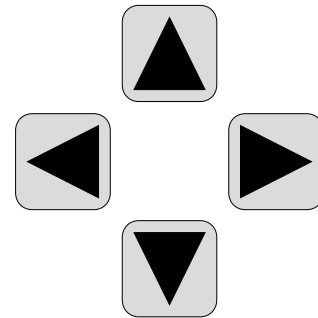
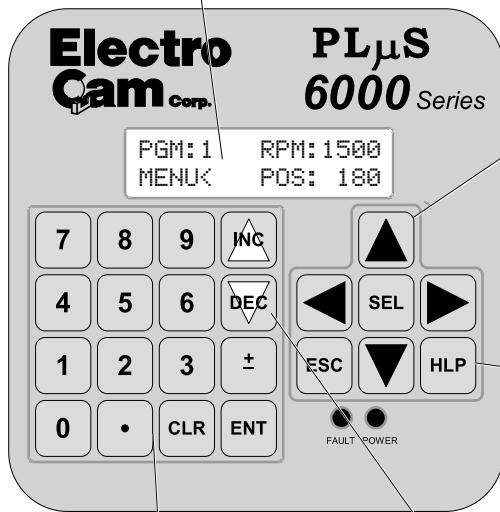


# Keypad Overview

Figure 19—Keypad Keys and Corresponding Functions

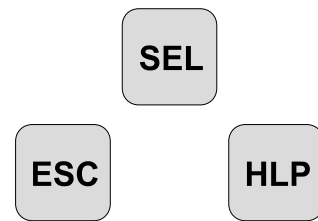
### Main Screen

- Shows Active Program, RPM, Position, and Group # if applicable.
- See **MAIN SCREEN** in this Section for details.
- Press **SEL** key when cursor is on “MENU” to enter Menu Tree (Fig. 20) and initiate programming.



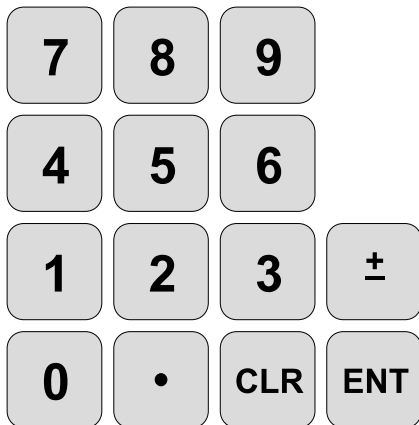
### Cursor Keys

- Scroll through Menu Tree (Fig. 20).
- Move around **within a screen**.
- Scroll through setpoints.



### ESC, SEL, HLP Keys

- **ESC** exits from current menu level to previous menu, or aborts numeric entry.
- **SEL** enters a new menu level; toggles a value; and selects an output group if multiple groups with different offsets are used.
- **HLP** shows help regarding menu selection and what keys to press. **Use this key if unsure what to do.**



### INC, DEC Keys

- Increment or decrement a value **within a field**.
- Hold for rapid scrolling of value.

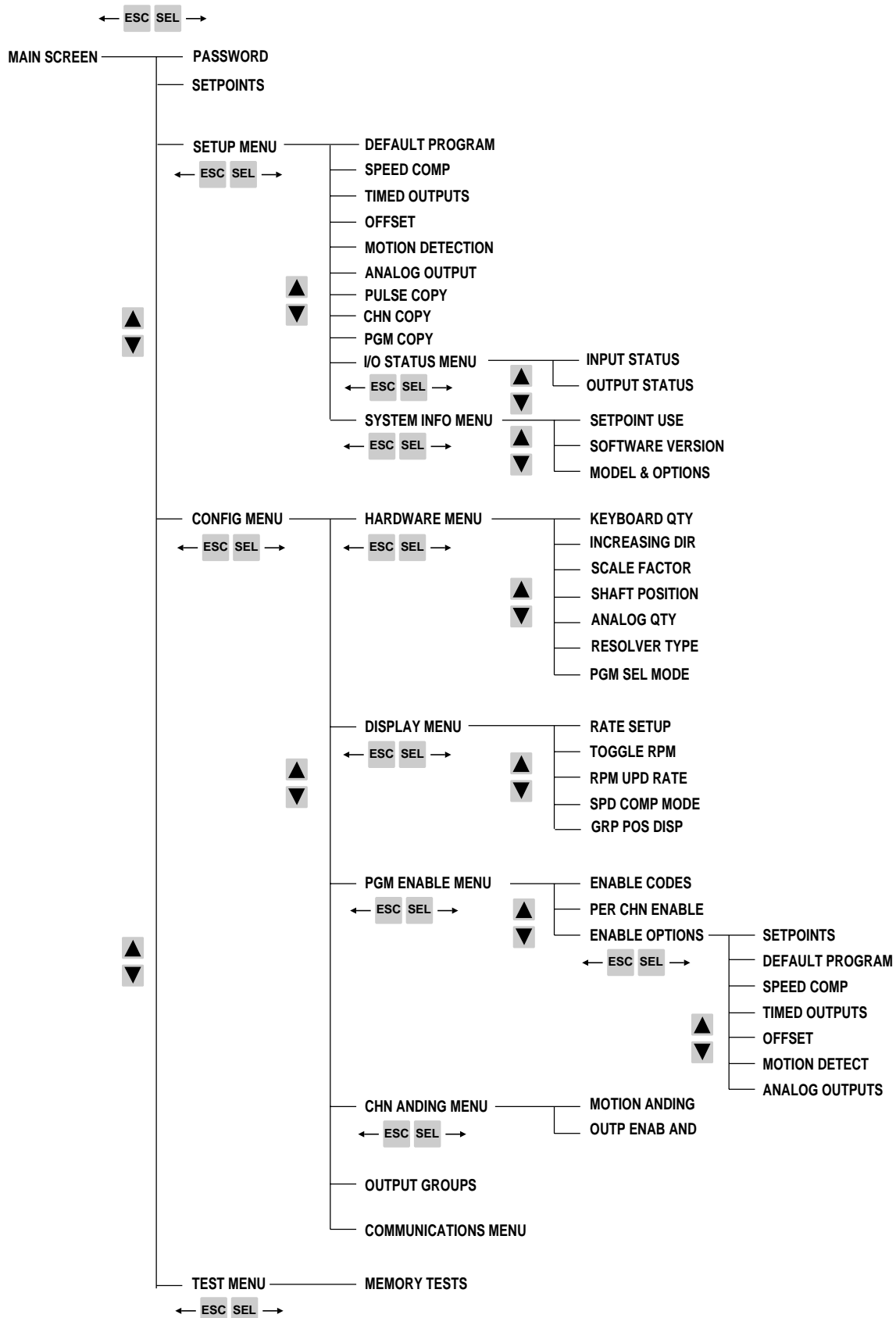
### Numeric Keys

- Input numeric values within a field.
- **ENT must be pressed to enter the value**; entry will flash until ENT is pressed.
- **CLR** will backspace within an entry prior to pressing ENT.
- **±** will convert a positive number to a negative number, or vice versa.

# Menu Tree

Figure 20—PS-6144 Menu Tree

- Functions are listed alphabetically in Section 3 of this manual starting on page 3-4.



# Initial Programming

---

## Bench Test

To test the PS-6144 prior to installing it, do the following:

1. Plug output modules into the controller beginning with Position 1 on the PS-6144-24M17, or Position 17 on the 6144-25. See Figure 9.
2. Connect a resolver. See Figure 16.
3. Connect the keypad/display to the controller. See Figure 12.
4. Set the **keypad** DIP switch to address "0" and termination "on," as shown in Figure 13. Set switches 6 and 7 on the **controller** DIP switch to "on," also shown in Figure 13.
5. Use two jumper wires to enable Master Level programming as shown in Figure 12. Connect one jumper from "+" of the keypad terminal block to "C." Connect the other jumper from "-" to "E1." These jumpers will permit access to the entire menu tree shown in Figure 20.
6. Connect DC input power.

