

# Analog Output

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Analog Output 1 Offset	M0:S.41	210	R/W	0-4095
Analog Output 1 High RPM	M0:S.42	212	R/W	0-3000
Analog Output 1 Value	M0:S.43	214	R/O	0-4095
Analog Output 2 Offset	M0:S.44	216	R/W	0-4095
Analog Output 2 High RPM	M0:S.45	218	R/W	0-3000
Analog Output 2 Value	M0:S.46	220	R/O	0-4095

## Screen

MAIN SCREEN **SEL** ▼ to FUNCTION MENU **SEL** ▼ to ANALOG OUTPUT **SEL**



To enter an Analog Output number, move the cursor to “Module” and use the numeric keys and ENT.

To program High RPM, move the cursor to “HI” and use the numeric keys and ENT.

To program Analog Output Offset, move the cursor to “OF” and use the numeric keys and ENT.

## Description

Analog output signals are linearly proportional to resolver RPM. Two types of analog output modules are available: 0-10 VDC and 4-20 mA.

This function assigns Offset and High RPM values to analog outputs.

- Characteristics can be programmed for Analog Outputs #1 and #2 even if no analog modules are physically installed in the PS-4108 rack.
- Before programming Offset and High RPM for Module #2, be sure the Analog Quantity function is set to 2. Otherwise, programming for Analog Output #2 will not be available.

### High RPM

Analog High RPM is the resolver speed at which full scale analog output will occur. It is programmed in whole RPM. When this speed is reached, the analog output signal level will be at full scale (10 VDC or 20 mA). Increasing speed beyond the High RPM will **not** increase the analog output beyond full scale.

### Offset

Analog Offset is the analog signal level that will be output when the resolver is at zero RPM. This allows the minimum analog signal to be greater than 0V or 4 mA. Because the analog output has 4096 increments (12 bits) of signal level available, the offset is specified as the number of increments of signal that should be output at zero RPM. Calculate Analog Output Offset values as follows:

For 0-10 VDC: (Minimum Signal/10) x 4096

Example: For a 2 VDC minimum signal; Offset = (2/10) x 4096 = 819

For 4-20 mA: ((Minimum Signal - 4)/16) x 4096

Example: For a 5 mA minimum signal; Offset = ((5-4)/16) x 4096 = 256

## Analog Quantity

### Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Analog Quantity (Real-World Outputs)	M0:S.40	208	R/W R/O	0-2 Model C01 0 Models C02,C03,C04

### Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to SECONDARY SETUP **SEL** ▼ to ANALOG QTY **SEL**



This screen does not appear in C02, C03, and C04 models.

Use the numeric keys to enter the number of analog channels. An analog output module is required to generate an analog output signal.

### Description

This screen displays the number of analog outputs that will be programmed into the controller.

The controller can have zero, one or two analog outputs, and each can be offset and scaled by different values. Also see ANALOG OUTPUT.

## Channel Copy

### Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Channel Copy Source Program	M0:S.800	1728	R/W*	0-47
Channel Copy Source Channel	M0:S.802	1732	R/W*	0-31
Channel Copy Destination Program	M0:S.801	1730	R/W*	0-47
Channel Copy Destination Channel	M0:S.803	1734	R/W*	0-31
Channel Copy Command/Status	M0:S.804	1736	R/W*	Bit 15 Error Bit 14 Source Pgm Error Bit 13 Dest Pgm Error Bit 12 Source Chn Error Bit 11 Dest Chn Error Bit 10 Reserved Bits Error Bit 9 Dest Chn Not Empty Error Bit 8-1 Reserved Bit 0 Execute/Busy

### Command/Status Register Bits

M0:S.804/0 Execute/Busy. Set this bit to execute the channel copy; it remains ON until the copy is complete or an error occurs.

M0:S.804/1-8 Reserved bits. Writing a one to any of these bits will cause a reserved bits error (see M0:S.804/10).

M0:S.804/9 The Destination Channel Not Empty Error Bit is set if the destination channel already contains one or more output pulses. This bit only applies to the C02 and C03 models.

## Channel Copy (cont'd)

### Command/Status Register Bits (continued)

M0:S.804/10	Reserved bits error. This bit is set if a one is written to any of the reserved bits.
M0:S.804/11	The Destination Channel error bit is set if the destination channel value is out of the range.
M0:S.804/12	The Source Channel error bit is set if the source channel value is out of the range.
M0:S.804/13	The Destination Program error bit is set if the destination program is out of the range.
M0:S.804/14	The Source Program error bit is set if the source program is out of the range.
M0:S.804/15	The Error bit is set if any of the above error bits is set. This provides a single bit to test for command success/failure. When this bit is set, test the other bits to determine the exact cause.

