PC56 Pattern Controller

Part 229 703A

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

Trademarks

Nordson Corporation

OPERATOR'S CARD

P/N 229 838A

PC56 Pattern Controller

Please Note

The operator's card contains only information necessary for daily operation and maintenance. For other information, refer to the product manual.

HINTS:

- All instructions begin at the main menu screen with the cursor (<) pointing at MENU.
- Return to the main menu from any level of the menu by pressing **ESC** repeatedly.
- **INC**, **DEC**, or the numeric keys are used to change values, followed by **ENT**.

WARNING: Allow only qualified personnel to operate the unit. Observe the safety instructions in the product manual.

- Always follow the instructions given in the operator's card and product manual.

PC56 Operator Settings

SETPOINTS (Change Glue Bead Length.)

1. Press **SEL** from the main menu screen.
2. Press **SEL** for SETPOINTS.
3. Enter **CH:** number to be changed, then press **ENT**.
4. Move cursor to **ON:** (bead start) and **OF:** (bead stop) using the arrow keys.
5. Set **ON:** by pressing **INC** to move bead start away from leading edge and **DEC** to move bead start toward leading edge.
6. Set **OF**: by pressing **INC** to make the bead longer and **DEC** to make the bead shorter.

BEAD WIDTH (Adjust Glue Bead Volume.)

1. Press **SEL** from the main menu.
2. Use arrow keys to move cursor to bead width.
3. Press **SEL.**
4. Press **INC** to increase glue volume or press **DEC** to decrease glue volume.

PRODUCT LENGTH (Set Length of Carton.)

1. Press **SEL** from the main menu.
2. Use arrow keys to move cursor to PRODUCT LENGTH, then press **SEL.**
3. Enter the carton length as seen by the photo eye.
4. Press **ENT.**

PC56 Operator Settings *(contd.)*

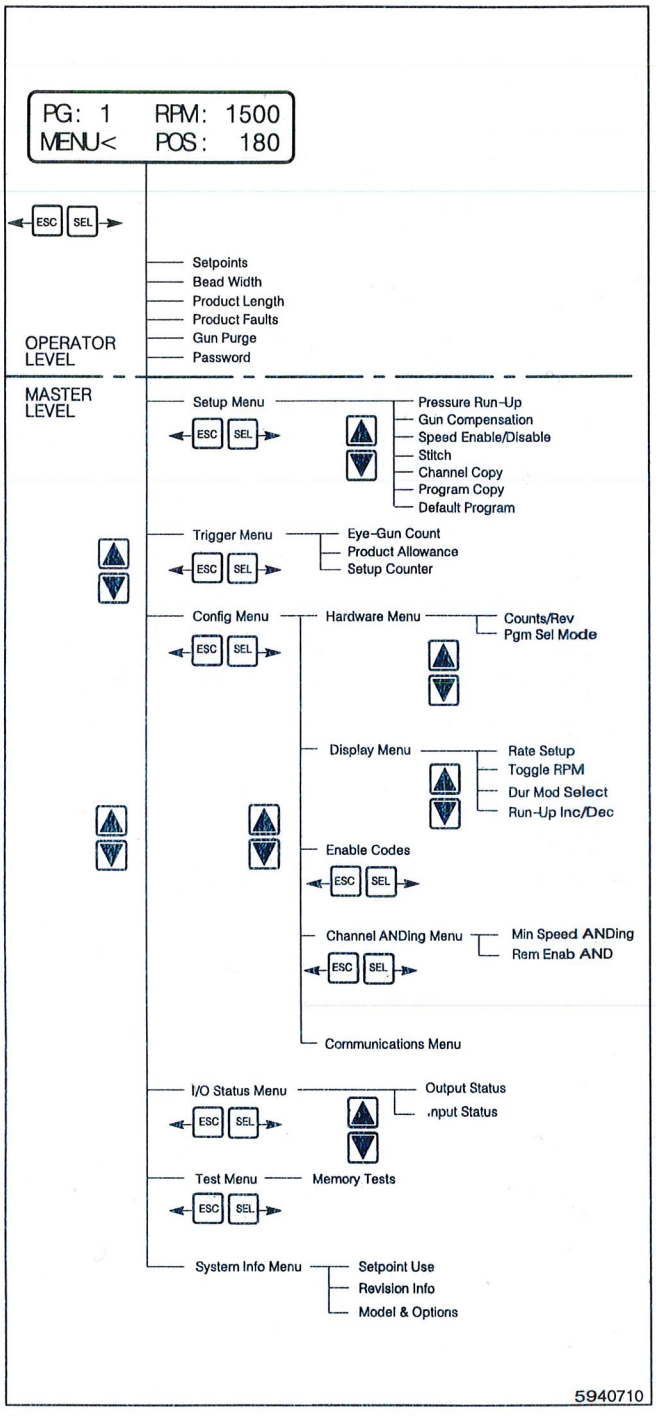
GUN PURGE (Purge a Gun Channel.)

1. Press **SEL** from the main menu.
2. Use the arrow keys to move cursor to GUN PURGE.
3. Press **SEL**.
4. Enter **CH:** number and press **ENT**.
5. Use the right arrow to move cursor to **STAT:**
6. Press **SEL** to turn gun channel on.
7. Press **down arrow** to move to **PURGE OP%:**
8. Press **INC** or **DEC** to change purge output pressure.
9. Press **SEL** again when you want to turn the gun channel off.

PRODUCT FAULTS (Find Number of Long and Short Cartons.)

1. Press **SEL** from the main menu.
2. Use the arrow keys to move cursor to PRODUCT FAULTS.
3. Press **SEL**.
4. Read the number of faults on display.
5. Enter 0 and press **ENT** for **SHORT PROD:** and **LONG PROD:** to reset to zero.

Menu Tree



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Section 1

Safety

Section 1
Safety

1. Operate Safely

Safety instructions contained in this section and throughout this document apply to tasks that may be performed with or on the unit. Warnings related to specific safety concerns are included within the text as appropriate. It is very important that these safety instructions are always followed. Failure to do so could result in personal injury and/or damage to the unit or other equipment.

With this in mind, here are some basic safety recommendations:

- Read and become familiar with this *Safety* section prior to installing, operating, maintaining, or repairing the unit.
- Read and follow the warnings which appear within the text and are related to specific tasks.
- Store this document within easy reach of personnel operating or maintaining the unit.
- Wear personal protective equipment and clothing such as safety goggles and gloves.
- Familiarize yourself with and follow all safety instructions prescribed by your company, general accident-prevention regulations, and government safety regulations.

2. Safety Symbols

The following symbols are used to warn against dangers or possible sources of danger. Become familiar with them! Failure to heed a warning could lead to personal injury and/or damage to the unit or other equipment.

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

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: Hot! Risk of burns. Wear heat-protective clothing, safety goggles, and/or heat-protective gloves depending on the symbols shown.

WARNING: Risk of explosion or fire. Fire, open flames, and smoking prohibited.

WARNING: System or material pressurized. Relieve pressure. Failure to observe may result in serious burns.

CAUTION: Failure to observe may result in equipment damage.

CAUTION: Hot surface. Failure to observe may result in burns.

3. Qualified Personnel

"Qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations, and have been trained to safely install, operate, maintain, and/or repair the equipment. It is the responsibility of the company operating the equipment to see that its personnel meet these requirements.

4. Intended Use

The unit is designed and intended to be used only for the purpose described in the *Description* section. Uses not in accordance with that section or as described in this document are considered unintended uses and not in accordance with governing regulations.

WARNING: Use of this equipment in ways other than described in this document may result in personal injury, death, or equipment damage.

The following actions of the owner or operator of the unit are some, but not all, examples of unintended use which would permit Nordson to claim it is not responsible for personal injury or property damage arising from such unintended use:

- Unapproved modifications or changes to the unit
- Failure to comply with the safety instructions
- Failure to comply with instructions concerning installation, use, operation, maintenance, or repair, or when these tasks are carried out by unqualified personnel
- Use of inappropriate or incompatible foreign materials or auxiliary equipment
- Failure to observe workplace safety rules or regulations issued by government authorities or safety councils

5. Installation and Electrical Connections

WARNING: Failure to follow the safety procedures can result in injury or death.

- All electrical, pneumatic, gas, and hydraulic connections and installations of hot melt equipment may only be carried out by qualified personnel. Be sure to observe installation instructions for components and accessories.
- Equipment must be properly grounded and fused according to its rated current consumption (see ID plate).
- Cables which run outside the unit must regularly be checked for wear or damage.
- Power supply wire gauge and insulation must be sufficient to handle rated current consumption.
- Cables must never be squeezed or pinched. Do not locate cables or hoses in high traffic areas.

6. Operation

The unit should be operated by qualified personnel in accordance with the instructions presented in this document.

WARNING: Failure to follow the safety procedures can result in injury or death.

- Never allow the unit to be operated by personnel under the influence of substances which reduce their reaction times, or who are not able to operate the equipment for physical reasons.
- Prior to each start-up of the unit, check protection and warning devices and make sure they are fully functional. Do not operate the unit if these devices are not functioning properly.
- When the removal of safety equipment is required for installation, maintenance, or repair of the unit, it must be re-connected immediately upon completion of the work.
- Prior to start-up of the unit, check to make sure all safety guards and safety equipment are in place and functioning properly.

6. Operation *(contd.)*

- In a humid environment, only equipment featuring a corresponding class of protection may be operated.
- Do not operate the unit in an explosive environment.
- Keep parts of the body or clothing away from rotating parts. Do not wear loose articles of clothing when operating or servicing units with rotating parts. Take off wrist watches, rings, necklaces, or similar pieces of jewelry and pin up or cover long hair before performing any work on or with the unit.
- To carry out measurements on work pieces, switch off the unit and wait until it comes to a standstill.
- Never point hand guns or applicator nozzles at yourself or other persons.

Less-Obvious Dangers

WARNING: An operator or service technician working with the unit should be aware of less-obvious dangers that often cannot be completely minimized at production sites:

- Exposed surfaces of the unit which cannot be practically safeguarded. They may be hot and take time to cool after the unit has been operating.
- The possibility that electrical potentials may remain in the unit after the unit was de-energized
- Hot melt material and vapors
- Hydraulically or pneumatically operated parts of the unit
- Parts winding something up or down which are not covered

Action in the Event of Unit Malfunction

If the unit malfunctions, switch it off immediately.

- Turn the circuit breaker or main power switch OFF.
- Have the unit repaired by qualified personnel only.

Danger of Burns

Contact with hot melt materials or hot areas of the unit may produce a severe skin burn.

WARNING: Hot! Risk of burns. Wear heat-protective clothing, safety goggles, and/or heat-protective gloves depending on the symbols shown.

- Be extremely careful when using hot melt material. Even solidified material may still be very hot.
- Always wear protective clothing which safely covers all exposed parts of the body.

In case of burns:

- Immediately cool affected skin areas using cold, clean water.
- Do not forcefully remove hot melt material from the skin.
- Immediately seek medical attention.

7. Maintenance/Repair

Allow only qualified personnel to perform the procedures described in this document. When performing such tasks, wear protective clothing, and equipment.

WARNING: Even when the circuit breaker or main power switch is OFF, the unit is still electrically energized. Complete the following steps prior to maintenance or repair:

- Disconnect, lock out, and tag external power supply.
- To ensure the external power supply is disconnected, attempt to operate the unit. If the unit does not energize, proceed with maintenance or repair work.
- If the unit energizes, repeat the disconnect, lock out, and tag procedure. Re-test the unit.

7. Maintenance/Repair (contd.)

- Follow the specific instructions provided in this manual to relieve the system pressure in the entire unit.
- Secure pneumatically- or hydraulically-operated equipment against uncontrolled movement.
- Only use parts which do not compromise the safety of the unit. Only use genuine Nordson parts.
- Always use tools with insulated handles when removing or installing components.

8. Cleaning

NOTE: Always refer to the material manufacturer's Material Safety Data Sheet (MSDS) or material information sheet before working with any material.

WARNING: Never clean any aluminum part or flush any system using halogenated hydrocarbon fluids. Examples of common halogenated hydrocarbons are: dichloromethylene, 1,1,1-trichloroethylene, and perchloroethylene. Halogenated hydrocarbons may react violently with aluminum parts.

WARNING: Fire, open flame, and smoking are prohibited when cleaning fluids are used. Observe all explosion prevention regulations. Cleaning fluids may only be heated using temperature-controlled and explosion-protected heaters.