When experimenting with the controller, note that the LED on an output module will light when that output channel is turned on. By hand-turning the resolver shaft and watching the module LED's, you can observe the effects of programming setpoint values. Remember that on a PS-6144-24-X16-M09, outputs 1-16 are transistor outputs. To activate the LED on a module installed in Position 17, enter the setpoint values into Output Channel 17.

## Machine Setup

Before installing the PS-6144 on a machine, be sure the DIP switches are properly set as shown in Figures 13 & 14. After installing the unit, program the following set-up information into the controller before attempting any other programming:

<u>Information</u>	<u>Menu Selection</u>	<u>Page</u>
Direction of Rotation	INCREASING DIR	3-11
Scale Factor	SCALE FACTOR	3-25
Shaft Position	SHAFT POSITION	3-28
No. of Keypads	KEYBOARD QTY	3-12
No. of Analog Outputs	ANALOG QTY	3-5
No. of Output Groups	OUTPUT GROUPS	3-18
Modes for Output Groups	OUTPUT GROUPS	3-18
Group Display Mode	GRP POS DISP	3-10
Group Offsets	OFFSET	3-16

Once this information is entered, setpoints can be established and modified in the groups and output channels desired. Refer to Section 5 for information on using groups and modes.

# Analog Output

## Menu Path

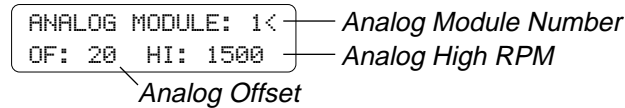
MAIN SCREEN **SEL** ▼ to SETUP MENU **SEL** ▼ to ANALOG OUTPUT **SEL**

## Purpose

Analog output signals are linearly proportional to the 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 output positions for analog modules.

## Screen



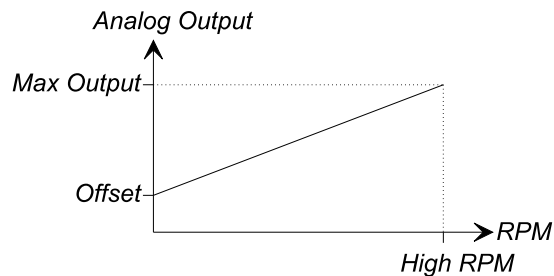
## Module Number

The following table shows the relationship between the analog module number on the screen and the module position on the controller back. See Figure 9 for an illustration of analog module positions.

<u>Model</u>	<u>Module #1 On Screen</u>	<u>Module #2 On Screen</u>
PS-6144-17	Output #17	Output #16
PS-6144-25	Output #25	Output #24

- Analog characteristics can be programmed for Modules #1 and #2 even if no analog modules are physically mounted on the controller. Programming can be done first, and modules mounted later.
- To program Offset and High RPM for Module #2, be sure the ANALOG QTY function (next page) is set to “2.” If ANALOG QTY is set to “1,” programming for Module #2 will not be available.
- When two analog outputs are used, the two outputs can have different values for Offset and High RPM.

**To program Module Number**, move the cursor to “Module” and use the numeric keys and ENT.



## 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.

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

## Analog Output (Cont'd)

---

### 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 zero volts or 4 mA. Because the analog output module 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 Offset values as follows:

**For 0-10 VDC:**  $(\text{Minimum Signal}/10) \times 4096$

**Example:** For a 2 VDC minimum signal;  $\text{Offset} = (2/10) \times 4096 = 819$

**For 4-20 mA:**  $((\text{Minimum Signal} - 4)/16) \times 4096$

**Example:** For a 5 mA minimum signal;  $\text{Offset} = ((5-4)/16) \times 4096 = 256$

**To program Analog Offset,** move the cursor to "Of" and use the numeric keys and ENT.

### See Also

OUTPUT STATUS

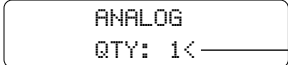
## Analog Quantity

---

### Menu Path

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** HARDWARE MENU  
**SEL** ▼ to ANALOG QTY **SEL**

### Screen

 ANALOG  
QTY: 1< — *Number of Analog Outputs*

### Purpose

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. See ANALOG OUTPUT for details.

### Programming

Use the numeric keys to enter "0," "1," or "2" analog channels. An analog output module is required to generate an analog output signal.

### See Also

ANALOG OUTPUT  
OUTPUT STATUS

## Channel Copy

---

### Menu Path

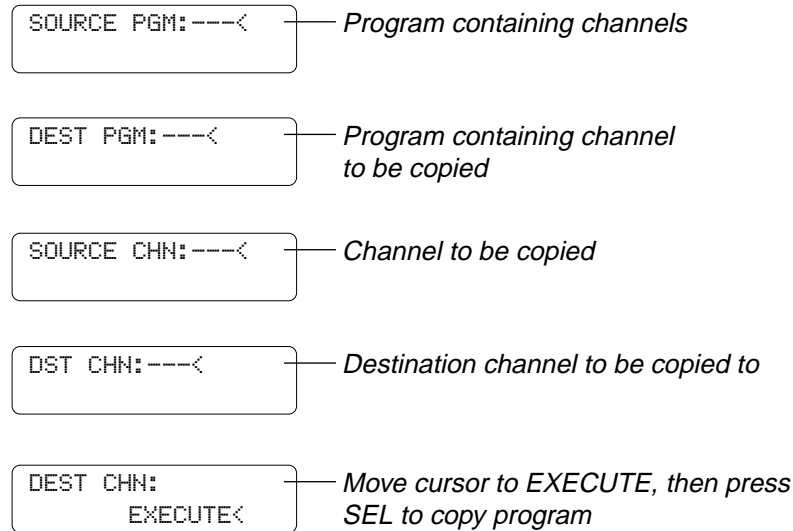
MAIN SCREEN **SEL** ▼ to SETUP MENU **SEL** ▼ to CHN COPY **SEL**

### Purpose

Channel Copy allows you to copy all setpoints to another channel in the specified program.

### Screens

The Channel Copy function consists of four screens:



### Programming

Use the numeric keys and SEL to enter program numbers.

During programming, the cursor keys allow you to move between the Source and Destination screens to allow you to change values before selecting EXECUTE.

## Communications

---

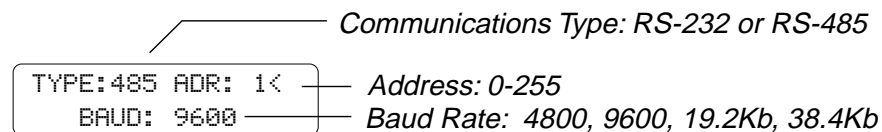
### Menu Path

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL**  
▼ to COMMUNICATIONS **SEL**

### Purpose

This function sets the communications type, **controller** address, and baud rate for communicating with a host computer.

### Screen



### Type

Use SEL to toggle between RS-232 and RS-485 communications on units shipped with date code 9549 or newer (default setting is RS 485).

### Address

The address must be unique for each controller installed on a network. This address is used by a host computer to identify and send information to a particular controller. A PLuS controller will ignore incoming information if the address field of the communication packet does not match the address of the controller.

The address set through COMMUNICATIONS programming takes effect only when the DIP switch shown in Figure 13 is set to an address value of zero. Whereas the DIP switch can set a maximum address of "7," the COMMUNICATIONS function can set addresses ranging from 0-255.

Use the numeric keys and ENT to program the address.

## Communications (Cont'd)

---

### Baud Rate

Use SEL to toggle between the available baud rates. The baud rate must match that of the host computer. Available baud rates are:

4,800; 9,600; 19,200; and 38,400.

**Note: Effective with Software Versions 1.97 and higher, the communications screen has been revised as shown below:**

```
TYPE: 232  ADR: 1<
TRM: ON   BR: 9600
```

*Termination Setting*

The termination setting should be ON if TYPE is set to RS-232, or if TYPE is set to RS-485 and only one PS-6144 controller is in the multi-drop network. **Setting the termination to OFF in these configurations may cause inaccurate RPM readings.**

If multiple PS-6144 controllers are connected in an RS-485 network, termination should be set to OFF on one and only one PS-6144 controller.

