

Section 3

Installation

Section 3 Installation



WARNING: Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.

1. Introduction

This section provides unpacking, safety, and installation information necessary for installing the Nordson PC50 Series controller.

Unpacking

Exercise normal care to prevent equipment damage during unpacking.

Inspection

The PC50 Series controller is shipped preassembled.

After unpacking the controller, make the following inspections:

- Check the cabinet surfaces for evidence of shipping damage.
- Open the front panel and check for loose electrical connections to the power supply, the controller and the keypad/display. Tighten any loose fasteners and connections.

2. Installation

Resolver Installation

The resolver must be mounted to the parent machine and then wired to the controller. Various other wiring connections may be required, depending on the required number of inputs and outputs to the controller.

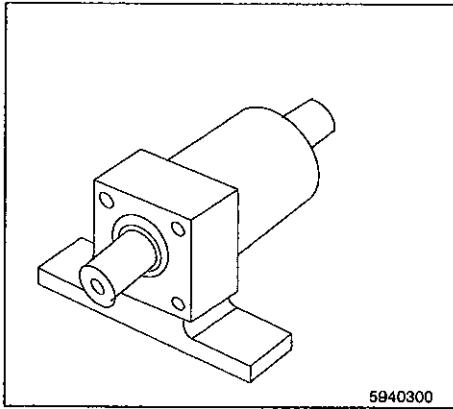


Fig. 3-1 Resolver

Choose a mounting location for the resolver that allows convenient mechanical connection of the resolver shaft to the machine. The resolver is normally driven at a 1:1 ratio to machine cycles, but this is not true in all applications. Commonly used methods for driving the resolver shaft include timing pulley and belt, chains and sprockets or direct in-line shaft-to-shaft coupling.

NOTE: If a shaft-to-shaft coupling is used, using a flexible coupling is recommended. Call Nordson for information on suitable flexible couplings.



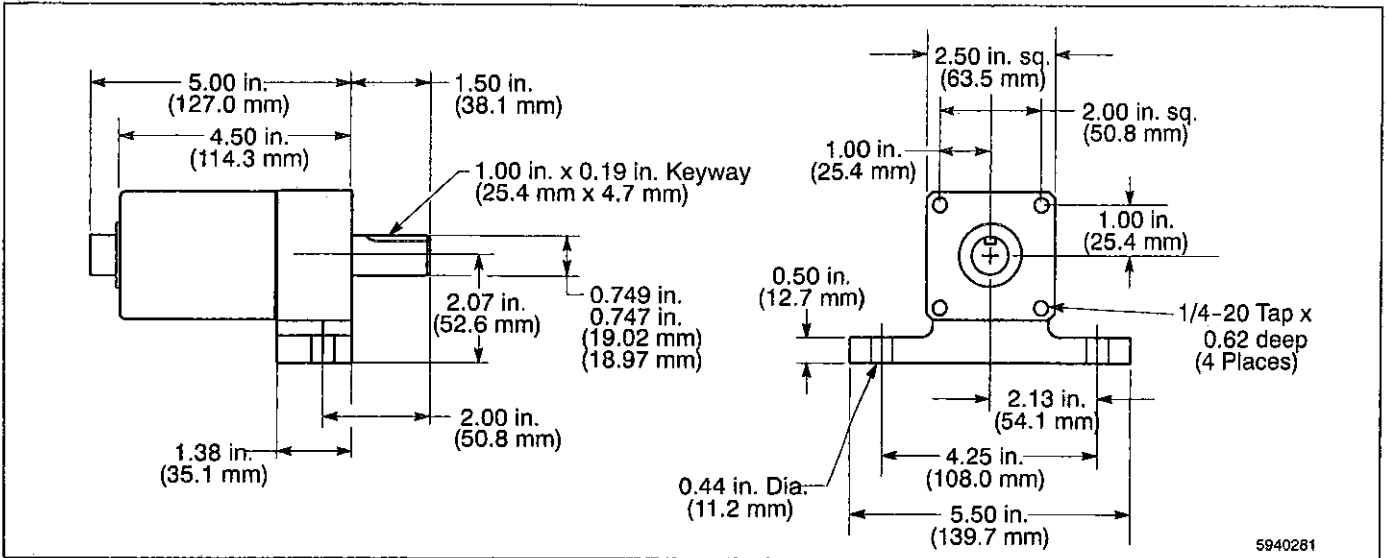
CAUTION: Using a solid coupling with shaft misalignment greater than 0.005" (T.I.R.) may damage the resolver. Because of tolerance stackups shimming a resolver to its mounting surface may be required for proper alignment.

No provision need be made for physically rotating the resolver shaft with respect to the machine shaft. PC50 Series controllers are easily programmed to set any resolver position as the 0° position.

If possible, select a location that shelters the resolver from accidental mechanical abuse, lubricants, washdown chemicals or any other liquids. Most resolvers have a NEMA 4 rating or better, but avoiding contaminants maximizes service and reliability.

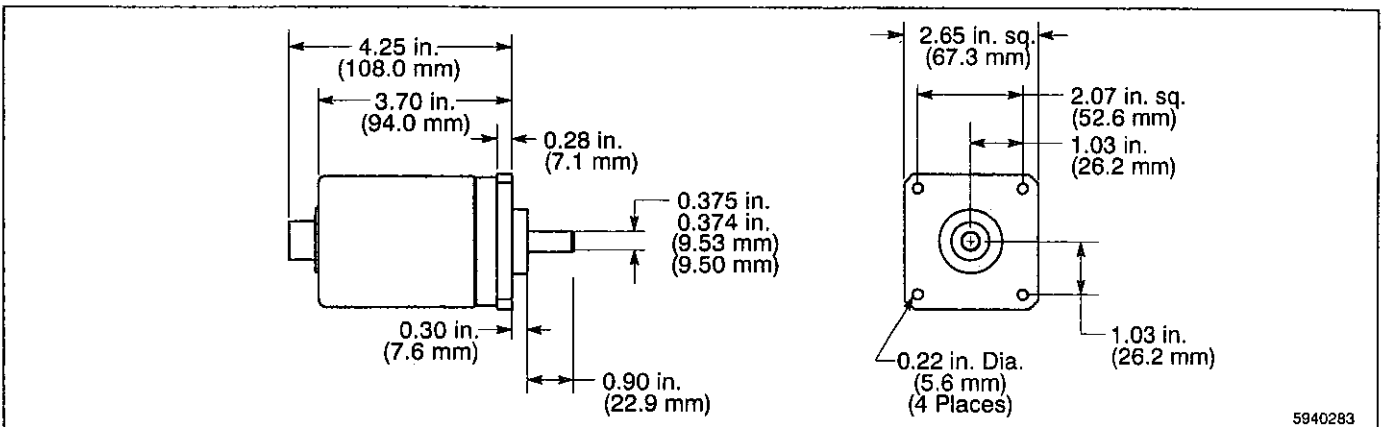
Figures 3-2, 3-3 and 3-4 provide dimensional information for the three most commonly used resolvers.

Resolver Installation (contd.)



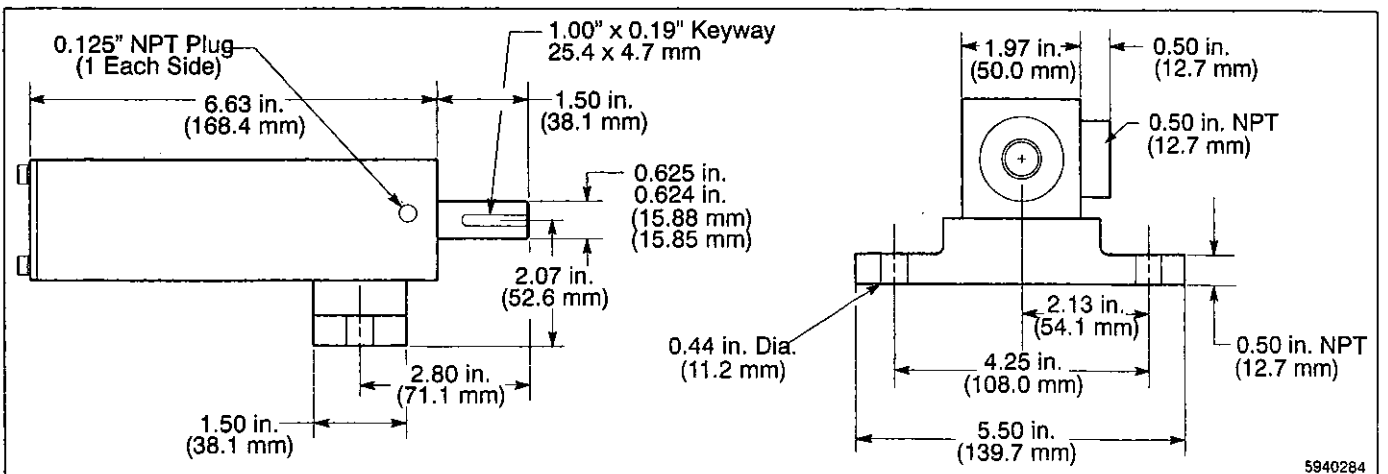
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Fig. 3-2 Foot Mount Resolver



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Fig. 3-3 Flange Mount Resolver



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Fig. 3-4 Stainless Steel Resolver

Resolver Installation (contd.)

Ambient Temperature

Resolver operation requires an ambient temperature range of -40 ° to +125 °C (-40 ° to +257 °F).



WARNING: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.



WARNING: Disconnect equipment from the line voltage.

Resolver Wiring

NOTE: Resolver cables supplied with the resolver are a special type, consisting of three individually twisted/shielded pairs with a common braid shield, insuring that reliable position information is being received by the controller. See Figures 3-5 and 3-6. Using other cable types could degrade the accuracy of the position signals, making them more susceptible to electrical noise.

Cables for non-stainless resolvers are shipped with one end soldered to the resolver connector and the other end screwed into the controller connector. See Figure 3-5.

Remove the controller connector if routing the cable through areas where the connector won't fit. Run the cable from the resolver back to the controller cabinet.

The shield is connected at both ends of the cable to prevent damage due to electrostatic discharge. If electrical noise problems are suspected when the control is in operation, call your Nordson Representative for advice regarding shielding.

The cable used with the stainless steel resolvers does not have a connector at the resolver end because screw terminals are used inside that resolver. When routing this cable, start at the controller end and run the plain end of the cable to the resolver. When properly connected, both ends of the cable shield will be connected. If electrical noise problems are suspected when the control is in operation, call your Nordson Representative for advice regarding shielding.

Resolver Wiring (contd.)

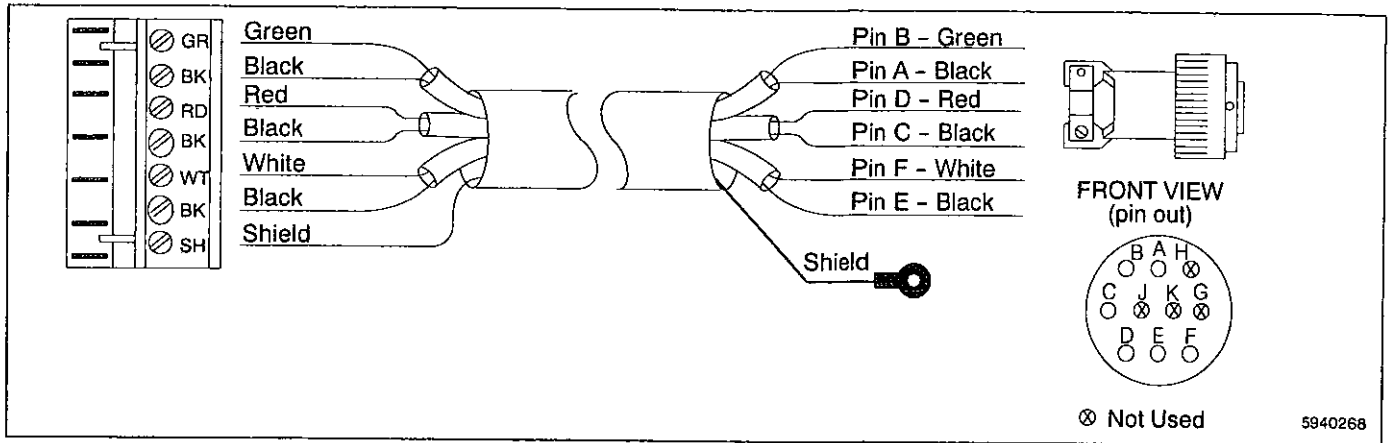


Fig. 3-5 Resolver Cable with Cannon Connector

NOTE: The resolver cable illustrated in Figure 3-5 has a ring lug on a green shield wire at the resolver end. Attach the ring lug to one of the resolver connector strain relief screws as a protection against static discharge through the resolver cable.

In some installations, it may be advisable to disconnect the ring lug to prevent ground loops through the cable shield. Call your local Nordson Representative if electrical noise problems are suspected.

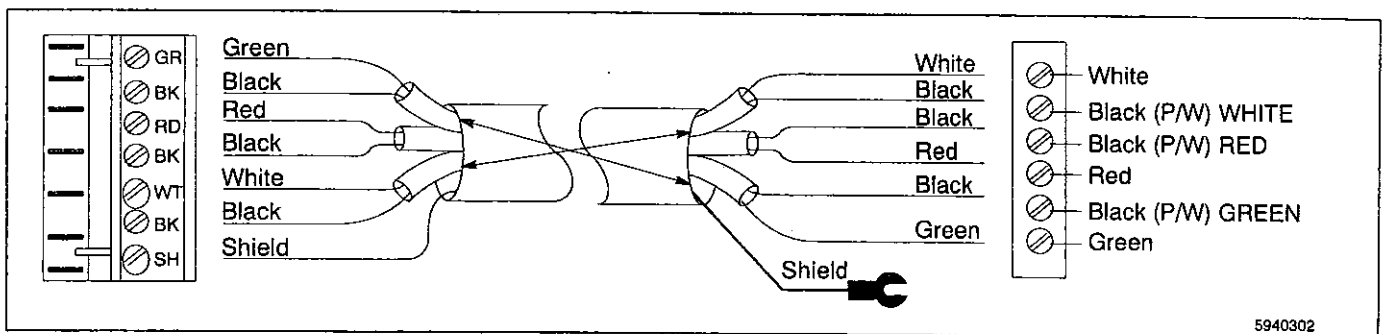


Fig. 3-6 Cable for Stainless Steel Resolver (with Terminal Strip Connections)

NOTE: The resolver cable illustrated in Figure 3-6 has a spade lug connected to the shield at the resolver end. Attach the lug to the grounding stud on the cover plate of the resolver.

In some installations, it may be advisable to disconnect the lug to prevent ground loops through the cable shield. If electrical noise problems are suspected when the controller is in operation, call your Nordson Representative.

Controller Installation

Mount the controller cabinet in a suitable location on the parent machine. The cabinet flanges are pre-drilled for mounting on a panel. Leave sufficient room on each side of the cabinet for wiring access. Resolver and serial communication access is provided on the left side of the cabinet. Input/ power cables are installed on the left hand side of the cabinet. System power wiring and input/output wiring access is provided by knockouts on both sides of the cabinet.

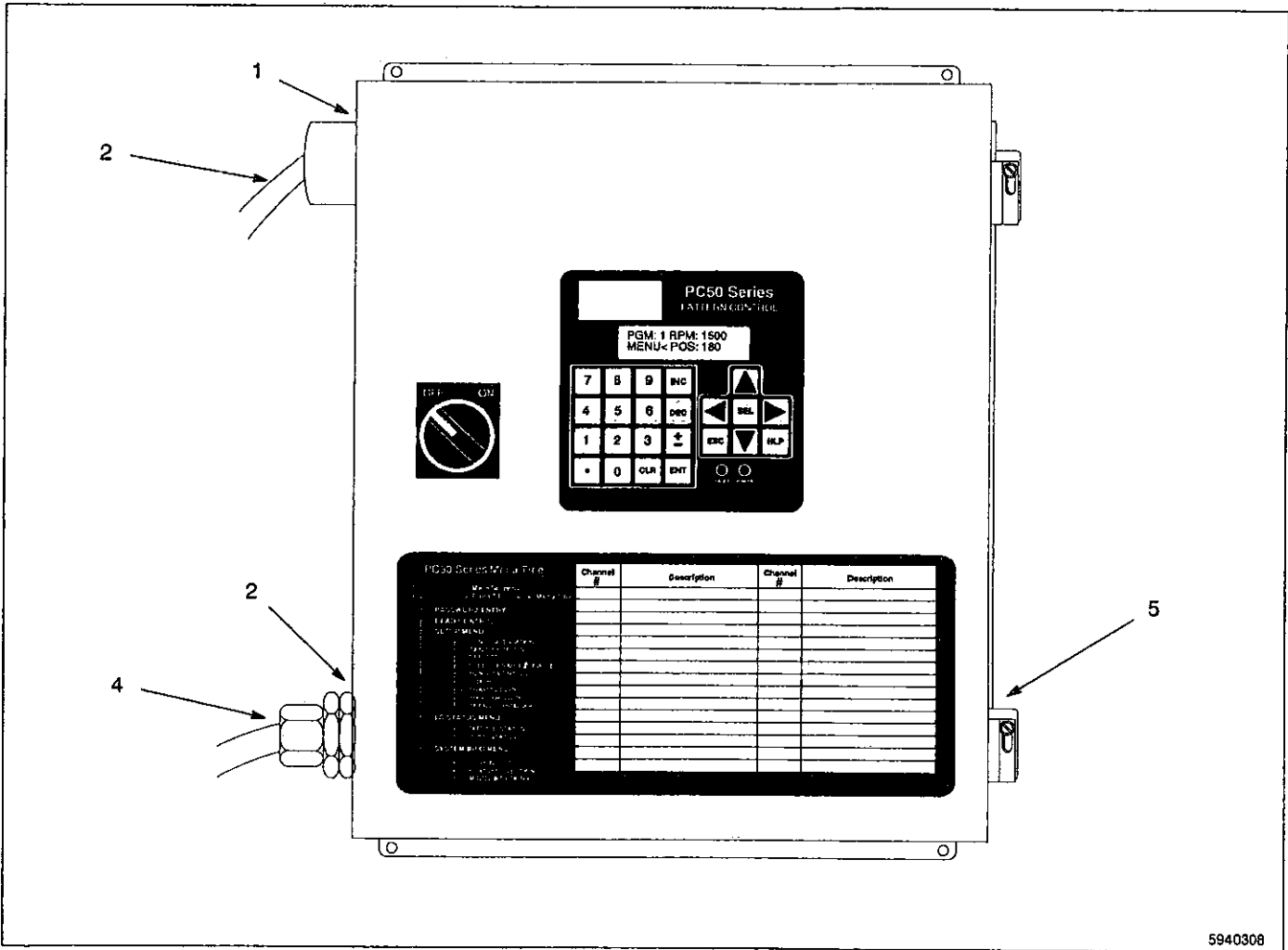


Fig. 3-7 Controller Cabinet

- | | | |
|--|--|---|
| <p>1. Knockout for AC Power or I/O Access (Not Shown)</p> <p>2. Resolver Cable Entrance w/ Nylon Conduit Fitting</p> | <p>3. Knockout for AC Power or I/O Access (Not Shown)</p> <p>4. Communication Cable Connection</p> | <p>5. Knockout for I/O Access (Not Shown)</p> |
|--|--|---|

Module Mounting

A phillips head screw holds each module in place. Individual modules can be removed and installed without affecting the other modules on the unit.



