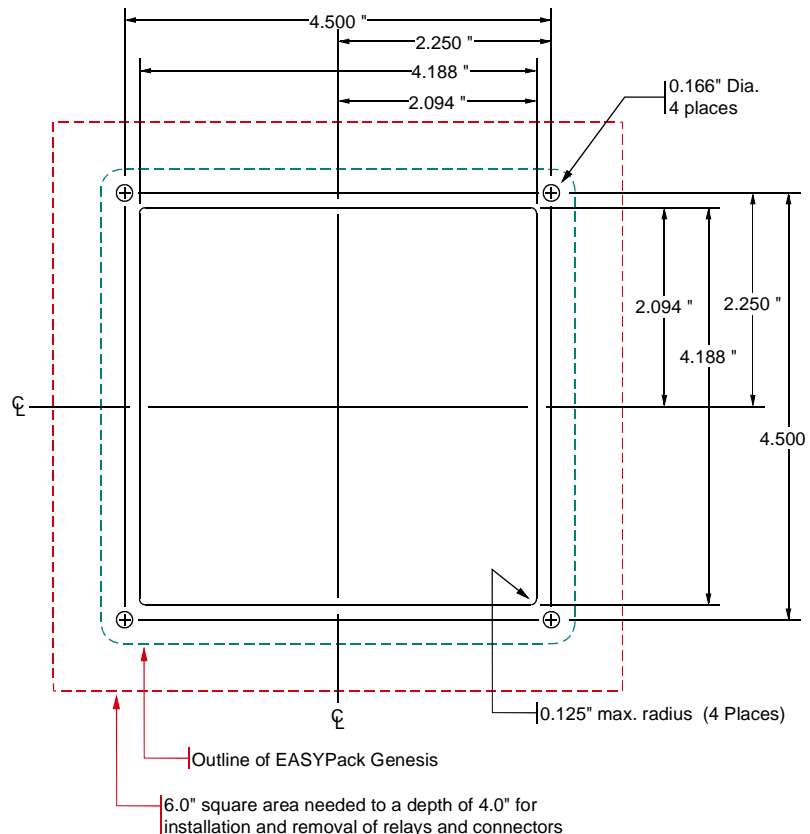


Figure 6.1 Panel Cutout

Ground Bus

A *Ground Bus* is required in each enclosure that houses electronic equipment. The ground bus is directly tied to the grounding electrode system of the machine and becomes the central grounding point for the enclosure and all of its equipment. Bonding wires are run from the enclosure and each piece of equipment to the ground bus, and then a single grounding electrode conductor is run to the system's grounding electrode.

Each connection must be separate, so a ground bus is typically fabricated in-house or by the panel shop responsible for wiring the enclosure. Figure 6.2 shows various ways to mount the ground bus to an enclosure and how to connect a bonding wire to the bus.

- ▶ **Do not connect two or more lugs to the bus with a single bolt. If you do, the connection may loosen up over time.**

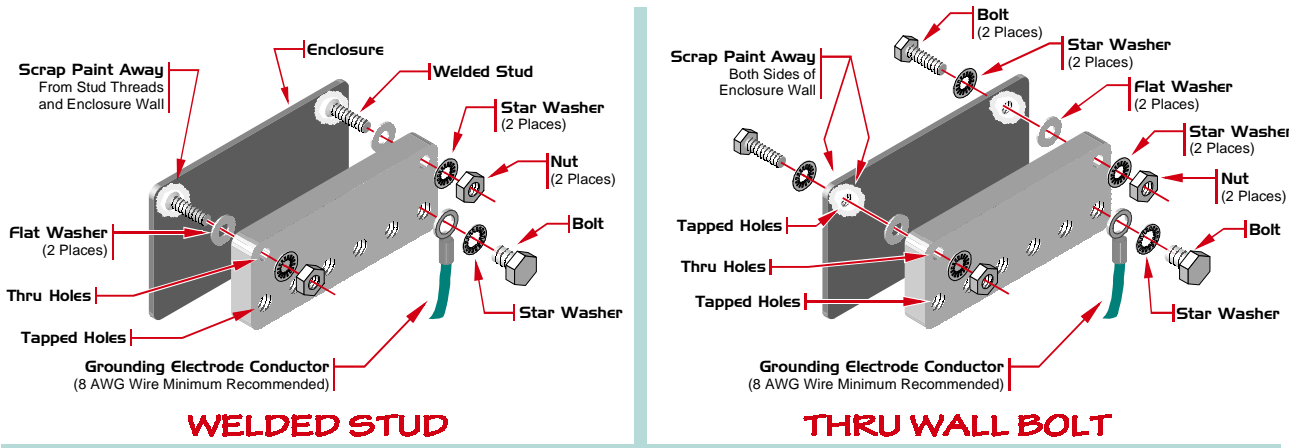


Figure 6.2 Ground Bus Installation

Bonding the Enclosure Door

If mounted correctly, the body of the enclosure will be bonded to the ground bus through the mounting hardware. However, you must install a bonding strap from the door of the enclosure to the ground bus. Do not rely on the door's hinge to bond it to the rest of the enclosure. The easiest way to ground the door is to run a bolt through the door as shown below and run a bonding wire to the ground bus.

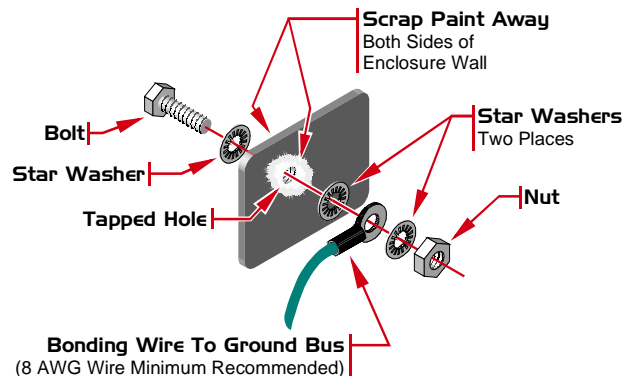


Figure 6.3 Enclosure Door Bonding

The national electrical code specifies the minimum bonding wire size for equipment based on the rating of the overcurrent device in the circuit ahead of the equipment. The code states that the size cannot be smaller than #14 AWG. However, the NEC is concerned with human safety, not EMI protection. For noise reduction purposes, the larger the bonding wire the better, so AMCI strongly recommends stranded, #8 AWG for all bonding wires.

Once the ground bus is installed and the enclosure is bonded to it, you can begin to install equipment in the enclosure and bond them to the ground bus as you go.

Mounting the EASYPack Genesis

Figure 6.4 shows how to mount the unit in the door or panel. Output Relays can be installed before or after the unit is mounted.

A closed cell neoprene gasket ships with the Genesis. Before mounting the Genesis in the cutout, install the gasket by removing its adhesive backing and adhering it to the back of the unit.

The top of the figure shows how to fasten three of the studs to the panel or enclosure. The bottom shows how to install the grounding lug on stud closest to the power connector.

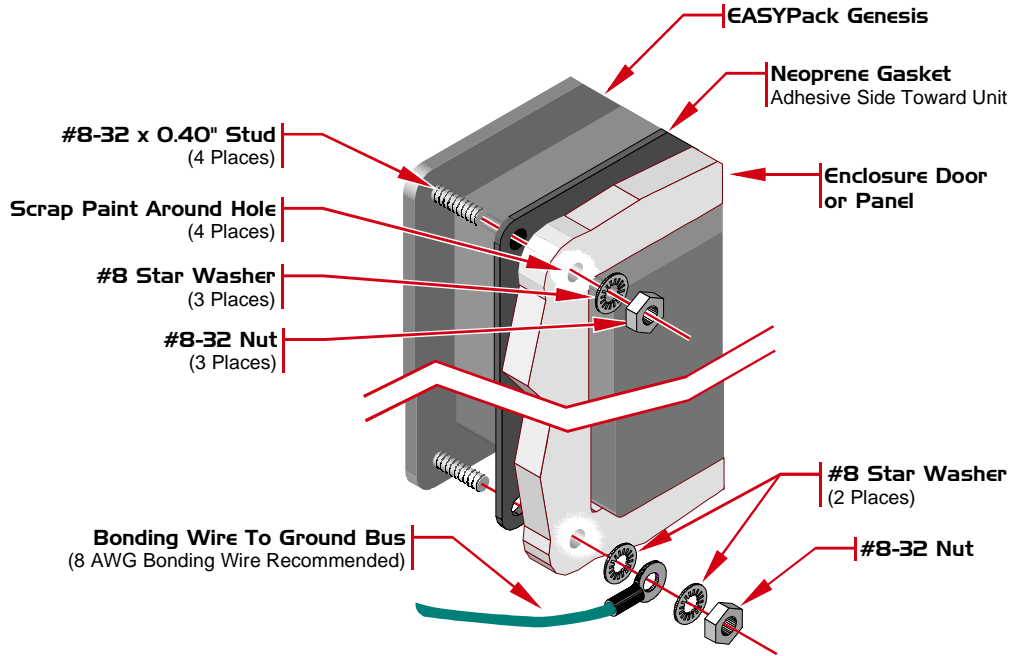


Figure 6.4 Mounting the EASYPack Genesis

Connecting Power

An external 18 to 30Vdc supply, typically 24Vdc, is required to power the EASYPack Genesis. Power consumption is ten watts. This translates into 0.4A @ 24Vdc. The power supply used to power the unit can also be used to power the five inputs if your application requires it.