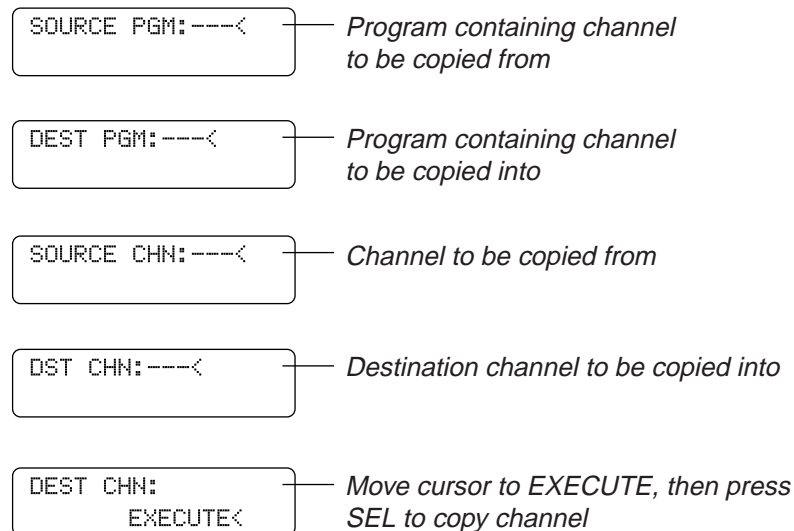
In the C01 and C04 models, all pulses in the destination program and channel will be deleted before any pulses are copied. In the C02 and C03 models, the copy is not permitted unless the destination channel is empty. When the error bit M0:S.804/15 is set, the Command Error bit and the Any Error bit are set in the Programming Error Register (I:S.7). To clear the error condition, toggle the Clear Error bit (O:S.0/8) ON. No additional commands will be accepted until the error bits are cleared.

### Screen

MAIN SCREEN SEL ▼ to FUNCTION MENU SEL ▼ to CHANNEL COPY

SEL

The Channel Copy function has five screens:



Use the numeric keys and SEL to enter program numbers. During programming, the cursor keys allow you to move between the screens to allow you to change values before selecting EXECUTE.

### Description

Channel Copy allows you to copy all the pulses in the source channel to the destination channel.

# Default Program

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## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Default Program	M0:S.120	368	R/W	0-47

## Screen

MAIN SCREEN **SEL** ▼ to FUNCTION MENU **SEL** ▼ to DEFAULT PROGRAM **SEL**

```
DEFAULT PGM: 0
ACTIVE PGM: 0
```

Use the numeric keys and ENT to enter or modify the Default Program.

## Description

The Default Program screen displays the current values of the Default Program and the Active Program, and allows the Default Program number to be modified.

The PL-1746 controller can store up to 48 programs in its memory. These programs are selected by either the Default Program register or the lowest six bits of O:S:1. The Active Program is the program that currently controls the output channels.

The following rules determine which program is the Active Program:

If the contents of O:S:1 are equal to zero, the Active Program is specified by the Default program register. If O:S:1 does not contain zero, then that is the Active Program number (up to max. value of 47).

# Direction of Rotation

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## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Direction of Rotation	M0:S.34	196	R/W* Not while running	0=CCW 1=CW

## Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** to INITIAL SETUP **SEL** to DIR OF ROTATION **SEL**

```
INCREASING
DIR: CCW
```

Press SEL to toggle the value. The new value will begin flashing. Press the ENT key to confirm your selection.

## Description

The Direction of Rotation screen displays the direction of resolver rotation (CW or CCW as viewed from the shaft end) that will cause the position display to increase in value. This is normally set so the position value increases as the machine turns in its forward direction.

# EEPROM Checksum

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
EEPROM Checksum Models C02,C03 only	M0:S.5	138	R/O	-32768 to 32767
EEPROM Checksum Command/Status Models C02,C03 only	M0:S.6	140	R/W	0=Done 1=Execute/Busy

## Screen

MAIN SCREEN **SEL** ▼ to TEST MENU **SEL** ▼ to SYSTEM INF MENU **SEL** ▼ to EEPROM CHECKSUM **SEL**

```
EEPROM CHECKSUM:
IFC2
```

## Description

This feature on the C02/C03 computes a checksum of the contents of all EEPROM (non-volatile memory). To cause the checksum to be computed, first write a 1 to the EEPROM Checksum Command/Status register (M0:S.6). Then wait until that register's contents change back to 0. Finally, read the new checksum from M0:S.5.

## Enable Codes

### Backplane Information

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Master Password	M0:S.106	340	R/W	0-9999
Setup Password	M0:S.105	338	R/W	0-9999
Operator Password	M0:S.104	336	R/W	0-9999
Per-Channel Operator Access Channels 0-31, 1 bit/channel	M0:S.280- M0:S.281	688- 690	R/W	0=Operator Accessible 1=Operator Inaccessible

## Screen

MAIN SCREEN **SEL** ▼ to PGM ENABLE MENU **SEL** to ENABLE CODES **SEL**

```
LEVEL: OPERATOR
PASSWORD: 1234
```

Use the SEL key to toggle between enable levels. Use the numeric keys, followed by ENT to assign codes.