The termination setting in this screen is independent of all DIP switch settings. Use the SOFTWARE VERSION function to determine version number.

## Default Program

---

### Menu Path

MAIN SCREEN  ▼ to SETUP MENU  DEFAULT PROGRAM

### Background

The PS-6144 controller can store up to 48 programs in its memory. The **Default Program** is the program that controls the output channels when terminals 1–8 of TB 3, Figure 7, are “off.”

The **Active Program** is the program number that is currently controlling the output channels. If there are program select inputs on TB 3, those inputs will determine the Active Program, and the Default Program will be ignored. If no hardware inputs are “on,” the Default Program will become the Active Program.

For installations where the program select inputs on TB 3 are not used, the Default Program will always be the Active Program.

This function displays the current Default Program and allows you to select a different one.

### Screen

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

*Enter new Default Program through Numeric Keypad, then press ENT.*

### Programming

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

### WARNING

**Injury and property damage hazard may occur due to changes in machinery operation. Program the Default Program with settings that will eliminate this hazard in the event of sudden activation.**

### See Also

PGM SEL MODE

# Enable Codes

---

## Menu Path

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

## Background

The PS-6144 has three levels of programming access: Operator, Setup, and Master in order of increasing capabilities. Figure 21 lists the menu 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 as shown in Figure 12. The first two rows of Figure 21 show which methods can be used to enable the various levels of programming access.

## Screen

LEVEL: OPERATOR	— <i>Enable Level: Operator, Setup, or Master</i>
PASSWORD: 1234	— <i>Password Number</i>

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

Use the SEL key to toggle between enable levels.

Use the numeric keys, followed by ENT to assign codes.

## Operation

- 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 one keypad in a two-keypad system is enabled, the other keypad will continue to operate in the “Normal Display” mode.
- 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.

## See Also

PER CHN ENABLE  
ENABLE OPTIONS  
PASSWORD

## Enable Codes (cont'd)

**Figure 21—Programming Access Levels for Various Menu Items**

	Programming Level			
	Normal Display	Operator	Setup	Master
<b>Can Be Enabled By...</b>				
Keypad Terminal	---	Yes (E2)	No	Yes (E1)
Password	---	Yes	Yes	Yes
<b>Menu Item Access</b>				
<b>Password</b>	Enter	Enter	Enter	Program
<b>Setpoints</b>	View	Program <sup>1</sup>	Program	Program
<b>Setup Menu</b>				
Default Program	View	Program <sup>1</sup>	Program	Program
Timed Outputs	View	Program <sup>1</sup>	Program	Program
Speed Comp	View	Program <sup>1</sup>	Program	Program
Offset	View	Program <sup>1</sup>	Program	Program
Motion Detect	View	Program <sup>1</sup>	Program	Program
Analog Output	View	Program <sup>1</sup>	Program	Program
Pulse Copy	View	---	Program	Program
CHN Copy	View	---	Program	Program
PGM Copy	View	---	Program	Program
<b>I/O Status Menu</b>				
Input Status	View	View	View	View
Output Status	View	View	View	View
<b>System Info Menu</b>				
Setpoint Use	View	View	View	View
Software Version	View	View	View	View
Model & Options	View	View	View	View
<b>Config Menu</b>				
<b>Hardware Menu</b>				
Keyboard Qty	---	---	---	Program <sup>2</sup>
Increasing Dir	---	---	---	Program
Scale Factor	---	---	---	Program
Shaft Position	---	---	---	Program
Analog Qty	---	---	---	Program
Resolver Type	---	---	---	Program
Pgm Sel Mode	---	---	---	Program
<b>Display Menu</b>				
Rate Setup	---	---	---	Program
Toggle RPM	---	---	---	Program
RPM Update	---	---	---	Program
Spd Comp Mode	---	---	---	Program
Grp Pos Disp	---	---	---	Program
<b>Pgm Enable Menu</b>				
Enable Codes	---	---	---	Program
Per Chn Enable	---	---	---	Program
Enable Options				
Setpoints	---	---	---	Program
Default Program	---	---	---	Program
Speed Comp	---	---	---	Program
Timed Outputs	---	---	---	Program
Offsets	---	---	---	Program
Motion Detect	---	---	---	Program
Analog Output	---	---	---	Program
<b>Chn ANDing Menu</b>				
Motion ANDing	---	---	---	Program
Outp Enab AND	---	---	---	Program
<b>Output Groups</b>	---	---	---	Program
<b>Communications</b>	---	---	---	Program
<b>Test Menu</b>				
Memory Tests	---	---	---	Run

<sup>1</sup> Can be programmed only if specified through PER CHN ENABLE and ENABLE OPTIONS.

<sup>2</sup> KEYBOARD QTY can be programmed only through the keypad whose address is "0." See Figure 14.

## Enable Options

---


### Menu Path

MAIN SCREEN SEL ▼ to CONFIG MENU SEL  
▼ to PGM ENABLE MENU SEL ▼ to ENABLE OPTIONS SEL

### Purpose

The Enable Options screen controls Operator Level access to SETUP MENU programming as indicated in Figure 21, note 1.

### Screen

 *SETPOINTS or SETUP MENU screen.*  
*Scroll through choices with UP and Down cursor keys.*  
*OPERATOR ENABLE: ON/OFF*  
*(Toggle with SEL key)*

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.**

### Programming

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.

### Setup Menu Items

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

SETPOINTS, DEFAULT PROGRAM  
SPEED COMP  
OFFSET  
MOTION DETECT  
ANALOG OUTPUTS

### See Also

PER CHN ENABLE

## Group Position Display

---

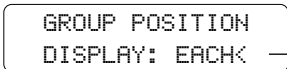
### Menu Path

MAIN SCREEN SEL ▼ to CONFIG MENU SEL DISPLAY MENU SEL  
▼ to GRP POS DISP SEL

### Purpose

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.**

### Screen

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

## Group Position Display (Cont'd)

---

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

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

*Active Program*

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

— *Machine Speed*  
— *Machine Position = Shaft Position + Offset*

*To enter Menu Tree, press SEL when cursor is here*

- 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 = Shaft Position + Group Offset*

— *Group #: To change, put cursor here and press SEL*  
— *To enter Menu Tree, put cursor here and press SEL*

### Programming

#### ! IMPORTANT

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 OFFSET programming, setting GRP POS DISP to “ONE” will immediately change the individual group offsets to the value of Group 1.

### See Also

OFFSET  
SHAFT POSITION  
OUTPUT GROUPS  
MAIN SCREEN

## Increasing Direction

---

### Menu Path

MAIN SCREEN SEL ▼ to CONFIG MENU SEL HARDWARE SEL  
▼ to INCREASING DIR SEL

### Purpose

The Increasing Direction 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.

### Screen

```
INCREASING
DIR: CCW
```

— *Direction of resolver shaft rotation (viewed from 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.

### Changing Direction

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

## Input Status

---

### Menu Path

MAIN SCREEN SEL ▼ to SETUP MENU SEL ▼ to I/O STATUS SEL ▼ to INPUT STATUS SEL

The input status screen displays the On/Off status of the DC inputs on Terminal Blocks TB 1 and TB 3, Figure 7.

### Screens

```
12345678 INPUT
01001001 1-8<
```

— *Input Numbers (1-8)*  
— *Input On/Off Status (0=Off, 1=On)*

```
90123456 INPUT
01001001 9-16<
```

— *Input Numbers (9-16)*

Inputs are numbered 1 through 16, but only 8 inputs are shown at one time. The On/Off status is shown under the input number; 0=Off, 1=On.

### Selecting Inputs

You may view inputs 1-8 or 9-16. Press SEL to toggle between the two groups of inputs.

## Keyboard Quantity

---

### Menu Path

MAIN SCREEN SEL ▼ to CONFIG MENU SEL HARDWARE MENU SEL KEYBOARD QTY SEL

### Purpose

The Keyboard Quantity screen shows the number of keypads the controller will communicate with.