NOTE The grounding wire shown in the figure from the Genesis to the ground bus is required even with the bonding wire run from a mounting stud to the ground bus. Over time, it is possible for bonding connections to loosen or corrode, so a redundant grounding connection lessens the likelihood of problems in the future.

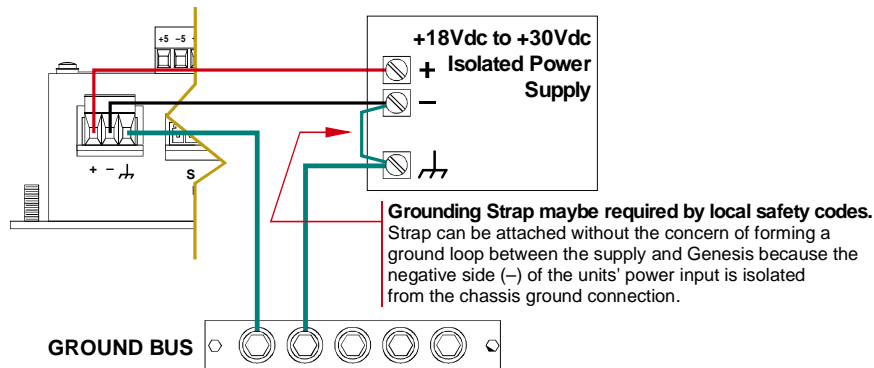


Figure 6.5 EASYPack Genesis DC Power Connections

Transducer Input Connector

The Transducer Input Connector, labeled “RESOLVER” has eight contacts. The mating connector is supplied with the EASYPack Genesis and also comes on any AMCI pre-assembled C1TG-(x) cable you may order. The AMCI part number for the mating connector is MS-8P, while the Phoenix Contact part number is MC1,5/8-ST-3,81, order number 1803633. Figure 6.6 shows the connector pinout to AMCI’s cable colors and industry standard resolver designations.

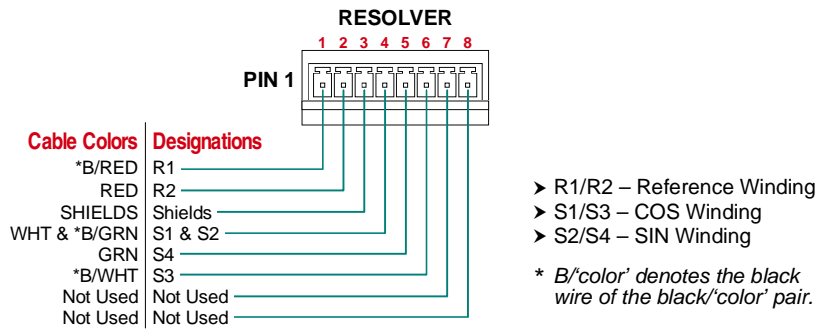


Figure 6.6 Transducer Input Connector Pinout

Transducer Connector Pinouts

Figure 6.7 shows the connector pinouts for all AMCI single transducers that have connectors. Note that some AMCI transducers have integral cables or conduit connections. For a complete listing of AMCI transducers without connectors, refer to [Compatible Transducers](#), starting on page 13.

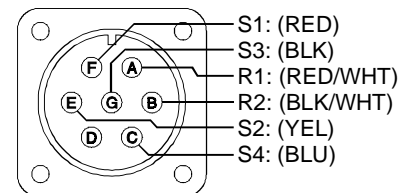


Figure 6.7 Transducer Connector Pinout

Transducer Cable Installation

Pre-assembled and tested cables are available from AMCI. The part number for the cable is C1TG-(x), where (x) is the length in feet. Figure 6.8 is the wiring diagram of the C1TG-(x) cable.

NOTE

- 1) The National Electrical Code cable type used for the transducer cable is CM (Communications, General Purpose cable). Therefore the installation of the cable falls under Article 800 of the National Electrical Code unless your local code or company policy is more restrictive.
- 2) The shields of the transducer cable must be grounded at the EASYPack only! The **Shields** pin on the Transducer Input Connector is brought to the chassis pin on the power supply connector. When installing the cable, treat the shield as a signal carrying conductor. Do not connect the shield to ground at any junction box or the transducer. This will eliminate ground loops that could damage the EASYPack Genesis.

Transducer Cable Installation (continued)

C1TG-(x) Wiring Diagram

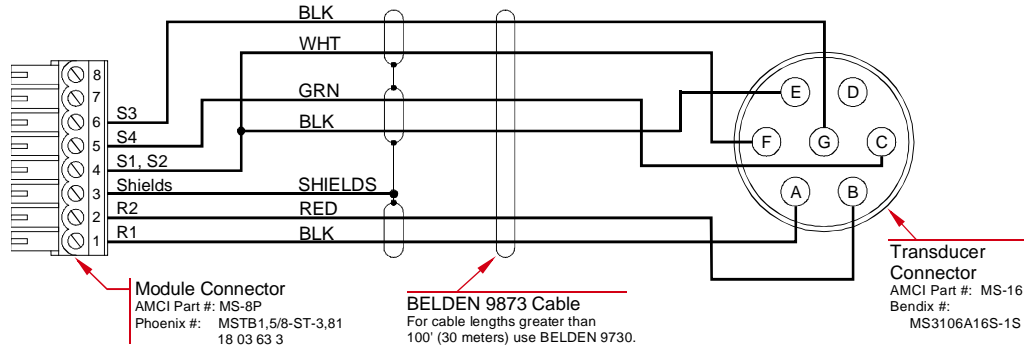


Figure 6.8 C1TG-(x) Wiring Diagram

Article 800 of the National Electrical Code specifies that the transducer cable cannot be installed with the following wiring:

- All conductors of electric light or power circuits
- Class 1 circuits
- Non-power limited fire protective signaling circuits.

Article 800 also states that transducer cable can be installed with Class 2 or Class 3 circuit conductors and other communication cables. All of these conductors are for low power, low voltage, devices such as optical and prox sensors.

There are listed exceptions to the ban on installing higher power conductors with the transducer cable, but AMCI strongly recommends against following these exceptions. The NEC is meant to protect individuals from hazardous situations, not insure a noise free environment. When installing the transducer cable, follow the general guidelines given in chapter 5 in the *Wiring* section, starting on page 42.

AMCI Transducer Outline Drawings

AMCI offers a broad line of resolver based transducers for use with the EASYPack Genesis. (See *Compatible Transducers* starting on page 13.) Outline drawings for all of these transducers, and full spec sheets for our most popular transducers, are available on our website, www.amci.com. If you do not have internet access, contact AMCI and we will fax the information to you.

AMCI Transducer Mounting

All AMCI resolver based transducers are designed to operate in the industrial environment and therefore require little attention. However, there are some general guidelines that should be observed to ensure long life.

- Limit transducer shaft loading to the following maximums:

	Radial Load	Axial Load
All 0.625" Shafts	100 lbs. (445 N)	50 lbs. (222 N)
All 0.375" Shafts	30 lbs. (133 N)	15 lbs. (66.7 N)
All Other Shafts	1 lb. (4.45 N)	0.5 lb. (2.22 N)

Table 6.1 Transducer Bearing Loads

- Minimize shaft misalignment when direct coupling shafts. Even small misalignments produce large loading effects on front bearings. It is recommended that you use a flexible coupler whenever possible. A flexible coupler is *required* for all HT-6 transducers and R11 resolvers.