- Never use an open flame to clean the unit or components of the unit.
- Use only cleaning fluids designed or intended to be used with the hot melt material being used in the unit. Never use paint fluids under any circumstances.
- Note the flash point of the cleaning fluid used. Only use a controlled heating method to heat fluids.
- Ensure sufficient room ventilation to draw off generated vapors. Avoid prolonged breathing of vapors.

9. Thermoplastic Hot Melt Material

NOTE: Always refer to the material manufacturer's Material Safety Data Sheet (MSDS) or material information sheet before working with any hot melt material.

- Ensure the work area is adequately ventilated.
- Do not exceed recommended processing temperatures. Doing so creates a danger to personnel due to decomposition of the material.

10. Equipment and Material Disposal

Dispose of equipment and materials used in operation and cleaning according to local regulations.

Section 2

Description

Section 2
Description

1. Introduction

This section describes controller capabilities that you should understand before programming the controller.

Channels, setpoints, duration, and gun compensation are topics discussed in this section to allow you to determine controller set up and programming. Thoroughly read and completely understand these topics prior to any programming attempts.

2. PC56 Pattern Controller Components

Controller and Keypad

The PC56 controller is available with its components mounted in a cabinet as shown in Figure 2-1, or as separate components as shown in Figure 2-2. The information contained in this manual applies to both configurations, unless specified otherwise.

Controller and Keypad (contd.)

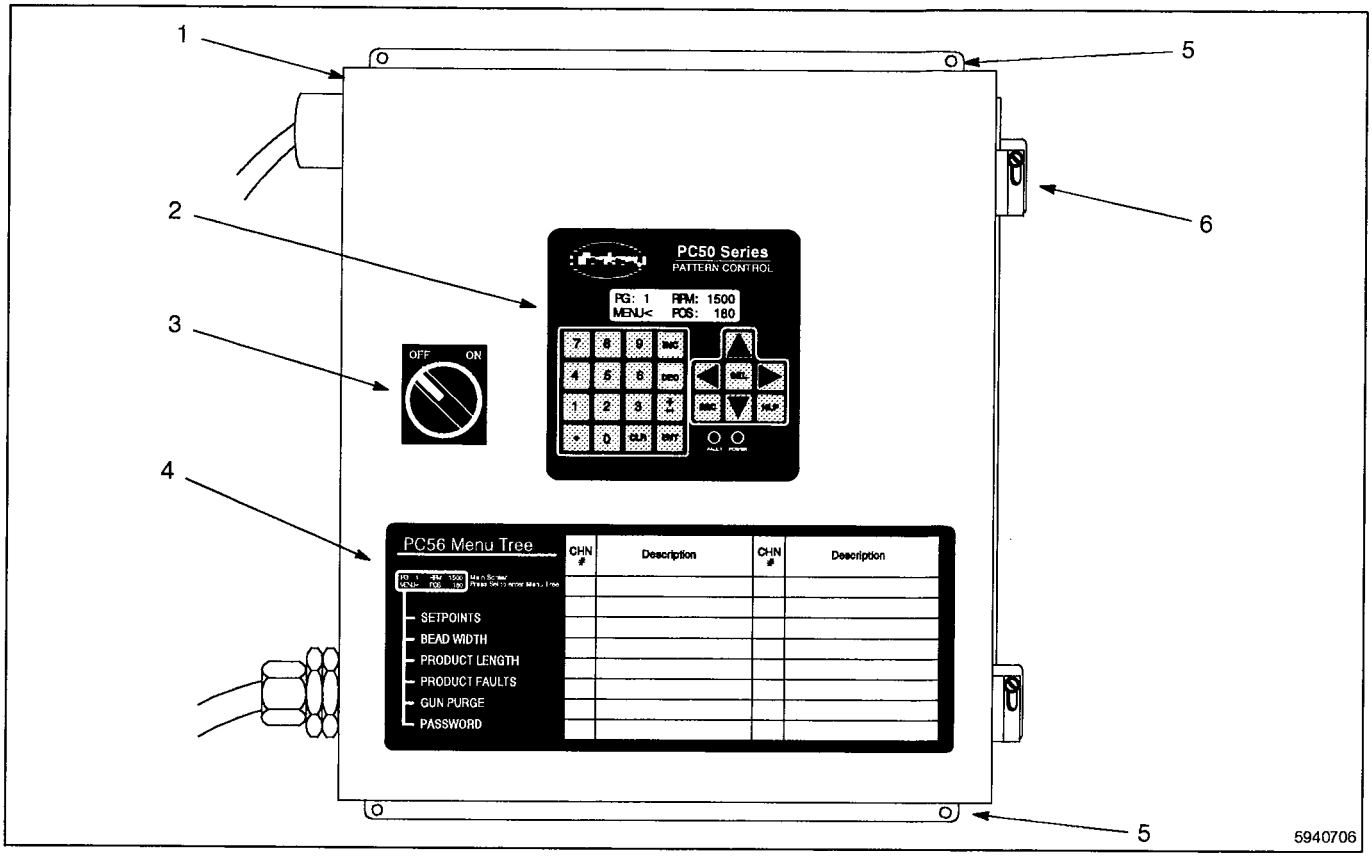

Fig. 2-1 PC56 Controller Mounted in a Cabinet

1. Cabinet
2. Keypad/display
3. On/off switch
4. Stick-on program menu and program list
5. Mounting flange (top and bottom)
6. Access to cabinet interior

The keypad/display provides a complete user interface from which every aspect of the controller's operation can be monitored and programmed. A clear silicon rubber boot assembly is available to provide protection for installations where caustic washdown chemicals are used.

Controller and Keypad *(contd.)*

When interfaced to a PLC or IBM compatible computer through the optional communication package, controller programming can be stored on disk. If programming in a controller is lost, the controller can be completely reprogrammed from the computer without using the keypad/display.

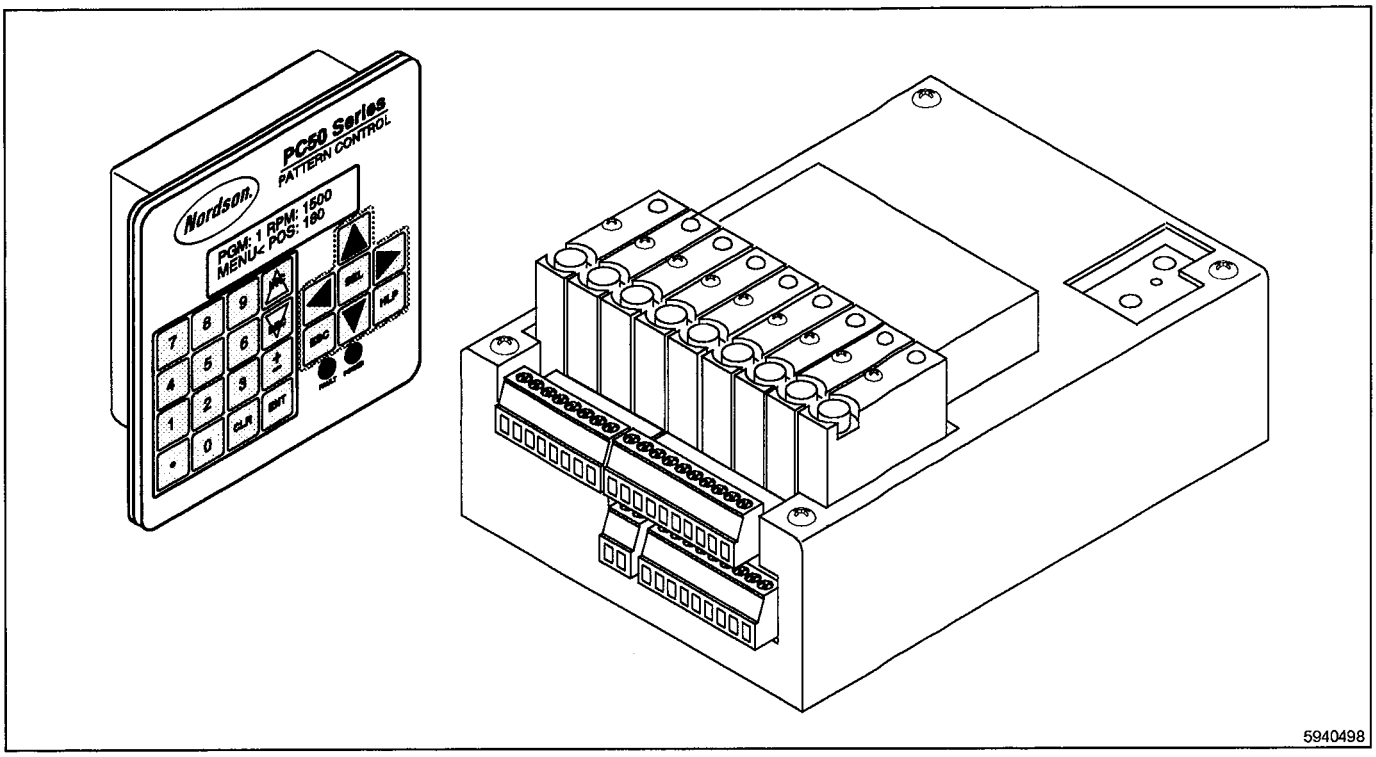

Fig. 2-2 PC56 Controller as Components

Controller and Keypad *(contd.)*

Figure 2-3 shows the controller keypad, program menu tree and the program listing that the operator creates.

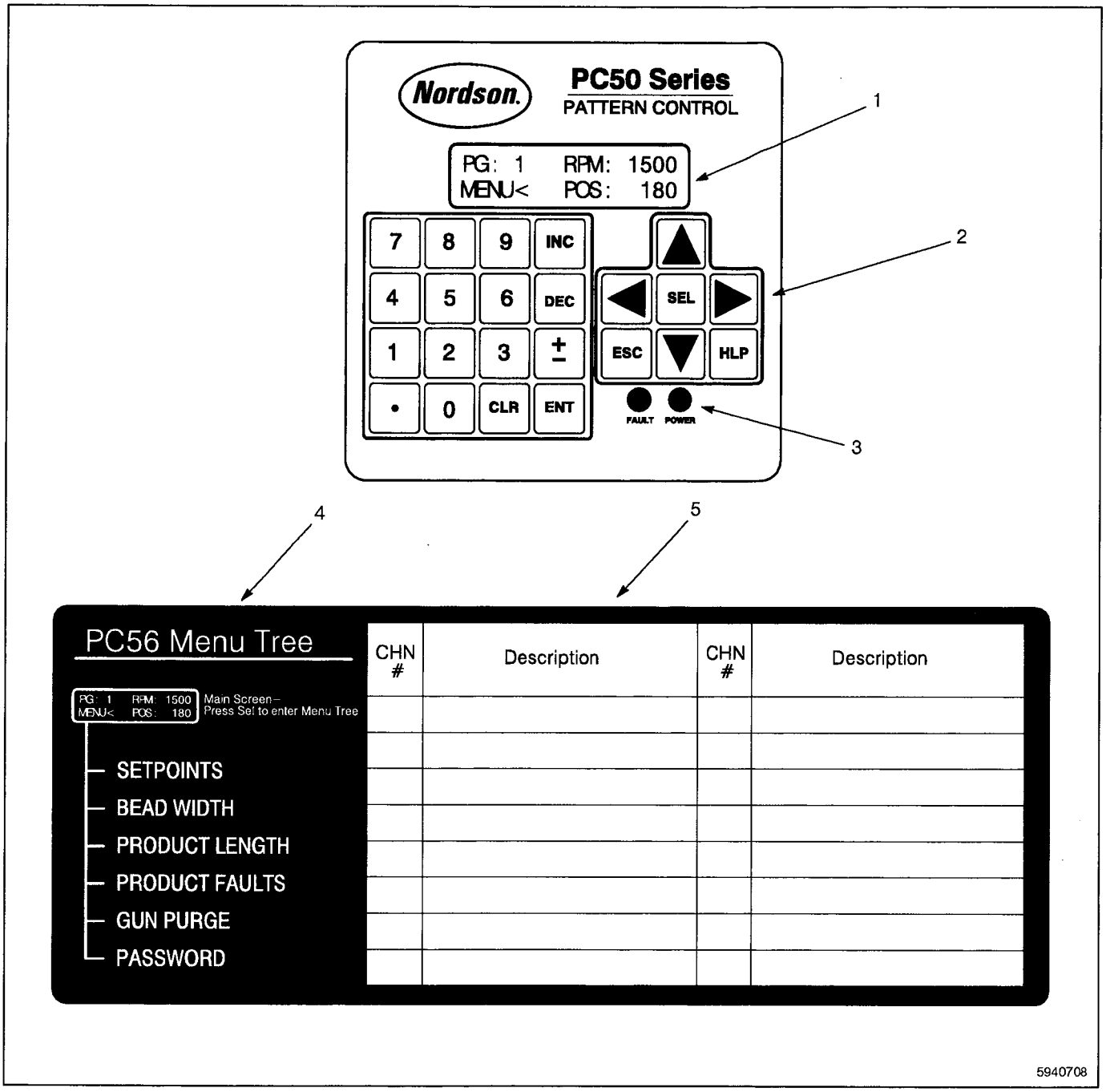

Fig. 2-3 Controller Keypad, Program Menu Tree, and Program Listing

1. Display
2. Cursor movement arrow keys
3. Power on/off and fault indications
4. Program menu tree
5. Operator created program listing

3. Resolver Description

PC56 controllers use a resolver that functions like an incremental encoder with a programmable number of counts per revolution. Resolvers use fixed and rotating coils to generate an electronic signal that represents shaft position. They have no brushes, contacts, or any frictional moving parts to wear out. In addition, the resolver is coupled to a machine shaft so that the resolver shaft rotates as the machine moves the product down the belt.