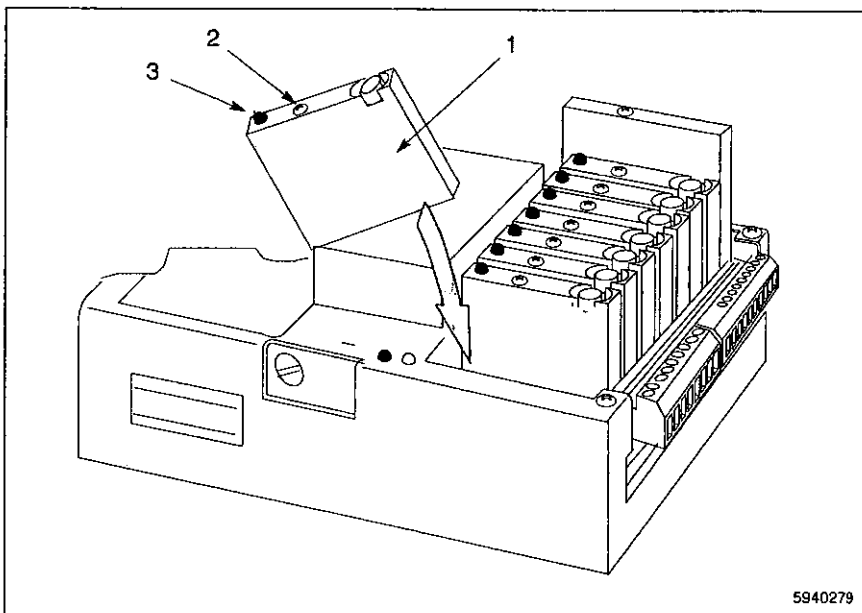
WARNING: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.



WARNING: Disconnect equipment from the line voltage.



WARNING: Disconnect power to the controller before changing modules.



- 1. Module
- 2. Phillips head screw
- 3. Module operating lamp

Fig. 3-8 Controller Module Removal/Replacement

DIP Switches

NOTE: If installing a PC55 controller that is purchased separately (not in a cabinet), set the DIP switches on the side of the controller and keypad to their proper positions before mounting the units in a panel. See *DIP Switch Settings* in this section for DIP switch information.

Controller Wiring Guidelines



WARNING: Disconnect equipment from the line voltage.



WARNING: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.

Controller Wiring, General

Follow normal wiring practices associated with installing electronic controls. Guidelines include:

- Route input and output wiring away from high voltage, motor drive, and other high level control signals.
- Use shielded cables for resolver, input, and communication circuits. Shield module output circuits driving low current electronic input circuits.
- Ground shielded cables at the controller end only (except for resolver cable). Use any of the screws on the controller back for grounding.
- Use appropriate suppression devices where module outputs are directly driving inductive loads.

Power Supply Wiring

NOTE: Nordson recommends installing a circuit breaker, with lockout capability, at the external AC power supply.

NOTE: Figure 3-9 illustrates the general arrangement for installing controller AC power. PC 50 Controllers are factory pre-wired for 240 VAC service.

When preparing to wire the input power supply terminal strip, verify that the terminal strip is correctly wired for the required supply voltage.

NOTE: Changing from 240 VAC to 120 VAC service requires installing additional jumpers on the terminal strip per schematics and wiring diagrams in Section 5, *Troubleshooting and Repair* and replacing fuses F1 and F2 with customer supplied 2 amp Slo Blo fuses.

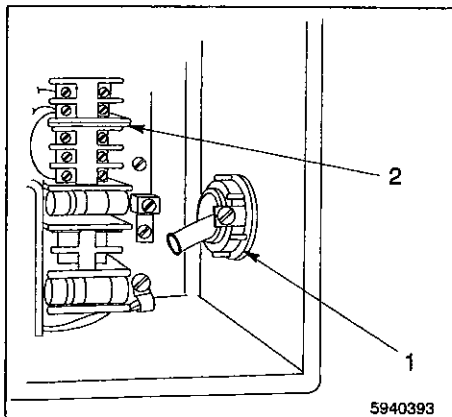


Fig. 3-9 AC Power Connection to Controller Power Supply

1. AC Power Supply In (w/Strain Relief)
2. Input Power Wiring Terminal Strip

Electrical power is supplied to the controller as illustrated in the schematics in Section 5, *Troubleshooting and Repair*.

Connect a 240 VAC or 120 VAC power cable to the controller's terminal strip as illustrated in Figure 3-9 and per the schematics and diagrams in Section 5, *Troubleshooting and Repair*. Provide a strain relief for the wires at the cabinet.

Power Supply Wiring (contd.)



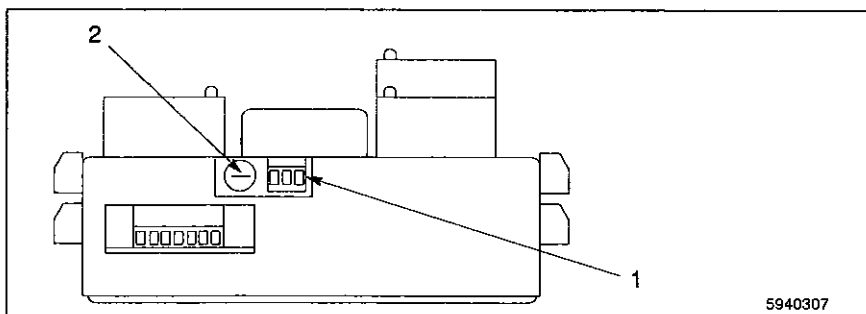
WARNING: Disconnect equipment from the line voltage.



WARNING: Risk of electrical shock. Failure to observe may result in personal injury, death, or equipment damage.

NOTE: To insure electrical noise immunity, connect a good electrical ground to the ground terminal on the power supply terminal block.

NOTE: For controllers purchased as individual components and installed in the customer's main control panel, provide electrical power from a 20 to 30 VDC power supply. From the VDC power supply, run wires to TB 8 (Figure 3-10). Reversing the polarity blows the 1-1/4 amp power fuse. The controller will not be damaged. Correct the polarity, then replace the fuse.



- 1. TB 8 20-30 VDC connection from DC power supply
- 2. Main Power Fuse (1 1/4 A Slo-Blo)

Fig. 3-10 Front View of Controller - Power Supply to Controller

Controller Input Wiring

Terminal Blocks

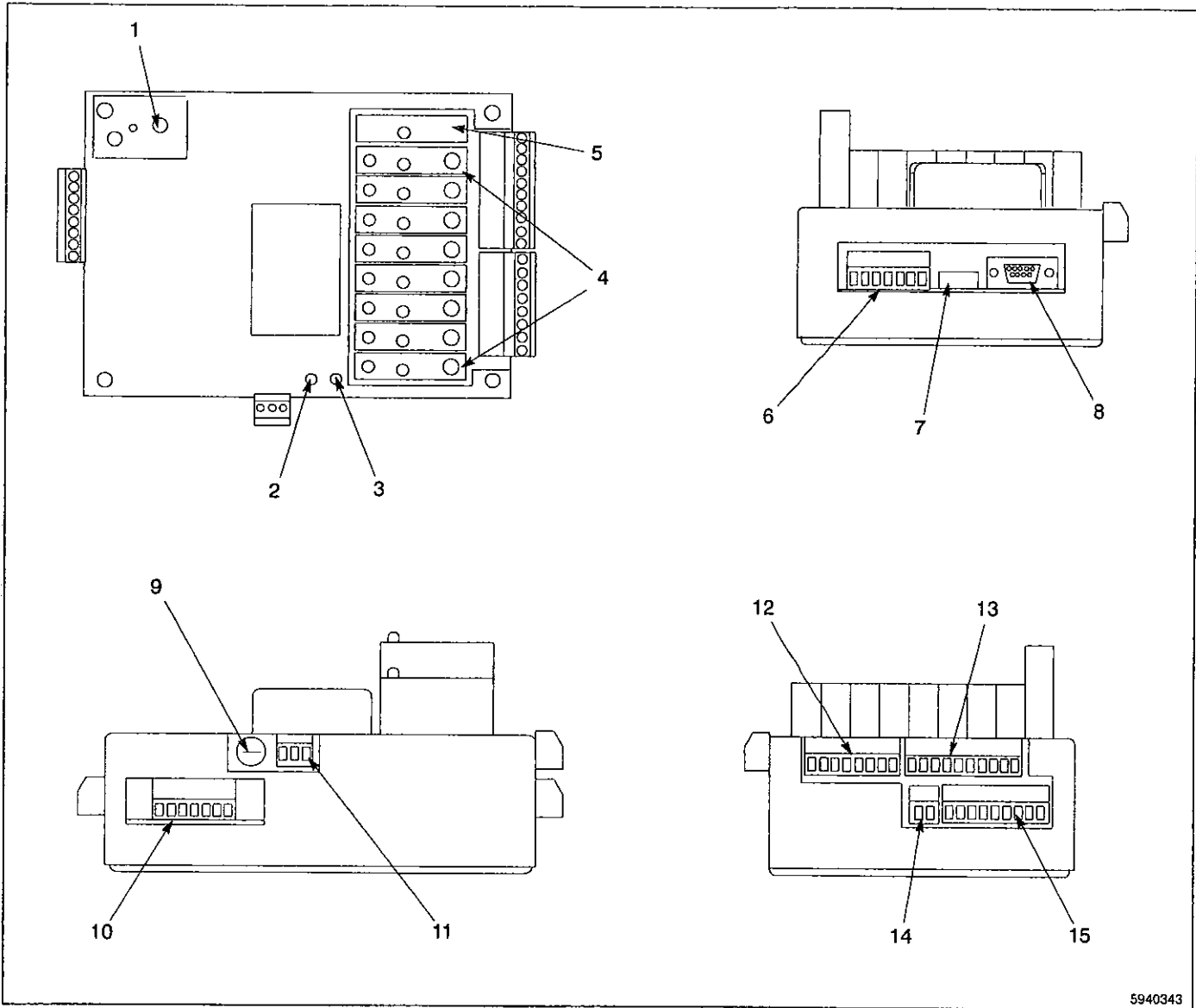
All terminal blocks can be unplugged from the controller. Each block is keyed so it cannot be plugged into the wrong socket. All terminals are labelled on each block. Controller general arrangement and location of the terminal blocks are illustrated in Figure 3-11 (PC54) and Figure 3-12 (PC55).

Input Terminals

Hardware inputs can be used to select a program of setpoints or activate groups of outputs based on sensor signals according to mode logic as described in Section 4, *Programming*.

Depending on the controller model, inputs on PC50 Series controllers are arranged on two terminal strips, TB 1 and TB 3, as shown in Figures 3-13 through 3-16. Inputs are optically isolated in groups of eight and can be powered from an external DC power source or the auxiliary power terminals located on TB 2.

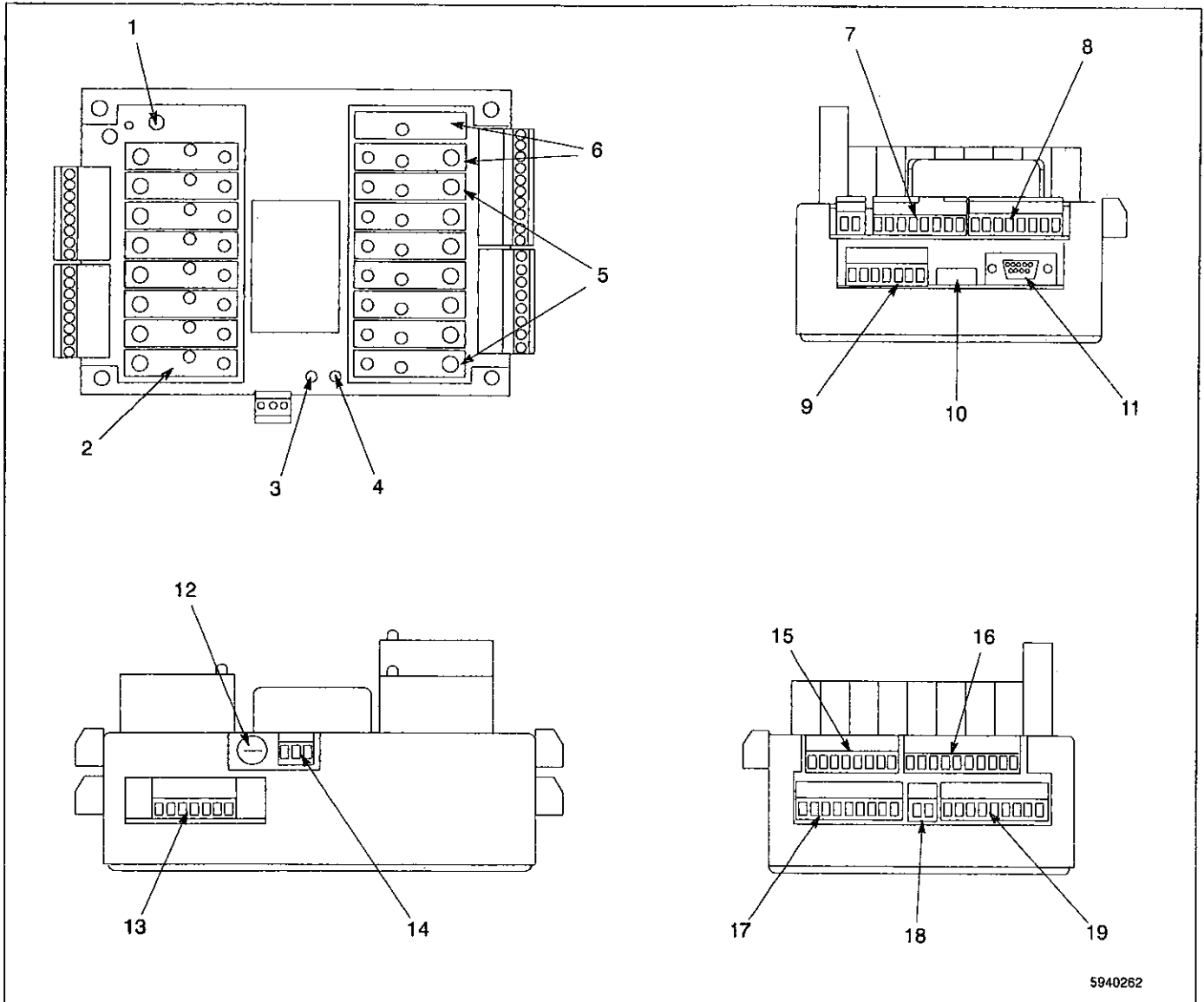
Controller Input Wiring (contd.)



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Fig. 3-11 PC54 Controller Components and Terminal Locations

- | | | |
|--|-----------------------|-------------------------------|
| 1. Aux. Power Fuse (TB 2) & tester | 6. TB 5 (Keypad) | 11. TB 8 (VDC for Controller) |
| 2. Status LED (Yellow) | 7. DIP Switch | 12. TB 7 (Outputs 1-4) |
| 3. Power LED (Green) | 8. DB-9F (RS-232/485) | 13. TB 6 (Outputs 5-9) |
| 4. AC/DC Modules (Outputs 1-8) | 9. Main Fuse, 1 1/4 A | 14. TB 2 (Power for Inputs) |
| 5. AC, DC, or Run Up Module (Output 9) | 10. TB 4 (Resolver) | 15. TB 1 (Inputs 1-8) |



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Fig. 3-12 PC55 Controller Components and Terminal Locations

- | | | |
|---|------------------------|-------------------------------|
| 1. Aux. Power Fuse (TB 2) & tester | 7. TB 10 (Outputs 5-8) | 13. TB 4 (Resolver) |
| 2. AC/DC Modules - Outputs 1-8 | 8. TB 9 (Outputs 1-4) | 14. TB 8 (VDC for Controller) |
| 3. Status LED (Yellow) | 9. TB 5 (Keypad) | 15. TB 7 (Outputs 9-12) |
| 4. Power LED (Green) | 10. DIP Switch | 16. TB 6 (Outputs 13-17) |
| 5. AC/DC Modules (Outputs 9-15) | 11. DB 9F (RS-232/485) | 17. TB 3 (Inputs 1-8) |
| 6. AC, DC, or Run Up Module Outputs (16 and 17) | 12. Main Fuse, 1 1/4 A | 18. TB 2 (Power for Inputs) |
| | | 19. TB 1 (Inputs 9-16) |

Controller Input Wiring (contd.)

Sinking or Sourcing

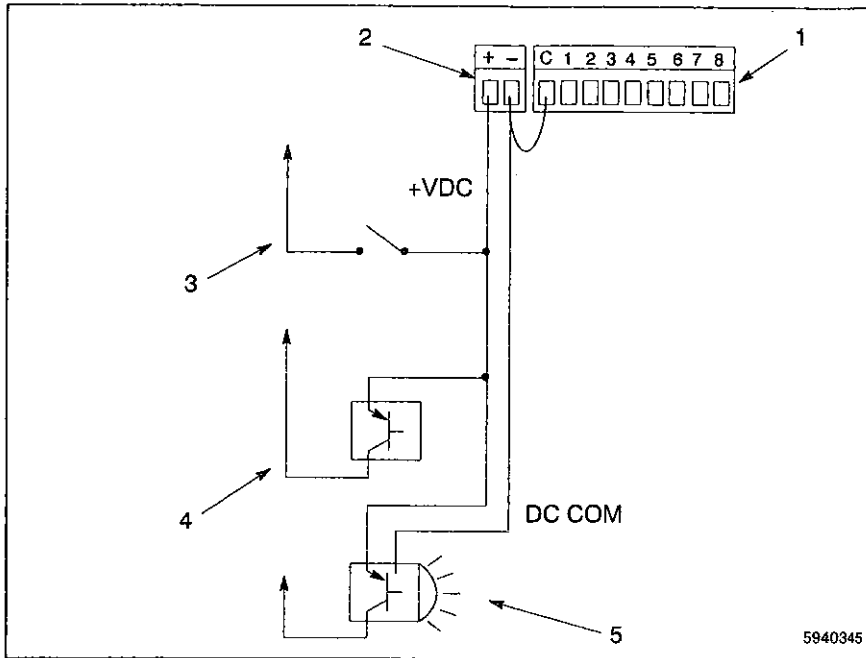
NOTE: PC54 Controllers have one input terminal strip (TB 1). See Figure 3-11. PC55 Controllers have two input terminal strips (TB 3 and TB 1). See Figure 3-12.