I/O Wiring

Figure 6.9 is the rear view of the EASYPack Genesis and shows the locations of the output relays and I/O wiring connectors.

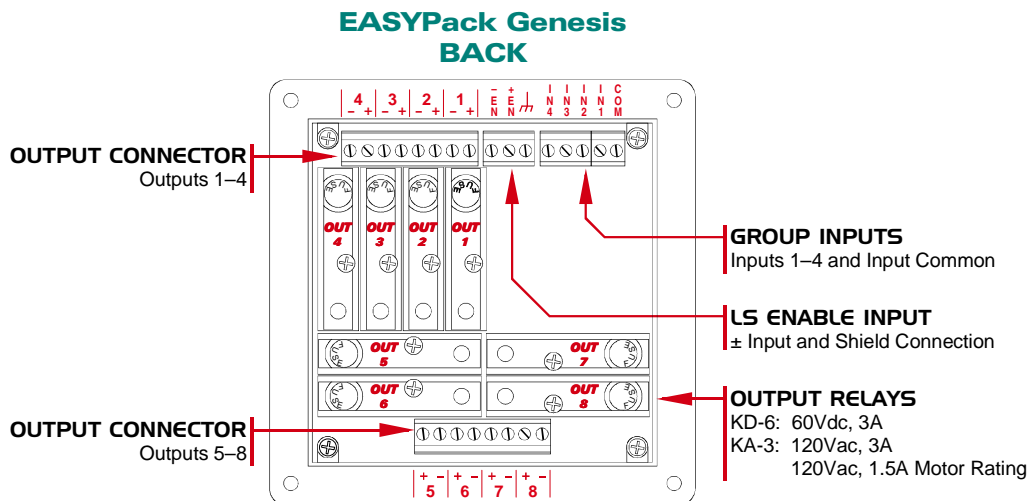


Figure 6.9 I/O Connector Placement

Group Input Wiring

Figure 6.10 shows a simplified schematic of the Group Inputs. The inputs are designed to accept 10 - 30 Vdc and require 10 mA to activate.

Note that the Input Common Pin is attached to one side of the power supply that powers the sensors connected to the inputs.

- If your sensors have sourcing outputs, then attach the Common pin to power supply ground.
- If your sensors have sinking outputs, attach the Common pin to +Vdc of the supply.
- All of your sensors must be sourcing or sinking. You cannot attach both types to the EASYPack Genesis at the same time.

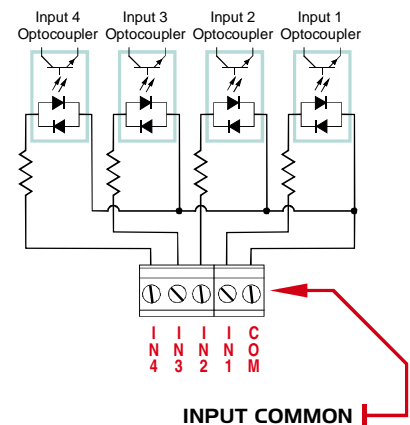


Figure 6.10 Group Input Schematic

I/O Wiring (continued)

Group Input Wiring (continued)

Figure 6.11 shows how to connect a three wire source or sink sensor to a Group Input.

You can use the power supply for the EASYPack Genesis to power the sensors. If you do:

- ▶ DO NOT connect the negative side of the supply to earth ground (chassis) at the sensor. Use a continuity tester to verify that the (-) side of the sensor's power is not connected to the body of the sensor before installing.
- ▶ DO NOT attach the power supply leads of the sensor to the Power Connector of the EASYPack Genesis. Connect the sensors directly to your power supply. If you make the connection at the EASYPack Genesis, any noise that may be injected into the sensor cable can be coupled into the unit.

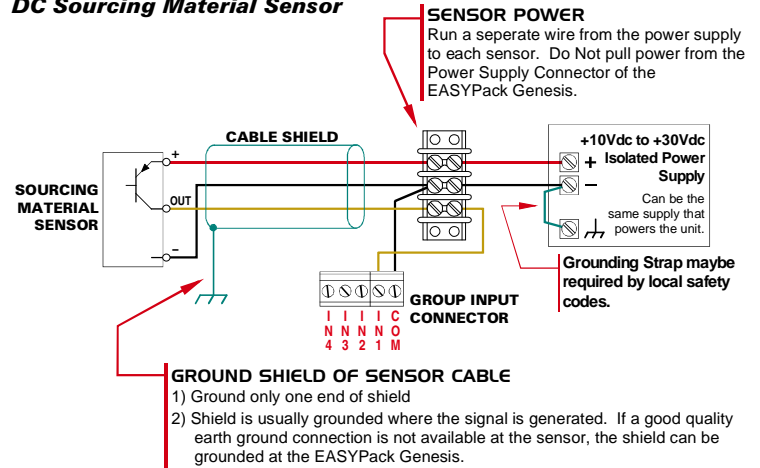
The shield of a cable is usually grounded where the signal carried by the cable is generated. Therefore, the shield is usually grounded at the sensor. However, if you do not have a quality bonding point at the sensor, ground the shield at the EASYPack Genesis. If you are using one or two Group Inputs, and you are not using the LS Enable Input, then ground the shields at the CHASSIS pin of the LS Enable Input Connector. (See figure 6.9 on the previous page.) If you have too many shields to connect to the pin, bond them to the enclosure's Ground Bus. You can accomplish this by bonding them to one of the unit's mounting studs. (See figure 6.4, *Mounting the EASYPack Genesis* on page 47 for instructions on bonding a wire to a stud.)



WARNING

DO NOT, UNDER ANY CIRCUMSTANCES, ground both ends of the cable shield. Doing so can form a ground loop that can damage the sensor or EASYPack Genesis.

DC Sourcing Material Sensor



DC Sink Material Sensor

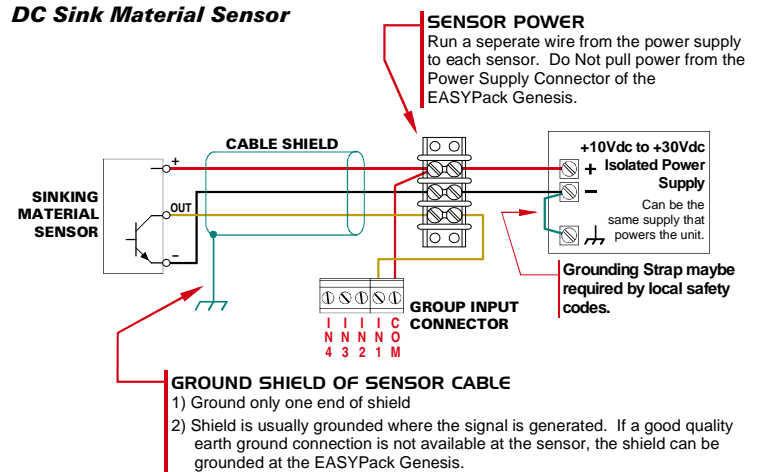


Figure 6.11 Group Input Wiring

I/O Wiring (continued)

LS Enable Input

Figure 6.12 shows a simplified schematic of the LS Enable Input. This AC/DC input operates at either 110Vac @ 8 mA_{rms} or 10–30Vdc @ 10 mA.

Wiring to the LS Enable input is very similar to wiring the Group Inputs. See figure 6.11 on the previous page for information on wiring a DC sensor to the input. Note that +Vdc or ground can be attached to either input pin and the input will still work correctly.

When wiring the input to accept 110Vac, the neutral conductor is typically attached to one of the pins and the hot conductor is switched through the load to the other.

If you cannot ground the shield of the cable at the sensor, ground it at the CHASSIS pin of the connector. DO NOT ground both ends of the shield.

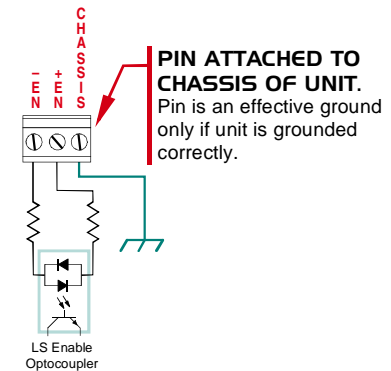


Figure 6.12 LS Enable Input Schematic

Output Wiring

You have a choice between AC or DC outputs when ordering the solid state relays for the EASYPack Genesis. Relay specifications can be found on page 24 in the section *Single-Turn Transducer Specifications*. Figure 6.9, *I/O Connector Placement*, found on page 50, shows the placement of the relays and the pinout of the output connectors. The connectors are also labeled on the unit.