## Description

This function is used to establish the numbers that will be used as passwords to enable the Operator, Setup, and Master levels.

The PL-1746 has three levels of programming access: Operator, Setup, and Master in order of increasing capabilities. The table on the next page lists the functions that can be programmed under the various levels of access. Programming levels can be activated, or "enabled," by entering a password on the keypad, or by activating Terminals E1 or E2 on the back of the keypad.

- Each programming level can have only one code. That code is stored in the controller and applies to all keypads connected to that controller.
- If a code is entered into a keypad that has a programming enable terminal energized, the access level will be the highest of the two.
- If both keypads in a two-keypad system are enabled, each keypad will operate at the programming level enabled on it. For example, if Operator Level is enabled on Keypad 1, and Setup Level is enabled on Keypad 2, Keypad 1 will operate at the Operator Level and Keypad 2 will operate at the Setup Level.

Also see PER CHN ENABLE, ENABLE OPTIONS, and PASSWORD.

# Enable Codes (cont'd)

## Programming Access Levels for Functions

Menu Item Access	PROGRAMMING LEVEL			
	Normal Display	Operator	Setup	Master
<b>Password</b>	Enter	Enter	Enter	Program
<b>Pulses</b>	View	Program <sup>1</sup>	Program	Program
<b>Function Menu</b>				
Speed Comp	View	Program <sup>1</sup>	Program	Program
Timed Outputs	View	Program <sup>1</sup>	Program	Program
Analog Output	View	Program <sup>1</sup>	Program	Program
Pulse Copy	View	---	Program	Program
Program Copy	View	---	Program	Program
Default Program	View	Program <sup>1</sup>	Program	Program
Channel Copy	View	---	Program	Program
Shift Position	View	Program <sup>1</sup>	Program	Program
<b>Config Menu</b>				
<b>Initial Setup</b>				
Dir of Rotation	---	---	---	Program
Scale Factor	---	---	---	Program
Machine Offset	View	Program <sup>1</sup>	Program	Program
Speed Comp Mode	---	---	---	Program
Motion Detection	View	Program <sup>1</sup>	Program	Program
Motion ANDing	---	---	---	Program
Outp Enable ANDing	---	---	---	Program
Output Groups	---	---	---	Program
Group Position Display	---	---	---	Program
Group Offset	View	Program <sup>1</sup>	Program	Program
Output Assign	---	---	---	Program
<b>Secondary Setup</b>				
Keyboard Qty	---	---	---	Program <sup>2</sup>
Analog Qty	---	---	---	Program
Rack Qty	---	---	---	Program
Resolver Mode	---	---	---	Program
Rate Setup	---	---	---	Program
Toggle RPM	---	---	---	Program
RPM Update Rate	---	---	---	Program
Shift Count	---	---	---	Program
Shift Window	---	---	---	Program
<b>Test Menu</b>				
<b>I/O Status Menu</b>				
Input Status	View	View	View	View
Output Status	View	View	Force	Force
Shift Register	View	View	View	View
<b>System Info Menu</b>				
Pulse Use	View	View	View	View
Software Version	View	View	View	View
Model & Options	View	View	View	View
EEPROM Checksum	View	View	View	View
Heap Status	View	View	View	View
<b>Memory Tests</b>	---	---	---	Run
<b>System Tests</b>				
<b>Program Enable Menu</b>				
<b>Enable Codes</b>	---	---	---	Program
<b>Per Chn Enable</b>	---	---	---	Program
<b>Enable Options</b>				
Pulses ---	---	---	Program	
Speed Comp	---	---	---	Program
Timed Outputs	---	---	---	Program
Analog Output	---	---	---	Program
Motion Detect	---	---	---	Program
Default Program	---	---	---	Program
Group Offset	---	---	---	Program
Machine Offset	---	---	---	Program
<b>Mapping Registers</b>				
<b>Input Maps</b>	---	---	---	Program
<b>Output Maps</b>	---	---	---	Program
<b>Interrupt Menu</b>				
<b>Interrupt Level</b>	---	---	---	Program
<b>Interrupt Enable</b>	---	---	---	Program

<sup>1</sup> Can be programmed only if specified through Per Channel Enable and Enable Options.

<sup>2</sup> Keyboard Quantity can be programmed only through the keypad whose address is "0".

# Enable Options

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Operator Enable Options	M0:S.107	342	R/W	Bit 15-8 Reserved Bit 7 Machine Offset Bit 6 Group Offset Bit 5 Default Program Bit 4 Motion Detect/ANDing Bit 3 Analog Outputs Bit 2 Timed Outputs Bit 1 Speed Comp Bit 0 Pulses

## Screen

MAIN SCREEN  ▼ to PGM ENABLE MENU  ▼ to ENABLE OPTIONS 

```

SETPOINTS<
ENABLE: ON
    
```

Press the Up Cursor and Down Cursor keys to select the function you wish to change. Press the SEL key to turn Operator access ON or OFF.