### Screen

```
KEYBOARD
QTY: 1<
```

— *Number of keyboard/display units attached to 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" as shown in Fig. 14.

### Keypad "0"

You can change the number of keypads shown in KEYBOARD QTY only from the keypad whose address is "0."

### IMPORTANT

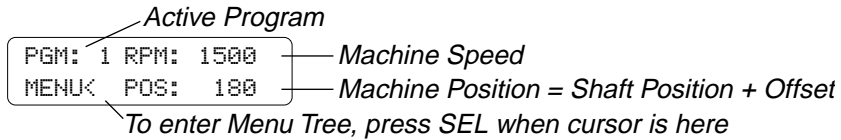
If **KEYBOARD QTY** is set to "2," but only one keypad is physically connected, Menu Tree operation will be very slow. Change **KEYBOARD QTY** to "1" to restore normal Menu Tree speed.

# Main Screen

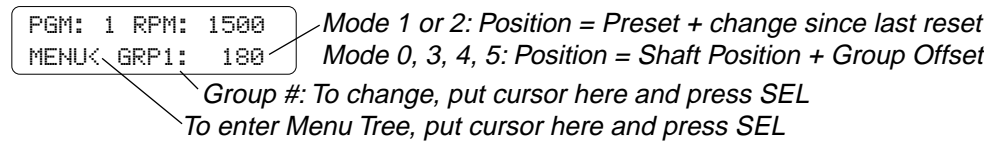
## Two Screens

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

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



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



## Active Program

The PS-6144 can store up to 48 programs of setpoints. The “Active Program” is the program currently controlling the output channels.

**If hardware inputs are being used to select the Active Program**, the display will indicate the program selected by the inputs. If all hardware inputs are off, the Active Program will be the Default Program specified through the DEFAULT PROGRAM function. For information on using hardware inputs to select the Active Program, see “Controller Input Wiring” in Section 2.

**If hardware inputs are not used**, the Active Program will be the program specified through the DEFAULT PROGRAM function.

## 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). Machine Speed is displayed as a value which is 1X, 2X, or 3X the resolver RPM. See RATE SETUP for details.

## Toggle RPM

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



## Entering Menu Tree




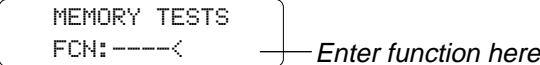
To enter the Menu Tree from the Main Screen, move the cursor to “MENU” and press the SEL key.

## See Also

DEFAULT PROGRAM  
RATE SETUP  
TOGGLE RPM  
GRP POS DISP  
OFFSET

## Memory Tests

---





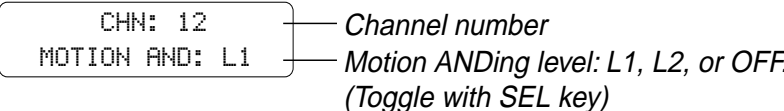
<b>Menu Path</b>	MAIN SCREEN  ▼ to TEST MENU  ▼ to MEMORY TESTS 
<b>Purpose</b>	This menu selection provides three functions that allow you to clear programmed values from the controller. An additional function tests the controller's watchdog timer.
<b>Screen</b>	
<b>Programming</b>	To perform one of the memory test functions, enter the function number using the numeric keys and press SEL.
<b>Function 7000</b>	<b>Clears all setpoints and configuration settings</b> from the controller's EEPROM. After clearing the setpoints, the controller will reload the factory default settings listed in the Appendix.
<b>Function 7001</b>	<b>Clears all configuration settings</b> from the controller's EEPROM. These include all of the programming performed through the Setup Menu and Config Menu on the menu tree, Figure 20. When finished, the controller will reload the factory default settings listed in the Appendix.
<b>Function 7002</b>	<b>Clears all setpoints</b> from the controller's EEPROM. These include any on/off setpoints programmed through SETPOINTS. All other settings will remain intact.
<b>Function 7998</b>	<b>Watchdog Timer Test.</b> 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. 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.**

## Motion ANDing

---

<b>Menu Path</b>	MAIN SCREEN  ▼ to CONFIG MENU  ▼ to CHN ANDING MENU  MOTION ANDING 
<b>Purpose</b>	This function is used to tie the operation of output channels to the Motion Detection levels programmed through MOTION DETECTION. Each output channel may be ANDed with either Motion Detection level. If an output is Motion ANDed, it will turn on only when the resolver RPM is in the range specified for that Motion Detection level, AND the setpoints programmed for that channel are "on."  Outputs that must always operate, regardless of machine speed, should <b>not</b> be ANDed with a Motion Detection level.
<b>Screen</b>	

This screen displays the channel number and the Motion Detection level for Motion ANDing: L1, L2, or OFF. The channel will not be Motion ANDed if the enable is OFF.

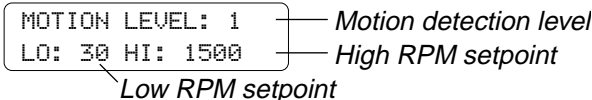
## Motion ANDing (Cont'd)

---

- Programming** 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.
- 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.
- See Also** MOTION DETECTION

## Motion Detection

---

- Menu Path** MAIN SCREEN **SEL** ▼ to SETUP MENU **SEL** ▼ to MOTION DETECT **SEL**
- Background**
- Motion Detection establishes one or two “Motion 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 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 levels. Once the Motion Levels are programmed, use MOTION ANDING to tie individual output channels to the Motion Levels.
- Screen**
- 
- The screenshot shows a rectangular box containing the text: MOTION LEVEL: 1, LO: 30 HI: 1500. Three lines with arrows point from the text to labels: the first line points to "Motion detection level", the second line points to "High RPM setpoint", and the third line points to "Low RPM setpoint".
- The Motion Detection screen displays the Motion Level, the Low RPM, and the High RPM.
- Programming** Use the numeric keys and ENT to change values for Motion Level, Low RPM, and High RPM.
- 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.
- See Also** MOTION ANDING

# Offset

## Menu Path

MAIN SCREEN **SEL** ▼ to SETUP MENU **SEL** ▼ to OFFSET **SEL**

## Background

Because the PS-6144 is a programmable device, it can be set to display a position of “zero” at any point in the machine cycle. Usually, a machine is jogged to the beginning of a cycle, and the SHAFT POSITION function is set to zero at this point.

In addition, each output group operating in **Mode 0, 3, 4, or 5** can be individually “offset” from this SHAFT POSITION through OFFSET programming. This allows the output channels in a group to be set to “zero” at a different machine position than the one that corresponds to “zero” in SHAFT POSITION.

**Note:** When programming a controller, there must be more than one group defined in the CONFIG MENU in order for a user to adjust OFFSET for a group in the SETUP MENU.

Setting a group to its own zero position can simplify setpoint programming for output channels by clarifying the relationship between the setpoints and the machine component controlled by the group. For example, suppose that an output group controls a glue head on a cartoning machine. By jogging the machine and viewing POS on the PS-6144 display, you realize that the glue head must turn on at 347° and off at 22° when using the position set through SHAFT POSITION. Since other output channels correlate well with SHAFT POSITION, you don’t want to change it. Instead, using the OFFSET function for this group, you could add 13° to the shaft position so that the glue head would turn on at a **group position** of 0° and off at 35°. Although the group position has been “offset” by 13°, the gun would still turn on at 347° and off at 22° in terms of **shaft position**.

For output groups operating in **Mode 1 or 2**, the group position is reset to a “preset” value whenever the group’s input terminal is energized. This preset is defined through OFFSET programming. Because the reset can occur at any resolver position, the relationship between the position of a group operating in Mode 1 or 2 and the SHAFT POSITION varies.