Input terminal strip(s) can be wired to accept sinking or sourcing input signals, but all eight inputs on that strip require the same type of signal. Many types of hardware can drive these inputs, including mechanical switches, relay contacts, DC 3-wire sensors, solid state DC output modules, and PLC DC outputs.

NOTE: Two wire DC sensors can also be used, but may require a load resistor in parallel with the input.

Figure 3-13 and Figure 3-14 illustrate current sourcing output, with positive (+) VDC being switched. Figure 3-15 and Figure 3-16 illustrate a current sinking output, with DC common being switched.

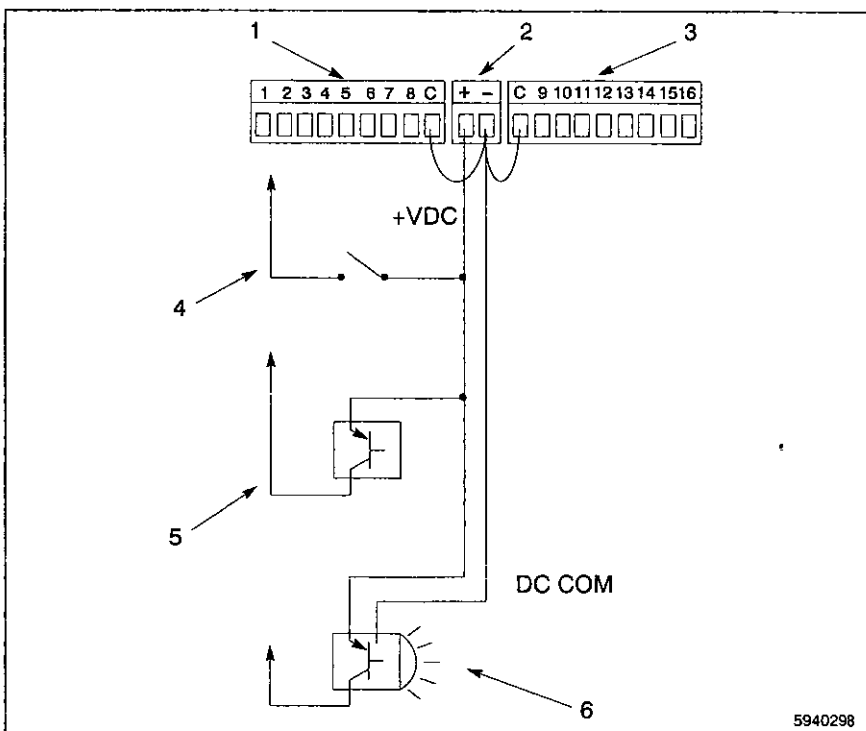
Controller Input Wiring (contd.)



1. TB 1 (Inputs 1-8)
2. TB 2 (Aux Power for Inputs)
3. Switch or Relay Contact (Connect to desired input 1-8)
4. Sourcing Module - (PLC or other electronic output Connect to desired input 1-8)
5. Three (3) wire DC Sensor with current sourcing output (PNP)

Terminal	Function
3-6	Program Select
1	Group 1 Input
2	Group 2 Input
7	First Cycle Enable
8	Remote Enable

Fig. 3-13 PC54 Controller Input Wiring - Sourcing Devices

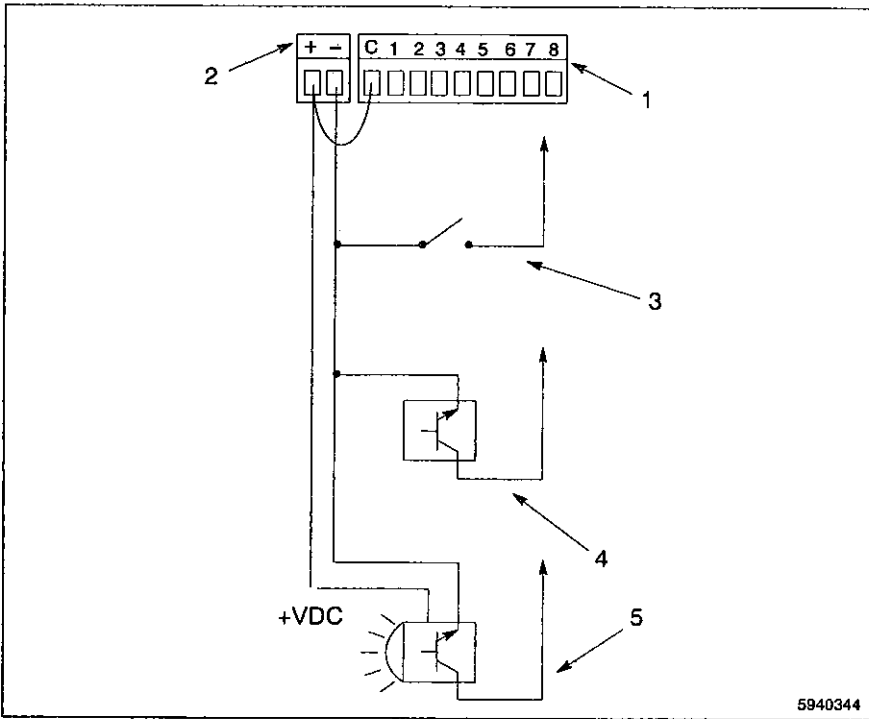


1. TB 3 (Inputs 1-8)
2. TB 2 (Aux Power for Inputs)
3. TB 1 (Inputs 9-16)
4. Switch or Relay Contact (Connect to desired input 1-16)
5. Sourcing Module - (PLC or other electronic output Connect to desired input 1-16)
6. Three (3) wire DC Sensor with current sourcing output (PNP)

Terminal	Function
1-8	Program Select
9	Group 1 Input
10	Group 2 Input
11	Group 3 Input
12	Group 4 Input
13	Group 5 Input
14	Group 6 Input
16	Remote Enable
15	First Cycle Enable

Fig. 3-14 PC55 Controller Input Wiring - Sourcing Devices

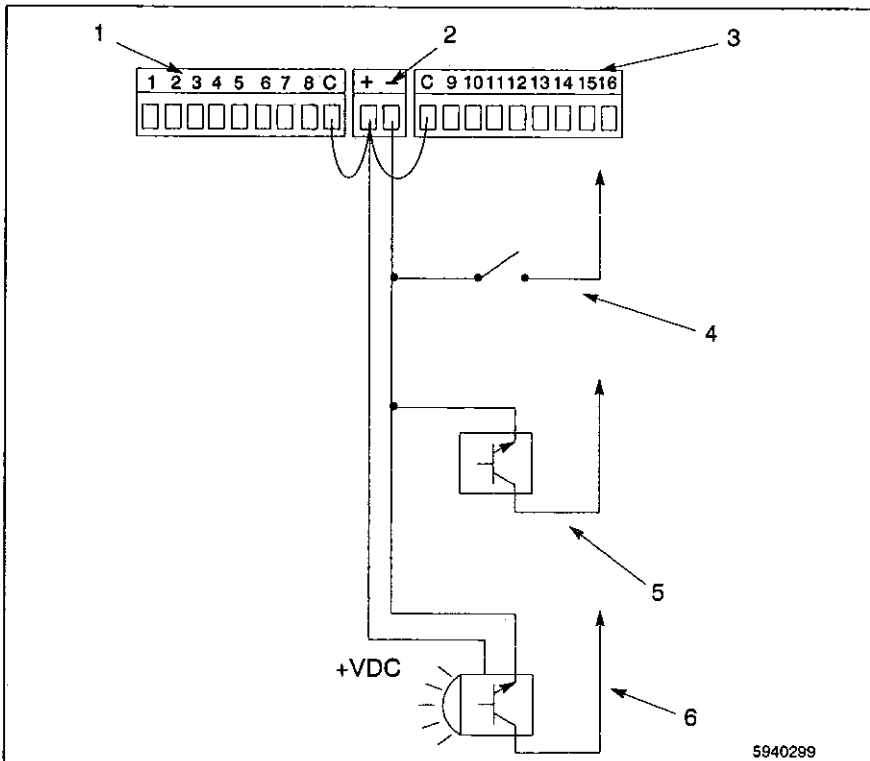
Sinking or Sourcing (contd.)



1. TB 1 (Inputs 1-8)
2. TB 2 (Aux Power for Inputs)
3. Switch or Relay Contact. (Connect to desired input 1-8)
4. Sinking Module - (PLC or other electronic output. Connect to desired input 1-8)
5. Three (3) wire DC Sensor with current sinking output (NPN)

Terminal	Function
3-6	Program Select
1	Group 1 Input
2	Group 2 Input
7	First Cycle Enable
8	Remote Enable

Fig. 3-15 PC54 Controller Input Wiring - Sinking Devices



1. TB 3 (Inputs 1-8)
2. TB 2 (Aux Power for Inputs)
3. TB 1 (Inputs 9-16)
4. Switch or Relay Contact. (Connect to desired input 1-16)
5. Sinking Module - (PLC or other electronic output. Connect to desired input 1-16)
6. Three (3) wire DC Sensor with current sinking output (NPN)

Terminal	Function
1-8	Program Select
9	Group 1 Input
10	Group 2 Input
11	Group 3 Input
13	Group 5 Input
14	Group 6 Input
15	First Cycle Enable (Mode 5)
16	Remote Enable

Fig. 3-16 PC55 Controller Input Wiring - Sinking Devices

Controller Input Wiring (contd.)**Input Wiring Guidelines**

- Voltage from TB 2 is the same as the voltage supplied to the controller
- Each input powered from TB 2 draws 11 mA at 24 VDC. TB 2 is fused at $\frac{1}{4}$ amp
- Inputs operate with voltages from 10 to 30 VDC
- An optional external power supply can be used instead of TB 2 to power inputs
- A combination of mechanical and solid state devices can be used
- On PC55 Controllers, TB 1 can be wired for sourcing while TB 3 is wired for sinking and vice versa

Input Terminal Function

The following are the input terminals and their corresponding functions:

Program Select (3-6 on PC54; 1-8 on PC55)

The on/off status of these terminals selects which program of setpoints is controlling the outputs. Binary, BCD, or Gray Code formats can drive these terminals as shown in Figure 3-18 and Figure 3-19.

NOTE: Nordson eight position Gray Code selector switches are available as accessories for PC50 Series controllers. See Section 8, *Options* for program select switch installation.

When all program select inputs are off, the "Default" program becomes active as programmed through DEFAULT PROGRAM function.

Group Inputs (1 and 2 on PC54; 9-14 on PC55)

These inputs work in conjunction with groups of outputs according to mode logic as discussed in Section 4, *Programming*. Typically, photo eyes and other sensors operate these inputs.

First Cycle Enable (7 on PC54; 15 on PC55)

Mode 5 uses this input to allow the machine to resume a cycle after being stopped in mid-cycle. See Section 4, *Programming* for details.

Remote Enable (8 on PC54 and 16 on PC55)

Any output (except Run UP) can be ANDed with this input through OUTPUT ENABLE ANDing. ANDed outputs operate *only when this input is on*. This output can be used in conjunction with Speed Enable/Disable and output modes.

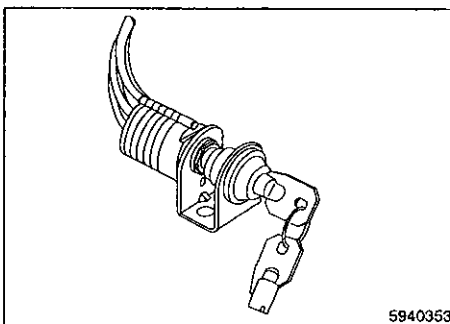


Fig. 3-17 Program Select Switch

Controller Input Wiring (contd.)

PC54 Controller

BCD FORMAT					BINARY FORMAT					GRAY CODE FORMAT				
Units														
Input Terminal:	6	5	4	3	Input Terminal:	6	5	4	3	Input Terminal:	6	5	4	3
Value:	8	4	2	1	Value:	8	4	2	1	Value:MSB				LSB
Program:Default	0	0	0	0	Program:Default	0	0	0	0	Program:Default	0	0	0	0
1	0	0	0	1	1	0	0	0	1	1	0	0	0	1
2	0	0	1	0	2	0	0	1	0	2	0	0	1	1
3	0	0	1	1	3	0	0	1	1	3	0	0	1	0
4	0	1	0	0	4	0	1	0	0	4	0	1	1	0
5	0	1	0	1	5	0	1	0	1	5	0	1	1	1
6	0	1	1	0	6	0	1	1	0	6	0	1	0	1
7	0	1	1	1	7	0	1	1	1	7	0	1	0	0
8	1	0	0	0	8	1	0	0	0	8	1	1	0	0
9	1	0	0	1	9	1	0	0	1	9	1	1	0	1
					10	1	0	1	0	10	1	1	1	1
					11	1	0	1	1	11	1	1	1	0
					12	1	1	0	0	12	1	0	1	0
					13	1	1	0	1	13	1	0	1	1
					14	1	1	1	0	14	1	0	0	1
					15	1	1	1	1	15	1	0	0	0

Fig. 3-18 PC54 Program Select Terminals for Various Formats

Controller Input Wiring (contd.)

Program Notes

BCD Format

- For BCD, calculate the program selected by adding the values for each of the inputs that are on. For example, if inputs 5, 3, and 1 are On, Program 15 is active ($10 + 4 + 1$).
- Only three of the normal four BCD digits for 10's are used.
- Nine (9) is the largest valid value for the units digit. A units digit combination larger than 9 sets the units digit to 9.

Binary Format

- For Binary, calculate the program selected by adding the values for each of the inputs that are on. For example, if inputs 5, 3, and 1 are On, Program 21 is active ($16 + 4 + 1$).

Gray Code Format

NOTE: Nordson eight position Gray Code program enable and program select switches are available as options for PC50 Series controllers. See Section 8, *Options* for program enable and program select switch installation instructions.

Notes Common to All Formats

- On PC54 controllers (16 programs available), any program select value larger than 16 selects program number 16.
- On PC55 controllers (64 programs available), any program select value larger than 64 selects program number 64.
- The Default Program is determined by programming the Default Program function. See Section 4, *Programming*.

Controller Output Wiring

Output Modules

Available outputs depend on the PC50 Series model:

Output Type	PC54	PC55
AC/DC/RR Modules Only	Outputs 1-8	Outputs 1-15
AC/DC/RR or *Run Up Modules	Output 9	Output 16 and/or 17
* Run Up modules are optional. The PC54 accepts 1 optional module; the PC55 accepts 2 optional modules.		

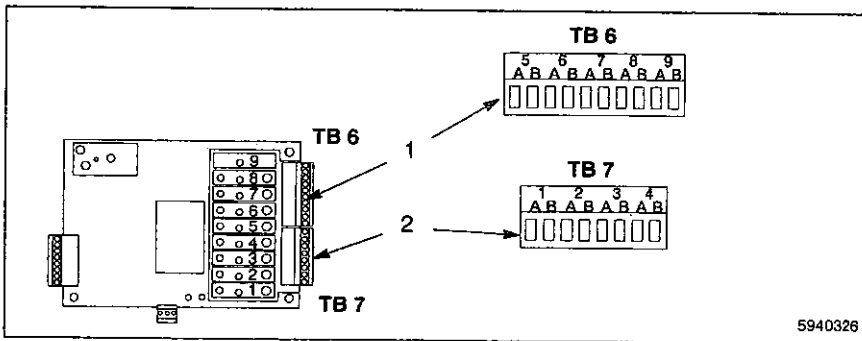
NOTE: The load device to be driven must match the output type.

Power Output Modules

Power output modules directly switch inductive loads and resistive loads. Each output module has two dedicated terminals and therefore does not share any common signal with the other modules. This allows AC and DC modules to be mixed on the same controller.

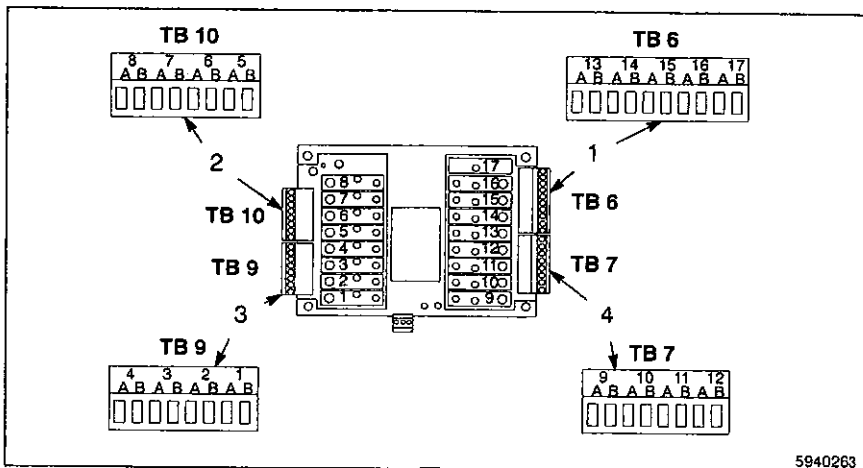
DC modules can be wired to sink or source as shown in Figure 3-24.

NOTE: The modules do not supply the power for the load; they simply switch it.



1. TB 6 (Outputs 5-9 with 9 being Run Up, or AC/DC)
2. TB 7 (Outputs 1-4)

Fig. 3-20 PC54 Output Terminal Strips



1. TB 6 (Outputs 13-15 with 16 & 17 being Run Up, or AC/DC)
2. TB 10 (Outputs 5-8)
3. TB 9 (Outputs 1-4)
4. TB 7 (Outputs 9-12)

Fig. 3-21 PC55 Output Terminal Strips

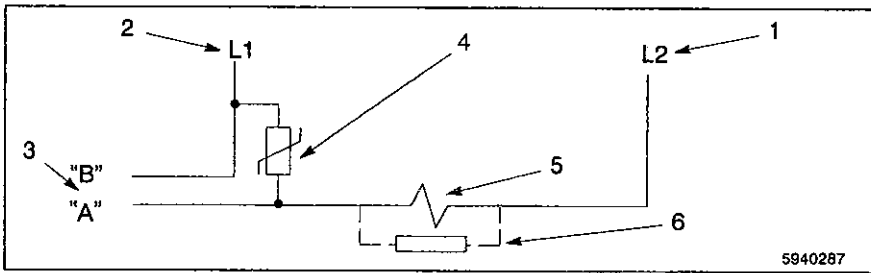
Controller Output Wiring (contd.)

Run Up Output Modules

Run Up output modules, which generate signals proportional to the resolver rpm, can be used only in the output positions shown Figure 3-21. A 0-10 VDC or 4-20 mA Run Up module can be used in either module position.

NOTE: RUN UP QTY must be programmed to indicate the number of Run Up modules installed. An external power supply is not needed; Run Up modules power is from the controller. The Run Up output signal is completely isolated.