## Description

This screen lists the various items in the SETUP MENU, and allows you to turn Operator access to those items on or off.

### IMPORTANT

**Access to the “on” items will be available only for those output channels that have been turned ON in PER CHN ENABLE.**

Access can be turned on or off for the following SETUP MENU items:

PULSES	MOTION DETECT
DEFAULT PROGRAM	ANALOG OUTPUTS
SPEED COMP	TIMED OUTPUTS
GROUP OFFSET	MACHINE OFFSET

Also see PER CHN ENABLE.

# Group Offset

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Group Quantity	M0:S.64	256	R/W*	1-6
Group Position Display	M0:S.65	258	R/W	0=EACH 1=ONE
Logic Inputs Status	M0:S.25	178	R/O	0-255
Group 0 Channel Count	M0:S.66	260	R/W*	0-32
Group 0 Mode	M0:S.82	292	R/W*	0-5
Group 0 Offset	M0:S.74	276	R/W	0 to (Scale Factor-1)
Group 0 Position	M0:S.16	160	R/W*	0 to (Scale Factor-1)
Group 1 Channel Count	M0:S.67	262	R/W*	0-32
Group 1 Mode	M0:S.83	294	R/W*	0-5
Group 1 Offset	M0:S.75	278	R/W	0 to (Scale Factor-1)
Group 1 Position	M0:S.17	162	R/W*	0 to (Scale Factor-1)
Group 2 Channel Count	M0:S.68	264	R/W*	0-32
Group 2 Mode	M0:S.84	296	R/W*	0-5
Group 2 Offset	M0:S.76	280	R/W	0 to (Scale Factor-1)
Group 2 Position	M0:S.18	164	R/W*	0 to (Scale Factor-1)
Group 3 Channel Count	M0:S.69	266	R/W*	0-32
Group 3 Mode	M0:S.85	298	R/W*	0-5
Group 3 Offset	M0:S.77	282	R/W	0 to (Scale Factor-1)
Group 3 Position	M0:S.19	166	R/W*	0 to (Scale Factor-1)
Group 4 Channel Count	M0:S.70	268	R/W*	0-32
Group 4 Mode	M0:S.86	300	R/W*	0-5
Group 4 Offset	M0:S.78	284	R/W	0 to (Scale Factor-1)
Group 4 Position	M0:S.20	168	R/W*	0 to (Scale Factor-1)
Group 5 Channel Count	M0:S.71	270	R/O	0-32
Group 5 Mode	M0:S.87	302	R/W*	0-5
Group 5 Offset	M0:S.79	286	R/W	0 to (Scale Factor-1)
Group 5 Position	M0:S.21	170	R/W*	0 to (Scale Factor-1)

\*Not while running

## Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to INITIAL SETUP **SEL** ▼ to GROUP OFFSET **SEL**

### GROUP OFFSET Screen—Group Mode 0, 3, 4 or 5

```
GRP:1< POS:  0
      ABS: 132
```

### GROUP OFFSET Screen—Group Mode 1 or 2

```
GRP:1< POS: 359
      PRE:  30
```

To change the offset or position for an output group, move the cursor to GRP and then use INC or DEC, or the numeric keypad, followed by ENT to select the group.

Enter the offset by moving the cursor to ABS (or PRE) and entering the value on the numeric keypad, followed by ENT.

Enter the position by moving the cursor to POS and entering the value on the numeric keypad, followed by ENT.

## Group Offset (cont'd)

---

### Description

In many machines with rotary motion, it is often necessary to provide some means to adjust the phase or angular position of one shaft with respect to another. This adjustability is usually obtained through the use of timing chains or belts, or possibly clutches, differentials, or couplings. All of these devices allow the position of a driven shaft to be offset from the position of the driving shaft. The PL-1746 has the ability to add offsets to the resolver position. This feature of the PL-1746 allows the user to change the timing of machine functions without incurring the time consuming task of mechanically altering the machine.

The group functions in the PL-1746 work off of machine position (see Positions & Offsets in Chapter 1 for more information). The PL-1746 always has at least one group and may have up to six groups. Each group can be individually offset from the machine position to allow individual functions to be properly timed with respect to the rest of the machine.

When a group is operating in modes 0, 3, 4, or 5, machine offset is entered by the user and remains fixed. The value is also stored in non-volatile memory and so is in effect during subsequent power cycles.

When a group is operating in modes 1 or 2, the user supplies a preset position or offset. When the group enable becomes active, the PL-1746 calculates an offset from the current machine position, such that the group position becomes the preset position. This allows the timing of outputs in groups operating in these modes to be synchronized to machine operations that do not occur at the same time during each machine revolution.

### Group Position

Jog the machine to a position that corresponds to the desired group position and enter the group position.