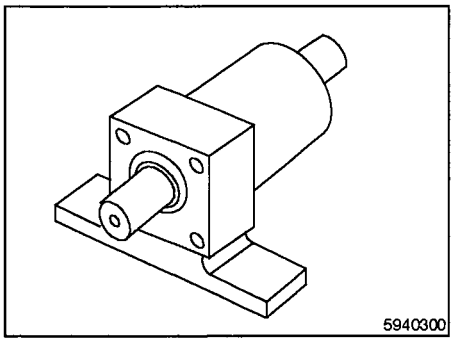

Fig. 2-4 Resolver

Based on the resolver signal, PC56 pattern controllers turn electrical circuits, or outputs, on and off.

Because the combination PC56 pattern controller/resolver system is completely electronic and has no frictional parts, it offers several advantages:

- Long service life with no parts to wear out
- On and off points can be adjusted instantly from the keypad
- Adjustment is possible with the machine running or stopped
- Programmable logic allows complex switching functions that are impossible with typical pattern controllers

4. Keypad and Display Description

This section explains the various controller keypad features.

Display Screen

The display shows the active program number, rate (as line speed, parts/minute or product count), and position. See *Main Screen* in Section 4, *Programming*, for a description of screen readouts.

Press SEL key when the cursor is on MENU to enter the menu tree and initiate programming.

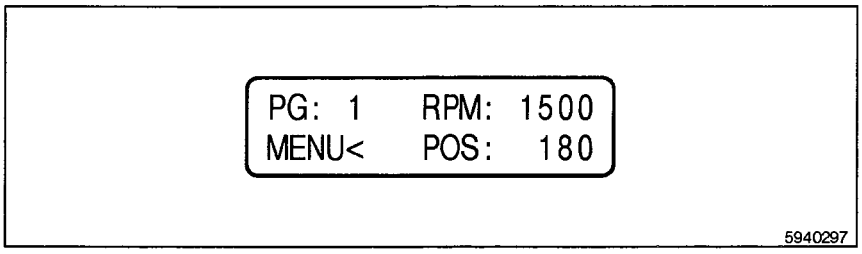

Fig. 2-5 Display Screen

The Keypad

The keypad has numerical keys, cursor keys, and function keys.

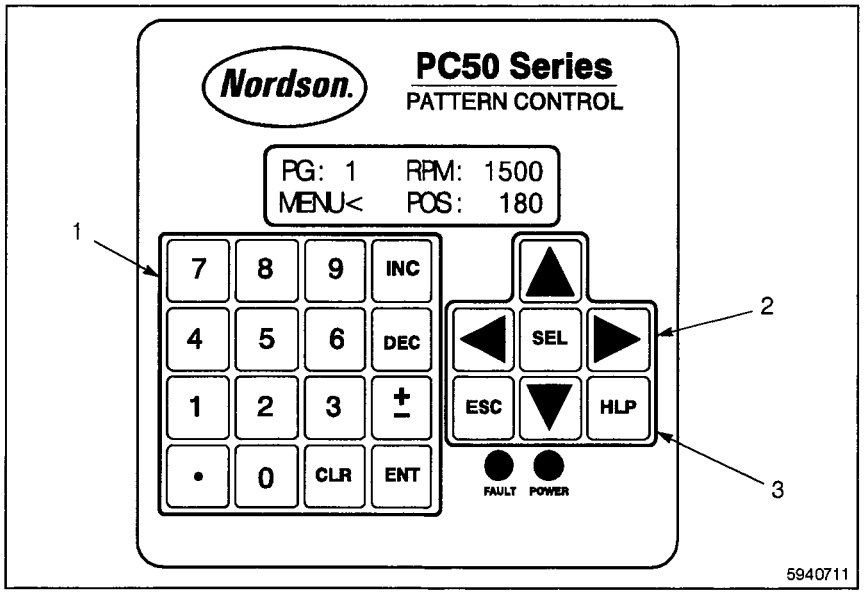

Fig. 2-6 Keypad

1. Numerical keys
2. Cursor keys
3. Function keys

The Keypad *(contd.)*

Use the numerical keys to enter values within a field. Use the cursor keys to scroll through the menu, move around within a screen, and scroll through setpoints and channels. The function keys are described in Table 2-1, *Keypad Functions*.

Table 2-1 Keypad Functions

Key	Function
ESC	Exit from the current menu level to the previous menu. Terminate numeric entry.
SEL	Enter a new menu level. Toggle a value. Select an output group if multiple groups with different offsets are used.
HLP	Obtain information on selecting menus and keys. Press this key if unsure what to do.
INC	Increment a value within a field. Hold for rapid increase of value.
DEC	Decrease a value within a field. Hold for rapid decrease of value.
ENT	Press ENT to enter the value within the field. The entry value flashes until ENT is pressed.
+/–	Convert a positive number to a negative number or a negative number to a positive number.

5. How the PC56 Controller Works

The following terms, used throughout this manual, are defined to provide understanding of PC56 controller installation, programming, and operation:

Table 2-2 Programming Terminology

Term	Description
Setpoint	On or off point within a rotation of the resolver. Setpoints are programmed into a channel through the keypad. The PC56 controller can turn any given channel on and off multiple times within one product cycle.
Duration	The channel is on.
Delay	The channel is off.
Channel	An independent bead sequence dispensed by a gun.
Multiple durations	Multiple pairs of setpoints are programmed into one channel.
Stitch	Adhesive applied in a repeating pattern of short adhesive beads (stitch lengths) with uniform spaces (stitch gaps) between them. This occurs during one duration.
Counts/rev	The number of pulses counted per revolution of the resolver. Counts can range from 17 to 4,096 counts per revolution.
Programs	A program is a combination of setpoints that perform a specific operation.
Inputs	Hardware inputs are dedicated to specific functions involving program selection, and, controlling output channels based on sensor signals.
Outputs	The signal from a channel that turns an external circuit on or off.

5. How the PC56 Controller Works *(contd.)*

This section uses a simple gluing application to explain the principles of programming the PC56 pattern controller. Before discussing programming in detail, however, four general application factors must be considered:

- Glue pattern resolution
- Maximum machine speed
- Proper sensor and gun placement
- Fault detection feature

Glue Pattern Resolution

The PC56 controller turns glue guns on and off by counting internally generated pulses as the resolver shaft turns. This means that the controller can control the guns only in increments of the pulse count. For example, if a machine were set up so that 100 counts occurred per ten inches of product travel, the pattern controller would be able to control glue bead length in increments of 0.1 inches. If the same machine were set up to generate 1000 counts per ten inches of product travel, the controller would provide glue bead adjustment in increments of 0.01 inches.

As resolution increases, the number of counts per unit of product travel increases, and the accuracy of glue bead control increases. The precision required depends on the product being glued. For coarse products such as cardboard cartons used for industrial warehousing, adjustments of +/– .1 inches might be adequate. However, for point-of-sale food cartons that are displayed in grocery stores, finer increments and higher resolutions are required to ensure consistent operating characteristics and no visible glue extending beyond carton flaps.

The counts/rev function of the PC56 controller establishes how many increments or pulses are counted in one revolution of the resolver shaft. Values can range from 17 to 4096 counts per revolution. The number of counts per revolution is determined by the desired glue pattern resolution as well as the ratio of belt travel to resolver revolutions, as explained in *Maximum Machine Speed*.

Maximum Machine Speed

Machine speed is usually expressed in terms of product travel along the line. Typical units are feet per second, feet per minute, meters per second, or meters per minute. In applying the PC56 controller, machine speed must be considered in relationship to the glue pattern resolution.

The PC56 controller can process a maximum of 10,000 counts per second. For example, if machine speed were ten feet per second, the maximum number of counts per foot of product travel would be 1,000 (1000 counts/ft x 10 ft/sec = 10,000 counts/sec). In this case, the maximum resolution of the glue pattern would be 1,000 increments per 12 inches of product travel, or 0.012 inches per increment of glue bead length.

The following formula may help in determining the relationships between resolution and machine speed:

Maximum Resolution for a given machine speed

Max. counts/foot	= 600,000 / speed in ft/min. or = 10,000 / speed in ft/sec
Max. counts/inch	= 50,000 / speed in ft/min. or = 4,167 / speed in ft/sec
Max. counts/meter	= 600,000 / speed in meter/min. or = 10,000 / speed in meter/sec

Once the desired resolution has been determined, the actual value programmed into the counts/rev function depends on the relationship of resolver-to-machine rpm. For example, suppose the desired glue bead resolution is 0.01 inches, or one count per 1/100th inch of product travel. In one foot of travel, 1200 counts occur. If the resolver shaft rotates once per foot of product travel, counts/rev is programmed at 1200. However, if the resolver rotates twice per foot of product travel, counts/rev is programmed at 600.

NOTE: When determining the relationship between resolver and machine RPM, be aware that for the PC56, the maximum resolver speed is 3000 RPM.

Proper Sensor and Gun Placement

See Figure 2-7. When the leading edge of a product reaches the product sensor, or trigger eye, the PC56 controller enters a marker into a counter. The marker advances one place in the counter for each pulse generated as the resolver turns. Based on the position of the marker in the counter, the PC56 turns the glue guns on and off and also monitor's product length.

If a second product passes under the sensor before the PC56 is finished processing the first product, a second marker is entered into the counter and the controller tracks both markers. This continues for up to sixteen products. If a seventeenth product passes under the sensor before the first product is completed, however, the controller cannot track the seventeenth product. The limit of sixteen products in process restricts the maximum distance between the product sensor and the last gun.

NOTE: The number of counts between the trigger eye and the last gun must be less than 14 times the sum of the product length and the product allowance.

The PC56 firmware is written to enforce this requirement. This means that if you enter two of these variables, the value you enter for the third variable must conform, or the control displays an, error: Value out of limits, message. For example, if product length is entered as 100 and product allowance is entered as 1, the eye-to-gun distance cannot be more than 1399.