When installing the cabling for the outputs, all local and national codes must be followed. Additionally:

- Keep as much physical space as possible between output wiring and input wiring within the enclosure
- Do not place output wiring in a conduit with input wiring. If you are using inputs, you should have at least two conduits connected to the enclosure. One conduit for the inputs and a second for power and the outputs. Of course, additional conduits may be necessary for your application.

Finally, all inductive loads on the machine require surge suppressors, especially those that are switched with mechanical relays. Refer to *Surge (EMI) Suppression* starting on page 39 for additional information.

PROGRAMMING OVERVIEW

This chapter covers:

- 1) How to use the keyboard to navigate the screens available on the EASYPack Genesis.
- 2) How to switch between View and Edit Modes.
- 3) Which programming functions that are available to users based on password levels
- 4) How to enable passwords if you choose to limit programming access.
- 5) How to select, create, copy, and delete programs
- 6) The error messages you may encounter while programming the unit.

Using the Display and Keyboard

The display provides four lines of text that are twenty characters long. Figure 7.1 shows a typical display.

- **Line 1:** Identifies the screen being displayed
- **Lines 2 and 3:** Shows parameters and their values
- **Line 4:** Displays the unit's status.

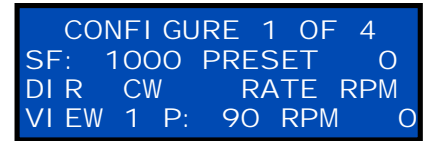


Figure 7.1 Sample Display

Usually, line 4 displays the current mode, (View or Edit), the number of the current program, and the machine's current position and speed. This information is replaced with an error message if a problem occurs.

The keypad is made up of twenty keys that perform various functions. Thirteen of the keys are *bi-level*, with blue on the top and white on the bottom. When the red Function LED next to the [FUNCTION] Key is on, pressing one of these keys selects the function listed on the blue level, while pressing one of these keys when the Function LED is off selects the function, or enters the data, listed on the white level. The [FUNCTION] Key simple toggles the state of the Function LED.

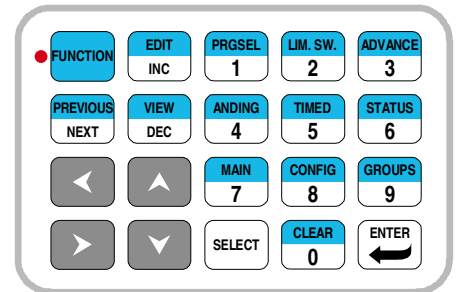


Figure 7.2 Genesis Keypad

Throughout this manual, the bi-level keys have two names, one for when the Function LED is on and one when it is off. For example, [PRGSEL] and [1] refer to the same key.

NOTE

These instructions do not constantly remind you to make sure the Function LED is on or off before pressing a key. If the instructions give the name of the key that is on the blue level, the Function LED must be on before pressing the key.

The blue level of keys [1] through [9] select the Data Screen to be shown on the display. The various Data Screens are introduced in the next section.

The four arrow keys are used to navigate around the screens. The right and left arrows switch between parameters on the display while the up and down keys switch between limit switches when programming parameters for these outputs.

Some parameters, such a *Limit Switch Type*, have a limited number of values. The [SELECT] key is used to cycle through the values of these parameters.

The [CLEAR] key is used to clear fault conditions such as the transducer fault message that appears on line 4 when the unit detects a problem with the transducer connection.

The [ENTER] key works the way you'd expect. Programming changes are not stored in memory until the [ENTER] key is pressed. If you change a parameter value and then switch to another parameter without pressing [ENTER], the new setting will not be stored and the parameter will revert back to its original value.

The [PREVIOUS/NEXT] key is used to cycle through the limit switch numbers or the four Configuration Screens.



Using the Display and Keyboard (continued)

The [INC] and [DEC] keys are used to fine-tune limits by adjusting one or both setpoints one count at a time or by adjusting the advances one millisecond at a time.

The [EDIT] and [VIEW] keys are used to switch between the unit's two operating modes. When the transducer is rotating, the EASYPack Genesis automatically switches to View Mode.

Available Data Screens

Table 7.1 lists the data screens available on the eight output EASYPack Genesis and the keys used to access them. A brief description of common usage is also given.

Screen Name	Access Key	Description
Program Select	[PRGSEL]	Used to select the running program, or create, copy, or delete them.
LS Setpoint	[LIM.SW.]	Used to program the Limit Switch Type, assign the limit to a group, and program its ON/OFF Setpoints. You can also fine-tune setpoints while the machine is running using the [INC] and [DEC] keys.
LS Advances	[ADVANCE]	Used to program the ON/OFF Advances for the limit switch outputs. You can also fine-tune advances while the machine is running using the [INC] and [DEC] keys.
LS ANDing	[ANDING]	Used to AND the state of a limit switch with the Motion Detector and/or the LS Enable Input.
LS Timed Output	[TIMED]	Used to program the Time Out value of a limit switch if it is set up as a Timed Limit Switch.
Status	[STATUS]	Used to monitor the status of the LS Outputs and the four Group Inputs
Main	[MAIN]	Default screen while the machine is running. This screen allows you to monitor machine position and speed, the present values of the group positions, and the currently running program.
Configuration 1	† [CONFIG]	Used to program the Scale Factor, Count Direction, and Rate Value parameters as well as preset the Machine Position value.
Configuration 2	† [CONFIG] [PREVIOUS/NEXT]	Used to program the Motion Detector Low/High Limit Setpoint as well as the Toggle Speed parameter.
Configuration 3	† [CONFIG] [PREVIOUS/NEXT]	Used to program the Rate Multiplier, Divisor, and Decimal Point Parameters.
Configuration 4	† [CONFIG] [PREVIOUS/NEXT]	Used to enable or disable all passwords and set the values for Master, Set-up and Operator passwords. If passwords are enabled, only a person with the MASTER password can access this screen.
PLS Groups	[GROUPS]	Used to program the Group Mode, Group Window, and Group Offset/Preset parameters.

Table 7.1 EASYPack Genesis Data Screens

† The four Configuration Screens are accessed by first pressing the [CONFIG] key to access the Configuration 1 Screen and then repeatedly pressing the [PREVIOUS/NEXT] key to cycle through the screens.

View and Edit Modes

The display has two modes of operation, *View Mode* and *Edit Mode*.

- **View Mode** – This is the default operating mode. The unit power up in View Mode and will switch to this state whenever the transducer is in motion. View Mode allows anyone to inspect programmable parameter values but not change them. The one exception is the passwords, which cannot be inspected while in View Mode. (For obvious reasons.)
- **Edit Mode** – Edit Mode allows you to program parameter values. If passwords are enabled, you will be asked to enter your password before the unit switches to Edit Mode and the parameters you will be allowed to program will be limited by your password.



View and Edit Modes (continued)

Switching Modes

To enter View Mode, simply press the [VIEW] key. The EASYPack will immediately switch to View Mode.

How you enter Edit Mode depends on whether or not passwords are enabled.

If passwords are disabled, simply pressing the [EDIT] key switches the EASYPack to Edit Mode. The unit will allow you to program all parameters. (You have the equivalent of Master level access if passwords were enabled.)

If passwords are enabled, the EASYPack Genesis asks you for a password before entering Edit Mode. You must enter your four digit code. As shown in figure 7.3, the number you enter is displayed as asterisks.

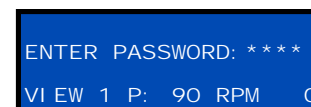


Figure 7.3 Enter Password Screen

Once your four digit code is keyed in, press [ENTER]. Your code is compared to the three stored in memory and you are granted access rights based on which password you match.

If you enter the wrong password, the display switches to the last screen that you were on in View Mode and flashes “INCORRECT ACCESS” on the bottom line for two seconds. Once again, press [EDIT] to bring up the password screen and try to enter your password a second time.



NOTE Why does the EASYPack Genesis switch to the last screen and make you wait two seconds instead of just leaving you on the password screen? It *really* slows down someone who’s trying to crack the passwords.

Password Access Levels

The use of passwords is disabled by default. If you choose to enable passwords, the table below shows what can be programmed based on the password entered when a person switches to *Edit Mode*.