- For standard PL-1746 controllers using Electro Cam resolvers, the ABS value will directly show the relationship between the group position and machine position in scale factor increments. For example, suppose that machine position is at 0 and SCALE FACTOR is set to 360. If the ABS of a group is 20, its position will be 20 degrees.
- If groups have been programmed with their own offsets, changing machine offset will change all of the group positions at once. **It is usually best to set machine offset to the desired zero position in the machine cycle before programming individual group offsets.**
- If groups have been programmed with their own offsets, changing GRP POS DISP to "ONE" will immediately change ABS for all groups to value programmed for Group 0.

### Programming Preset

Preset is programmed in scale factor units.

- The **preset** value is stored in the controller on power down. However, the last **group position** is not. On power up, the group position will be the same as machine position. When the group's input terminal is energized, then the group position will reset to the preset value.

Also see MACHINE OFFSET, GRP POS DISP, OUTPUT GROUPS, and Section 6 for details on Output Grouping & Modes.

# Group Position Display

## Backplane

PL-1746 Function Name	SLC 500 File Address	Mapping Index Number	Read/Write Capability	Valid Range for Data
Group Position Display	M0:S.65	258	R/W	0=EACH 1=ONE

## Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to INITIAL SETUP **SEL** ▼ to GRP POS DISP **SEL**

```
GROUP POSITION
DISPLAY: EACH<
```

Group Position Display Mode: EACH = Each output group has its own offset value; ONE = One value of offset is shared by all output groups.

Enter the GRP POS DISP function and press SEL to toggle between “ONE” and “EACH.”

- GRP POS DISP must be set to “EACH” to assign different offsets to groups through OFFSET programming.
- If groups have been assigned different offsets through GROUP OFFSET programming, setting GRP POS DISP to “ONE” will immediately change the individual group offsets to the value of Group 0.

The value selected in this screen determines the appearance of the main screen as shown below:

### Main Screen—

- One Output Group
- Multiple Output Groups, and GRP POS DISP set to “One”

```
PGM: 1 RPM: 1500
MENU< POS: 180
```

Machine Speed

Machine Position = Resolver Position + Machine Offset

### Main Screen—

- Multiple Output Groups and GRP POS DISP Set to “Each”

```
PGM: 1 RPM: 1500
MENU< GRP1: 180
```

Mode 1 or 2: Position = Preset + change since last reset

Mode 0, 3, 4, 5: Position = Machine Position + Group Offset

Group#: To change, place cursor here and press SEL



**IMPORTANT**

## Description

The Group Position Display determines whether each output group can have its own position in the machine cycle, or if all groups share one position. Because the position of a group operating in Mode 1 or 2 changes each time the group’s input terminal is energized, GRP POS DISP must be set to EACH if any groups are assigned to Mode 1 or Mode 2.

Also see GROUP OFFSET, MACHINE OFFSET, OUTPUT GROUPS, and MAIN SCREEN.

# Input Maps

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Input Word 0 Map #	M0:S.208	544	R/W	0-32767
Input Word 1 Map #	M0:S.209	546	R/W	0-32767
Input Word 2 Map #	M0:S.210	548	R/W	0-32767
Input Word 3 Map #	M0:S.211	550	R/W	0-32767
Input Word 4 Map #	M0:S.212	552	R/W	0-32767
Input Word 5 Map #	M0:S.213	554	R/W	0-32767
Input Word 6 Map #	M0:S.214	556	R/W	0-32767
Input Word 7 Map #	M0:S.215	558	R/W	0-32767

### Screen

MAIN SCREEN **SEL** ▼ to MAPPING MENU **SEL** to INPUT MAP REGS **SEL**

```

REG#  INPUT MAP#
 0          0
    
```

Use INC/DEC keys to select the desired mapping register. Use select, then the numeric keypad, to enter the mapping index number followed by the ENT key. See the section on Remote I/O and Register Mapping for more information. These registers allow the user to select M0 or M01 file registers for reading through the eight Input file registers.

### Description

This screen displays the input mapping registers. When a mapping index number is placed in one of these registers, the corresponding M0 or M1 register will be mapped into the indicated input file register.

# Input Status

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Output Word 0 Logic Inputs	O:S.0	None	W/O	Bit 16-10 Reserved Bit 9 Clear Shift Register (Models C02,C03 only) Bit 8 Clear Error Bit 7 Output Enable Bit 6 First Cycle Enable Bit 5 Group 5 Input Bit 4 Group 4 Input Bit 3 Group 3 Input Bit 2 Group 2 Input Bit 1 Group 1 Input Bit 0 Group 0 Input
Logic Inputs Status	M0:S.25	178	R/O	0-255

### Screen

MAIN SCREEN **SEL** ▼ to TEST MENU **SEL** ▼ to I/O STATUS **SEL** ▼ to INPUT STATUS **SEL**

```

INPUTS 76543210
0-7    00000000
    
```

(continued)

## Input Status (cont'd)

---

### Description

The input status screen displays the Logic Inputs status of the group inputs (0-5), first cycle enable (6), and output enable (7).