AC Output



- 1. Neutral
- 2. Hot
- 3. Module Terminals
- 4. Varistor
- 5. Load
- 6. R-C Suppressor

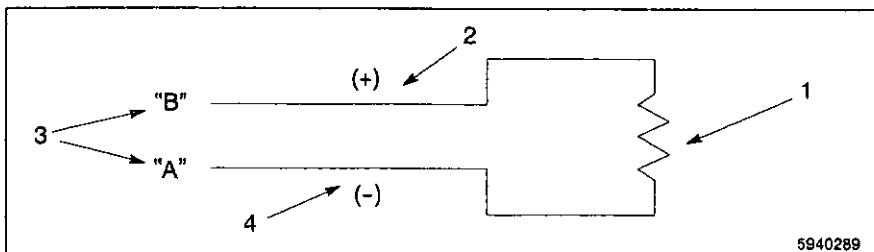
Fig. 3-22 AC Output

NOTE: Although most applications will not require the varistor or R-C suppressor shown in Figure 3-22, when switching devices are in series or parallel with the AC module, voltage spikes may damage the module.

Use one of the following two methods to suppress voltage spikes.

- For infrequent switching, connect a varistor (item 4) across the terminals.
- For continuous switching, wire an R-C suppressor (item 6) in parallel with the load.

Run Up Output



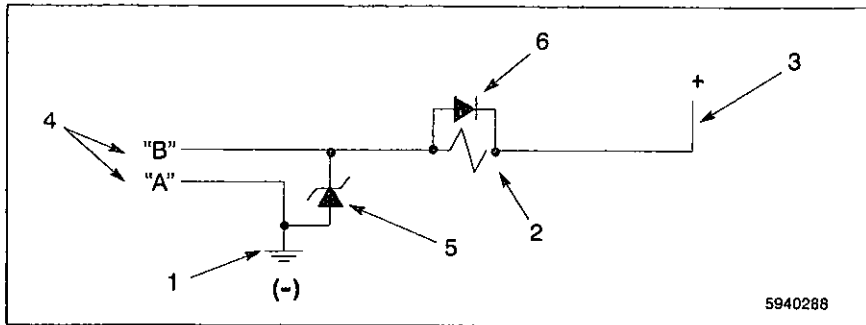
- 1. Run Up Load Device
- 2. Run Up Positive Voltage
- 3. Module Terminals
- 4. Run Up Negative Voltage

Fig. 3-23 Run Up Output

NOTE: Run Up output modules source the Run Up signal, no external power supply is required and the Run Up output signals are isolated.

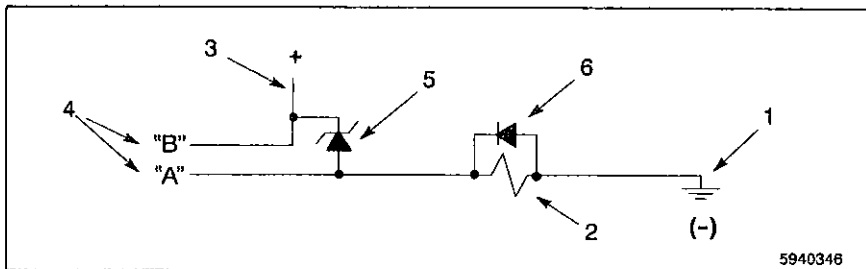
Controller Output Wiring (contd.)

DC Output - Sourcing and Sinking



- 1. DC Common
- 2. Load
- 3. Positive VDC
- 4. Module Terminals
- 5. Zener Diode
- 6. Reverse Bias Diode

Fig. 3-24 DC Output - Sinking



- 1. DC Common
- 2. Load
- 3. Positive VDC
- 4. Module Terminals
- 5. Zener Diode
- 6. Reverse Bias Diode

Fig. 3-25 DC Output - Sourcing

NOTE: Diodes are not required in most applications, however, highly inductive DC loads may damage modules by generating voltage spikes when switched off. Suppress voltages spikes using one of the following two methods: See Figures 3-24 and 3-25.

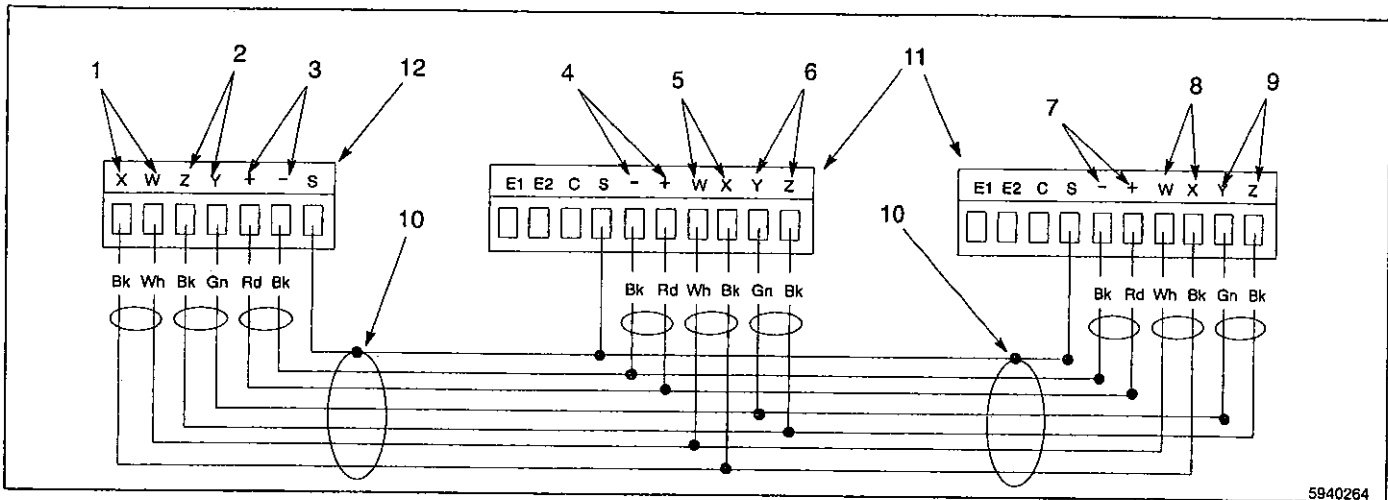
- Connect a Zener diode (item 5) across the terminals. This does not significantly increase the load turn off time. The voltage rating of the diode must be greater than the normal circuit voltage.
- Connect a reverse-biased diode (item 6) across the load. This may increase load turn off time.

3. Keypad Wiring

Number of Keypads

One or two keypads may be connected to a PC54 controller as shown in Figure 3-26.

Figures 3-31, 3-32, and 3-33 illustrate possible keyboard configurations and how they are linked together.



5940264

Fig. 3-26 Keypad Wiring

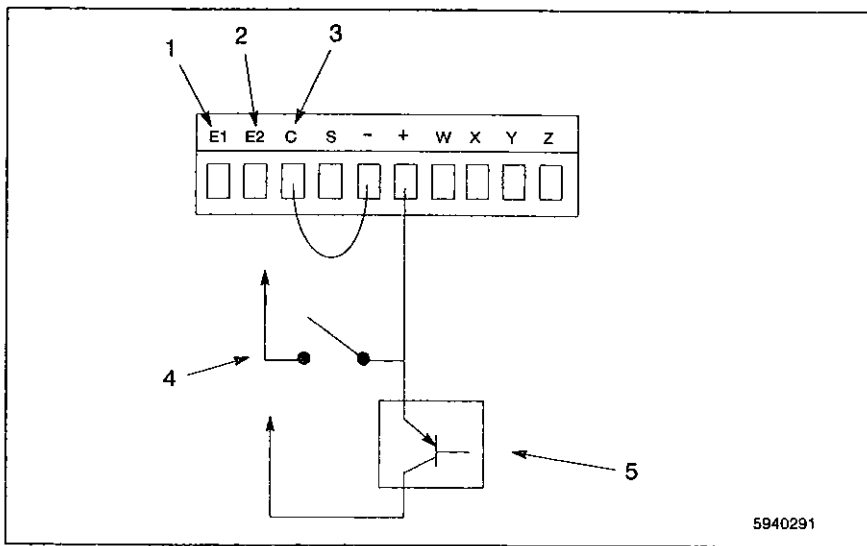
- | | | |
|-------------------------------|------------------------------|--------------------------------------|
| 1. RS-485 to Keypad | 5. RS-485 from Host | 9. RS-485 to Host |
| 2. RS-485 from Keypad | 6. RS-485 to Host | 10. Shield |
| 3. Positive (+) 20-30 VDC Out | 7. Positive (+) 20-30 VDC In | 11. Keypad Terminal Block |
| 4. Positive (+) 20-30 VDC In | 8. RS-485 from Host | 12. Controller Terminal Block (TB 5) |

Programming Enable

The terminal block on the back of each keypad includes terminals to select Master or Operator level programming access for that keypad. These terminals can be temporarily jumpered during set-up to allow entry of programming access codes, or they can be switched with a variety of devices including mechanical switches, relay contacts, and PLC DC outputs. See **PASSWORDS** in the programming section for details on programming access.

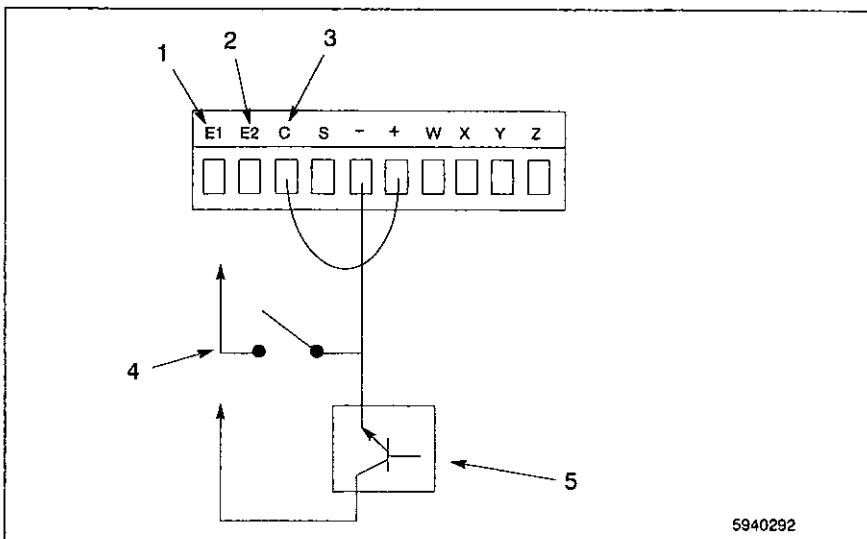
If a solid state device will activate the Programming Enable terminals, that device is the determining factor in whether sourcing or sinking wiring is used.

For mechanical devices such as jumpers or key switches, either sourcing or sinking wiring may be used. Figures 3-27 and 3-28 illustrate keypad terminal block sinking and sourcing wiring for programming enable.



- 1. Master Program Enable
- 2. Operator Program Enable
- 3. Enable Common
- 4. Switch (To E1 or E2)
- 5. Sourcing Device (To E1 or E2)

Fig. 3-27 Program Enable, - Sourcing



- 1. Master Program Enable
- 2. Operator Program Enable
- 3. Enable Common
- 4. Switch (To E1 or E2)
- 5. Sinking Device (To E1 or E2)

Fig. 3-28 Program Enable, - Sinking

4. Controller/Keypad DIP Switch Configurations

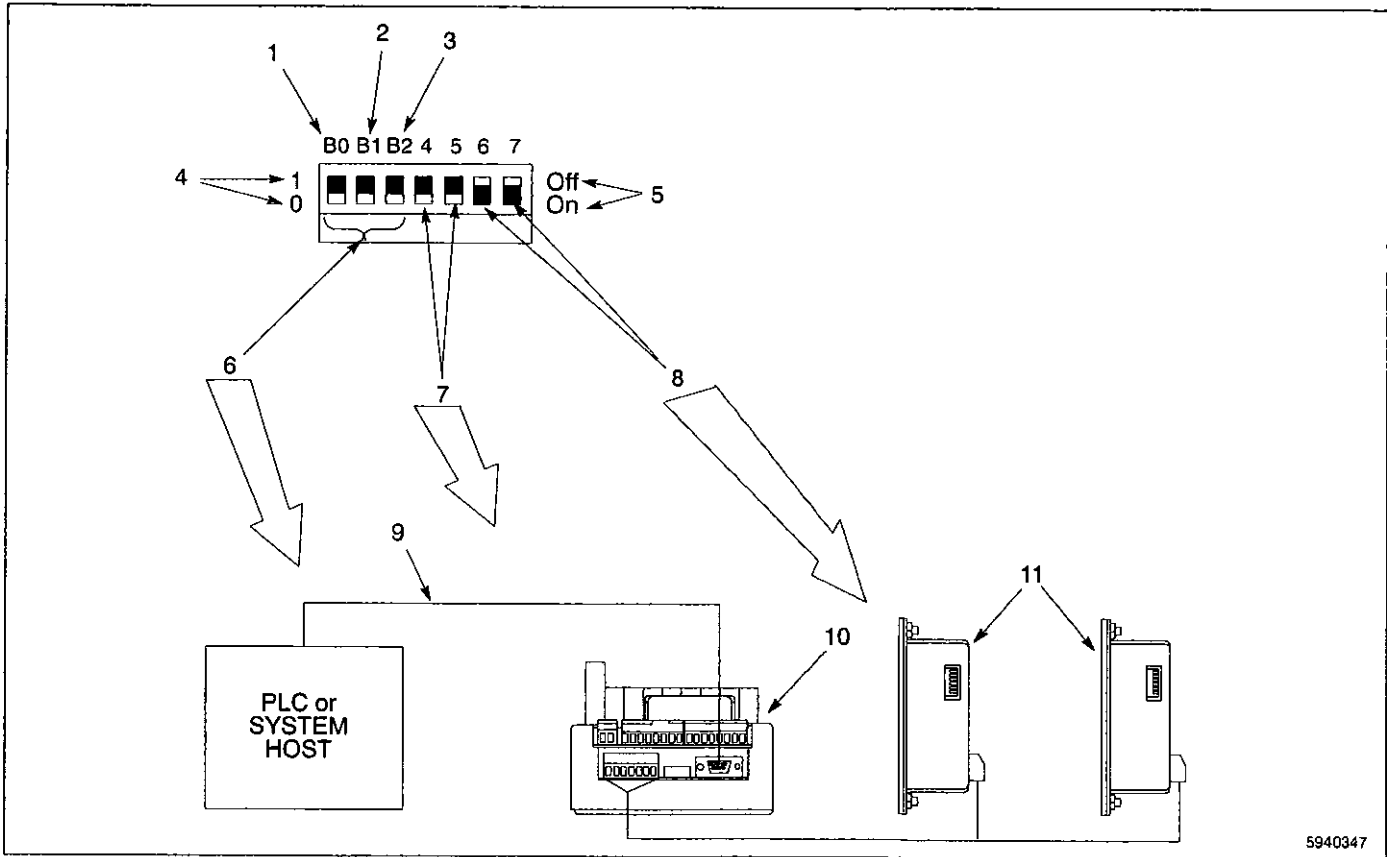
DIP Switches

Each keypad and controller has a DIP switch as shown in Figures 3-29 and 3-30.

Controller Settings

The address settings on the controller DIP switch apply to a network connecting the controller to a PLC or other system host. When the DIP switch is set to zero, the default address programmed through the COMMUNICATIONS function takes effect. Whereas the DIP switches can set a maximum address of '7', the COMMUNICATIONS function can establish much higher address numbers. These settings are not related to communications with the keypads.

Two sets of termination switches are included on the controller. One set establishes the termination value for an RS-485 network connecting the controller to a PLC or other system host. It does not apply to an RS-232 network. The other termination switches apply to the keypad network. See Figures 3-31, 3-32 and 3-33 for guidelines and sample settings.



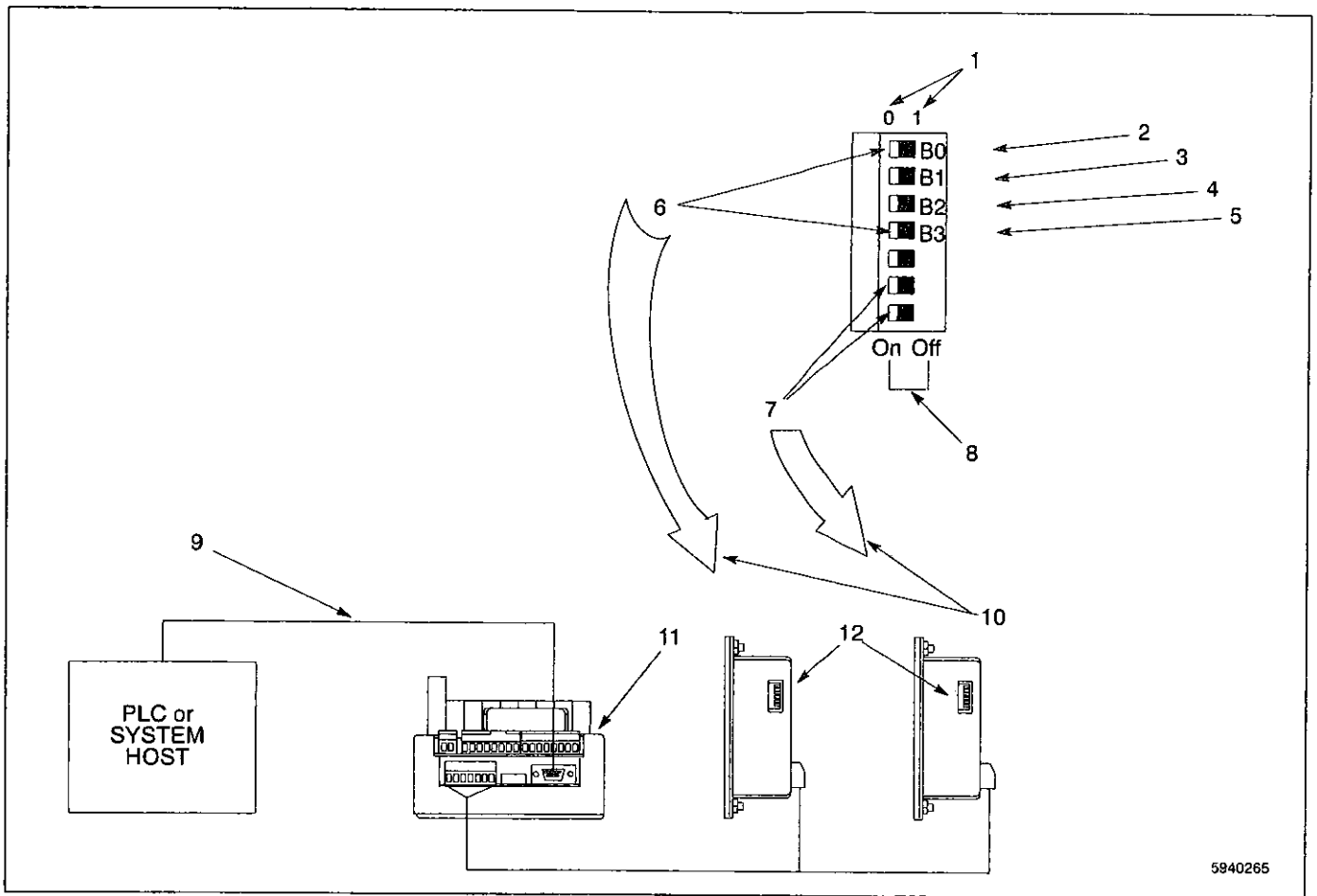
5940347

Fig. 3-29 Controller DIP Switch Identification

- | | | |
|-------------------------|--|--|
| 1. 1's Digit | 5. For Termination Settings | 8. Termination for Keypad Communications (6 and 7) |
| 2. 2's Digit | 6. Address for System Communications (B0, B1, and B2) | 9. RS-232 or RS-485 System Communications |
| 3. 4's Digit | 7. Termination for System Communications (RS-485 Only) (4 and 5) | 10. Controller |
| 4. For Address Settings | | 11. Keypads |

Keypad Settings

The address and termination settings on the keypad DIP switch apply to the RS-485 network that connects it to the controller. See Figures 3-31, 3-32 and 3-33 for guidelines and sample settings.