Screens/Functions	Master	Set-up	Operator
Select Running Program	Yes	Yes	Yes
Create, Copy, or Delete a Program	Yes	Yes	No
Inc/Dec Limit Switch Setpoints	Yes	Yes	Yes
LS Setpoint Screen	Edit/View	Edit/View	View Only
LS Advance Screen	Edit/View	Edit/View	View Only
LS ANDing Screen	Edit/View	Edit/View	View Only
LS Timed Output Screen	Edit/View	Edit/View	View Only
Status Screen	This is a View Only Screen		
Main Screen	This is a View Only Screen		
Configuration 1 Screen	Edit/View	View Only	View Only
Configuration 2 Screen	Edit/View	View Only	View Only
Configuration 3 Screen	Edit/View	View Only	View Only
Configuration 4 Screen	Edit/View	Unavailable	Unavailable
PLS Groups Screen	Edit/View	Edit/View	View Only

Table 7.2 Screen Access Based on Password Level

Basically, a *Master* is able to select, create, copy, or delete programs and program any parameter. A *Set-up* level user, such a shift supervisor, can do everything a Master can do except program Transducer Set-up parameters. An *Operator* level user can only select the running program and increment/decrement setpoints. Note that Operators can only select between programs that already exist, they cannot create new programs.



Setting Passwords

The following procedure is for enabling passwords and setting their values.

- 1) Press the [EDIT] key, even if you're already in Edit Mode. If you enter Edit Mode without being required to enter a password then passwords are disabled. If you are required to enter a password, then you must enter the *Master* password.
- 2) Press [CONFIG], followed by the [NEXT] key three times. This switches you to the Configuration 4 Screen shown in figure 7.4. The Disable/Enable Password field will be blinking.
- 3) Press [SELECT] as needed to switch the field to "ENABLE" and press [ENTER]. The cursor switches to the Password Name field.
- 4) Press [SELECT] to switch to the Password Name you wish to set (Master, Set Up, or Operator). Press [ENTER] to switch to the Password Value field.
- 5) Enter the new four digit code. Any value between 0000 and 9999 is acceptable. Press [ENTER] to store the new value. The cursor moves back to the Disable/Enable Password field.
- 6) Press [▶] to move to the Password Name field. If needed, repeat steps 4 & 5 for the other passwords.

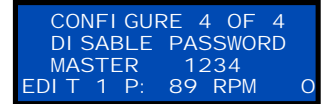


Figure 7.4 Password Screen



If you set two passwords equal to each other, the password grants the higher of the two levels. For example, setting Operator and Set Up passwords to 3333 grants Operator level privileges.

Manipulating Programs

The *Program Select Screen*, shown in figure 7.5, is used to select, create, copy, and delete programs. It is accessed with the [PRGSEL] key. You must be in *Edit Mode* before you can perform any of these operations. If passwords are enabled, your access is limited by the password entered.

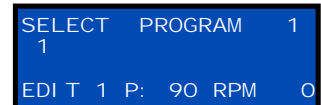


Figure 7.5 Program Select Screen

- **Master and Operator Levels:** Select, Create, Copy, and Delete functions.
- **Operator Level:** Select function only.

The EASYPack Genesis can store up to 35 programs. You can assign any number from 0 to 99 to the programs, and they do not need to be consecutive. Figure 7.5 shows the Program Select Screen with only one program available.

When you first enter the screen, the word "SELECT" will be blinking. Press [SELECT] to cycle through the values for this field and press [ENTER] to select the operation you want to perform.

- **SELECT:** Changes the running program
- **NEW:** Creates a new program that has all parameter values set to their defaults.
- **SAVE AS:** Creates a copy of the current running program.
- **DELETE:** Deletes a program. The program you select to delete cannot be the current running program.

After you press [ENTER], the cursor switches to the program number on the top line. Use keys [0] through [9] to enter the correct, or new, program number. If you make a mistake when entering a program number, the unit flashes an error message on the bottom line. A complete alphabetical list of programming error messages is table 7.3, *Programming Error Messages*, found on the next page.

- **SELECT:** The program number you enter must already exist. Once its entered, the program number on the bottom line of the display, ("EDIT 1" in the figure above), will change to the new program.
- **NEW:** The program number you add must not already exist. When created, the number of the new program appears on the display unless you already have fourteen or more programs defined.
- **SAVE AS:** The program number you add must not already exist. When created, the new program is a copy of the currently running program. The number of the new program appears on the display unless you already have fourteen or more programs defined.
- **DELETE:** The program number you enter must exist and cannot be the presently running program. The unit will ask you for confirmation. Press [SELECT] to cycle between YES and NO. Pressing [ENTER] while the display shows YES deletes the program.



Manipulating Programs (continued)

As you create new programs their number are added in numeric order to lines 2 and 3 of the display. Once you enter more than fourteen programs, the display changes to one similar to figure 7.6, where the word “MORE” is displayed. If you see this display, you can use the [▼] and [▲] keys to cycle through the available program numbers.

```

SELECT PROGRAM 1
1 2 3 4 5 6 7
10 11 12 13 14 MORE>
EDIT 1 P: 90 RPM 0
    
```

Figure 7.6 15+ Programs

Programming Error Messages

The following table is an alphabetical list of error messages you may encounter while programming the EASYPack Genesis. Error message appear on the bottom line of the display for two seconds whenever an error occurs.

Error Message	Cause
CHANNEL # ERROR	You set the LS Number to 0 or 9. (Valid Numbers are 1 to 8).
DIVISOR ERROR	You're attempting to program the Rate Divisor to a value of zero or greater than 63.
GROUP # ERROR	You attempted to program the Group number to zero or greater than four.
MODE # ERROR	You attempted to program the Group Mode number greater than four.
GROUP WINDOW OFF ERR	You attempted to program the Group Window OFF Setpoint outside its range of 0 to (Scale Factor -1).
GROUP WINDOW ON ERR	You attempted to program the Group Window ON Setpoint outside its range of 0 to (Scale Factor -1).
INCORRECT ACCESS	In View Mode instead of Edit Mode, or passwords are enabled and your access level doesn't permit the operation you're attempting.
LIMIT SWITCH OFF ERROR	You attempted to program the LS OFF Setpoint outside its range of 0 to (Scale Factor -1) or you attempted to make the LS OFF Setpoint equal to the LS ON Setpoint while incrementing or decrementing it.
LIMIT SWITCH ON ERROR	You attempted to program the LS ON Setpoint outside its range of 0 to (Scale Factor -1) or you attempted to make the LS ON Setpoint equal to the LS OFF Setpoint while incrementing or decrementing it.
LS GROUP # ERROR	You attempted to program the PLS Group Number to zero or greater than four.
MOTION LIMIT ERROR	You're attempting to program the Motion Detector Low or High Setpoint to a value greater than 2,000.
MULTIPLIER ERROR	You're attempting to program the Rate Multiplier to a value of zero or greater than 1,100.
OFFS/PRESET ERROR	You attempted to program the Group Offset/Preset value outside its range of 0 to (Scale Factor -1).
PRESET VALUE ERROR	You're attempting to preset the machine position to a value greater than or equal to the Scale Factor or you a trying to do this while a transducer fault exists.
PRGM ALREADY IN USE	The program number you entered while creating or copying a program already exists or you are attempting to delete the current running program.
SCALE FACTOR ERROR	You're attempting to program the Scale Factor to a value less than 2 or greater than 1,000.
TOGGLE SPEED ERROR	You're attempting to program the Toggle Speed to a value greater than 2,000.

Table 7.3 Programming Error Messages



Notes

CONFIGURATION PROGRAMMING

This chapter covers how to program the Transducer Setup Parameters available under the first three Configuration Screens. Setting passwords, which is done on the fourth Configuration Screen, is covered in the previous chapter.

Before You Start, Know This...

In order to keep the amount of repetition to a minimum, the instructions in this chapter assume you're already in **Edit Mode**. Instructions on entering Edit Mode can be found in the *View and Edit Modes* section found on page 54.

If passwords are enabled, you must have Master access to program any of the parameters covered in this chapter.

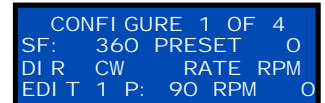
For the most part, entering data on these screens is fairly intuitive. Numeric data is entered with the [0] through [9] keys and the values for non-numeric data are cycled through with the [SELECT] key. In either case, you must press [ENTER] before new data is accepted.

The right [▶] and left [◀] arrow keys are used to move the blinking cursor to the next or previous fields on the screen. Use these keys to skip over a field if you don't intend to change its value.