The SLC-500 writes a "1" to activate an input in the Logic Inputs word (O:S.0).

The Logic Inputs Status Register (M0:S.25) contains the current state of the hardware inputs from the rack OR'ed with the corresponding bits O:S.0, but when O:S.0 is mapped, the Logic Inputs Status Register only contains the bits from the PS-4108 rack or the inputs on the front of the C02/C03.

## Interrupt Enable

---

### Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Interrupt Enables Channels 0-31, 1bit/channel	M0:S.132- M0:S.133	392- 394	R/W	0=Disabled 1=Enabled

### Screen

MAIN SCREEN **SEL** ▼ to INTERRUPT MENU **SEL** ▼ to INTERRUPT ENABLE REGS  
**SEL**

```
ENABLES 76543210
0-7      00000000
```

Use the SEL key to select a set of eight channels, then the left or right arrow keys to select the enable bit for an individual channel. Use the SEL key to toggle that channel's bit.

### Description

Setting a bit to one will enable that channel to cause an interrupt to the SLC-500 ladder program when one active transition occurs. See "INTERRUPT LEVEL" for more information about transitions.

## Interrupt Level

---

### Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Interrupt Levels Channels 0-31, 1bit/channel	M0:S.128- M0:S.129	384- 386	R/W	0= Rising Edge 1= Falling Edge

### Screen

MAIN SCREEN **SEL** ▼ to INTERRUPT MENU **SEL** ▼ to INTERRUPT LEVEL REGS  
**SEL**

```
LEVELS 76543210
0-7      00000000
```

Use the SEL key to select a set of eight channels, then the left or right arrow keys to select the level bit for an individual channel. Use the SEL key to toggle that channel's bit.

### Description

This screen shows which transition of each output channel is selected to generate an interrupt to the SLC-500 ladder program. Setting a bit to zero will select the zero to one transition of the specified output channel. Setting a bit to one will select the one to zero transition of the specified output channel.

# Keyboard Quantity

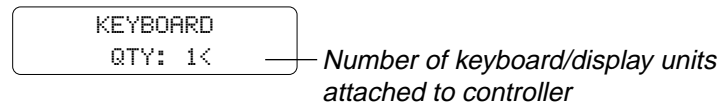
---

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Keyboard Quantity	M0:S.48	224	R/W	0-2

## Screen

MAIN SCREEN SEL ▼ to CONFIG MENU SEL ▼ to SECONDARY SETUP SEL ▼ to  
KEYBOARD QTY SEL



Use numeric entry followed by ENT to change keyboard quantity.

## Description

The Keyboard Quantity screen shows the number of keypads communicating with the controller. The controller will attempt to establish communication with as many keypads as are programmed through this screen. Keypads are assumed to be addressed sequentially, starting at address "0".

### Keypad "0"

The keypad with address "0" is used to change the number of keypads shown in KEYBOARD QTY. *If KEYBOARD QTY is set to "2," but only one keypad is physically connected, Menu Tree operation will be very slow. Change KEYBOARD QTY to "1" to restore normal Menu Tree speed.*

Special conditions that apply when KEYBOARD QTY is set to zero: To improve system performance, the KEYBOARD QTY may be set to zero to stop the keypad communications task in the PL-1746. This provides a slight improvement in scan time, and reduces timing jitter in output pulses. However, the user may wish to regain keyboard communications at some time. This can be accomplished in two slightly different ways:

One way is to program the KEYBOARD QTY variable in the M0 file, M0:S.48. The KEYBOARD QTY variable will be changed immediately, but access to the keyboards will not occur until after the unit is power cycled.

The other way is to install a correctly configured keypad, then cycle power. The PL-1746 will identify the presence of the keypad, and enable communications with it. At this time, the KEYBOARD QTY may be changed to reflect the actual number of keypads.

# Machine Offset

---

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Machine Offset	M0:S.33	194	R/W*	0 to (Scale Factor-1)
Machine Position	M0:S.24	176	R/W*	0 to (Scale Factor-1)
Resolver Position	M0:S.23	174	R/O *Not while running	0 to (Scale Factor-1)

## Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to INITIAL SETUP **SEL** ▼ to MACHINE OFFSET **SEL**

```
MCHN POS:
MCHN OFST:
```

Use the INC/DEC keys, or the numeric keys followed by ENT to change MACHINE POSITION and/or MACHINE OFFSET.

## Description

Because the PL-1746 is a programmable device, it can be set to display a position of “zero” at any point in the machine cycle. Usually, the machine is jogged to the beginning of a cycle, and MACHINE POSITION is set to zero at this point. This function eliminates the need to adjust the physical coupling between the machine and resolver in order to change the displayed machine position. The MACHINE OFFSET can also be set directly by entering it's value.

Set MACHINE POSITION or MACHINE OFFSET before doing any PULSE or GROUP OFFSET programming.