5940265

Fig. 3-30 Keypad DIP Switch Identification

- | | | |
|-------------------------------------|--|---|
| 1. 0's and 1's for Address Settings | 5. 8's Digit | 9. RS-232 or RS-485 System Communications |
| 2. 1's Digit | 6. Address for Keypad Communication (B0 thru B3) | 10. For RS-485 Keypad/Controller Communications |
| 3. 2's Digit | 7. Termination for Keypad Communication | 11. Controller |
| 4. 4's Digit | 8. ON/OFF for Termination Settings | 12. Keypad |

DIP Switch Guidelines

Termination:

- Termination must be "on" for devices on each end of the chain.
- Termination must be "off" for devices in the middle of the chain.
- Both termination switches in a pair must be in the same position.

Address:

- Keypad addresses must be assigned starting with '0' and increasing sequentially.
- The physical location of a keypad in the chain has no relationship to its address.

DIP Switch Guidelines (contd.)

- During initial programming, the KEYBOARD QTY function must be used to enter the number of keypads in the chain. KEYBOARD QTY can be accessed only through the keypad whose address is '0'.

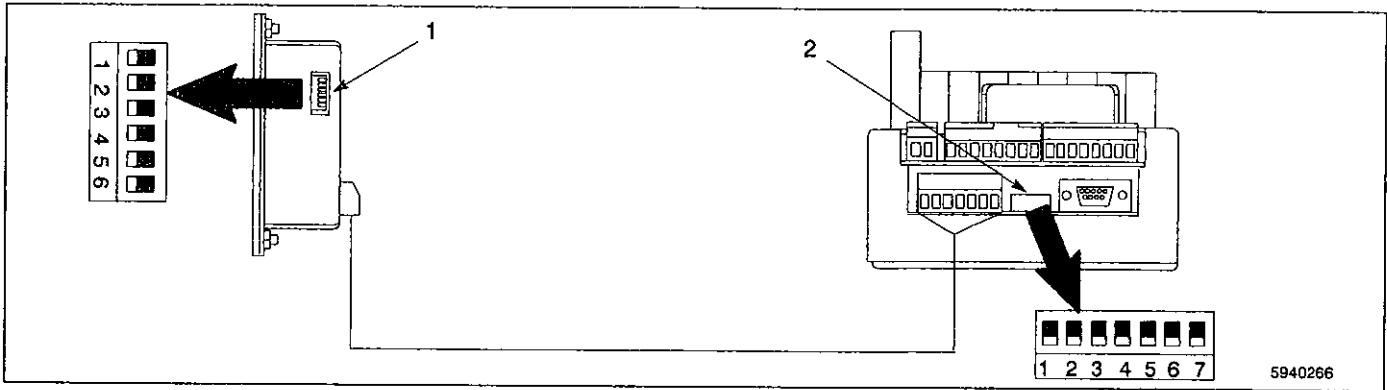


Fig. 3-31 DIP Switch Settings - One Keypad

1. Keypad DIP Switches
Termination: ON and Address: 0
2. Controller Keypad DIP Switches
Termination: ON (Switches 6 & 7)

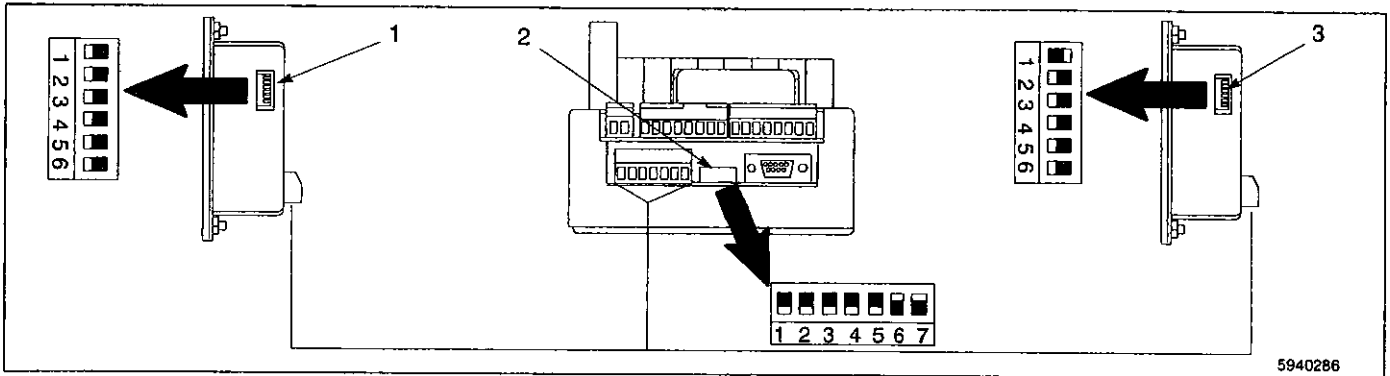


Fig. 3-32 DIP Switch Settings - Two Keypads with Controller in Middle

1. Keypad DIP Switches
Termination: ON and Address: 0
2. Controller Keypad DIP Switches
Termination: OFF (Switches 6 & 7)
3. Keypad DIP Switches
Termination ON and Address: 1

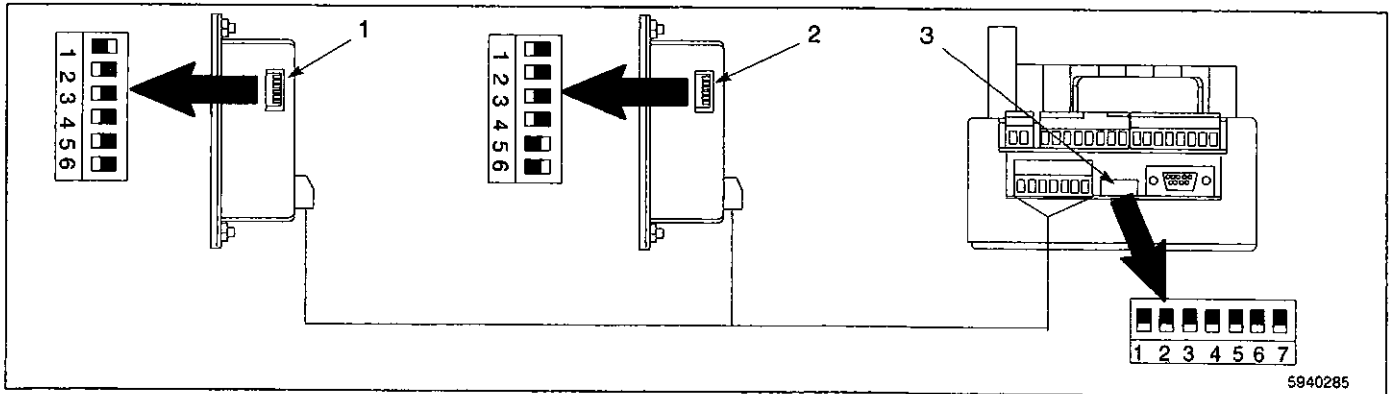


Fig. 3-33 DIP Switch Settings - Two Keypads with Controller on End

1. Keypad DIP Switches
Termination: ON and Address: 1
2. Keypad DIP Switches
Termination Off and Address: 0
3. Controller Keypad DIP Switches
Termination: ON (Switches 6 & 7)

5. Communications Wiring

If the optional communications package is purchased, follow the communications wiring steps detailed here.

NOTE: All communication set up and operation procedures are detailed in the instruction sheet provided with communication system software.

DB-9F Port

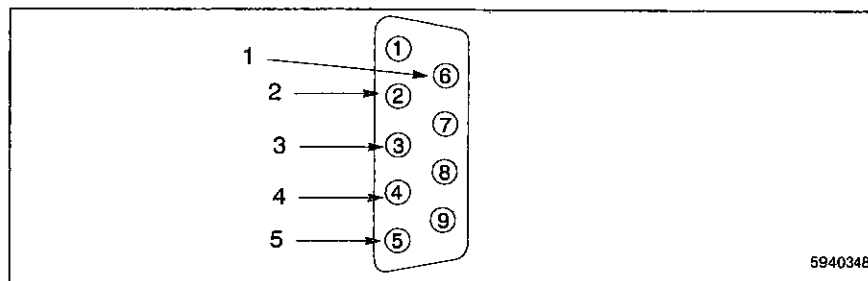
Serial communication to a PLC or other system host is provided through a DB-9 female connector. See Figures 3-11 and 3-12 for location. This connector can be wired for RS-232 or RS-485 communications.

RS-232/485 Selection

Use the COMMUNICATIONS function to select RS-232 or RS-485 communications.

RS-232

RS-232 can connect only a single PC50 Series controller to a system host.



- 1. Data Terminal Ready (Not Used)
- 2. Transmit Data to Host
- 3. Receive Data From Host
- 4. Clear to Send (Not Used)
- 5. Signal Common

Fig. 3-34 DB-9 Female Connector on Controller - RS-232 Signals

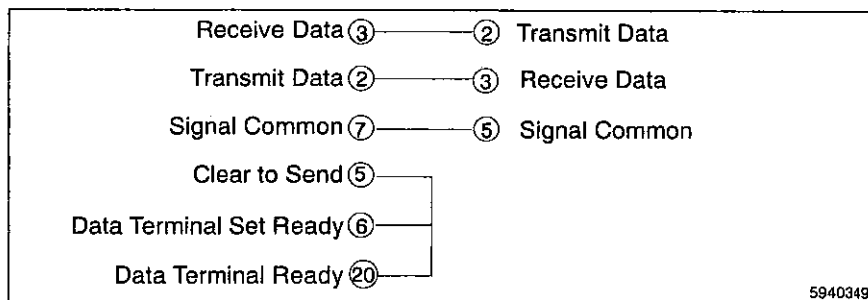


Fig. 3-35 RS-232 Cable Wiring - DB-25 (Host) to DB-9F (Controller)

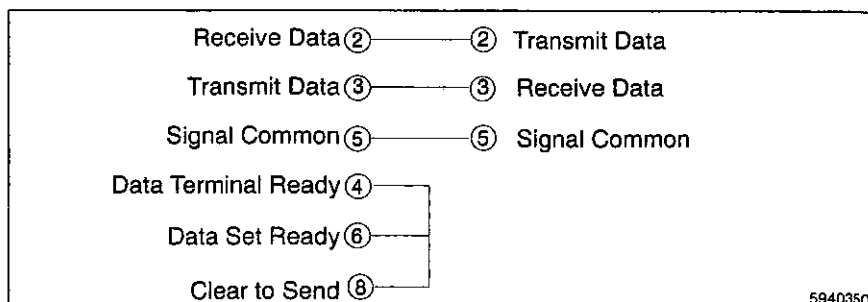


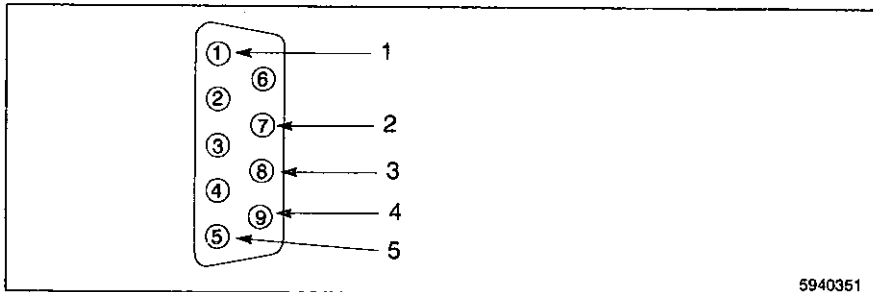
Fig. 3-36 RS-232 Cable Wiring - DB-9 (Host) to DB-9F (Controller)

5. Communications Wiring

(contd.)

RS-485

RS-485 can be used for "multi-drop" networks where more than one controller could be connected to the system host.



1. Receive Data From Host (-)
2. Transmit Data to Host (-)
3. Transmit Data to Host (+)
4. Receive Data From Host (+)
5. Signal Common

5940351

Fig. 3-37 DB-9 Female Connector on Controller - RS-485 Signals

6. Initial Programming

Bench Test

Test the PC50 Series controller, prior to installation, following the steps below:

1. Verify that output modules are plugged into the controller beginning with Position 1. See Figures 3-20 and-21.
2. Verify resolver connection. See Figure 3-5 and Figure 3-6.
3. Verify keypad/display wiring connection to the controller. See Figures 3-11 and 3-12.
4. Set the controller DIP switches 6 and 7 to "ON," as shown in Figure 3-29.
5. Set the keypad DIP switch to address '0' and termination "ON," as shown in Figure 3-30.
6. Use two jumper wires to enable Master Level programming as shown in Figure 3-27 (for sourcing) and Figure 3-28 (for sinking). These jumpers permit access to the entire menu tree. The menu tree is illustrated in Figure 4-1.
7. Verify DC input power. See Figure 3-10.

NOTE: Factory default for the PC54 is for all outputs to be in Mode 2.

NOTE: Supply a trigger for the PC54 input terminals 1 and/or 2. See Table 2-1. Since only 2, 3, and 5 Operating Modes are available on the PC54, an input signal is required to test the controller.

When experimenting with the controller, note that the LED on an output module lights 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.

6. Initial Programming

(contd.)

Machine Setup

After installing the unit, program the following set up information into the controller before attempting any other programming:

Information	Menu Selection
Direction of Rotation	INCREASING DIR
Scale Factor	SCALE FACTOR
Shaft Position	SHAFT POSITION
No. of Keypads	KEYBOARD QTY
No. of Run Up Outputs	RUN UP QTY
No. of Output Groups	OUTPUT GROUPS
Modes for Output Groups	OUTPUT GROUPS
Group Display Mode	GRP POS DISP
Group Offsets	OFFSET

Once this information is entered, setpoints can be established and modified in the groups and output channels.

Section 4

Programming

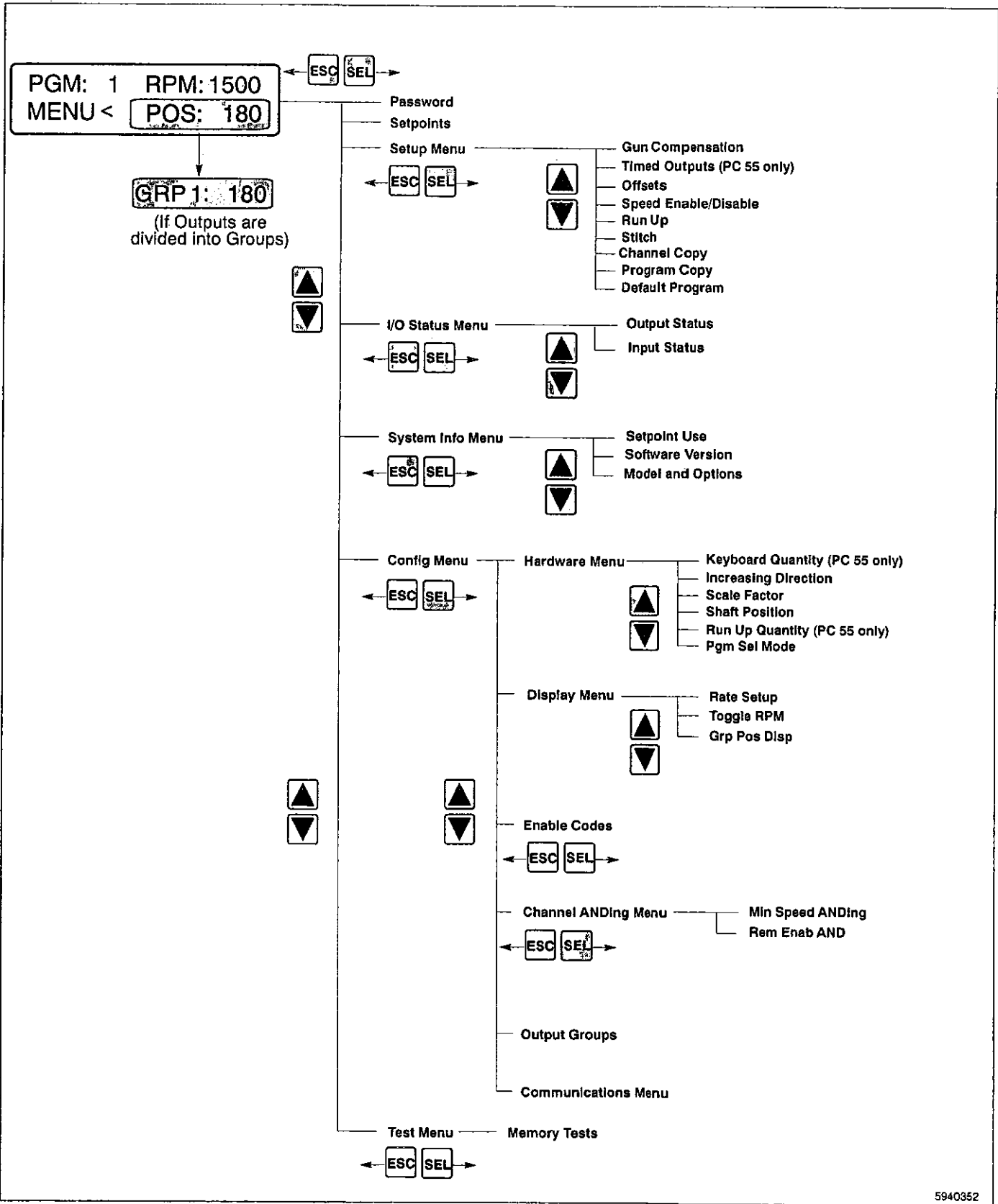
Section 4 Programming

1. Introduction

This section provides the basic steps required for programming PC50 Series controllers. Explanations for controller functions and capabilities are provided in Section 3, *Description*. PC50 Series controller installation and initial testing is provided in Section 3, *Installation*.