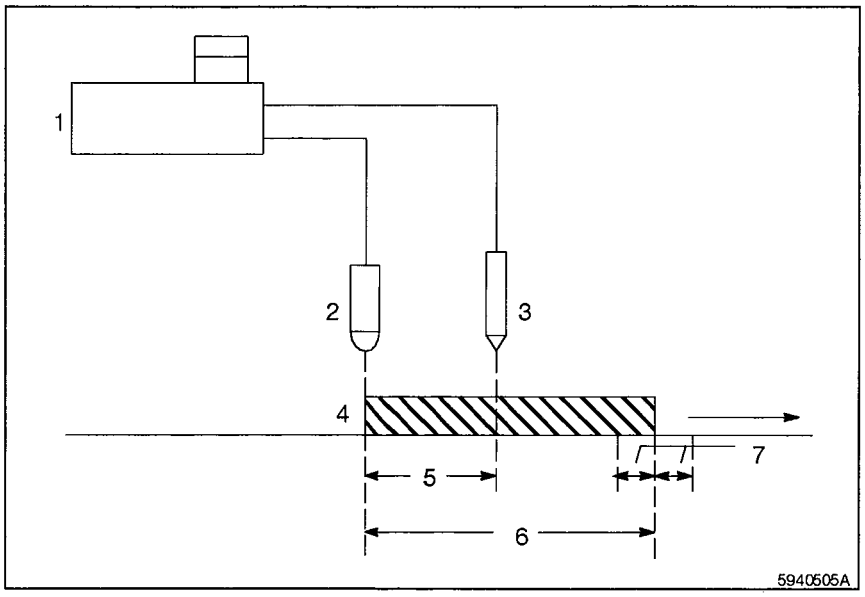

Fig. 2-7 Product Length and Eye-to-Gun Distances

1. PC56 controller
2. Product sensor (trigger eye)
3. Glue gun
4. Product
5. Value programmed into eye>gun count distance
6. Value programmed into product length
7. Value programmed into prod allowance

NOTE: Values are programmed as a count of pulses generated as the resolver turns. Values can be measured by jogging the machine and using the setup counter function.

Fault Detection Feature

Refer to Figure 2-8. As the product passes under the trigger eye, the PC56 monitors the sensor signal to check for proper product length. If the signal turns off at any value within the range of product length, plus or minus prod allowance, the controller accepts the product as normal and does not generate a fault signal. If, however, the signal turns off outside of these limits, the PC56 immediately turns off channel 8 for 50 milliseconds and disables all guns. The channel 8 output can be directed to a PLC or other controller which counts the number of faults over time and/or activates an ejection mechanism further down the line. (If the signal from output channel 8 is not used in the application, no module is required in that position on the controller.)

The PC56 controller also counts how many products are measured as too long or too short. These counts are read using the product faults function in the menu tree.

Regardless of whether or not the fault tracking feature is used, a value for product length must always be entered, and the PC56 controller always disables the glue guns if the trigger eye detects a product that is too long or too short. In most applications, some value for prod allowance should be entered to avoid nuisance glue gun disabling if products are not exactly the correct product length.

Fault Detection Feature *(contd.)*

Now that the general application principles have been explained, output channel programming can be discussed. The illustration in Figure 2-8 shows a machine using glue guns to apply a glue pattern to a specific product.

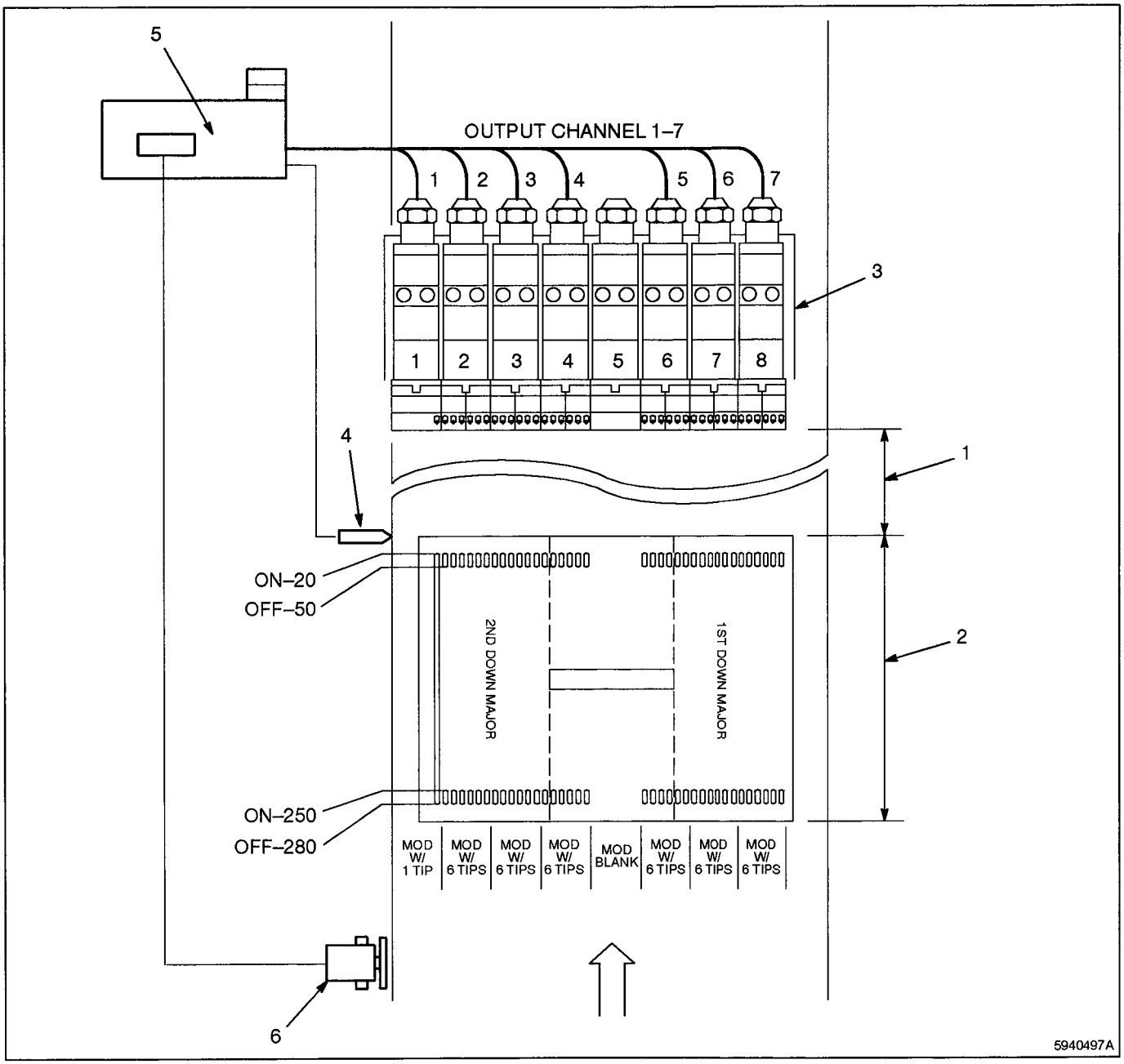

Fig. 2-8 PC56 Controller Application

1. Eye-to-gun distance (–200 counts)
2. Product length (300 counts)
3. H208 mini-bead glue gun (8 modules)
4. Trigger eye
5. PC56 controller
6. Resolver

Machine Description

On power-up the trigger input is armed and the position counter is reset to 0 and disabled. When the trigger eye sees the leading edge of a product in Figure 2-8, the position counter increases to a maximum value equal to the product length plus the product allowance plus the number of counts to the last glue gun. In this example, the product length is 300, the product allowance is 10 and the number of counts to the (last) glue gun is 400. Therefore, when the trigger eye sees a product, the position counter is set to a maximum value of 710.

Once the trigger eye goes active, the pulses generated by the resolver cause the position counter to increment as the product goes down the line. With the values input, the product is not underneath the guns until 400 counts have passed. At this time the leading edge of the product goes under the guns and glue gun outputs 1 –7 turn on and off according to the values specified through the setpoint programming. The glue gun outputs then continue to switch on and off for the next 300 counts (+/– 10) and then the position counter expires and is disabled and the product exits the glue guns.

If a new trigger input is received, such as the trigger eye sensing the leading edge of the next product before the first position counter expires, a new position counter is established for the next product. Up to 16 position counters can be created and in operation at the same time.

The table below shows how each output channel's setpoints are set to produce the glue pattern on the carton that is shown in Figure 2-8.

Table 2-3 Channel Setpoints for Figure 2-8 Glue Pattern

Output Channels	Channel Setpoints			
	ON	OFF	ON	OFF
1	20	280	——	——
2	20	50	250	280
3	20	50	250	280
4	20	50	250	280
5	20	50	250	280
6	20	50	250	280
7	20	50	250	280

Machine Description *(contd.)*

In normal operation, the trailing edge of the product clears the trigger eye when the marker reaches the value programmed in product length, plus or minus the value programmed in prod allowance. If the eye turns off before or after this range, a fault signal is generated and output channel 8 switches off for 50 ms and the glue guns are turned off immediately. Conditions which may cause the eye to turn off early or late include:

- defective products that are too long or short
- skewed product placement on the conveyor belt
- overlapped products

6. Specifications

Specifications for the PC56 controller are listed in the following tables.

Table 2-4 Electrical

Input power	20–30 VDC keypad/display is powered from controller (TB8).
Input current	500 mA max. @ 20 VDC (includes controller, 1 keypad, resolver, 8 power modules, 1 run-up module and 8 inputs all on.
Permanent memory	EEPROM (no battery required)
Firmware memory	5V flash EPROM, upgradeable through serial communications

Table 2-5 Environment

Operating temp	32° to 131 °F (0° to 55 °C)
Storage temp	–40° to 160 °F (–40° to 70 °C)
Humidity	95% maximum relative non-condensing
NEMA rating keypad/display	NEMA 4X (NEMA, 1, 4, 4X and 12)

Table 2-6 Physical

Overall dimensions	Refer to Section 3, *Installation*
Weight	Controller: 3.5 lb (1.6 kg) Keypad: 0.5 lbs (0.2 kg)

6. Specifications *(contd.)*

Table 2-7 Cabinet Mounting

Wall or machine mounting by bolts through cabinet flanges. Optional auxiliary keypad may be mounted up to 1000 feet from controller cabinet. Controller unit, if ordered as individual unit not mounted in cabinet, provided with EN-50035 (G profile) or EN-50022 (top hat profile).

Table 2-8 Inputs (TB1)

DC inputs	8 DC optically isolated inputs configurable as sinking or sourcing as a group of 8. Inputs must be either all sinking or all sourcing.
Input on state voltage	10–30 VDC
Input current	11 mA @ 24 VDC
Program select response:	100 ms typical (may be longer with large number of setpoints)
Response of all other inputs	1 – 2 scans

Table 2-9 DC Outputs (Modules)

0–60 VDC switching	Output voltage: 0–60 VDC Output current: 3 amps DC @/ below 35 °C (95 °F) Above 35 °C derate 35.7 mA/°C (19.8 mA/°F) Turn on/off time: each, 50 microseconds
0–200 VDC switching	Output voltage: 0–200 VDC Output current: 1 amp DC @/ below 45 °C (113 °F) Above 45 °C derate 18 mA/°C (10 mA/°F) Turn on/off time: each, 50 microseconds

Table 2-10 Run-Up Outputs

0–10 VDC	Output voltage: 0–10 VDC, proportional to rpm Output current: 10 mA maximum Resolution: 12 bits (4096 increments) Load resistance 1 K ohms minimum
4–20 VDC	Output current: 4–20 mA Resolution: 12 bits (4096 increments) Load resistance 450 ohms maximum

6. Specifications (contd.)

Table 2-11 Operation

Response time	Outputs updated within 50 microseconds of a position change.
Counts/rev	Programmable, 17 – 4096
Gun compensation	Programmed in 0.1 ms steps, pull in/drop out times can be individually compensated. Calculations every 10 ms. All channels can be individually compensated.
Multiple programs	32 programs standard
Total duration memory	1228 durations
Durations per program	512 maximum
Durations per output	512 maximum
Maximum count rate	10,000 per second
Baud rates (RS-232)	4800, 9600, 19.2K, 38.4K bps

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 PC56 controller.

Unpacking

Exercise normal care to prevent equipment damage during unpacking.

Inspection

The PC56 Pattern Controller is offered as an integrated unit with all components mounted in a cabinet or as separate modules which can be mounted in the customer's enclosure or cabinet. The information contained in this manual applies to both configurations, unless specified otherwise.

If your PC56 controller is mounted in a cabinet, 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. Tighten any loose fasteners and connections.

If your PC56 controller was ordered without a cabinet, make the following inspections:

- Open each carton and make sure all your ordered items are present.
- Inspect each component for shipping damage.

2. Controller Installation

The P56 controller can be ordered with or without a cabinet.

Controller With Cabinet

Using the pre-drilled cabinet flanges, mmount the controller cabinet in a suitable location on a panel of the parent machine. 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. System power wiring and input/output wiring access is provided by knockouts on both sides of the cabinet.