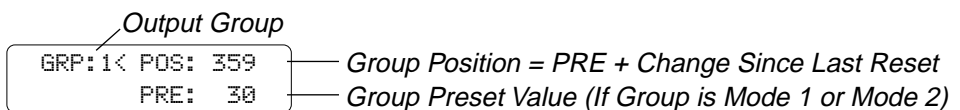
Units with the gray code output option “-G” generate an 8-bit position signal across Outputs 1 through 8. This gray code position signal always corresponds to the position as programmed through SHAFT POSITION, and is not affected by group positions programmed through the OFFSET function.

## Screens

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



### OFFSET Screen—Group Mode 1 or 2



(continued)

## Offset (cont'd)

---

### Offset Programming

To change the offset for an output group in Mode 0, 3, 4, or 5, first select the group by moving the cursor to GRP. Use INC or DEC, or the numeric keypad and ENT to select the group.

Offset can be programmed in two ways:

**Direct Entry**—Enter the offset directly by moving the cursor to ABS and entering the offset value on the numeric keypad, followed by ENT.

**Group Position**—Jog the machine to a position that corresponds to the desired group position, move the cursor to POS, and enter the group position using the numeric keypad, followed by ENT. For example, jog the machine to a point where the group position should be zero, then press “0” ENT while the cursor is at POS.

- For standard PS-6144 controllers using Electro Cam resolvers, the ABS value will directly show the relationship between the group position and machine 0 (shaft position) in scale factor increments. For example, suppose that SHAFT POSITION is set to machine 0 and SCALE FACTOR is set to 360. If the ABS of a group is 20, its position will always be 20 degrees ahead of the machine position.
- If groups have been programmed with their own offsets, changing SHAFT POSITION will change all of the group positions at once.

### CAUTION

**It is usually best to set SHAFT POSITION 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 change ABS for all groups to the value programmed for Group 1.

### Programming Preset

To change the preset for an output group in Mode 1 or 2, first select the group by moving the cursor to GRP. Use INC or DEC, or the numeric keypad and ENT to select the group. Move the cursor to PRE and enter the preset value, followed by ENT. 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 SHAFT POSITION. When the group's input terminal is energized, then the group position will reset to the preset value.

### See Also

SHAFT POSITION  
GRP POS DISP  
OUTPUT GROUPS

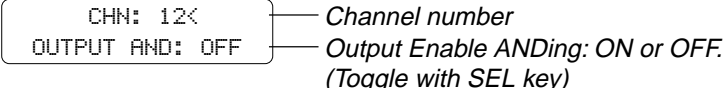
Section 5 for details on Output Grouping & Modes

## Output Enable ANDing

**Menu Path** MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to CHN ANDING MENU **SEL** ▼ to OUTPUT ENABLE ANDING **SEL**

**Purpose** Output Enable ANDing allows you to AND any output channels with Input Terminal #16, Figure 7. A channel ANDed with this terminal will be enabled to turn on at its programmed setpoints only while the terminal is energized.

**Screen**



CHN: 12< — Channel number  
OUTPUT AND: OFF — Output Enable ANDing: ON or OFF.  
(Toggle with SEL key)

**Programming** Select a new channel by pressing INC/DEC, or using the numeric keys followed by ENT.

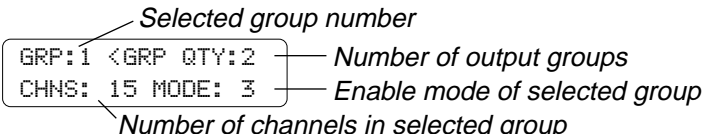
Use the SEL key to toggle ANDing on and off.

## Output Groups

**Menu Path** MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to OUTPUT GROUPS **SEL**

**Purpose** This function allows you to divide output channels into groups, and assign operating modes to the groups. Operating modes provide a powerful tool for relating output channel operation to sensor signals or other inputs. Incorporating modes into a control system can greatly improve line efficiency, reduce scrap, and improve control accuracy between machine sections at high speeds. See Section 5 for a complete explanation of the uses and applications of operating modes.

**Screen**



GRP: 1 <GRP QTY: 2 — Number of output groups  
CHNS: 15 MODE: 3 — Enable mode of selected group  
CHNS: 15 — Number of channels in selected group

### Establishing Groups

When dividing outputs into groups, keep these rules in mind:

- Output channels are assigned to groups sequentially. Group 1 will begin with Output 1 and include the specified number of outputs; Group 2 will begin with the next output and continue sequentially for its specified number of outputs; and so on. The last group will automatically include all of the remaining outputs.
- You can establish as many as six groups or as few as one.
- More than one group can be assigned to the same mode.

#### Grouping Example 1—All Outputs in One Group

<u>Output Group</u>	<u>Includes Outputs</u>	<u>Mode</u>
1	1 thru 25	3

#### Grouping Example 2—Two Groups

<u>Output Group</u>	<u>Includes Outputs</u>	<u>Mode</u>
1	1 thru 4	2
2	5 thru 25	0

(continued)

## Output Groups (Cont'd)

---

### Grouping Example 3—Three Groups

<u>Output Group</u>	<u>Includes Outputs</u>	<u>Mode</u>
1	1 & 2	0
2	3 & 4	4
3	5 thru 25	0

#### Programming

Begin by moving the cursor to GRP QTY and entering the number of groups desired, followed by ENT.

Next, move the cursor to GRP and enter "1" followed by ENT.

Move the cursor to CHNS and enter the number of output channels to be included in Group 1, followed by ENT.

Move the cursor to MODE and enter the operating mode for the group from zero to five, followed by ENT. See Section 5 for an explanation of the operating characteristics of each mode.

Move the cursor back to GRP and repeat these steps for each group to be programmed.

#### Main Screen

When output channels are divided into groups, the appearance of the Main Screen will change slightly. See MAIN SCREEN for details.

#### See Also

MAIN SCREEN  
OFFSET  
GRP POS DISP

## Output Status

---

#### Menu Path

MAIN SCREEN  ▼ to SETUP MENU  ▼ to I/O STATUS   
▼ to OUTPUT STATUS

#### Purpose

This screen shows the On/Off state of the output channels, and it allows the outputs to be forced.

#### Screens

*Both Models, Outputs 1-8*

```
12345678 OUTPUT
01001001 1-8<-----
```

Output Numbers (1-8)  
Output On/Off Status (0=Off, 1=On)

*PS-6344-17, Outputs 9-17*

```
901234567 OUTPUT
0100100AA 9-17<-----
```

Output Numbers (9-17)  
Analog Modules shown with "A"

*PS-6344-25, Outputs 9-25*

```
90123456 OUTPUT
01001000 9-16<-----
```

Output Numbers (9-16)

```
789012345 OUTPUT
0100100AA 17-25<-----
```

Output Numbers (17-25)  
Analog Modules shown with "A"

If any output positions have been programmed as analog outputs, the On/Off status will show "A" instead of "0" or "1."

## Output Status (Cont'd)

---

### Selecting Outputs





Press the SEL key to change the set of outputs displayed.



### Forcing Outputs

Forcing outputs allows you to force an output on or off for diagnostic purposes. This function is not available on earlier software models.

**Note:** When leaving the Output Status screen, keep in mind that any outputs that have been forced will return to their originally programmed state.

### Programming

Press  to access Output 1, causing the "0" to blink. Press  to turn this output on. The "0" will change to a "1". Select other desired outputs by pressing  or . If the output is already on, a "1" will be present instead of a "0". So, the "1" will change to a "0" when the output is forced.

Press  to return to output number selection. Outputs will remain forced until you leave the Output Status screen. Press  to access Outputs 9-17 on the PS-6144-17 and Outputs 9-16 or 17-25 on the PS-6144-25.

## Password

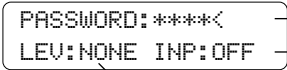
---

### Menu Path

MAIN SCREEN  PASSWORD 

This screen provides an area to enter a password. It also shows the current programming access level and the status of the Programming Enable terminals on the back of the keypad, Figure 12.