If you encounter an error message while going through these instructions and you cannot figure out why, refer to table 7.3, *Programming Error Messages*, found on page 57 for an alphabetical list of all programming error messages and their causes.

The Configuration 1 Screen

The Configuration 1 Screen is shown in figure 8.1. You access this screen by pressing [CONFIG]. From this screen you can program the Scale Factor, Count Direction, and Rate Value parameters as well as preset the Machine Position.



```
CONFIGURE 1 OF 4
SF: 360 PRESET 0
DIR CW RATE RPM
EDIT 1 P: 90 RPM 0
```

Figure 8.1 Configuration 1

In the following list, the number in parentheses immediately after the parameter name is the page in the Specifications chapter that describes the parameter.

Scale Factor: (p.27)

Entered with the numeric keys, this parameter sets the number of counts per turn and can be programmed to any value between 2 and 1,000.

NOTE Programming the Scale Factor resets all other parameters to their default values. This includes erasing all limit switch programming data.

Machine Preset Value: (p.27)

Entering this parameter works differently than all others. It's set with the numeric keys, but when [ENTER] is pressed, the EASYPack Genesis asks you for confirmation. If you want to preset the Machine Position, simply press [ENTER]. If you made an error and don't want to preset the Machine Position, then press [SELECT] to change the display to "NO" and then [ENTER].

Count Direction: (p.27)

The Count Direction value is cycled between clockwise (CW) and counter-clockwise (CCW) with the [SELECT] key.

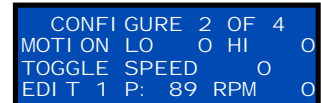
Rate Value: (p.26)

The Rate Value field is cycled through its four values of RPM, IPM, CPM, and BPM with the [SELECT] key.

The Configuration 2 Screen

The Configuration 2 Screen is shown in figure 8.2. Access this screen by pressing [CONFIG] followed by [NEXT]. From this screen you can program the Motion Detector Low and High Setpoint and Toggle Speed parameters.

In the following list, the number in parentheses immediately after the parameter name is the page in the Specifications chapter that describes the parameter.



```

CONFIGURE 2 OF 4
MOTION LO 0 HI 0
TOGGLE SPEED 0
EDIT 1 P: 89 RPM 0
  
```

Figure 8.2 Configuration 2

Motion Detector Low Setpoint: (p.28)

Entered with the numeric keys, this parameter can be programmed to any value between 0 and 2,000.

Motion Detector High Setpoint: (p.28)

Entered with the numeric keys, this parameter can be programmed to any value between 0 and 2,000.

NOTE

If the Low Setpoint is less than the High Setpoint, the output of the Motion Detector will be on between the setpoint speeds. If the Low Setpoint is greater than the High Setpoint, the output of the Motion Detector is off between the two setpoints. If the setpoints are equal, the Motion Detector will never be on. The state of the Motion Detector is important if you are using the Motion ANDing feature of the EASYPack Genesis.

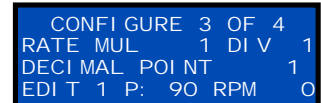
Toggle Speed: (p.26)

Entered with the numeric keys, this parameter can be programmed to any value between 0 and 2,000.

The Configuration 3 Screen

The Configuration 3 Screen is shown in figure 8.3. Access this screen by pressing [CONFIG] followed by pressing [NEXT] twice. From this screen you can program the Rate Multiplier, Divisor, and Decimal Point parameters.

In the following list, the number in parentheses immediately after the parameter name is the page in the Specifications chapter that describes the parameter.



```

CONFIGURE 3 OF 4
RATE MUL 1 DIV 1
DECIMAL POINT 1
EDIT 1 P: 90 RPM 0
  
```

Figure 8.3 Configuration 3

Rate Multiplier: (p.28)

Entered with the numeric keys, this parameter can be programmed to any value between 1 and 1,100.

Rate Divisor: (p.28)

Entered with the numeric keys, this parameter can be programmed to any value between 1 and 63.

Rate Decimal Point: (p.28)

Even though the data is numeric, this parameter is limited to the values of 1, 10, 100 and 1,000. The [SELECT] key is used to cycle through these values.

This chapter covers how to program normal limit switches. This includes ON/OFF Setpoints and ON/OFF Advances. Programming instructions for timed limit switches, as well as Motion Detector and/or LS Enable ANDing is covered in the next chapter.

Before You Start, Know This...

In order to keep the amount of repetition to a minimum, the instructions in this chapter assume you're already in **Edit Mode**. Instructions on entering Edit Mode can be found in the *View and Edit Modes* section found on page 54.

If passwords are enabled, you must enter the Master or Set-Up password in order to program any of the parameters covered in this chapter. Personnel with the Operator level password cannot program these parameters.

For the most part, entering data on these screens is fairly intuitive. Numeric data is entered with the [0] through [9] keys and the values for non-numeric data are cycled through with the [SELECT] key. In either case, you must press [ENTER] before new data is accepted.

The right [▶] and left [◀] arrow keys are used to move the blinking cursor to the next or previous fields on the screen. Use these keys to skip over a field if you don't intend to change its value. You can also use these keys to switch between screens if you are on the first or last field on the display.

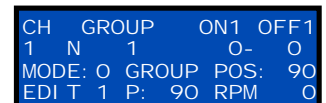
The [PREVIOUS/NEXT] key can be used to cycle through the eight limit switches. When you use this key, the cursor automatically moves to the *LS Number* field on the display.

The up [▲] and down [▼] arrow keys can also be used to cycle through the eight limit switches. Where as the [PREVIOUS/NEXT] key always moves the cursor to the LS Number field of the screen, the up and down arrow keys keep you on the same field if the new limit switch is being used. If it is unprogrammed, the cursor jumps to the LS Number field.

If you encounter an error message while going through these instructions and you can't figure out why, refer to table 7.3, *Programming Error Messages*, found on page 57 for an alphabetical list of all programming error messages and their causes.

The LS Setpoint Screen

The LS Setpoint Screen is shown in figure 9.1. Access this screen by pressing [LIM.SW.]. From this screen you can program the Limit Switch Type and LS ON/OFF Setpoints for each of the eight outputs. If you are using PLS Group functionality, you also assign each limit switch to a Group from this screen.



CH	GROUP	ON1	OFF1
1	N 1	0-	0
MODE: 0 GROUP POS: 90			
EDI	T 1	P: 90	RPM 0

Figure 9.1 LS Setpoint

Note that all of the data is entered on line 2. On this screen, line 3 of the display shows the mode and position of the group the limit switch is assigned to. You cannot alter this data from this screen. It's programmed on the *PLS Groups Screen*, which is covered on page 66.

In the following list, the number in parentheses immediately following the parameter name is the page in the Specifications chapter that describes the parameter.

LS Number: (Not a Parameter)

When you first enter the screen, or switch between limit switches with the [PREVIOUS/NEXT] key, the cursor moves to the LS Number field. This field allows you to select the limit switch number that you want to inspect or program. Use the [PREVIOUS/NEXT], [▲] or [▼] keys to cycle through the limit switches. You can also jump to a specific output by keying in the number [1] through [8], and pressing [ENTER].

The LS Setpoint Screen (continued)

Limit Switch Type: (p.30)

When you enter a LS Number, the cursor jumps to the Limit Switch Type field. This parameter is cycled through its three values with the [SELECT] key. Its three values are:

- “-” (disabled)
- “N” (Normal)
- “T” (Timed)

NOTE

The instructions in this section only cover how to program a *Normal* limit switch (Position on / Position off). Complete instructions on programming a *Timed* limit switch are given under *Programming a Timed Limit Switch Output*, found on page 65.

PLS Group Number:

When you program the Limit Switch Type to *Normal* or *Timed*, the cursor jumps to the PLS Group Number field.

NOTE

- 1) If you are not using the advanced PLS Group Programming feature, leave this field at its default value of 1.
- 2) If you are using the advanced PLS Group Programming feature, then set this field with the numeric keys to assign the limit to the proper group. The field can be set to any value from one to four.

LS ON/OFF Setpoint Pairs: (p.31)

ON and OFF Setpoints can be set to any value between zero and (Scale Factor -1).

The next field on the screen is the LS ON Setpoint. It can be changed by entering a new value with the numeric keys and pressing [ENTER], or using the [INC] and [DEC] keys. If you increment or decrement the field, the parameter is updated every time a key is pressed, so there's no need to press the [ENTER] key.