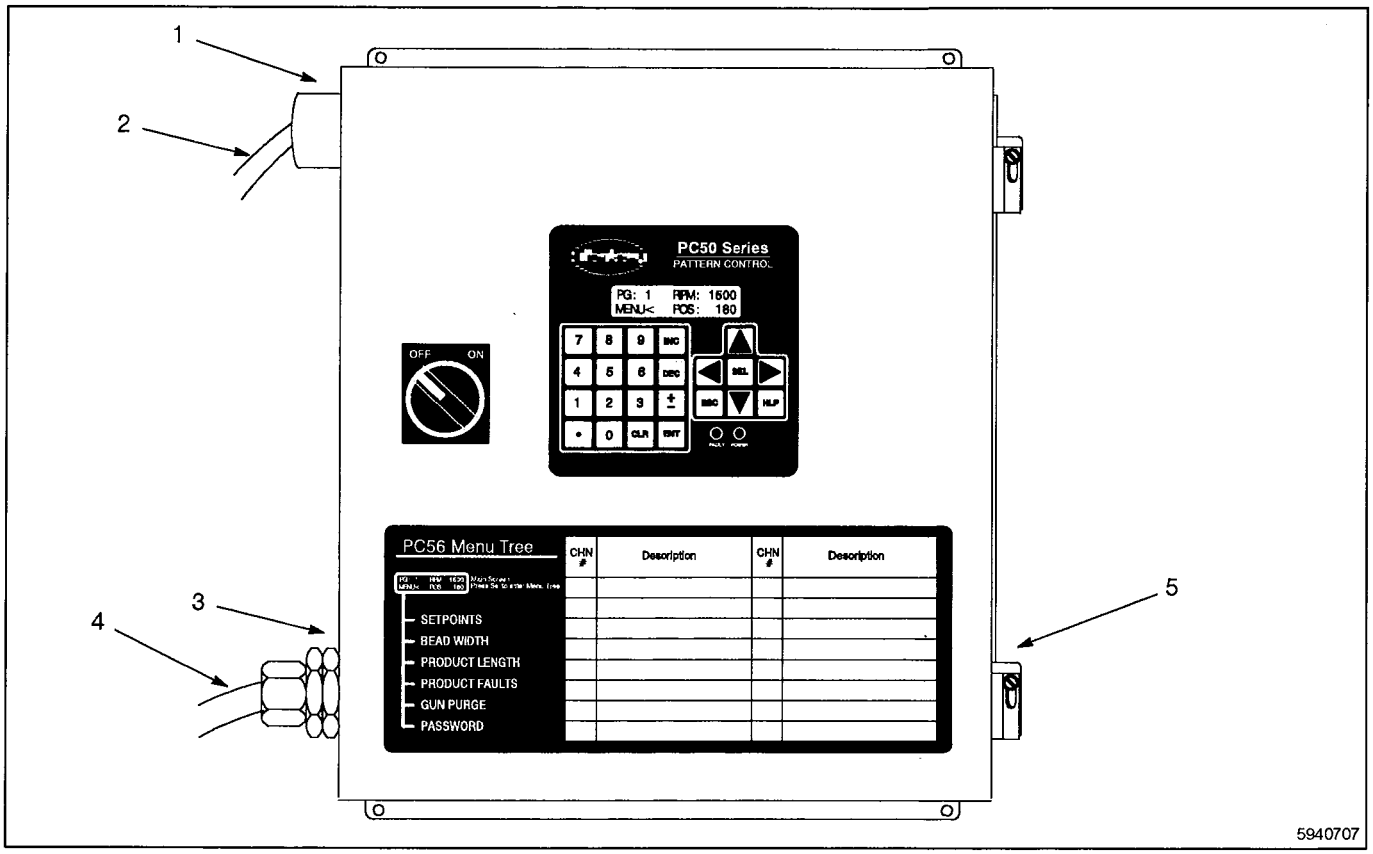

Fig. 3-1 Controller Cabinet

1. Knockout for AC power or I/O access (not shown)
2. Resolver cable entrance w/nylon conduit fitting
3. Knockout for I/O access (not shown)
4. Communication cable connection
5. Knockout for AC power or I/O access (not shown)

Controller Without Cabinet

When the PC56 controller is ordered without a cabinet, it comes with three plastic connectors which mount to DIN rails. The keyboard comes with a gasket and hardware for mounting to a panel front.

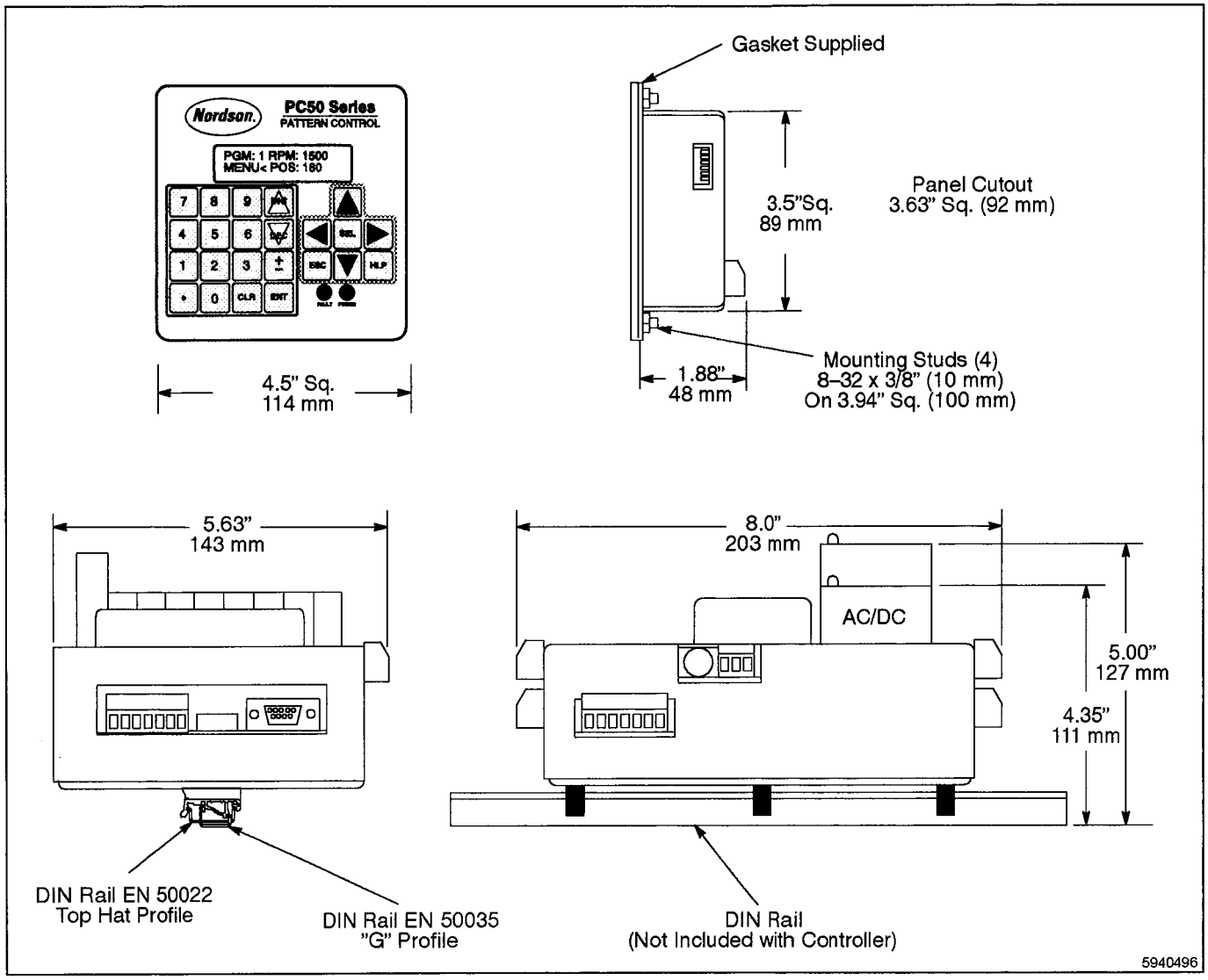

Fig. 3-2 Controller Without Cabinet

3. 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.

Choose a mounting location for the resolver that allows convenient mechanical connection of the resolver shaft to the machine. Commonly used methods for driving the resolver shaft include timing pulley and belt, chains and sprockets or direct in-line shaft-to-shaft coupling.

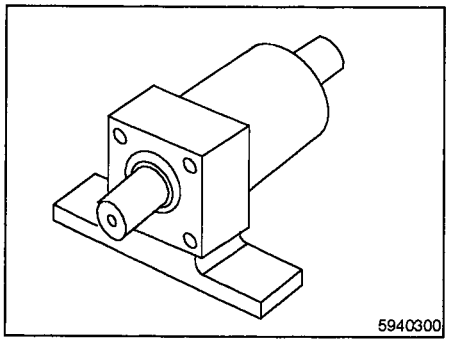

Fig. 3-3 Resolver

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

3. *Resolver Installation* *(contd.)*

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

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 3-4, 3-5, and 3-6 provide dimensional information for the three most commonly used resolvers.