### Screen



*— Password entry area*  
*— Keypad programming terminal input status*  
*— Current programming level (hardware or software)*

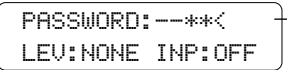
**Enable Levels** There are three programming access levels; OPERATOR, SETUP, and MASTER. See Figure 21 for a summary of the programming functions available to the different levels. The codes that correspond to each level are established in the ENABLE CODES screen.

### Entering a Password

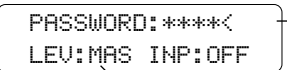
Enter a password through the numeric keypad followed by ENT. As you press the number keys, the asterisks will be replaced by dashes. If you make a mistake, press CLR to erase the last key you pushed.

If you enter a password that has been programmed through ENABLE CODES, the keypad will function at the corresponding programming level. See ENABLE CODES for a description of the various levels.

If either of the programming enable terminals on the back of the keypad is active when a password is entered, the programming level will be whichever is greater.



*— Dashes replace asterisks as numbers are entered*



*— Dashes change back to asterisks with ENT*  
*— Enable level shown if number matches programmed password value*

## Password (Cont'd)

---

### Clearing a Password

When programming operations are completed, enter a password value of "0," then ENT to clear the enable level.

If a keypad is left unattended with an active password, the access code will clear after five minutes of keypad inactivity and the keypad will revert to the "Normal Display" mode shown in Figure 21.

### See Also

ENABLE CODES

## Per Channel Enable

---

### Menu Path

MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to PGM ENABLES **SEL** ▼ to PER CHN ENABLE **SEL**

### Purpose

This screen is used to enable Operator Level access to individual output channels. PER CHN ENABLE is used in conjunction with the ENABLE OPTIONS screen to assign Operator Level access to selected programming functions.

### Screen

```
CHN: 12<
CHN ENABLE: ON
```

— Channel number  
— Per channel enable: ON/OFF  
(Toggle with SEL key)

### Channel Select

Press the INC/DEC keys, or use the numeric keys and ENT.

### Enable Toggle

Press the SEL key to toggle the enable ON or OFF.

### See Also

ENABLE OPTIONS

## Program Copy

---

### Menu Path

MAIN SCREEN **SEL** ▼ to SETUP MENU **SEL** ▼ to PGM COPY **SEL**

### Purpose

Program Copy allows you to copy all of the channels and setpoints from one program to another. It is often easier to copy an existing program and modify it, than to enter a new program from scratch.

### Screens

The Program Copy function consists of four screens:

```
SRC PROGRAM: ---<
```

— Program to be copied from

```
DST PROGRAM: ---<
```

— Destination to be copied to

```
DST PROGRAM: 6<
EXECUTE<
```

— Move cursor to EXECUTE, then press SEL to copy program

```
DST PROGRAM: 6
COMPLETE<
```

— COMPLETE indicates program successfully copied

### Programming

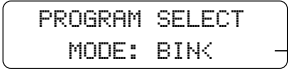
Use the numeric keys and SEL to enter program numbers. During programming, the cursor keys allow you to move between the Source and Destination screens to allow you to change values before selecting EXECUTE.

## Program Select Mode

---

**Menu Path** MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** HARDWARE **SEL** ▼ to PGM SEL MODE

**Purpose** This screen allows you to specify the format for the hardware Program Select inputs on Terminals 1 through 8 of Terminal Block 3, Figure 7.

**Screen**  — *Hardware Program Select Format: BIN = Binary, GRAY = Gray Code, BCD = Binary Coded Decimal*

The Program Select inputs can operate in Binary, BCD, or Gray Code formats as shown in Figure 8.

Use the SEL key to toggle the input format.

### ! WARNING

**Injury and property damage hazard may occur due to changes in machinery operation. If the input signals controlling program selection are lost due to a malfunction, the Default Program will activate. Program the Default Program with settings that will eliminate this hazard in the event of sudden activation.**

**See Also** DEFAULT PROGRAM

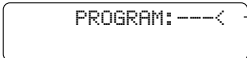
## Pulse Copy

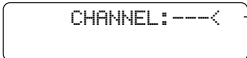
---

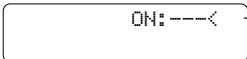
**Menu Path** MAIN SCREEN **SEL** ▼ to SETUP MENU **SEL** ▼ to PULSE COPY **SEL**

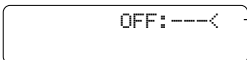
**Purpose** Pulse Copy allows you to program a series, or “train” of pulses into a channel without having to enter the On and Off setpoints for each pulse. The Pulse Copy function prompts you for the beginning and ending setpoints for the pulse train; the number of pulses in the train; and the duration of a pulse. Pulse Copy then divides the designated portion of the resolver cycle into the specified number of pulses, evenly dividing the unused portion of the segment between the pulses.

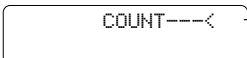
**Screens** The Pulse Copy function consists of eight screens:

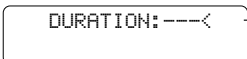
 — *Program to add pulses to; Enter number, then SEL to go to next screen*

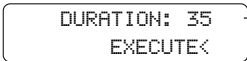
 — *Channel to add pulses to; Enter number, then SEL to go to next screen*

 — *"On" time of leading edge of first pulse; Enter number, then ENT & SEL to go to next screen*

 — *"Off" time of trailing edge of last pulse; Enter number, then ENT & SEL to go to next screen*

 — *Total number of pulses to be added; Enter number, then ENT & SEL to go to next screen*

 — *Duration of each pulse added; Enter number, then ENT & SEL to go to next screen*

 — *Move cursor to EXECUTE, then press SEL to generate pulses. To review values before executing, move cursor to top row and press SEL as needed*

 — *COMPLETE indicates pulses have been generated*

(continued)

## Pulse Copy (cont'd)

### Example

Generate a train of pulses as follows:

<u>Pulse</u>	<u>On</u>	<u>Off</u>
1	0	50
2	100	150
3	200	250
4	300	350
5	400	450
6	500	550
7	600	650
8	700	750
9	800	850
10	900	950

Each pulse is 50 increments wide, separated from the next pulse by 50 increments.

Program PULSE COPY as follows:

```
PROGRAM: ---<
```

— Program to add pulses to;  
Enter number, then SEL to go to next screen

```
CHANNEL: ---<
```

— Channel to add pulses to;  
Enter number, then SEL to go to next screen

```
ON: 0<
```

— "On" time of leading edge of first pulse;  
Enter 0, then ENT & SEL to go to next screen

```
OFF: 950<
```

— "Off" time of trailing edge of last pulse;  
Enter 950, then ENT & SEL to go to next screen

```
COUNT 10<
```

— Total number of pulses to be added;  
Enter 10, then ENT & SEL to go to next screen

```
DURATION: 50<
```

— Duration of each pulse added;  
Enter 50, then ENT & SEL to go to next screen

```
DURATION: 50  
EXECUTE<
```

— Move cursor to EXECUTE, then press SEL to generate pulses.

```
DURATION: 35  
COMPLETE<
```

— COMPLETE indicates pulses have been generated

Go to SETPOINTS to confirm the pulse train:

```
<-P-> CH: 1 <EDG  
ON: 0 OF: 50
```

— Move cursor to OF and use arrow keys to review pulse setpoints

# Rate Setup

## Menu Path

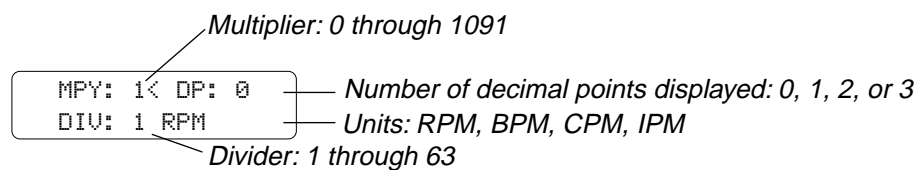
MAIN SCREEN **SEL** ▼ to CONFIG MENU **SEL** ▼ to DISPLAY **SEL**  
 RATE SETUP **SEL**

## Purpose

The Rate Setup function allows you to configure the RPM display on the Main Screen. Three parameters can be programmed:

- **Units**—The Main Screen can label the resolver speed as Revolutions Per Minute (RPM), Bags Per Minute (BPM), Cartons Per Minute (CPM), or Inches Per Minute (IPM).
- **Rate**—The ratio of actual resolver RPM to displayed RPM. This ratio is a fraction consisting of a multiplier (MPY) over a divider (DIV).
- **Decimal Points**—The controller divides the Rate by 1, 10, 100, or 1000 to display 0, 1, 2, or 3 decimal places, respectively.