Review the menu tree prior to programming the controller. Programming steps have a menu path description, but following the menu tree illustration is helpful while scrolling to the programming selection.

Although sample screens are provided with many of the programming steps, sample screens are not provided for each step. Typically, those functions requiring only one screen for data display or data entry do not have a screen illustration.



5940352

Fig. 4-1 PC50 Series Controller Program Menu Tree

2. Initial Programming
(contd.)

Specific set up information, generally related to controller firmware and system interface physical characteristics must be initially programmed into the controller before other system configuration information can be entered.

Follow the Menu Tree while performing programming functions. Initial programming dictates starting at the main screen, scrolling down to the CONFIGURATION (CONFIG) MENU, then selecting the HARDWARE MENU. Selections in the HARDWARE MENU provide the basis for system set up.

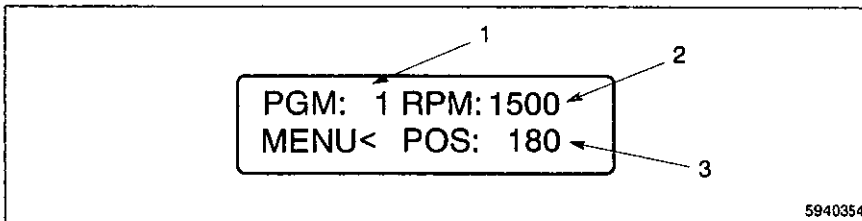
NOTE: Not all programming and/or operator interface screens are illustrated. Only multi-step screens or multiple screens within a procedure are presented.

Main Screens

On power-up, or after five minutes of keypad inactivity, the controller displays one of two main screens. The screen that is displayed depends on whether one, or multiple, output groups are programmed and whether each output group has its own position in the machine cycle or if all groups share one position in the machine cycle.

NOTE: Group Position Display (GRP POS DISP) programming determines the main screen that is displayed.

- One Output Group, and GRP POS DISP set to "One" or "Each"
- Multiple Output Groups, and GRP POS DISP set to "One"

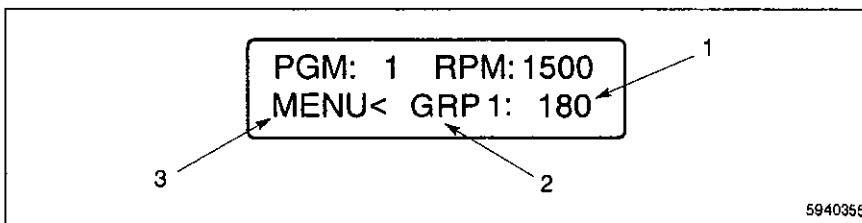


- 1. Active Program
- 2. Machine Speed
- 3. Machine Position

Fig. 4-2

NOTE: Machine position, (item 3 in Figure 4-2), is equal to the machine shaft position plus the Group Offset.

- Multiple Output Groups and GRP POS set to "Each"



- 1. Group Position
- 2. Group Selection
- 3. Menu Tree Entry

Fig. 4-3

NOTE: For Operating Modes 1 or 2, position (item 1 in Figure 4-3), is equal to the Preset plus the change since last reset. For Operating Modes 0, 3, 4, or 5, position (item 1, Figure 4-3), is equal to the shaft position plus the Group Offset.

Main Screen (contd.)

Active Program

The PC54 controller can store 16 programs in its memory. The PC55 is capable of storing 64 programs in its memory. The “active program” (item 1, Figure 4-2) is the program currently controlling the output channels.

If hardware inputs, such as Nordson’s program enable and program select switches, are being used to select the Active Program, the display indicates the program selected by the inputs. If all hardware inputs are off, the active program is the DEFAULT PROGRAM specified through the DEFAULT PROGRAM function.

NOTE: *Controller Input Wiring* in Section 3, *Installation* provides information on using hardware inputs to select the Active Program. Section 8, *Options* provides instructions for installing Nordson’s program enable and program select switches.

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

Machine Speed

When the machine is moving, Machine Speed (item 2, Figure 4-2) 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

Enter the Menu Tree from the Main Screen by moving the cursor to “MENU”, then pressing the SEL key.

See also DEFAULT PROGRAM, RATE SETUP, TOGGLE RPM, OFFSETS and GRP POS DISP

Password

Menu Path

At the MAIN SCREEN:

- Press SEL.
- Scroll down to PASSWORD. Press SEL.

The screen displays the current programming access level and provides an area to enter a password. Press SEL to toggle between the access levels. Use the numeric keys, followed by ENT, to enter the password number code. Programming levels are activated (or "enabled") by entering the password or by activating Terminals E1 and E2 on the back of the keypad. (See Figures 3-26, 3-27, and 3-28).

Figure 4-34 provides a summary of programming functions available to the different levels. Codes corresponding to each level are established in the ENABLE CODES screen.

Entering a Password

Enter a password through the numeric keypad, followed by ENT. As the number keys are pressed, dashes replace the asterisks. If a mistake is made, pressing CLR erases the last key pushed.

If a password is entered that has been programmed through ENABLE CODES, the keypad functions at the corresponding programming level.

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 which ever is greater.

Clearing a Password

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

A keypad left unattended with an active password automatically clears the access code after five minutes of keypad inactivity. The keypad reverts to the "Normal Display" mode shown in Figure 4-34.

See also CONFIGURATION MENU and ENABLE CODES later in this section for Password set up information.

Hardware Menu

Initial programming of the controller begins with selections in this menu. Upon completion, other items are programmed through the CONFIGURATION MENU. PASSWORDS and SETPOINTS are other programmed selections, but are selections off the main menu tree.

Keyboard Quantity

The KEYBOARD QTY screen shows the number of keypads with which the controller will communicate.

NOTE: The P55 controller can be provided with an additional keyboard, the PC54 controller cannot.

Menu Path

At the MAIN SCREEN:

- Press SEL.
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to HARDWARE MENU. Press SEL.
- Scroll down to KEYBOARD QTY. Press SEL.

The controller attempts 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 Figures 3-31, 3-32, and 3-33.

NOTE: Changing the number of keypads shown in KEYBOARD QTY can only be done from the keypad whose address is '0'.

NOTE: 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.

Hardware Menu (contd.)**Increasing Dir****Menu Path**

At the MAIN SCREEN:

- Press SEL.
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to HARDWARE. Press SEL.
- Scroll down to INCREASING DIR. Press SEL.

The Increasing Direction screen displays the direction of resolver rotation, clockwise (CW) or counter-clockwise (CCW), as viewed from the shaft end, that causes the position display to increase in value.

Whether CW or CCW, the position value should increase as the machine turns in its forward direction.

Changing Direction

Pressing SEL toggles the value of increasing direction. The new value begins flashing. Pressing the ENT key confirms the selection.

Scale Factor**Menu Path**

At the MAIN SCREEN:

- Press SEL.
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to HARDWARE MENU. Press SEL.
- Scroll down to SCALE FACTOR. Press SEL.

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.

NOTE: The scale factor on PC54 controllers ranges from 2-1024. PC55 controllers have a scale factor ranging from 2-4096.

NOTE: When the scale factor is changed, all programmed setpoints are recalculated, converting them to the new scale factor. The keypad/display is inoperative until the calculations are complete.

Hardware Menu (contd.)

Shaft Position

Menu Path

At the MAIN SCREEN:

- Press SEL.
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to HARDWARE MENU. Press SEL.
- Scroll down to SHAFT POSITION. Press SEL.

Because PC50 Series controllers are programmable devices, they 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.

Programming

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

NOTE: Set SHAFT POSITION before doing any SETPOINT or OFFSET programming.

Hardware Menu (contd.)**Run Up Qty**

NOTE: PC54 controllers can have 0, or 1 optional Run Up module.
PC55 controllers can have 0, 1, or 2 optional Run Up modules.

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to HARDWARE MENU. Press SEL.
- Scroll down to RUN UP QTY. Press SEL.

This screen displays the number of RUN UP outputs being programmed into the controller.

Programming

Use the numeric keys to enter '0', '1,' or '2' for the number of modules installed in the controller. Run Up output module(s) are required to generate the Run Up output signal(s).

Each output can be offset and scaled by different values. See RUN UP OUTPUT for details.

See also RUN UP OUTPUT and OUTPUT STATUS

Hardware Menu (contd.)

Pgm Sel Mode

Menu Path

At the MAIN SCREEN:

- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to HARDWARE. Press SEL.
- Scroll down to PGM SEL MODE. Press SEL.

This screen allows you to specify the format for the hardware Program Select inputs on:

- PC55 - Terminals 1 through 8 of Terminal Block 3 (TB3).
- PC54 - Terminals 3 through 6 of Terminal Block 1 (TB1).

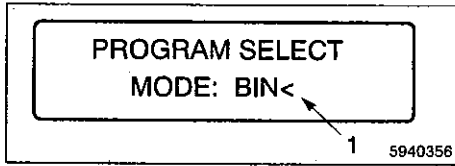


Fig. 4-4 Program Select Screen
1. Format Selection

See Figures 3-13 through 3-16.

The Program Select inputs can operate in Binary, BCD or Gray Code formats as shown in Figures 3-18 and 3-19.

Use the SEL key to toggle the input format.



WARNING: If the input signals controlling program selection are lost due to a malfunction, the DEFAULT PROGRAM activates. To prevent sudden changes in machinery operation that may damage equipment or injure personnel, program the DEFAULT PROGRAM with settings that will not cause harm in the event of sudden activation.

See also DEFAULT PROGRAM

Setpoints

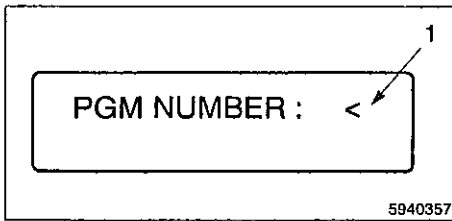


Fig. 4-5 Setpoints Preliminary Screen

1. Program to View/Modify

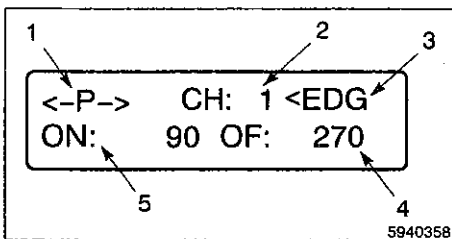


Fig. 4-6 Active Program Display

1. <-P-> for Multiple Pulses (Blank if Only 1 Pulse in Display)
2. Channel
3. Pulse Mode
4. OFF Setpoint
5. ON Setpoint

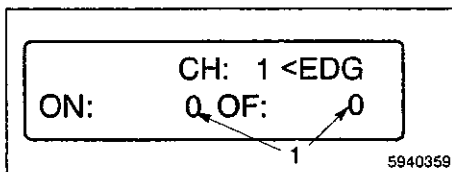


Fig. 4-7 Channel Display

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to SETPOINTS. Press SEL.

When SETPOINTS is selected, a preliminary screen specifies which program's setpoints will be programmed.

Although the active program is displayed, 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.

Channel to Edit

Use the numeric keypad and ENT to select the channel to program.

NOTE: PC54 controllers have 1-9 channels available; PC55 controllers have 1-17 channels available.

Setpoint Values

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

- If a channel has more than one duration, you may view the other durations by pressing the right cursor key when viewing the OFF setpoint, or by pressing the left cursor key when viewing the ON setpoint.
- If a channel contains no durations, the ON and OFF setpoints are '0'. (item 1)
- If a channel is always on, both the ON and OFF setpoints are '1'.

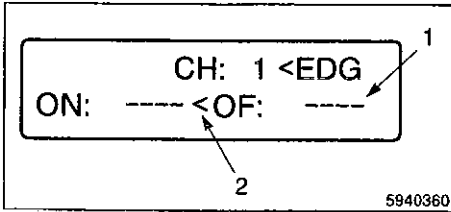
Setpoints (contd.)

Fig. 4-8 Adding Durations

Adding a Duration

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

The display changes to show blank ON and OFF (item 1) setpoints; the cursor (item 2) will point to the ON setpoint. Enter the ON setpoint through the numeric keypad, then press the ENT key or the right cursor to move to the OFF setpoint. Enter the OFF setpoint through the numeric keypad, then press the ENT key.

Adding Multiple Durations

If ON and OFF setpoints for a duration are visible on the screen and SEL is pressed to program a new duration, the original duration remains in the output channel. If the ON or OFF setpoints being entered overlap an existing duration in the channel, "Error: Duration Overlap" is displayed on the screen.

- To abort entering a duration at any time, press ESC.

Changing Setpoints

Change a setpoint value by entering a new value using the numeric keys, followed by ENT, or increase/decrease the setpoint value with the INC and DEC keys.

Duration Modes

The Duration Mode controls how the INC and DEC keys modify setpoints. There are three modes; EDG (edge), DUR (duration), and CHN (channel.)

Change the Duration Mode by pressing the SEL key when the cursor points to the Duration Mode.

- In EDG mode, the INC and DEC keys affect the selected ON or OFF setpoint only.
- In DUR mode, both ON and OFF setpoints are incremented or decremented simultaneously.
- In CHN mode, all ON and OFF setpoints for all durations in the channel are incremented or decremented simultaneously.

Setpoints (contd.)

Deleting a duration - Delete a duration by making ON equal to OFF, or vice versa.

- If there is more than one duration in the channel, the next duration appears in the ON/OFF setpoint area.
- If the channel has no more durations, the ON and OFF setpoints are both zero.

Clearing a Channel - Clear a channel of all durations by entering a new duration 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 duration with both ON and OFF values equal to '1'.

Record Setpoints - Record setpoints as they are established for each program.

NOTE: For most installations, before programming setpoints, it is best to set SHAFT POSITION to zero at the start of a machine cycle. This allows jogging the machine to various points in the machine cycle where output channels must turn on or off. The operator then notes these machine positions on the controller display and enters the positions into setpoint programming. Setpoints programmed in this manner relate directly to the machine position. If setpoints are programmed before SHAFT POSITION is set, and SHAFT POSITION subsequently changes, the setpoints no longer correlate with the machine's zero position.

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

2. Set-Up Menu

Gun Compensation

Menu Path

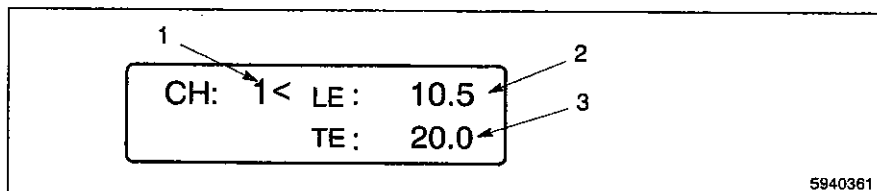
At the MAIN SCREEN:

- Press SEL
- Scroll down to SETUP MENU. Press SEL.
- Scroll down to GUN COMP. Press SEL.

Adhesive application peripheral devices, such as pneumatic gun solenoids and electric gun drivers, require a fixed amount of time to perform their function. As a parent machine speeds up, these devices require earlier actuation in the cycle in order to perform at the required time. Gun compensation automatically advances the On/Off setpoints of specified output channel(s) as the parent machine speeds up, maintaining proper synchronization at all speeds.

PC50 Series controllers can be programmed with pull in/drop out compensation, so that the ON and OFF edges in a channel can have different gun compensation values.

When GUN COMP MODE is selected, the data entry screen illustrated in Figure 4-9 appears.



1. Output Channel
2. Pull in (10.5 ms shown)
3. Drop out (20 ms shown)

Fig. 4-9 Pull in/Drop out Gun Compensation Screen

Gun Compensation (contd.)**Gun Comp Units**

Gun compensation is programmed by entering the on/off response times of the output device in milliseconds (0.001 Sec). The output turns on the assigned number of milliseconds before the programmed ON position is reached, and turns off the assigned number of milliseconds before the programmed OFF position is reached. As parent machine production speed increases, the number of degrees of advance automatically increases, maintaining the number of milliseconds of advance.

Programming

To change output channels, move the cursor to the channel number and enter a new channel number or use the INC or DEC keys.

To change gun comp values, use the numeric keys or INC and DEC. To enter tenths of milliseconds, use the decimal point. When entering even milliseconds, the decimal point is not needed. (For example, when "12" is entered and ENT pressed, the resulting value is 12.0.)

Negative Speed Comp

Negative values of gun compensation cause an output channel to lag its programmed machine position by the specified number of milliseconds. (See Gun Compensation in Section 2, *Description* for a detailed discussion on applying negative speed compensation.)

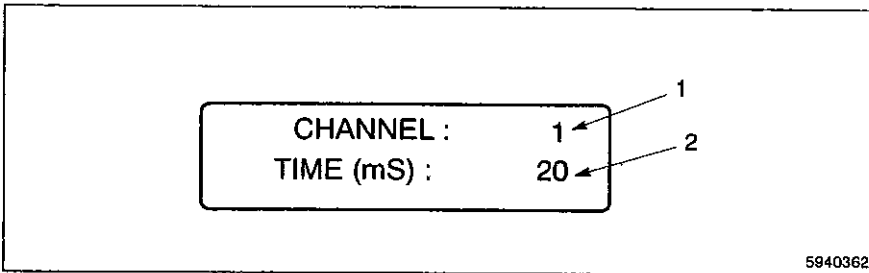
To program negative gun comp, press the +/- key after entering a number, but before pressing ENT. You may also decrement (decrease) a value below zero.

Timed Outputs (PC55 Only)**Menu Path**

At the MAIN SCREEN:

- Press SEL
- Scroll down to SETUP MENU. Press SEL.
- Scroll down to TIMED OUTPUTS. Press SEL.

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.



1. Channel
2. Time Duration

Fig. 4-10 Timed Output Screen

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

Outputs are timed in 1 millisecond (ms) increments up to a maximum of 9999 ms (9.999 seconds).

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

NOTE: If the parent machine is rotating in the reverse direction, timed outputs energize when the OFF edge of the duration occurs.

Offsets

NOTE: Group Position Display (GRP POS DISP) must be set to "EACH" to assign different offset groups through OFFSET programming.

Menu Path

At the MAIN SCREEN:

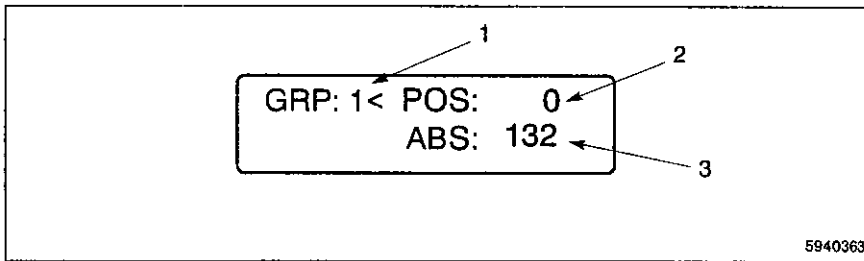
- Press SEL
- Scroll down to SETUP MENU. Press SEL.
- Scroll down to OFFSET. Press SEL.