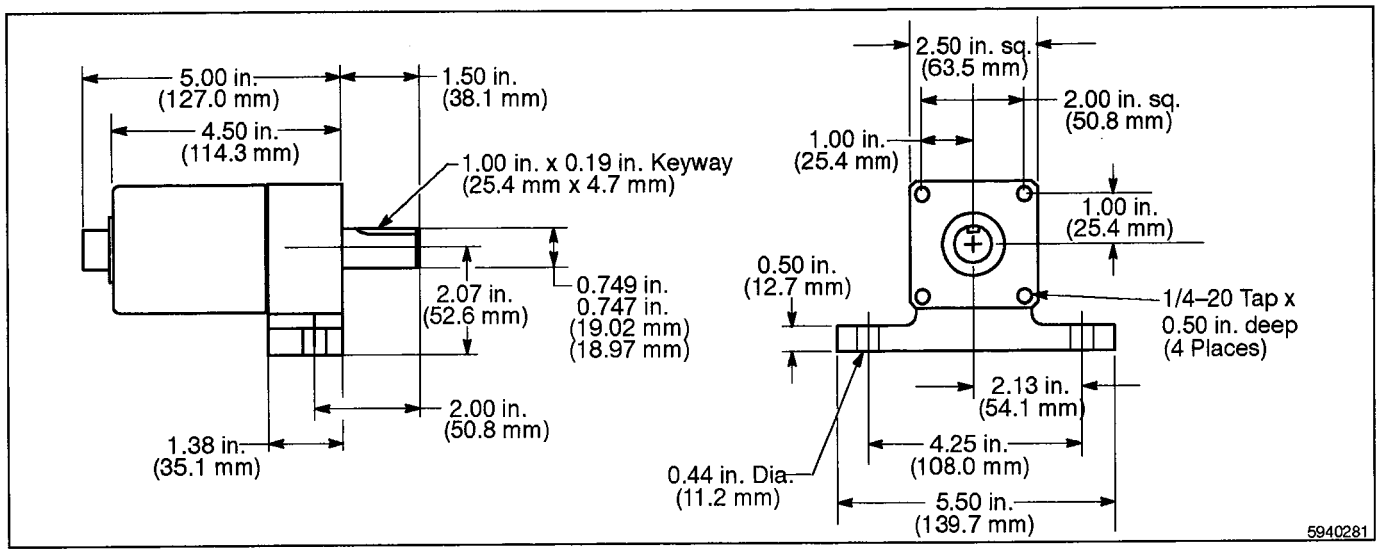

Fig. 3-4 Foot Mount Resolver

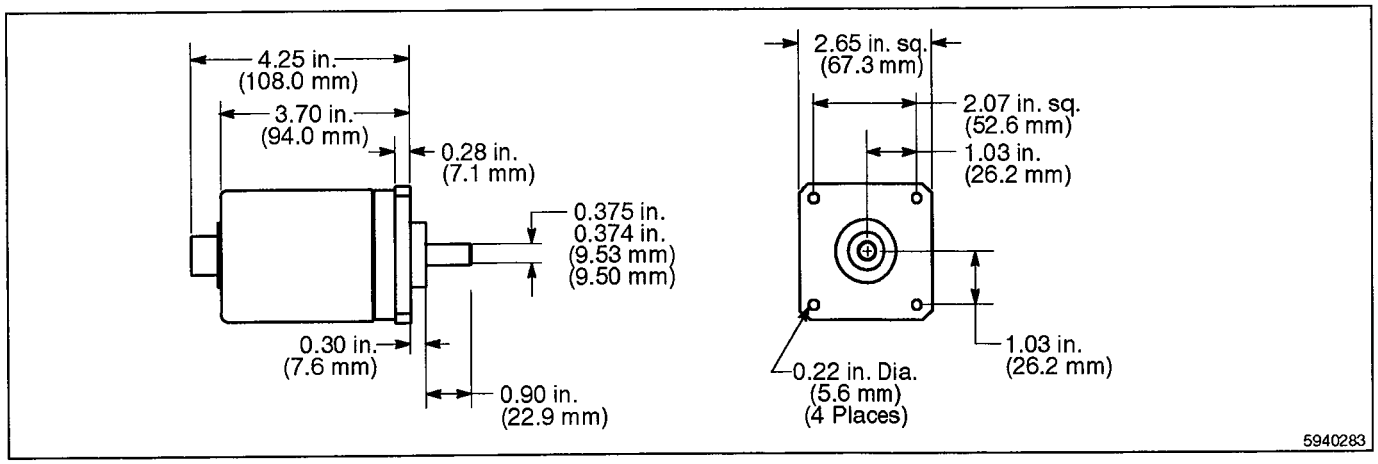

Fig. 3-5 Flange Mount Resolver

3. Resolver Installation
(contd.)

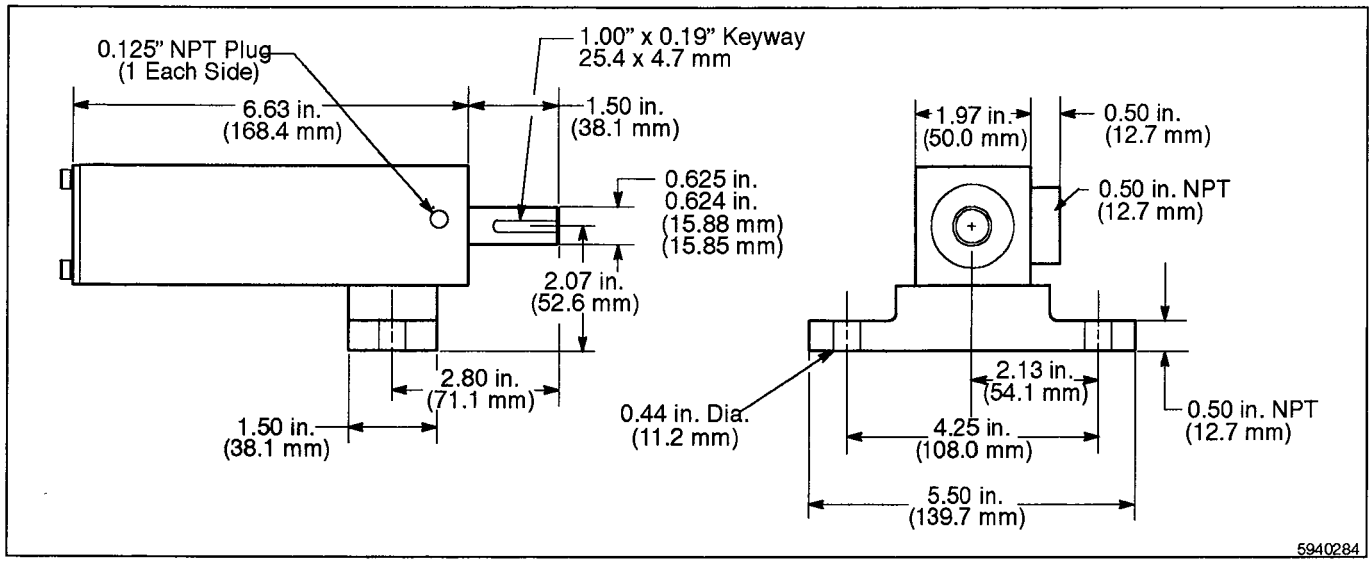

Fig. 3-6 Stainless Steel Resolver

Ambient Temperature

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

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

Resolver Wiring

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 3-7 and 3-8. 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 3-7.

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.

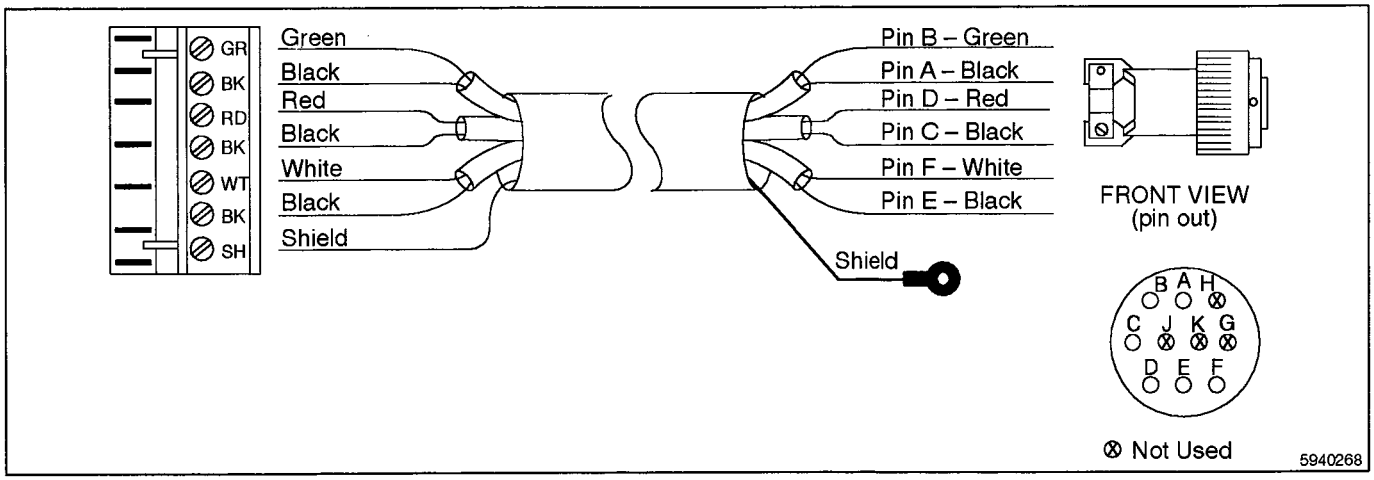

Fig. 3-7 Resolver Cable with Cannon Connector

Resolver Wiring *(contd.)*

The resolver cable illustrated in Figure 3-7 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.

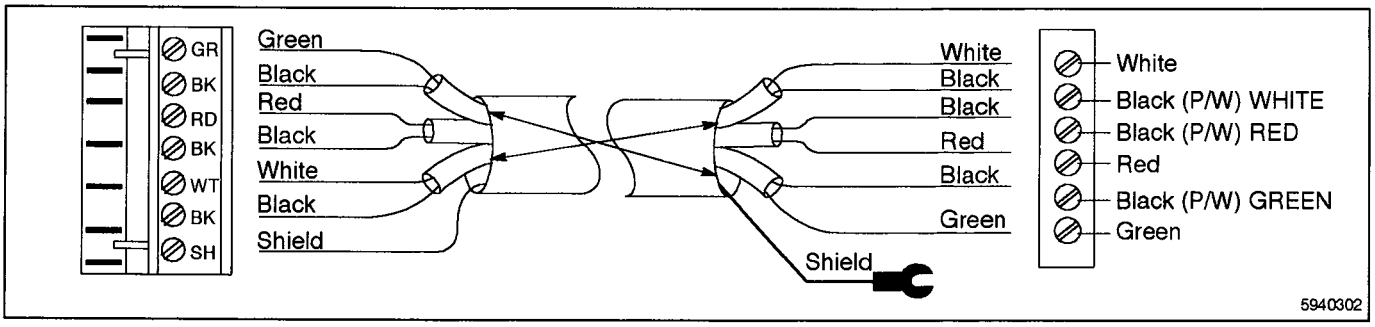

Fig. 3-8 Cable for Stainless Steel Resolver (with Terminal Strip Connections)

The resolver cable illustrated in Figure 3-8 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.

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. Disconnect equipment from the line voltage. Failure to observe may result in personal injury, death, or equipment damage.

Risk of electrical shock and equipment damage. Disconnect power to the controller before changing modules.

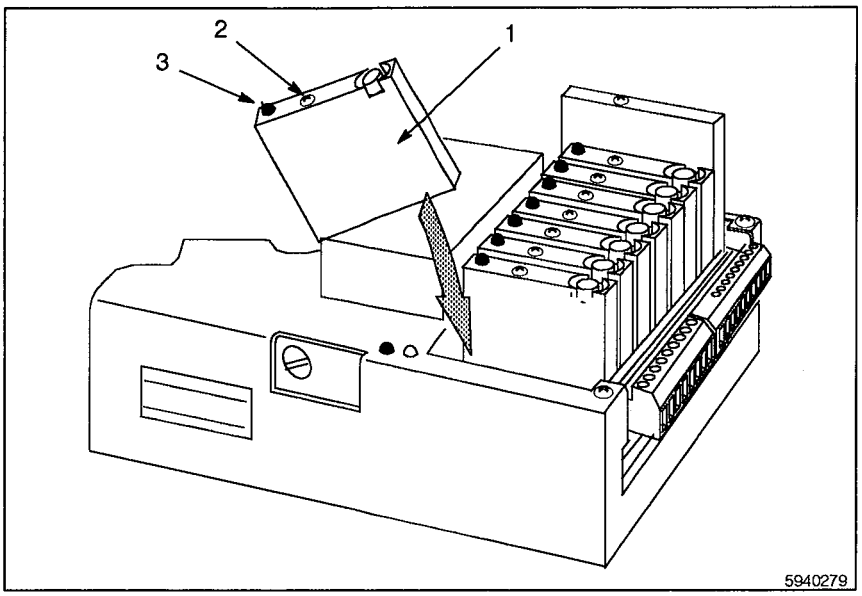

Fig. 3-9 Controller Module Removal/Replacement

1. Module
2. Phillips head screw
3. Module operating LED

DIP Switches

If installing a 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 *Controller/Keypad DIP Switch Configurations* in this section for DIP switch information.

Controller Wiring Guidelines

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

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

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

Figure 3-10 illustrates the general arrangement for installing controller AC power. PC56 controllers that are factory mounted in a cabinet come pre-wired for 240 VAC (single phase) service.

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

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 replacing fuses F1 and F2 with customer supplied 2 amp Slo Blo fuses.

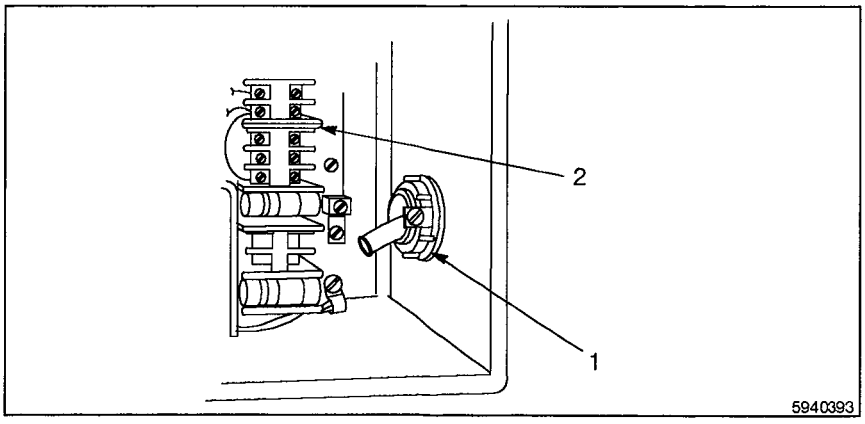

Fig. 3-10 AC Power Connection to Controller Power Supply

1. AC power supply in (w/strain relief)
2. Input power wiring terminal strip

Power Supply Wiring *(contd.)*

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

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

Connect a 240 VAC (single phase) or 120 VAC power cable to the controller's terminal strip as illustrated in Figure 3-10 and per the schematics and diagrams in Section 5, *Troubleshooting.* Provide a strain relief for the wires at the cabinet.

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

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 TB8 (Figure 3-11). Reversing the polarity blows the 1.25 amp power fuse. The controller will not be damaged. Correct the polarity, then replace the fuse.