Once you've set the ON Setpoint, the next field is the dash between the ON and OFF setpoints. With the cursor here, pressing the [INC] or [DEC] keys changes the ON and OFF setpoints together. This shifts where the output turns on and off but keeps the size of the window the same.

- To skip this field, just press [▶] or [ENTER].

The OFF Setpoint is set in the same manner as the ON Setpoint, using the numeric keys and pressing [ENTER], or the [INC] and [DEC] keys.

If you are using only one setpoint pair for the limit, you can use the [PREVIOUS/NEXT] key to move to the next limit switch you have to program.

Entering Multiple Setpoints

Normal limit switches have four ON/OFF setpoint pairs per output. The unit distinguishes between them by showing the setpoint pair number on the top line of the display. When entering setpoint pair 1, the top line will show “ON1 OFF1”, setpoint pair two shows “ON2 OFF2”, etc.

You can move between the setpoint pairs with the [▶] and [◀] keys.

NOTE

- 1) If you're not using all of the setpoint pairs, leave the unused one at their defaults of 0-0.
- 2) If you are on the fourth OFF Setpoint and press [ENTER], the display switches to the LS Advance Screen. If you want to continue programming setpoints, then use either the [LIM.SW.] or [◀] keys to switch back to the LS Setpoint Screen.

The LS Advance Screen

The LS Advance Screen is shown in figure 9.2. Access this screen by pressing [ADVANCE]. From this screen you can program the ON and OFF Advances for each of the eight outputs.

```

CH      ADVANCES
1  ON   0msOFF  0ms
MODE: 0 GROUP POS: 90
EDIT 1 P: 90 RPM 0
    
```

Figure 9.2 LS Advance

Note that all of the data is entered on line 2. On this screen, line 3 of the display shows the mode and position of the group the limit switch is assigned to. You cannot alter this data from this screen. It's programed on the *PLS Groups Screen*, which is covered on page 66.

In the following list, the number in parentheses immediately following the parameter name is the page in the Specifications chapter that describes the parameter.

LS ON/OFF Advances: (p.31)

The LS Advances can be set to any value between 0 and 999 milliseconds.

When you first enter the screen, or switch between limit switches with the [PREVIOUS/NEXT] key, the cursor moves to the *LS Number* field. This field allows you to select the limit switch number that you want to inspect or program. Use the [PREVIOUS/NEXT], [▲], or [▼] keys to cycle through the limit switches. You can also jump to a specific output by keying in the number [1] through [8], and pressing [ENTER].

There are only two other fields on the screen, the ON Advance and OFF Advance. Their values are set with the numeric keys and [ENTER].

When you are on the OFF Setpoint and press [ENTER], the display switches to the LS ANDing Screen. If you want to continue programming setpoints, then use either the [ADVANCE] or [◀] keys to switch back to the LS Advance Screen.

Notes

This chapter covers how to program timed limit switches as well as Motion Detector and/or LS Enable ANDing. PLS Group Programming is also presented.

Before You Start, Know This...

In order to keep the amount of repetition to a minimum, the instructions in this chapter assume you're already in **Edit Mode**. Instructions on entering Edit Mode can be found in the *View and Edit Modes* section found on page 54.

If passwords are enabled, you must enter the Master or Set-Up password in order to program any of the parameters covered in this chapter. Personnel with the Operator level password cannot program these parameters.

For the most part, entering data on these screens is fairly intuitive. Numeric data is entered with the [0] through [9] keys and the values for non-numeric data are cycled through with the [SELECT] key. In either case, you must press [ENTER] before new data is accepted.

The right [▶] and left [◀] arrow keys are used to move the blinking cursor to the next or previous fields on the screen. Use these keys to skip over a field if you don't intend to change its value. You can also use these keys to switch between screens if you are on the first or last field on the display.

The [PREVIOUS/NEXT] key can be used to cycle through the eight limit switches. When you use this key, the cursor automatically moves to the *LS Number* field on the display.

The up [▲] and down [▼] arrow keys can also be used to cycle through the eight limit switches. Where as the [PREVIOUS/NEXT] key always moves the cursor to the LS Number field of the screen, the up and down arrow keys keep you on the same field if the new limit switch is being used. If it is unprogrammed, the cursor jumps to the LS Number field.

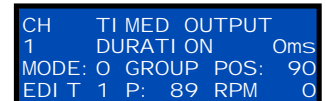
If you encounter an error message while going through these instructions and you can't figure out why, refer to table 7.3, *Programming Error Messages*, found on page 57 for an alphabetical list of all programming error messages and their causes.

Programming a Timed Limit Switch Output

For the most part, programming a *Timed* limit switch is identical to programming a *Normal* limit switch. The only difference is the number of ON/OFF Setpoint pairs available. While a *Normal* limit switch has four pairs, a *Timed* limit switch only has one.

Programming the setpoint pair is covered in the *The LS Setpoint Screen*, starting on page 61. Set the Limit Switch Type field to "T".

Once you have the setpoint pair programmed, press [TIMED] to switch to the *LS Timed Output Screen*. You will have to switch to the correct limit switch number by using the [PREVIOUS/NEXT], [▲], or [▼] keys to cycle through the limit switches. You can also jump to a specific output by keying in the number [1] through [8], and pressing [ENTER].



CH	1	TIMED OUTPUT
		DURATI ON Oms
MODE:	0	GROUP POS: 90
EDI T	1	P: 89 RPM 0

Figure 10.1 LS Timed Output

If the output is programmed as a *Normal* limit switch, then the second line of the display will only show the LS Number field. If the output is programmed as a *Timed* limit switch, the display will be similar to figure 10.1.

Once you enter the LS Number, the cursor moves to the Time Out field. Enter the value of the Time Out parameter with the numeric keys and press [ENTER]. The range of values is 0 to 9,999 milliseconds. When you do, the display switches to the LS Setpoint Screen.

LS ANDing Screen

If you have decided to use the state of the Motion Detector and/or the LS Enable Input to condition the state of your limit switches, the LS ANDing Screen is where you associate the inputs with the outputs. Figure 10.2 shows the default screen for output 1.

```
CH  MOTI ON  ENABLE
1   OFF      OFF
MODE: 0 GROUP POS: 89
EDIT 1 P: 89 RPM 0
```

Figure 10.2 LS ANDing

Once you call up the screen, you may have to switch to the correct limit switch number. Do this with the [PREVIOUS/NEXT], [▲], or [▼] keys to cycle through the limit switches or jump to a specific output by keying in the number [1] through [8], and pressing [ENTER].

LS Motion ANDing: (p.33)

When you enter a LS Number, the cursor jumps to the LS Motion ANDing field. This parameter is cycled between OFF and ON with the [SELECT] key. Once you set its state, press [ENTER] to accept the value.

Enable ANDing: (p.33)

After you enter a value for the LS Motion ANDing parameter the cursor moves to the Enable ANDing field. You can also use the right/left arrow keys to move to the cursor. This parameter is cycled between OFF and ON with the [SELECT] key. Once you set its state, press [ENTER] to accept the value.

PLS Groups Screen

NOTE If you are not using the advanced PLS Group Programming functionality, don't change any values available on this screen.

Figure 10.3 shows the default PLS Groups Screen. Note that this screen uses lines 1 through 3 for entering data.

In the following list, the number in parentheses immediately after the parameter name is the page in the Specifications chapter that describes the parameter.

The functionality of each Group Mode is described in the *SPECIFICATIONS* chapter, starting on page 34.

```
GROUP NUMBER 1 MODE0
WI NDOW ON 0 OFF 0
GRP OFFSET/PRESET 0
EDIT 1 P: 90 RPM 0
```

Figure 10.3 PLS Groups

Group Number

Entered with the numeric keys, this parameter can be programmed to any value between 1 and 4. When you change this value, the rest of the display updates to show the parameter values of the chosen group.

Group Mode: (p.33)

Entered with the numeric keys, this parameter can be programmed to any value between 0 and 4.

Group Window ON/OFF Setpoints: (p.34)

Entered with the numeric keys, these parameters can be programmed to any value between 0 and (Scale Factor -1). Only Modes 1, 2 and 4 actually use the Group Window, if you are using Modes 0 or 3, you can leave these fields at their defaults of zero.

Group Offset/Preset: (p.34)

Entered with the numeric keys, these parameters can be programmed to any value between 0 and (Scale Factor -1). Modes 0, 3, and 4 use this value as a positive offset from the Machine Position. Modes 1 and 2 use it as a Preset Value. In these two Modes, the Group Position is set equal to this value when the proper input conditions are met for the Mode.