NOTE: PC54 controllers have Operating Modes 2, 3, and 5 available. PC55 controllers have Operating Modes 0-5 available.

Offset Programming

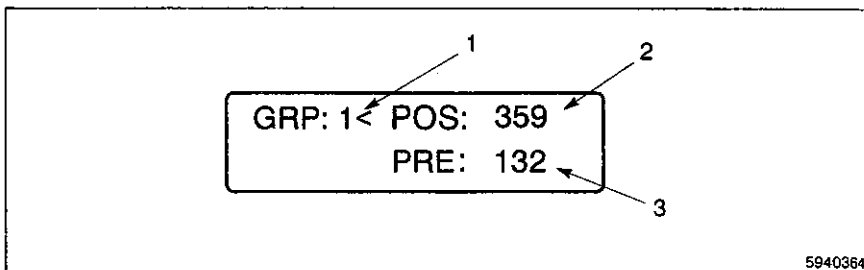
To change the offset for an Output Group in Operating Mode 0, 3, 4, or 5, first select the group by moving the cursor to GRP. Use INC or DEC, or the numeric keypad and ENT to select the Output Group.

Screens



1. Output Group
2. Group Position = Shaft Position + ABS Offset
3. Absolute Offset Value for This Group

Fig. 4-11 Offset Screen - Operating Mode 0, 3, 4 or 5



1. Output Group
2. Group Position = PRE + Change Since Last Reset
3. Group Preset Value (If Group is in Operating Mode 1 or 2)

Fig. 4-12 Offset Screen - Operating Mode 1 or 2

Offset Programming (contd.)

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 corresponding 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.

- The ABS value directly shows 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 changes all of the group positions at once. 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" immediately changes ABS for all groups to the value programmed for Group 1.

Programming Preset

To change the preset for an Output Group in Operating 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.

NOTE: 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 resets to the preset value.

See also SHAFT POSITION, GRP POS DISP, OUTPUT GROUPS

See Output Groups and Operating Modes in Section 2, *Description*.

Speed Enable/Disable

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to SETUP MENU. Press SEL.
- Scroll down to SPEED ENABLE/DISABLE. Press SEL.

SPEED ENABLE/DISABLE establishes one or two speed ranges, with low and high RPM values. The two ranges are independent of each other.

Each output channel can be ANDed with either SPEED ENABLE/DISABLE level. ANDed outputs are enabled only when the resolver speed is within the specified speed range. Output channels that are not ANDed are "on" whenever the machine position is within their programmed setpoints, regardless of machine speed.

One use of SPEED ENABLE/DISABLE and MIN SPEED ANDing is to turn off devices such as glue guns if the parent machine stops or jams.

The SPEED ENABLE/DISABLE function is used to establish one or two speed levels. Once the speed levels are programmed, use MIN SPEED ANDing to tie individual output channels to a SPEED ENABLE/DISABLE level.

The SPEED ENABLE/DISABLE screen displays the SPEED LEVEL, the LOW RPM, and the HIGH RPM.

Programming

Use the numeric keys and ENT to change values for SPEED LEVEL, LOW RPM, and HIGH RPM.

See MIN SPEED ANDing

Using Channels as Motion Detectors

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 Speed Enable/Disable level. This turns the output "on" constantly, as long as the machine speed is within the specified Speed Enable/Disable range.

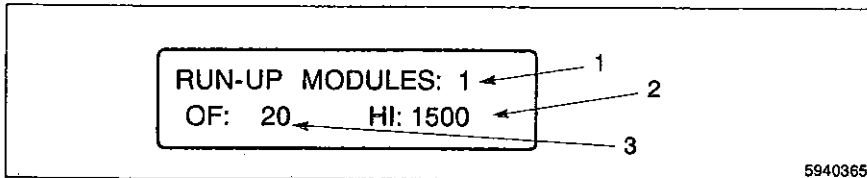
See also MIN SPEED ANDing

Run Up

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to SETUP MENU, press SEL
- Scroll down to RUN UP OUTPUT, press SEL



1. Run Up Module Number
2. Run Up High RPM
3. Run Up Offset

Fig. 4-13 Run-Up Module Screen

RUN UP output signals are linearly proportional to the resolver RPM. Two types of Run Up output modules are available: 0-10 VDC and 4-20 mA.

This function assigns OFFSET and HIGH RPM values to output positions for Run Up modules.

Module Number

The following table shows the relationship between the Run Up module number on the screen and the module position on the controller back. See Figures 3-20 and 3-21 for an illustration of Run Up module positions.

Model	Module #1 On Screen	Module #2 On Screen
PC54	Output #9	N/A
PC55	Output #17	Output #16

NOTE: RUN UP characteristics can be programmed for Modules #1 and #2 even if no Run Up modules are physically mounted on the controller. Programming can be done first, and the modules mounted later.

NOTE: To program OFFSET and HIGH RPM for Module #2 on PC55 controllers, be sure the RUN UP QTY function is set to '2'. If RUN UP QTY is set to '1', programming for Module #2 is not available.

NOTE: When two Run Up outputs are used, the two outputs can have different values for OFFSET and HIGH RPM.

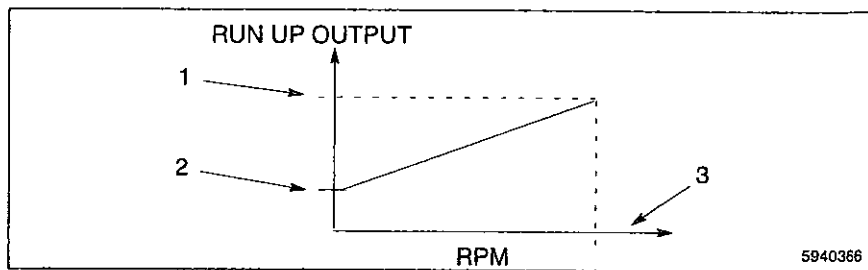
Run Up (contd.)**Module Number** (contd.)

Fig. 4-14

1. Max Output
2. Offset
3. High RPM

To program Module Number, move the cursor to "RUN UP MODULE", then use the numeric keys to enter the number of modules, then press ENT.

High RPM

Run Up High RPM is the resolver speed at which full scale output occurs. High RPM is programmed in whole RPM. When this speed is reached, the Run Up output signal level is at full scale (10 VDC or 20 mA). Increasing speed beyond the High RPM will not increase the RUN UP output beyond full scale.

To program High RPM, move the cursor to "Hi" and enter the number using the numeric keys, then press ENT.

Offset

Run Up Offset is the signal level output when the resolver is at zero RPM. This allows the minimum signal to be greater than zero volts or 4 mA.

NOTE: PC50 Series controllers have 4096 increments of Run Up signal level available.

The offset is specified as the number of signal increments that should be output at zero RPM.

Calculate Run Up Offset values as follows:

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

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

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

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

To program RUN UP Offset, move the cursor to "Of", use the numeric keys to enter the calculated Offset value, then press ENT.

See OUTPUT STATUS

Stitch**Menu Path**

At the MAIN SCREEN:

- Press SEL
- Scroll down to SETUP MENU. Press SEL.
- Scroll down to STITCH. Press SEL.

Stitch allows programming a series of durations into a channel without having to enter On and Off setpoints for each duration. The Stitch function prompts for the beginning and ending setpoints for the durations (individual stitches within the pattern); the number of durations per stitch pattern; and the length of time for each duration. Stitch then divides the designated portion of the resolver cycle into the specified number of stitch durations, evenly dividing the unused portion of the segment between the durations.

Programming

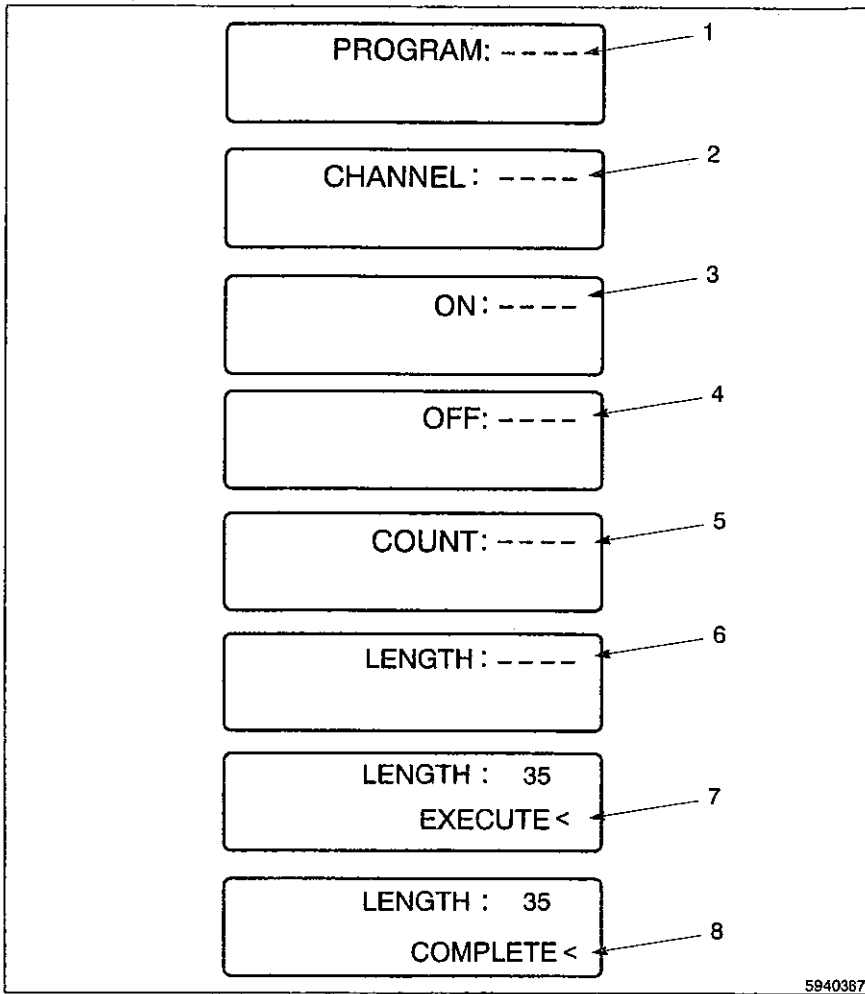
Example - Generate a stitch pattern as follows:

DURATION	ON	OFF
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 duration is 50 increments wide, separated from the next duration by 50 increments.

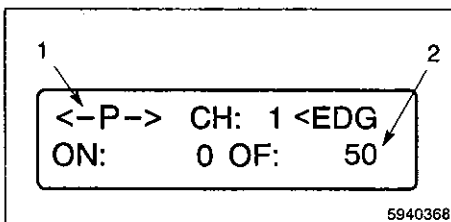
Programming (contd.)

The STITCH function requires navigating through eight screens. Figure 4-15 illustrates the screens and the captions explain each step.



1. Program to Add Stitch Pattern to:
Enter Number, Then SEL to Go to Next Screen
2. Channel to Add Stitch Pattern to:
Enter Number, Then SEL to Go to Next Screen
3. "On" Time of Leading Edge of First Duration:
Enter Number, Then ENT and SEL to Go to Next Number
4. OFF Time of Trailing Edge of Last Duration:
Enter Number, Then ENT and SEL to Go to Next Screen
5. Total Number of Durations to be Added:
Enter Number, Then ENT and SEL to Go to Next Screen
6. Length of Each Duration to be Added:
Enter Number, Then ENT and SEL to Go to Next Screen
7. Move Cursor to EXECUTE, Then Press SEL to Generate Stitch Pattern. To Review Values Before Executing, Move Cursor to Top Row and Press SEL as Needed.
8. COMPLETE Indicates Stitch Pattern Has Been Generated.

Fig. 4-15



After completing the programming, go to SETPOINTS to confirm the Stitch pattern.

Fig. 4-16 Stitch Verification

1. <-P-> Indicates Multiple Durations in Channel
2. Move Cursor to OF and Use Arrow Keys to Review Duration Setpoints.

Channel Copy

Menu Path

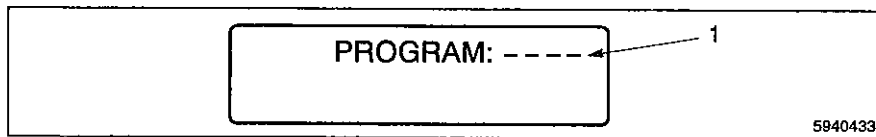
At the MAIN SCREEN:

- Press SEL
- Scroll down to SETUP MENU. Press SEL.
- Scroll down to CHANNEL COPY. Press SEL.

Channel Copy allows copying all of the durations from one channel to another in the same program.

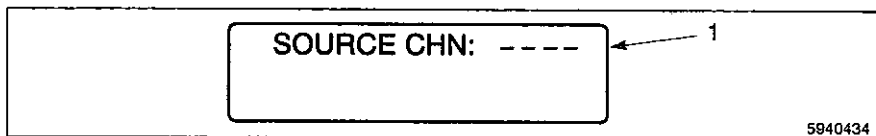
This function is especially useful for cartoning or other applications where complex patterns must be applied to parallel flaps as cartons travel past the guns.

The Channel Copy function consists of five screens:



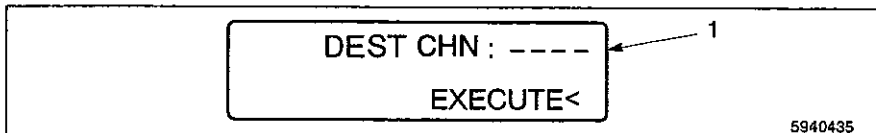
1. Program Containing Channel to Copy. Enter Number, Press ENT, then SEL

Fig. 4-17



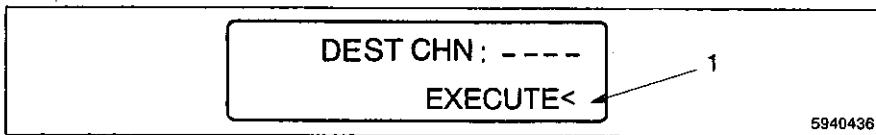
1. Channel Being Copied From. Enter Number, Press ENT, then SEL

Fig. 4-18



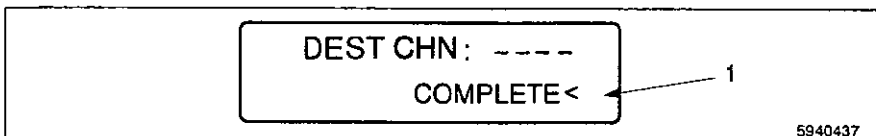
1. Destination Channel Being Copied to. Enter Number, Press ENT, then SEL

Fig. 4-19



1. Move Cursor to Execute, then Press SEL

Fig. 4-20



1. COMPLETE indicates Channel Information Successfully Copied

Fig. 4-21

Program Copy

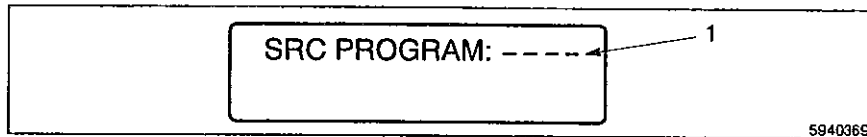
Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to SETUP MENU. Press SEL.
- Scroll down to PGM COPY. Press SEL.

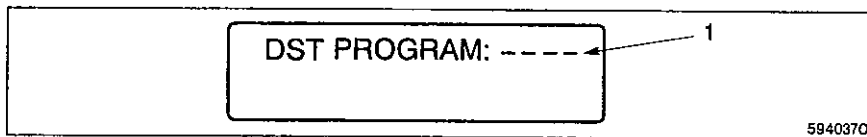
Program Copy allows copying all of the channels and setpoints from one program to another. It is often easier to copy an existing program, and then modify it, than to enter new programs from scratch.

The Program Copy function consists of four screens:



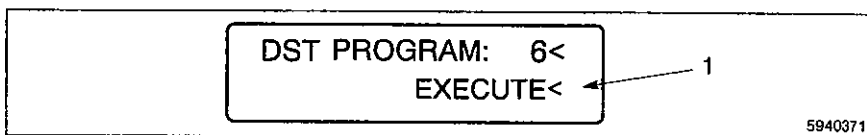
1. Program to be Copied From

Fig. 4-22



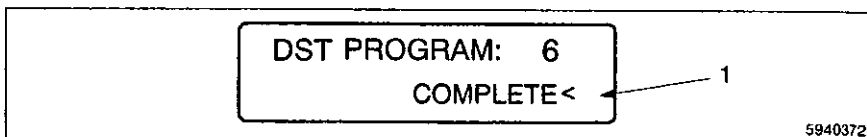
1. Destination Program to be Copied to

Fig. 4-23



1. Move cursor to Execute, then press SEL to copy program

Fig. 4-24



1. Complete indicates Program successfully copied

Fig. 4-25

Programming

Use the numeric keys and SEL to enter program numbers.

During programming, the cursor keys allow movement between the Source and Destination screens and allow value changes before selecting EXECUTE.

Default Program

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll to SETUP MENU. Press SEL.
- Scroll to DEFAULT PROGRAM. Press SEL.

The Default Program is the program that controls the output channels when terminals 3-6 of TB 1 on the PC54 or terminals 1-8 of TB 3 on the PC55 (Program Select terminals) are "off". See Figures 3-13 and 3-14.

NOTE: The PC54 controller can store 16 programs in its memory. The PC55 is capable of storing 64 programs in its memory.

The Active Program is the program number currently controlling the output channels. If there are program select inputs on TB 1 or TB 3, those inputs determine the Active Program, and the Default Program is ignored. If no hardware inputs are "on", the Default Program becomes the Active Program.

For installations where the program select inputs on TB 1 or TB 3 are not used, the Default Program is always the Active Program.

Programming

Use the numeric keys to enter the number of the program designated as the Default program, then press ENT.



WARNING: If hardware input signals are used to select the Active Program, and those signals are lost due to a malfunction, the Default Program activates. To prevent sudden changes in machinery operation that may damage equipment or injure personnel, program the Default Program with settings that will not cause harm in the event of sudden activation.

See also PGM SEL MODE

3. Input /Output Status Menu

Output Status

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to I/O STATUS MENU. Press SEL.
- Scroll down to OUTPUT STATUS. Press SEL.

The screen(s) display the On/Off state of the output channels. The 0 indicates Off; the 1 indicates On.