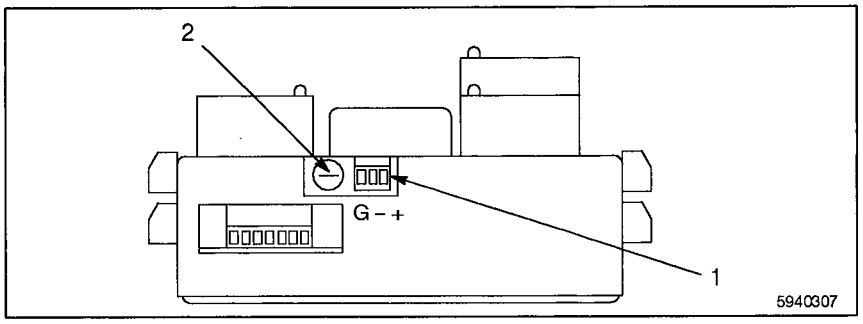

Fig. 3-11 Front View of Controller – Power Supply to Controller

1. TB8 20–30 VDC connection from DC power supply
2. Main power fuse (1 1/4 A Slo-Blo)

Controller Input Wiring

Hardware inputs can be used to select a program of setpoints or activate outputs based on sensor signals. Inputs can be powered from an external DC power source or the auxiliary terminals located on TB2.

Terminal Blocks

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

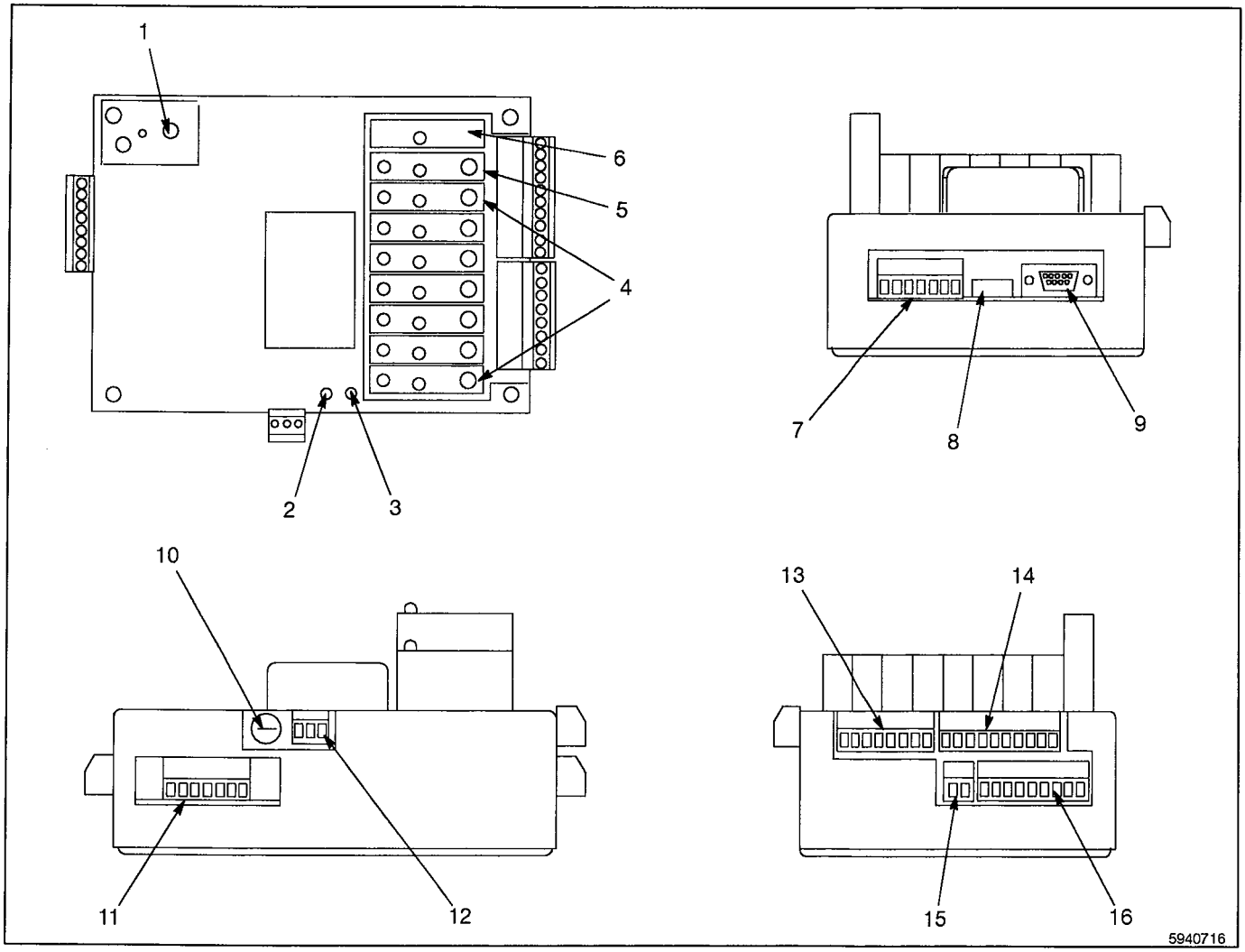

Fig. 3-12 Controller Components and Terminal Locations

1. Aux. power fuse (TB2) & tester
2. Status LED (Yellow)
3. Power LED (Green)
4. AC/DC modules (output 1–7)
5. Overlap fault module (output 8)
6. Run-Up module (output 9)
7. TB5 (keypad)
8. DIP switch
9. DB-9F (RS-232/485)
10. Main fuse, 1 1/4 A
11. TB4 (resolver)
12. TB8 (VDC for controller)
13. TB7 (outputs 1–4)
14. TB6 (outputs 5–9)
15. TB2 (power for inputs)
16. TB1 (inputs 1–8)

Sinking or Sourcing

PC56 controllers have one input terminal strip (TB1). See Figure 3-12.

Input terminal strips can be wired to accept sinking or sourcing input signals, but all eight inputs 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. Two wire DC sensors can also be used, but may require a load resistor in parallel with the input.

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

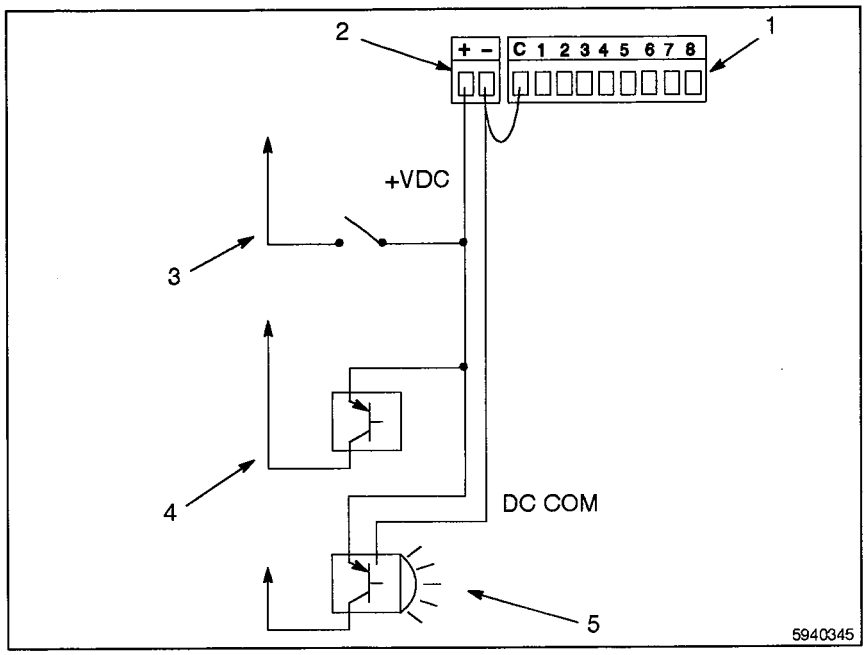

Fig. 3-13 PC56 Controller Input Wiring –Sourcing Devices

1. TB1 (INPUTS 1–8)
2. TB2 (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-wire DC sensor with current sourcing output (PNP)

Sinking or Sourcing (contd.)

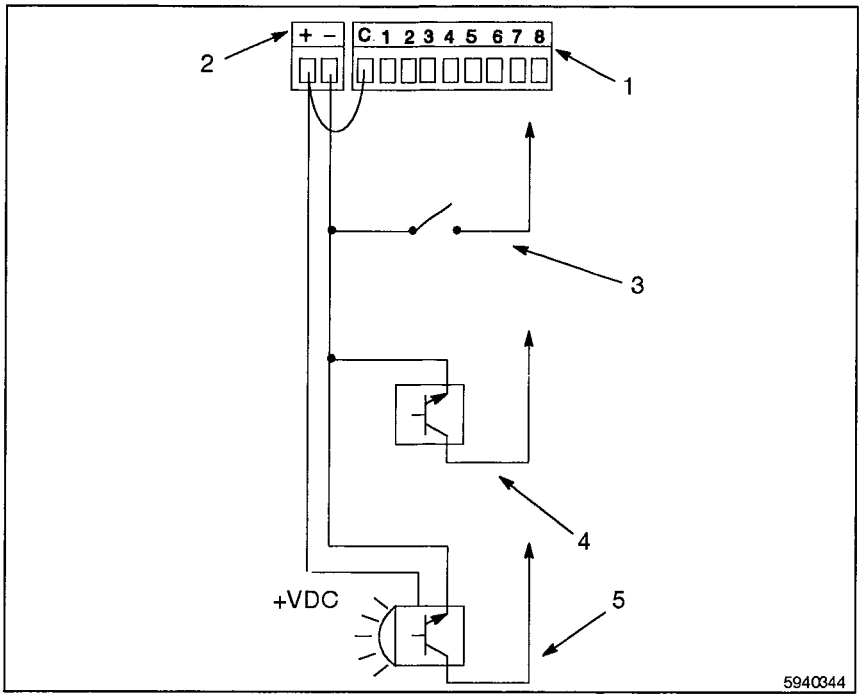

Fig. 3-14 PC56 Controller Input Wiring – Sinking Devices

1. TB1 (inputs 1–8)
2. TB2 (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-wire DC sensor with current sinking output (NPN)

Input Power

TB2 is the auxiliary power for inputs and voltage from TB2 is the same as the voltage supplied to the controller. Each input powered from TB2 draws 11 mA at 24 VDC. TB2 is fused at 0.25 amp. Inputs operate with voltages from 10 to 30 VDC.

Inputs on TB1

Table 3-1 lists the input terminals for TB1 and describes their functions.

Table 3-1 Input Terminals for TB1

Input	Function	Description
1	Trigger input	Activate the outputs so that the outputs respond to the setpoints programmed in the setpoints menu.
2	Reserve trigger	Not used.
3–7	Program select	Selects which program of setpoints is controlling the outputs. Binary, BCD, or gray code formats can drive these terminals.
8	Remote enable	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.

Figure 3-15 shows a program select switch which is available as an accessory. See *Program Enable and Select Switches* later in this section for information on program select switch installation.

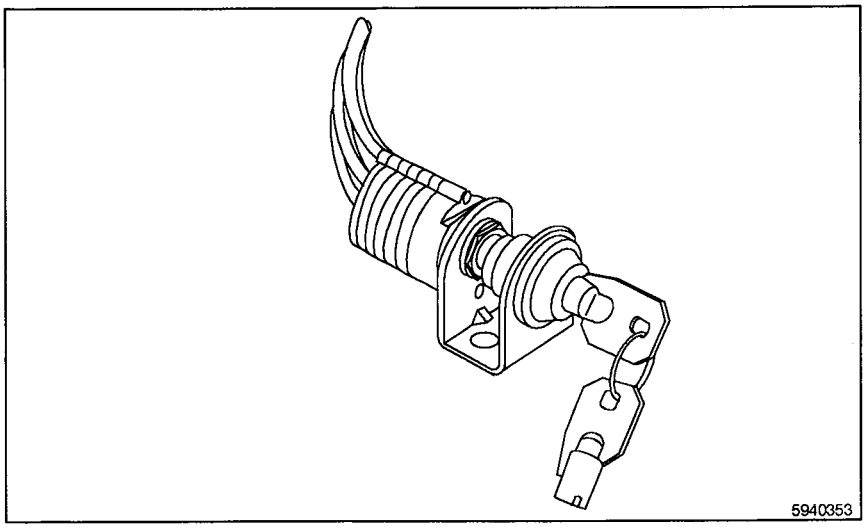

Fig. 3-15 Program Select Switch

When all program select inputs are off, the default program becomes active as programmed through the default program function.