## Screen



Following are a few examples of the relationships between multiplier (MPY), divider (DIV), decimal points (DP), actual resolver speed, and displayed resolver speed:

If MPY Is...	And DIV Is...	And DP Is...	Then MPY/DIV Is...	And a Resolver Speed Of...	Is Displayed As...
1	2	0	.5	100 RPM	50 RPM
1	2	1	.5	100 RPM	5.0 RPM
1	2	2	.5	100 RPM	.50 RPM
1	2	3	.5	100 RPM	.050 RPM
1	1	0	1.0	100 RPM	100 RPM
1	1	1	1.0	100 RPM	10.0 RPM
1	1	2	1.0	100 RPM	1.00 RPM
1	1	3	1.0	100 RPM	.100 RPM
2	1	0	2.0	100 RPM	200 RPM
2	1	1	2.0	100 RPM	20.0 RPM
2	1	2	2.0	100 RPM	2.00 RPM
2	1	3	2.0	100 RPM	.200 RPM

## Programming

**Units**—Move the cursor to the “Units” field and use SEL to toggle between values.

**MPY & DIV**—Move the cursor to MPY or DIV and use the numeric keys followed by ENT to enter a value.

**DP**—Move the cursor to DP and use SEL to toggle between values.

## Resolver Type

---

**Menu Path** MAIN SCREEN SEL ▼ to CONFIG MENU SEL ▼ to HARDWARE MENU SEL  
RESOLVER TYPE SEL

**Purpose** The PS-6144 can operate with resolvers that have a transformation ratio of .454 or 1. Standard Electro Cam resolvers have a ratio of .454. Some resolvers made by other manufacturers have a ratio of 1.


**Screen**  Pressing the SEL key changes resolver type to OTHER.

## RPM Update Rate

---

**Menu Path** MAIN SCREEN SEL ▼ to CONFIG MENU SEL ▼ to DISPLAY SEL  
RPM UPD RATE SEL

**Purpose** The RPM Update Rate is how often the RPM display on the Main Screen is updated. This rate can be programmed to be 1/Sec, 2/Sec, or 10/Sec.

**Screen**  RPM Update Rate: How often RPM display on main screen is updated; 1/Sec, 2/Sec, or 10/Sec.

Press the SEL key to toggle the selection.

## Scale Factor

---

**Menu Path** MAIN SCREEN SEL ▼ to CONFIG MENU SEL ▼ to HARDWARE MENU SEL SCALE FACTOR SEL

**Purpose** This function controls the number of increments into which one resolver revolution is divided. A scale factor of 360 (0 to 359) allows the controller to operate in degrees. A scale factor of 1024 (0 to 1023) allows positions to be programmed more accurately. In some applications the scale factor can be set so each increment equals a unit of linear travel.

**Screen**  Number of increments each revolution is broken into

**Limits** Scale factors range from two to 1024 on standard controllers. For controllers equipped with the “-H” option, scale factor can be as high as 4096.

**Recalculations** When the scale factor is changed, all programmed setpoints are recalculated to convert them to the new scale factor. The keypad/display will be inoperative until the calculations are done.

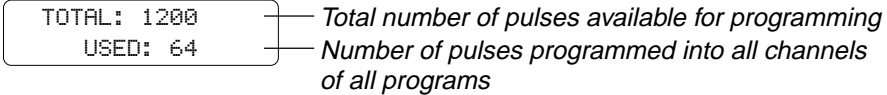
# Setpoint Use

---

**Menu Path** MAIN SCREEN SEL ▼ to SETUP MENU SEL ▼ to SYSTEM INFO SEL SETPOINT USE SEL

**Purpose** This function displays the total number of setpoint On/Off pairs, or “pulses” available for programming, and the number of pulses that have been programmed.

**Screen**



```
TOTAL: 1200
USED: 64
```

*Total number of pulses available for programming*  
*Number of pulses programmed into all channels of all programs*

The number of setpoints shown as "Used" is the sum of all pulses that are programmed into all channels of all programs. The "Total" value is the number of pulses that can be stored in non-volatile EEPROM memory. The difference between the two numbers is the number of pulses available for programming.

The number of pulses programmed into all channels of all programs cannot exceed the value displayed as Total.

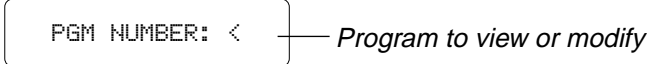
There are no values that can be changed in this screen.

# Setpoints

---

**Menu Path** MAIN SCREEN SEL ▼ to SETPOINTS SEL

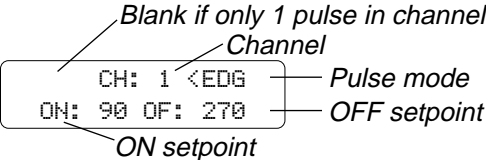
**Screens** When SETPOINTS is selected, a preliminary screen specifies the program whose setpoints will be programmed.



```
PGM NUMBER: <
```

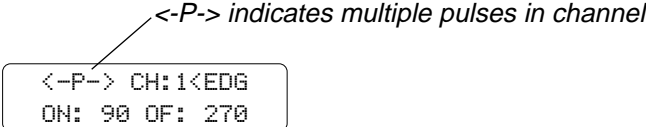
*Program to view or modify*

The active program is displayed, but any other program can be specified by using the numeric keys or INC and DEC to choose a program, then pressing SEL to move to setpoint programming.



```
CH: 1 <EDG
ON: 90 OF: 270
```

*Blank if only 1 pulse in channel*  
*Channel*  
*Pulse mode*  
*OFF setpoint*  
*ON setpoint*



```
<-P-> CH: 1 <EDG
ON: 90 OF: 270
```

*<-P-> indicates multiple pulses in channel*

**Channel to Edit** Use the numeric keypad and ENT to select the channel to program.

- **Channels 91 through 96 are special channels used for Output Grouping and Modes. See Section 5 for details.**

**Setpoint Values** Use the left and right arrow keys to move between the ON and OFF setpoints.

- If a channel has more than one pulse, you may view the other pulses by pressing the right cursor key when viewing the OFF setpoint, or by pressing the left cursor key when viewing the ON setpoint.

*(continued)*

## Setpoints (Cont'd)

- If a channel contains no pulses, the ON and OFF setpoints will be “0.”
- If a channel is always on, both the ON and OFF setpoints will be “1.”

```
CH:1 EDG
ON: 0< OF: 0
```

ON and OFF setpoints both 0 if no pulses in channel. Both 1 if channel always ON

### Adding a Pulse

You may add a new pulse to a channel by pressing the SEL key when the cursor points to either the ON or the OFF setpoint.

```
CH:1 EDG
ON: ---< OF: ---
```

Enter ON setpoint, then ENT or right cursor to OF. Enter OFF setpoint, then press ENT.

The display will change to show blank ON and OFF setpoints; the cursor will point to the ON setpoint. Enter the ON setpoint through the numeric keypad, and then press the ENT key or the right cursor to move to the OFF setpoint. Enter the OFF setpoint through the numeric keypad and then press the ENT key.

### Adding Multiple Pulses

If ON and OFF setpoints for a pulse are visible on the screen and you press SEL to program a new pulse, the original pulse will remain in the output channel. If the ON or OFF setpoints entered overlap an existing pulse in the channel, you will see an “Error: Pulse Overlap” message.

To abort entering a pulse at any time, press ESC.