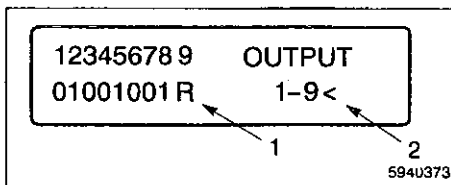


Fig. 4-26 PC 54 Output Status Screen (1 Screen)

1. Output On/Off Status Line
2. Output Numbers 1-9

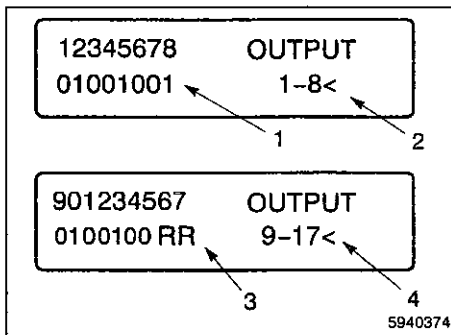


Fig. 4-27 PC55 Output Status Screens (2 Screens)

1. Output On/Off Status Line
2. Output Numbers 1-8
3. Output Numbers 9-17

Change the set of outputs displayed by pressing the SEL key.

NOTE: If any output positions have been programmed as Run-Up outputs, the On/Off status shows 'R' instead of '0' or '1'.

NOTE: Output numbers 9-17 are outputs for the PC55 controller, and are not available on the PC54 controller.

Forcing Outputs

Forcing outputs allows forcing an output on or off for diagnostic purposes.

NOTE: When leaving the Output Status screen, remember that any forced outputs return to their original programmed state.

Programming

Press the left arrow to access Output 1, causing the '0' to blink. Press SEL to turn this output on. The '0' changes to a '1'. Select other desired outputs by pressing the left or right arrows. If the output is already on, a '1' is displayed instead of a '0'. The '1' changes to a '0' when the output is forced.

Press ESC to return to output number selection. Outputs remain forced until you leave the Output Status screen. Press SEL to access Outputs 9-17 on the PC55.

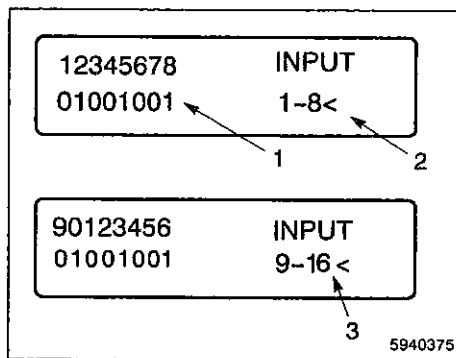
3. Input/Output Status Menu (contd.)

Input Status

Menu Path

At the MAIN SCREEN

- Press SEL
- Scroll down to I/O STATUS MENU. Press SEL.
- Scroll down to INPUT STATUS. Press SEL.



The input status screen displays the On/Off status of the DC inputs on Terminal Blocks TB 1 and TB 3 (for PC55 controllers only), (see Figure 3-13 and Figure 3-16).

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. The 0 indicates Off; the 1 indicates On.

Selecting Inputs

View inputs 1-8 (for PC54 and PC55 controllers).

Fig. 4-28 Input Status Screens

1. Input On/Off Status Line
2. Input Numbers 1-8
3. Input Numbers 9-16 (PC55 only)

NOTE: On PC55 controllers only, inputs 9-16 may be viewed by pressing the SEL key to toggle between the two groups of inputs.

4. System Info Menu

Setpoint Use

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to SYSTEM INFO MENU. Press SEL.
- Scroll down to SETPOINT USE. Press SEL.

The Setpoint Use screen displays:

- the total number of setpoint On/Off pairs, or "durations" available for programming
- the number of durations that have been programmed

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

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

Values cannot be changed in this screen.

Firmware Version

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to SYSTEM INFO MENU. Press SEL.
- Scroll down to FIRMWARE VERSION. Press SEL.

The Firmware 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.

Values cannot be changed in this screen.

5. Config Menu

Sub-menus falling under the CONFIG MENU include: HARDWARE MENU, DISPLAY MENU, ENABLE CODES, CHN ANDING MENU, OUTPUT GROUPS and COMMUNICATIONS MENU. Many of these sub-menus require access only during original controller programming.

Hardware Menu

Selections within the HARDWARE MENU were provided earlier in this section under *Initial Programming*

Display Menu

RATE SET UP

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to DISPLAY MENU. Press SEL.
- Scroll down to RATE SETUP. Press SEL.

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

- Rate—The ratio of displayed RPM to actual resolver RPM. This ratio is a fraction consisting of a multiplier (MPY) (item 1, Figure 4-29) over a divider (DIV) (item 4, Figure 4-29).
- Units— (item 3, Figure 4-29) 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).
- Decimal Points—The controller divides the Rate by 1, 10, 100, or 1000 to display 0, 1, 2, or 3 decimal places, respectively (item 2, Figure 4-29).

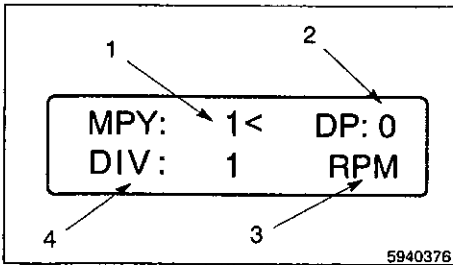


Fig. 4-29 Rate Setup Screen

Display Menu (contd.)

RATE SET UP (contd.)

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	0.5	100 RPM	50 RPM
1	2	1	0.5	100 RPM	5.0 RPM
1	2	2	0.5	100 RPM	0.50 RPM
1	2	3	0.5	100 RPM	0.050 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	0.100 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	0.200 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.

Display Menu (contd.)

TOGGLE RPM

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to DISPLAY MENU. Press SEL.
- Scroll down to TOGGLE RPM. Press SEL.

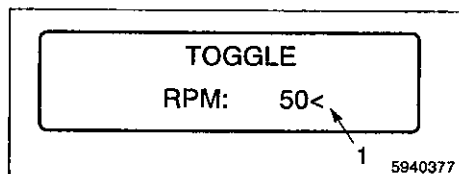


Fig. 4-30 Toggle RPM Screen

1. Toggle RPM (resolver RPM)

After a certain speed the Position digits scroll too fast to read. Toggle RPM allows setting the resolver rpm at which the Position display on the Main Screen disappears. At speeds below the Toggle RPM setting, the Position display is visible; at speeds above the Toggle RPM setting, the Position does not display.

Programming

Use the numeric keys and ENT to enter an RPM setting at which Position display will blank out. Use INC and DEC to change an existing value.

Display Menu (contd.)

GROUP POSITION DISPLAY

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to DISPLAY MENU. Press SEL.
- Scroll down to GRP POS DISP. Press SEL.

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 in Operating 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 Operating Mode 1 or Mode 2.

Screen

In the Group Position Display Mode:

- EACH = Each Output Group has its own offset value.
- ONE = One value of Offset is shared by all Output Groups.

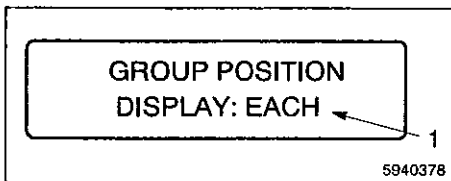


Fig. 4-31 Group Position Display Screen

1. Group Position Display Mode

The value selected in the Group Position screen (illustrated in Figure 4-31) determines the appearance of the main screen illustrated in Figure 4-32 and described in the illustration captions.

- One Output Group, and GRP POS DISP set to "One" or "Each"
- Multiple Output Groups, and GRP POS DISP set to "One"

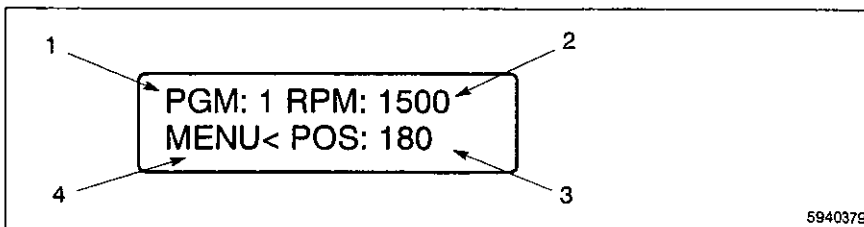


Fig. 4-32

- 1. Active Program
- 2. Machine Speed
- 3. Machine Position = Shaft Position + Offset
- 4. To enter Menu Tree, press SEL when cursor is here

Display Menu (contd.)

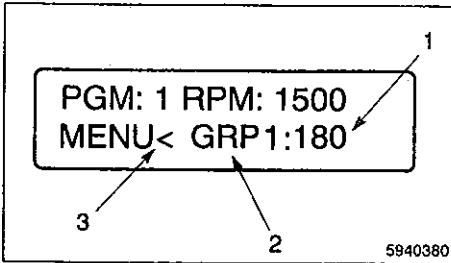


Fig. 4-33

GROUP POSITION DISPLAY (contd.)

- Multiple Output Groups, and GRP POS DISP set to "Each"

For item 1 in Figure 4-33, in Operating Mode 1 or 2, Position equals:

Preset + change since last reset

In Operating Mode 0, 3, 4, or 5, Position equals:

Shaft Position + Group Offset

Item 2 in Figure 4-33, is the Group number. To change the Group number, put the cursor in that location and press SEL.

To enter the Menu Tree (item 3, Figure 4-33) put the cursor at MENU and press SEL.

Programming

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

NOTE: GRP POS DISP must be set to "EACH" to assign different offsets to groups through OFFSET programming.

NOTE: If groups have been assigned different offsets through OFFSET programming, setting GRP POS DISP to "ONE" immediately changes the individual group offsets to the value of Group 1.

Enable Codes

Menu Path

At the MAIN SCREEN:

- Press SEL. Scroll down to CONFIG MENU. Press SEL.
- Scroll down to ENABLE CODES. Press SEL.

PC50 Series controllers have two levels of programming access: OPERATOR and MASTER, in order of increasing capabilities.

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 illustrated in Figures 3-27 and 3-28. The chart in Figure 4-34 indicates what items can be accessed or viewed from the Operator level and the Master level.

Programming

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

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

Each programming level can have only one password. That password is stored in the controller and applies to all keypads connected to that controller.

If a password is entered into a keypad that has a programming terminal energized, the access level will be the higher 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. One keypad may be Operator enabled, while the other keypad may be Master enabled.

Programming Access Levels for Various Menu Items

	Programming Level		
	Normal Display	Operator	Master
Can Be Enabled By . . .			
Keypad Terminal Password	---	Yes (E 2) Yes	Yes (E1) Yes
Menu Item Access			
Password	Enter	Enter	Enter
Setpoints	View	Program	Program
Setup Menu			
Gun Comp	View	Program	Program
Timed Outputs (PC55 Only)	View	Program	Program
Offsets	View	Program	Program
Speed Enable/Disable	View	Program	Program
Run-Up	View	Program	Program
Stitch	---	---	Program
Channel Copy	---	---	Program
Program Copy	---	---	Program
Default Program	View	Program	Program
I/O Status Menu			
Input Status	View	View	View
Output Status	View	View	View
System Info Menu			
Setpoint Use	View	View	View
Firmware Version	View	View	View
Model & Options	View	View	View
Config Menu			
Hardware Menu			
Keyboard Qty (PC55 Only)	---	---	Program ¹
Increasing Dir	---	---	Program
Scale Factor	---	---	Program
Shaft Position	---	---	Program
Run-Up Qty	---	---	Program
Pgm Sel Mode	---	---	Program
Display Menu			
Rate Setup	---	---	Program
Toggle RPM	---	---	Program
Grp Pos Disp	---	---	Program
Enable Codes			
Chn ANDing Menu			
Min Speed ANDing	---	---	Program
Rem Enab AND	---	---	Program
Output Groups			
Communications Menu			
Test Menu			
Memory Tests	---	---	Run
<p>NOTES: ¹ KEYBOARD QTY can be programmed only through the keypad whose address is '0'.</p>			

Fig. 4-34 Programming Access Levels for Menu Items

Chn ANDing Menu**MIN SPEED ANDing****Menu Path**

At the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to CHN ANDING MENU. Press SEL.
- Scroll down to MIN SPEED ANDing. Press SEL.

This function links the operation of output channels to the SPEED ENABLE/DISABLE levels programmed through SPEED ENABLE/DISABLE. Each output channel may be ANDed (linked) with either SPEED ENABLE/DISABLE level.

If an output is MIN SPEED ANDed, it turns on only when:

- the resolver RPM is in the range specified for that SPEED ENABLE/DISABLE level
- And*
- the setpoints programmed for the ANDed channel are "on".

NOTE: Outputs that must always operate, regardless of machine speed, should not be ANDed with a SPEED ENABLE/DISABLE level.

This screen displays the channel number and the SPEED ENABLE/DISABLE level for MIN SPEED ANDing: L1, L2, or OFF. The channel will not be MIN SPEED ANDed if the enable is OFF.

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 SPEED ENABLE/DISABLE level.
- MIN SPEED ANDing and REMOTE ENABLE ANDing can be combined for any given output channel.
- When MIN SPEED ANDing is activated for a channel, it applies to that channel in all programs.

Using Channels as Motion Detectors

Change any output channel to a Motion Detector channel by programming it to be on at '1' and off at '1', and then ANDing it with the desired SPEED ENABLE/DISABLE level. Output is then "on" constantly as long as the machine speed is within the specified SPEED ENABLE/DISABLE range.

See also SPEED ENABLE/DISABLE

Remote Enable ANDing

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to CHN ANDing MENU. Press SEL.
- Scroll down to REMOTE ENABLE ANDing. Press SEL.

REMOTE ENABLE ANDing allows ANDing (linking) any output channels with input terminal #8 on PC54 controllers, or input terminal #16 on PC55 controllers. (See Figures 3-13 and 3-16). An output channel's programmed setpoints ANDed with input terminal #8 (PC54) or #16 (PC55) are enabled *only* while the terminal is energized.

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

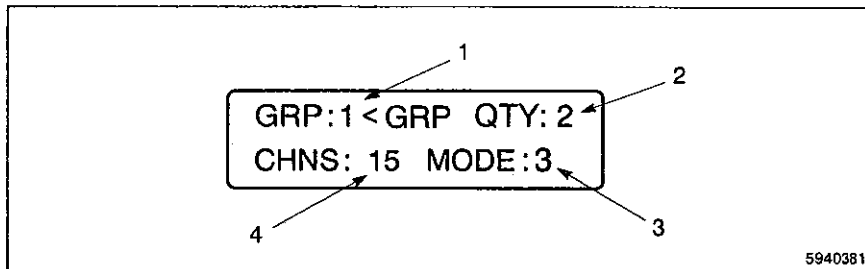
Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL.
- Scroll down to OUTPUT GROUPS. Press SEL.

This function allows division of output channels into groups, and then assigning Operating Modes to the Output 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 high speed control accuracy between machine sections.



1. Selected Output Group
2. Number of Output Groups
3. Mode of Selected Output Group
4. Number of Channels in Selected Output Group

Fig. 4-35 Offset Screen -Group Mode 1 or 2

A complete explanation of the uses and applications of Output Groups and Operating Modes is provided in Section 2, *Description*.

Establishing Groups

When dividing outputs into groups, several rules must be followed:

- Output channels are assigned to Output Groups sequentially. Group 1 begins with Output 1 and includes the specified number of outputs; Group 2 begins with the next output and continues sequentially for its specified number of outputs; and so on. The last group automatically includes all remaining outputs.
- With the PC54 controller, 1 or 2 groups can be established. With the PC55 controller, as many as six groups or as few as one group can be established.
- More than one group can be assigned to the same mode.

Establishing Groups (contd.)

PC54 Grouping Examples

Table 4-1 Grouping Example 1 - All Outputs in One Group

Output Group	Includes Outputs	Mode
1	1 thru 8	3

Table 4-2 Grouping Example 2 - Two Groups

Output Group	Includes Outputs	Mode
1	1 thru 4	2
2	4 thru 8	0

PC55 Grouping Examples

Table 4-3 Grouping Example 1 - All Outputs in One Group

Output Group	Includes Outputs	Mode
1	1 thru 16	3

Table 4-4 Grouping Example 2 - Two Groups

Output Group	Includes Outputs	Mode
1	1 thru 4	2
2	5 thru 16	0

Table 4-5 Grouping Example 3 - Three Groups

Output Group	Includes Outputs	Mode
1	1 & 2	0
2	3 & 4	4
3	5 thru 16	0

Establishing Groups (contd.)

Programming

Begin by moving the cursor to GRP QTY, then entering the number of Output 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 Output Group from zero to five, followed by ENT.

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

NOTE: When output channels are divided into Output Groups, the appearance of the Main Screen changes slightly. See MAIN SCREEN for details.

See also MAIN SCREEN, OFFSET, GRP POS DISP

Communications

Communications programming allows configuring a RS-232/485 serial port (See Figures 3-11 and 3-12) to match the requirements of the host PC or PLC.

Serial communications can be used in two ways:

- To exchange operating data and parameters with a host computer using standard ModBus ASCII protocol (available on the PC55 controller only)
- To upload/download PC50 Series controller programs using Nordson's optional Communications Software (available for PC54 and PC55 controllers)

NOTE: Initial communications programming is required only if an optional communications package is being installed.

NOTE: These communications programming instructions must be used in conjunction with installation instructions and operating procedures found in the instruction sheet provided with the Nordson Communication Software package.

Menu Path

From the MAIN SCREEN:

- Press SEL
- Scroll down to CONFIG MENU. Press SEL
- Scroll down to COMMUNICATIONS. Press SEL

Purpose

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

Type

Use SEL to toggle between RS-232 and RS-485 communications.

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. The controllers 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 switches, see Figure 3-29 and Figure 3-30, are 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 to enter the Address, then press ENT.

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.

6. Test Menu

Memory Tests

Menu Path

At the MAIN SCREEN:

- Press SEL
- Scroll down to TEST MENU. Press SEL.
- Scroll down to MEMORY TESTS. Press SEL.

This menu selection provides three functions allowing the clearing of programmed values from the controller. A function test of the controller's watchdog timer is available as well.

Programming

Perform one of the memory test functions by using the numeric keys to enter a function number, then pressing SEL.

Test Functions

Function 7000	Clears all setpoints and configuration settings from the controller's EEPROM. After clearing the settings, the controller reloads the factory default settings.
Function 7001	Clears all configuration settings from the controller's EEPROM, including all programming performed through the SETUP Menu and CONFIG Menu on the Menu Tree. When finished, the controller reloads the factory default settings.
Function 7002	Clears all setpoints from the controller's EEPROM, including any ON/OFF setpoints programmed through SETPOINTS. All other settings are preserved.
Function 7998	The Watchdog Timer monitors controller microprocessor operation, shutting the controller down if any internal malfunction is detected. The controller may continue if the Watchdog Timer fails, but subsequent malfunctions or irregularities may go undetected. Function 7998 tests the Watchdog Timer. When operating properly, the controller resets. If the controller does not reset, failure has occurred and <i>the controller must be replaced</i> .



CAUTION: If a controller fails the Watchdog Timer test, do not continue operating the controller. The controller may appear to be functioning normally, but any internal malfunction may cause erratic operation, possibly activating outputs at the wrong point in the machine cycle. Such erratic operation may damage products and machinery, and injure machinery operators.