Note: When direction of motion reverses, one circular unit out of 4096 will be skipped. This prevents position transducer jitter.

See Positions & Offsets in Chapter 1.

# Main Screen

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Active Program	O:S.1	None	W/O	0-47
Resolver Speed	M0:S.22	1742	R/O	0 to 3000
Machine Offset	M0:S.33	194	R/W* *Not while running	0 to (Scale Factor-1)

## Screen

On power-up, or after five minutes of keypad inactivity, the controller will display one of two main screens:

- Main Screen—**
- **One Output Group**
  - **Multiple Output Groups, and GRP POS DISP set to “One”**

```
PGM: 1 RPM: 1500 — Machine Speed
MENU< POS: 180 — Machine Position = Resolver Position + Machine Offset
```

- Main Screen—**
- **Multiple Output Groups and GRP POS DISP set to “Each”**

```
PGM: 1 RPM: 1500 — Mode 1 or 2: Position = Preset + change since last reset
MENU< GRP1: 180 — Mode 0, 3, 4, 5: Position = Machine Position + Group Offset
                    Group#: To change, place cursor here and press SEL
```

## Description

### Active Program

The PL-1746 can store up to 48 programs of setpoints. The “Active Program” is the program currently controlling the output channels.

If active program at O:S.1 is set to zero, default program is displayed. If active program is not zero, active program is displayed

### Machine Speed

When the machine is moving, Machine Speed is displayed in user selectable units of RPM (revolutions per minute), BPM (bags per minute), or CPM (cartons per minute). See RATE SETUP for details.

### Group Position

Group Position is displayed only when the resolver speed is below the TOGGLE RPM speed. At higher speeds, Group Position will be blank. See TOGGLE RPM for details.

```
PGM: 1 RPM: 1500 — Machine position not shown above toggle RPM
MENU<
```

### Menu

To enter the Menu Tree from the Main Screen, move the cursor to “MENU” and press the SEL key.

Also see DEFAULT PROGRAM, RATE SETUP, TOGGLE RPM, GRP POS DISP GROUP OFFSET, and the Positions & Offsets section in Chapter 1.

# Memory Tests

---

## Screen

MAIN SCREEN **SEL** ▼ to TEST MENU **SEL** ▼ to MEMORY TESTS **SEL**

MEMORY TESTS  
FCH: ----< — Enter function here

To perform one of the memory test functions, enter the function number using the numeric keys and press SEL.

## Description

This menu selection provides several functions listed below.

### Function 7000

**Clears all pulses and configuration settings** from the controller's EEPROM. After clearing the pulses, the controller will reload the factory default settings.

When the function is complete, the address of the last memory location cleared is displayed. Press ESC to continue.

The PLS will then reset and the PS-6400 keypad will show "EEPROM reset to factory defaults".

### Function 7001

**Clears all configuration settings** from the controller's EEPROM. These include all programming other than pulses. When finished, the controller will reload the factory default settings.

When the function is complete, the address of the last memory location cleared is displayed. Press ESC to continue.

The PLS will then reset and the PS-6400 keypad will show "EEPROM reset to factory defaults".

### Function 7002

**Clears all pulses** from the controller's EEPROM.

When the function is complete, the address of the last memory location cleared is displayed. Press ESC to continue.

### Function 7998

**Watchdog Timer Test.** The "Watchdog Timer" monitors the operation of the controller's microprocessor and shuts the controller down if any internal malfunction is detected. If the Watchdog Timer fails, the controller may continue to operate. However, any subsequent malfunctions or noise-induced irregularities may go undetected, and the controller may begin to operate erratically.

To test the Watchdog Timer, run Function 7998. If the controller's Watchdog Timer is working properly, the controller will reset and the display will show "STATUS WATCHDOG TIMER TIMEOUT". If Function 7998 does not reset the controller, the Watchdog Timer has failed. Replace the controller immediately and return the faulty unit to the factory.

## WARNING

**Failure of controller to pass the watchdog timer test can cause erratic operation, resulting in injury and damage to equipment.**

# Model & Options

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Model	M0:S.0	128	R/O	1746
Options	M0:S.2	132	R/O	0 = Standard, 1 = Shift Register

MAIN SCREEN **SEL** ▼ to TEST MENU **SEL** ▼ to SYSTEM INFO MENU **SEL** ▼ to MODEL & OPTIONS **SEL**

```

PL-1746-C02/3-R1
OPTIONS: STD
    
```

## Description

This screen displays the model type and the options included (designated by letters).

# Motion ANDing

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Motion ANDing Channels 0-31, 1 word/channel	M0:S.512- M0:S.543	1152- 1214	R/W* Not while running	0=OFF 1=ML1 2=ML2

## Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to INITIAL SETUP **SEL** ▼ to MOTION ANDING **SEL**

```

CHN: 12
MOTION AND: L1
    
```

— Channel number  
 — Motion ANDing level: L1, L2, or OFF.  
 (Toggle with SEL key)

This screen displays the channel number and the motion ANDing limit band for Motion ANDing: L1, L2, or OFF. The channel will not be Motion ANDed if the enable is OFF. Select a new channel by pressing the INC/DEC keys, or through direct numeric entry followed by ENT. Press the SEL key to toggle the ANDing to L1, L2, or OFF.