### Changing Setpoints

Change a setpoint value with the numeric keys followed by ENT, or with the INC and DEC keys.

### Pulse Modes

The Pulse Mode controls how the INC and DEC keys modify setpoints. There are three modes; **EDG** (edge), **PUL** (pulse), and **CHN** (channel.) Change the Pulse Mode by pressing the SEL key when the cursor points to the Pulse Mode.

In **EDG** mode, the INC and DEC keys will affect the selected ON or OFF setpoint only.

In **PUL** mode, both ON and OFF setpoints will be incremented or decremented simultaneously.

In **CHN** mode, **all** ON and OFF setpoints for all pulses in the channel will be incremented or decremented simultaneously.

### Deleting a Pulse

A pulse may be deleted by making ON equal to OFF, or vice versa. If there is more than one pulse in the channel, the next pulse will appear in the on/off setpoint area. If the channel has no more pulses, the ON and OFF setpoint will both be zero.

### Clearing a Channel

To clear a channel of all pulses, enter a new pulse with ON and OFF setpoints of “0.”

### Channel Always ON

A channel may be programmed to be on for a full revolution (always on) by entering a new pulse with both ON and OFF values equal to “1.”

### Record Setpoints

Photocopy the form inside of the back cover and use it to write down setpoints for each program.

### IMPORTANT

For most installations, before programming setpoints, it is best to set SHAFT POSITION to zero at the start of a machine cycle. This allows you to jog the machine to various points in the machine cycle where output channels must turn on or off, note these machine positions from the PS-6144 display, and enter them into setpoint programming. Setpoints programmed in this manner will relate directly to the machine position. If setpoints are programmed before SHAFT POSITION is set, and SHAFT POSITION is subsequently changed, the setpoints will no longer correlate with the machine zero position.

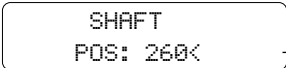
The same logic applies if OFFSET will be used for individual output groups. Program the offsets before establishing setpoints for the channels in the groups.

## Shaft Position

---

**Menu Path** MAIN SCREEN SEL ▼ to CONFIG MENU SEL ▼ to HARDWARE MENU SEL ▼ to SHAFT POSITION SEL

**Purpose** Because the PS-6144 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 SHAFT 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.

**Screen**  — Resolver Position Without Offset

**Programming** Use the INC/DEC keys, or the numeric keys followed by ENT to change shaft position.

- Set SHAFT POSITION before doing any SETPOINT or OFFSET programming.

## Software Version

---

**Menu Path** MAIN SCREEN SEL ▼ to SETUP MENU SEL ▼ to SYSTEM INFO SEL ▼ to SOFTWARE VERSION SEL

**Purpose** The Software Version screen displays the revision number of the firmware contained within the controller. This information may be useful if the unit needs to be returned for service.

**Screen** 

There are no values that can be changed in this screen.

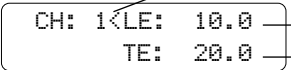
## Speed Compensation

---

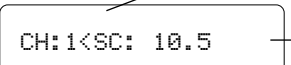
**Menu Path** MAIN SCREEN SEL ▼ to SETUP MENU SEL ▼ to SPEED COMP SEL

**Background** Some devices such as pneumatic cylinders and glue guns require a fixed amount of time to perform their function. As a machine speeds up, these devices need to be actuated earlier in the cycle in order to complete their action at the required time. Speed compensation automatically advances the On/Off setpoints of specified output channel(s) as the machine speeds up, maintaining proper synchronization at all speeds. See Section 4 for a detailed discussion of speed compensation.

**Screens** For standard controllers, one value of speed compensation applies to both the ON and OFF setpoints in a channel. The SPEED COMP screen for standard controllers looks like this:

 — *Output Channel*  
— Leading edge compensation (10 msec shown)  
— Trailing edge compensation (20 msec shown)

For units with the “-L” option (Leading /Trailing edge), the ON and OFF edges in a channel can have different values of speed comp. If SPEED COMP MODE in these models is set to “One,” the same value will apply to both ON and OFF edges, and the screen above will show. If SPEED COMP MODE is set to L/T, Leading/Trailing Edge speed comp is activated, and the following screen appears:

 — *Output Channel*  
— Speed Compensation (10.5 msec shown)

## Speed Compensation (cont'd)

---

<b>Speed Comp Units</b>	Speed compensation is programmed by entering the response time of the output device in milliseconds (.001 Sec). The output will always turn on this number of msec before the programmed ON position is reached, and turn off this number of msec before the programmed OFF position is reached. As speed increases, the number of degrees of advance will automatically increase to maintain the number of msec of advance.
<b>Programming</b>	To change output channels, move the cursor to the channel number and enter a new one. You may also INC or DEC the channel number. To change speed comp values, use the numeric keys or INC and DEC. To enter tenths of msec, use the decimal point. When entering even msec, the decimal point is not needed: "12 ENT" will result in a value of 12.0.
<b>Negative Speed Comp</b>	Negative values of speed compensation cause an output channel to lag its programmed machine position by the specified number of msec. See Section 4 for details on applying negative speed compensation. To program negative speed comp, press the +/- key <b>after</b> entering a number but <b>before</b> pressing ENT. You may also decrement a value below zero. NOTE: Regardless of the number of outputs available, speed compensation is limited to any 16 of those available outputs.

## Speed Comp Mode

---

<b>Menu Path</b>	MAIN SCREEN <small>SEL</small> ▼ to CONFIG MENU <small>SEL</small> ▼ to DISPLAY MENU <small>SEL</small> ▼ to SPD COMP MODE <small>SEL</small>
<b>Purpose</b>	For units with the "-L" option (Leading/Trailing Edge Speed Comp), Speed Comp Mode determines whether standard or leading/trailing edge speed compensation is in effect.
<b>Screen</b>	<div data-bbox="516 1119 802 1188" style="border: 1px solid black; padding: 5px; display: inline-block;">SPEED COMP MODE: ONE</div> — <i>Speed Comp Mode: ONE = Leading/Trailing edge have same speed comp; L/T = Each edge can have a different value of speed comp.</i>
	When the Speed Comp Mode is ONE, the same value of speed comp is used for both leading and trailing edges. When the Speed Comp Mode is "L/T", the leading and trailing edges of a pulse may have different values of speed comp.
<b>Programming</b>	Press the SEL key to toggle between ONE and L/T. Press ENT to confirm your selection.
<b>See Also</b>	SPEED COMPENSATION

## Timed Outputs

---

### Menu Path

MAIN SCREEN SEL ▼ to SETUP MENU SEL ▼ to TIMED OUTPUTS SEL

### Purpose

Any four outputs can be programmed to time out rather than remain on until an OFF setpoint is reached. This makes the output duration constant regardless of machine speed. If the OFF setpoint is reached before the specified time has elapsed, the timing will be aborted and the output will turn off immediately.

Once an output times out, it will not turn on until the next ON setpoint is reached. Each timed output can have a unique time delay length.

Outputs are timed in one msec increments up to a maximum of 9999 msec (9.999 seconds).

### Screen

```
CHANNEL: 1
TIME(mS): 20
```

— Channel  
— Time duration

### Pulse Required

A timed output must be programmed with ON and OFF position setpoints in order for output timing to take effect.

### Reverse Rotation

If the machine is rotating in the reverse direction, timed outputs will energize when the OFF edge of the pulse occurs.

## Toggle RPM

---

### Menu Path

MAIN SCREEN SEL ▼ to CONFIG MENU SEL ▼ to DISPLAY MENU SEL ▼ to TOGGLE RPM SEL

### Purpose

Toggle RPM is the resolver speed at which the Position display on the Main Screen will disappear. At speeds below the Toggle RPM the Position display will be visible; at speeds above the Toggle RPM the Position will not be shown.

### Screen

```
TOGGLE
RPM: 50
```

— Toggle RPM: Position display on main screen  
is not shown at speeds above Toggle RPM

### Programming

Use the numeric keys and ENT to enter a new value, or use INC and DEC to change an existing value.