MONITORING MACHINE OPERATION

This chapter covers how to use the Main and Status Screens to monitor the EASYPack Genesis while the machine is operating and how to use the increment and decrement functions to fine-tune limit switch setpoints and advances. The chapter finishes with a listing of error messages you may encounter and how to clear them.

While the Machine is Running...

The EASYPack Genesis has a built-in ten minute timer that is reset to zero every time a key is pressed. If a key is not pressed for ten minutes, the EASYPack Genesis puts itself into *View Mode* and switches the display to the Main Screen.

If you are in *Edit Mode* and the transducer starts moving, the EASYPack Genesis switches itself to *View Mode*. The unit doesn't switch to the Main Screen. It stays in View Mode as long the transducer is rotating and will switch back to Edit Mode if the built-in timer has not timed out. If the timer has timed out, the unit switches the display to the Main Screen and will stay in View Mode.

The Main and Status Screens

The Main Screen, accessed with [MAIN], shows the currently running program, the Machine Position, and the Machine Speed. Two versions of the screen are shown in figure 11.1. In both screens, the top line displays the presently running program, the present Machine Position, and the present Machine Speed.

The top screen is the one you'll see if you are not using the advanced PLS Group functionality. The second line only shows the Group 1 position value. Only Group 1 is shown because all of the limit outputs are assigned to Group 1 and the Group's position equals the Machine Position because the Group Offset feature is not being used.

If you are using PLS Groups, then your display may be similar to the bottom screen. This screen shows the position values of all four Groups. You will only see a Group on this screen if a limit switch is assigned to it. Also note that the figure shows four different position values. This occurs if you use the Group Offset/Preset feature.

The other screen that shows what's happening while the machine is running is the Status Screen. This screen, accessed with the [STATUS] key, shows the present state of the eight outputs and the five inputs. The display shows either 0 or 1 for each output or input.

For outputs, the value is zero if it's off and 1 when it's on. In figure 11.2, outputs 6, 5, and 1 are on while the rest are off.

For inputs, the value equals 1 when the input is powered. Inputs 1 through 4 correspond to Group Inputs 1 - 4 and Input 5 corresponds to the LS Enable Input. In the figure, the LS Enable Input and Group Inputs 1 and 2 are receiving power while Group Inputs 3 and 4 are off.

```
PRG 1 POS 90 RPM 0
G1 POS 90
```

```
PRG 1 POS 90 RPM 0
G1 POS 0 G2 POS 90
G3 POS180 G4 POS270
```

Figure 11.1 PLS Groups

```
STATUS 87654321
OUTPUT 00110101
INPUT 10011
VIEW 1 P: 90 RPM 0
```

Figure 11.2 Status Screen

Incrementing / Decrementing Setpoints

While the machine is running, the EASYPack Genesis does not allow you to change the unit's programming. However, it does allow you to fine tune your setpoints and advances by incrementing or decrementing them. This feature uses the [INC] and [DEC] keys and is available to all password levels.

In order to use this feature, the unit must be in *Edit Mode* before you start running the machine. Also, this feature is only available as long as the ten minute timer has not expired. See *While the Machine is Running...* above.

Incrementing / Decrementing Setpoints (continued)

To use this feature:

- 1) Put the unit in Edit Mode and start running the machine.
- 2) Switch to the *LS Setpoint Screen* with the [LIM.SW.] key.
- 3) Move the cursor to the setpoint pair you wish to fine tune. See *The LS Setpoint Screen* starting on page 61 if you need information on navigating through the display.
- 4) Figure 11.3 shows an example of a LS Setpoint Screen with the first setpoint pair of limit switch 1 set to 10 - 100. The cursor can be placed on the On Setpoint, the Off Setpoint, or the dash between them. When on a setpoint, the [INC] and [DEC] keys will change only that setpoint. If the cursor is on the dash between the setpoints, the [INC] and [DEC] keys will change *both* setpoints. This has the effect of shifting where the setpoint window occurs without changing its size.

CH	GROUP	ON1	OFF1
1	N	1	10-100
MODE: 0		GROUP	POS: 90
EDIT	1	P: 90	RPM 0

Figure 11.3 Inc/Dec Setpoints



Use care when incrementing and decrementing setpoints.

- 1) Make sure you're changing the correct setpoint pair.
- 2) If you have multiple setpoint pairs on a limit, be aware that the increment/decrement feature only changes one setpoint pair at a time, so it is possible to increment one setpoint pair into another.

Incrementing / Decrementing Advances

You can fine tune your ON/OFF Advances with the [INC] and [DEC] keys while the machine is running. Like incrementing and decrementing setpoints, this feature is available to all password levels.

In order to use this feature, the unit must be in *Edit Mode* before you start running the machine. Also, this feature is only available as long as the ten minute timer has not expired. See *While the Machine is Running...* on page 67 for an explanation of the timer.

To use this feature:

- 1) Put the unit in Edit Mode and start running the machine.
- 2) Switch to the *LS Advances Screen* with the [ADVANCE] key.
- 3) Move the cursor to the advance you wish to fine tune. See *The LS Advance Screen* starting on page 63 if you need information on navigating through the display.
- 4) Use the [INC] and [DEC] keys to fine tune the advance.
- 5) Run the machine at a different speed to verify that the limit is still firing correctly. If it's not, then you have one of two problems.
 - 1: The delay that you are trying to compensate for is non-linear.
 - 2: The ON/OFF setpoint pair(s) are not set correctly. Run the machine at very low speed, when the advances do not make a large difference in where the setpoints fire. If the limit is not firing correctly here, adjust it with the ON/OFF setpoints, not the advances.

If you need further help in determining the correct setpoints and advances for your machine, consult our FAQ, "*How do I determine the correct setpoints and advances for my machine?*" found on our website, www.amci.com.



Error Messages

Other than programming error messages, which are covered on page 57, you'll only see two error messages. The first is a transducer fault message, and the other is a nvRAM (non-volatile RAM) error.

Transducer Fault

The Transducer Fault message occurs whenever there is a problem with the transducer connection. When this occurs, the bottom line of the display shows "TRANSDUCER FAULT" instead of the normal status information. Figure 11.4 shows this message on the Main Screen, and all other screens are similarly changed.

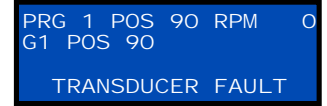


Figure 11.4 Transducer Fault Message

If the message is not blinking, it means there is an actual fault with the connection. Check all wiring for opens and shorts and make sure the cable is wired correctly. It is sometime easy to cross connect two of the three black wires in the cable. All AMCI cables are tested at the factory and are properly wired when shipped, but sometimes the Transducer Input connector is taken off the cable before it's pulled through conduit and mis-wired when the connector is re-attached. If you need a wiring diagram, refer to *CITG-(x) Wiring Diagram* found on page 49.

If the message is blinking, it means the fault can now be cleared. If you see the fault appear and start flashing while the machine is running, this is most commonly caused by a burst of electrical noise that's injected into the transducer cable or a connection in the cable that has become loose. (The EASYPack Genesis latches a fault even if it only occurs for a few milliseconds.)

A transducer fault is cleared with the **[CLEAR]** key, but you have to be in Edit Mode before you can clear it. If the message is blinking but you cannot clear it, press the **[EDIT]** key to make sure you are in the proper mode. Operators at all password levels can clear a transducer fault.

nvRAM Error

Figure 11.5 shows an nvRAM Error message. All of the unit's parameters are stored in a battery backed RAM which will hold the values for approximately ten years. This is our vendor's specification, and it is actually based on such things as environmental temperature, amount of time the unit is powered, etc.



Figure 11.5 nvRAM Error

This error is cleared with the **[CLEAR]** key. A working transducer must be attached before the error can be cleared.

This error occurs for one of three reasons.

- 1) The battery is dead. If this message occurs on every power up, then a dead battery is the most likely cause. Contact AMCI for assistance.
- 2) There was an inadvertent power outage while the unit was storing information. It only takes a few microseconds to update the information in the nvRAM, but the error can occur in this way.
- 3) A very large burst of electrical noise occurred near the unit, or was coupled into it through the transducer or I/O wiring.

The most common cause of this fault is actually number three, because of problems with grounding and surge suppression. This fault screen is one that you should hardly ever see, so if you see it on a regular basis, consider it a symptom of a problem with the machine that must be addressed.



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