## Description

This function is used to tie the operation of output channels to the motion detection levels programmed through MOTION ANDING LIMIT BANDS. Each output channel may be ANDed with either motion ANDing limit band. If an output is Motion ANDed, it will turn ON only when the resolver RPM is in the range band specified for that motion ANDing limit band, AND the setpoints programmed for that channel are ON.

### Operation

- Any number of output channels can be ANDed to a single Motion Detection level.
- Motion ANDing and Output Enable ANDing can be combined for any given output channel.
- When Motion ANDing is activated for a channel, it will apply to that channel in all programs.

### Motion Detector

An output channel can be used as a motion detector by programming it to be on at “1” and off at “1,” and then ANDing it with the desired Motion Level. This will turn the output on constantly as long as the machine speed is within the specified Motion Level range. Outputs that must always operate, regardless of machine speed, should **not** be ANDed with a motion ANDing limit band. Also see MOTION DETECTION.

# Motion Detection

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Motion Level 1 Low Limit (ML1L)	M0:S.96	320	R/W	0 to (ML1H-1)
Motion Level 1 High Limit (ML1H)	M0:S.97	322	R/W	(ML1L+1) to 3000
Motion Level 2 Low Limit (ML2L)	M0:S.98	324	R/W	0 to (ML2H-1)
Motion Level 2 High Limit (ML2H)	M0:S.99	326	R/W	(ML2L+1) to 3000

## Screen

MAIN SCREEN  ▼ to CONFIG MENU  ▼ to INITIAL SETUP  ▼ to MOTION DETECT

```

MOTION LEVEL: 1
LO: 30 HI: 1500
  
```

— Motion detection level  
— High RPM setpoint  
— Low RPM setpoint

Use the numeric keys and ENT to change values.

## Description

Motion Detection establishes one or two “Motion Detection Levels,” or speed ranges, with low and high RPM values. These two ranges are independent of each other.

Each output channel can be ANDed with either Motion Level. ANDed outputs will be enabled only when the resolver speed is within the specified speed range. Output channels that are not ANDed will be “on” whenever the machine position is within their programmed setpoints, regardless of machine speed. One use of Motion Detection Levels and Motion ANDing is to turn off devices such as glue guns if the machine stops or jams.

The MOTION DETECTION function is used to establish one or two Motion Detection Levels. Once the Motion Detection Levels are programmed, use MOTION ANDING to tie individual output channels to the Motion Detection Levels.

### Motion Detector

An output channel can be used as a motion detector by programming it to be on at “1” and off at “1,” and then ANDing it with the desired Motion Detection Level. This will turn the output on constantly as long as the machine speed is within the specified Motion Detection Level range.

Also see MOTION ANDING.

# Output Assignment

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
<b>C02,C03 only</b> Output Assignments Outputs 0-5, 1word/output	M0:S.600- M0:S.605	1328- 1338	R/W* Not while running	0-31

## Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** to INITIAL SETUP **SEL** ▼ OUTPUT ASSIGN **SEL**

OUTPUT: 0  
 CHANNEL: 0

To select the output to assign or the channel to use for that output, use the numeric keys and ENT, or use the INC and DEC keys.

## Description

The Output Assignment screen allows selection of any channel to drive each of the front panel output terminals.

# Output Enable ANDing

## Backplane

<i>PL-1746 Function Name</i>	<i>SLC 500 File Address</i>	<i>Mapping Index Number</i>	<i>Read/Write Capability</i>	<i>Valid Range for Data</i>
Output Enable ANDing Channels 0-31, 1bit/channel	M0:S.272- M0:S.273	672- 674	R/W	0=On 1=Off

## Screen

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to INITIAL SETUP **SEL** ▼ to OUTPUT ENABLE ANDING **SEL**

CHN: 12<  
 OUTPUT AND: OFF

— Channel number  
 — Output Enable ANDing: ON or OFF.  
 (Toggle with SEL key)

Select a new channel by pressing INC/DEC, or using the numeric keys followed by ENT. Use the SEL key to toggle ANDing on and off.

## Description

Output Enable ANDing allows you to AND any output channels with the Output Enable Signal. A channel ANDed with this signal will be enabled to turn on at its programmed setpoints only while the Output Enable Signal is energized. The signal is the logical OR of bit 7 in the register at address O.S.0 and PS-4108 rack input 7 (or dc input 7 on the front panel of C02/C03 models). Note that if output word 0 is mapped to another register, its value is ignored (set to zero) and the source for this signal is rack (dc input) input 7 alone.

Also see INPUT STATUS.