Programming Formats

Binary, BCD, or gray code formats drive the inputs on TB2. The BCD, binary, and gray code formats for the program select terminals are listed in Figure 3-16. Follow the guidelines in Table 3-2 to work with the BCD, binary, and gray code formats.

Table 3-2 Using the BCD, Binary and Gray Code Formats

Format	Guidelines	Example
BCD	Calculate the program selected by adding the values for each of the inputs that are on. Only one of the normal four BDC digits for tens are used. Nine is the largest valid value for the units digit. A larger units digit combination sets the units digit to nine.	If inputs 7, 5, and 3 are on, program 15 is active. (10 + 4 + 1)
Binary	Calculate the program selected by adding the values for each of the inputs that are on.	If inputs 7, 5, and 3 are on, program 21 is active. (16 + 4 + 1)
Gray Code	Uses the optional program enable and program select switches.	

Programming Formats (contd.)

BCD FORMAT

	10's		Units		
Input Terminal:	**7**	**6**	**5**	**4**	**3**
Value:	10	8	4	2	1
Program:Default	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	1	0	0	0	0
11	1	0	0	0	1
12	1	0	0	1	0
13	1	0	0	1	1
14	1	0	1	0	0
15	1	0	1	0	1
16	1	0	1	1	0
17	1	0	1	1	1
18	1	1	0	0	0
19	1	1	0	0	1

BINARY FORMAT

Input Terminal:	**7**	**6**	**5**	**4**	**3**
Value:	16	8	4	2	1
Program:Default	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	1	0	1
22	1	0	1	1	0
23	1	0	1	1	1
24	1	1	0	0	0
25	1	1	0	0	1
26	1	1	0	1	0
27	1	1	0	1	1
28	1	1	1	0	0
29	1	1	1	0	1
30	1	1	1	1	0
31	1	1	1	1	1

GRAY CODE FORMAT

Input Terminal:	**7**	**6**	**5**	**4**	**3**
Value:	MSB				LSB
Program:Default	0	0	0	0	0
1	0	0	0	0	1
2	0	0	0	1	1
3	0	0	0	1	0
4	0	0	1	1	0
5	0	0	1	1	1
6	0	0	1	0	1
7	0	0	1	0	0
8	0	1	1	0	0
9	0	1	1	0	1
10	0	1	1	1	1
11	0	1	1	1	0
12	0	1	0	1	0
13	0	1	0	1	1
14	0	1	0	0	1
15	0	1	0	0	0
16	1	1	0	0	0
17	1	1	0	0	1
18	1	1	0	1	1
19	1	1	0	1	0
20	1	1	1	1	0
21	1	1	1	1	1
22	1	1	1	0	1
23	1	1	1	0	0
24	1	0	1	0	0
25	1	0	1	0	1
26	1	0	1	1	1
27	1	0	1	1	0
28	1	0	0	1	0
29	1	0	0	1	1
30	1	0	0	0	1
31	1	0	0	0	0

Fig. 3-16 PC56 Program Select Terminal Format

Wiring the Output Terminals

AC/DC modules are available on outputs 1–7, output 8 is for fault detect, and the run-up module is available on output 9.

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

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 Figures 3-20 and 3-21.

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

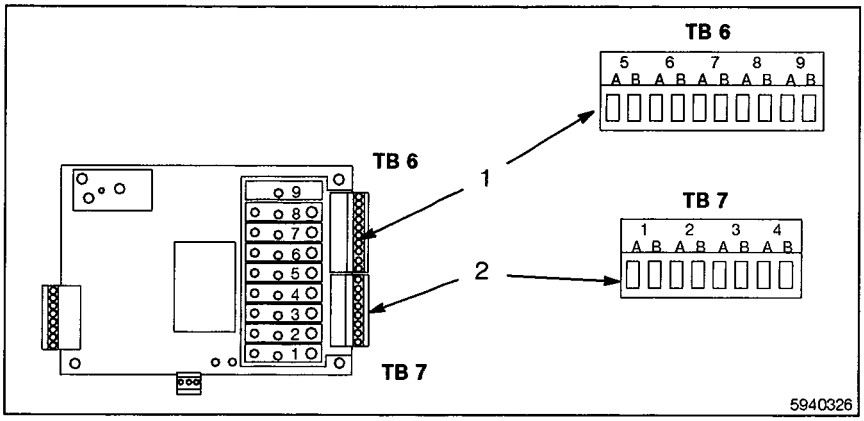

Fig. 3-17 PC56 Output Terminal Strips

1. TB6 (outputs 5–9)
2. TB7 (outputs 1–4)

Run-Up Output Modules

The run-up output module, which generates a signal proportional to the resolver rpm, can be used only in output position 9. A 0–10 VDC or 4–20 mA run-up module can be used.

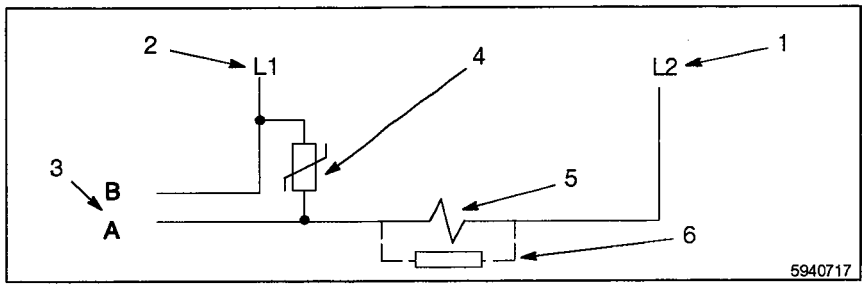

Fig. 3-18 AC Output

1. Neutral
2. Hot
3. Module terminals
4. Varistor (optional)
5. Load (AC solenoid)
6. R-C suppressor (optional)

Although most applications will not require the varistor or R-C suppressor shown in Figure 3-18, 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 across the terminals.
- For continuous switching, wire an R-C suppressor in parallel with the load.

Run-Up Output Modules (contd.)

An external power supply is not needed, because the run-up module receives power from the controller. The run-up output signal is completely isolated.

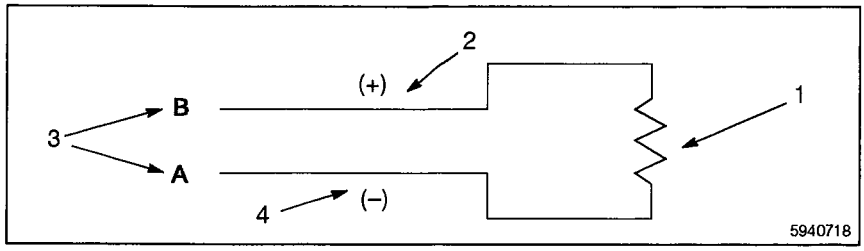

Fig. 3-19 Run-Up Output

1. Run-Up load device
2. Run-Up positive voltage
3. Module terminals (TB6 – 9)
4. Run-Up negative voltage

DC Output – Sourcing and Sinking

Output terminals can be wired for sourcing or sinking.

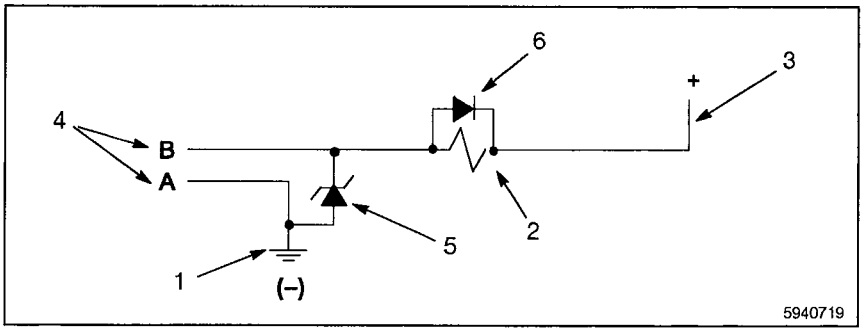

Fig. 3-20 DC Output - Sinking

1. DC common
2. Load (DC solenoid)
3. Positive VDC
4. Module terminals (TB6, TB7)
5. Zener diode (optional)
6. Reverse bias diode (optional)

DC Output – Sourcing and Sinking (contd.)

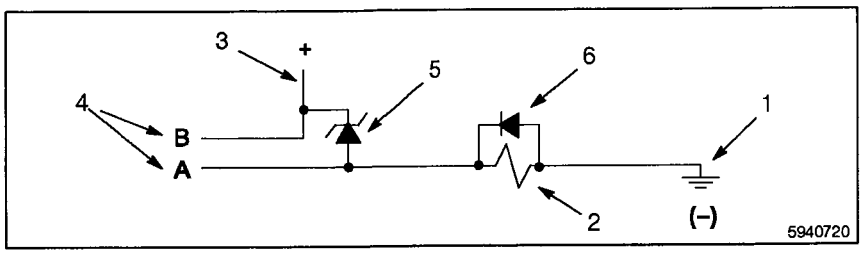

Fig. 3-21 DC Output – Sourcing

1. DC common
2. Load (DC solenoid)
3. Positive VDC
4. Module terminals (TB6, TB7)
5. Zener diode (optional)
6. Reverse bias diode (optional)

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 3-20 and 3-21):

- Connect a Zener diode 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 bias diode across the load. This may increase load turn off time.

Keypad Wiring

Only one keypad may be connected to a PC56 controller.

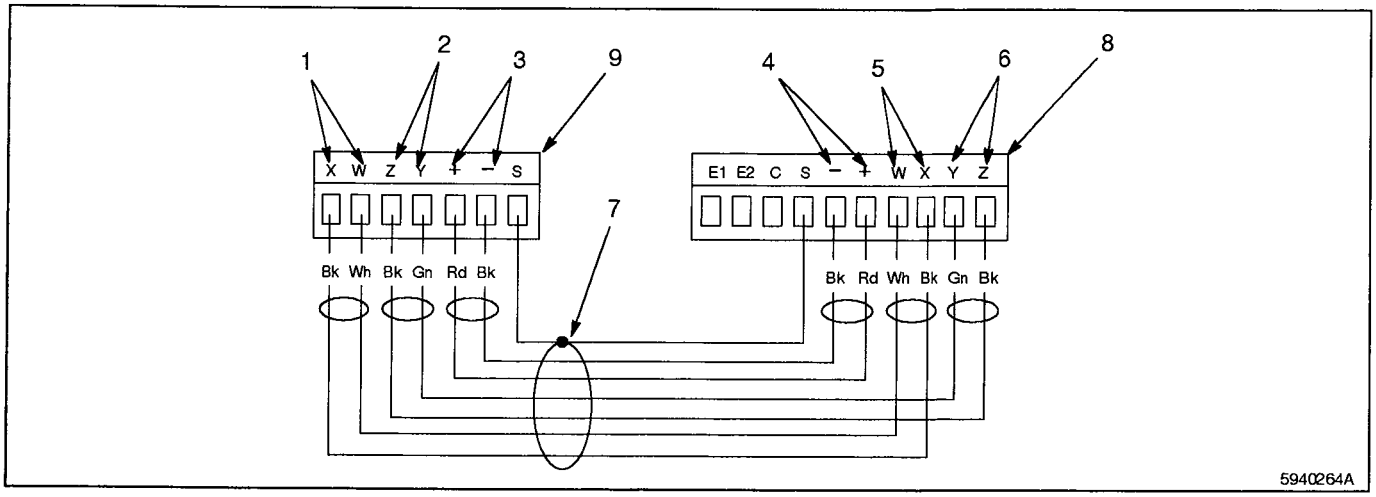

Fig. 3-22 Keypad Wiring

1. RS-485 to keypad
2. RS-485 from keypad
3. Positive (+)20–30 VDC out
4. Positive (+) 20–30 VDC in
5. RS-485 from controller
6. RS-485 to controller
7. Shield
8. Keypad terminal block
9. Controller terminal block (TB5)

Programming Access

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 setup 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 *password* in the programming section for details on programming access.

If a solid state device activates the programming enable terminals, that device is the determining factor in whether sourcing or sinking wiring is used.

Programming Access *(contd.)*

For mechanical devices such as jumpers or key switches, either sourcing or sinking wiring may be used. Figures 3-23 and 3-24 illustrate keypad terminal block sinking and sourcing wiring for programming enable.

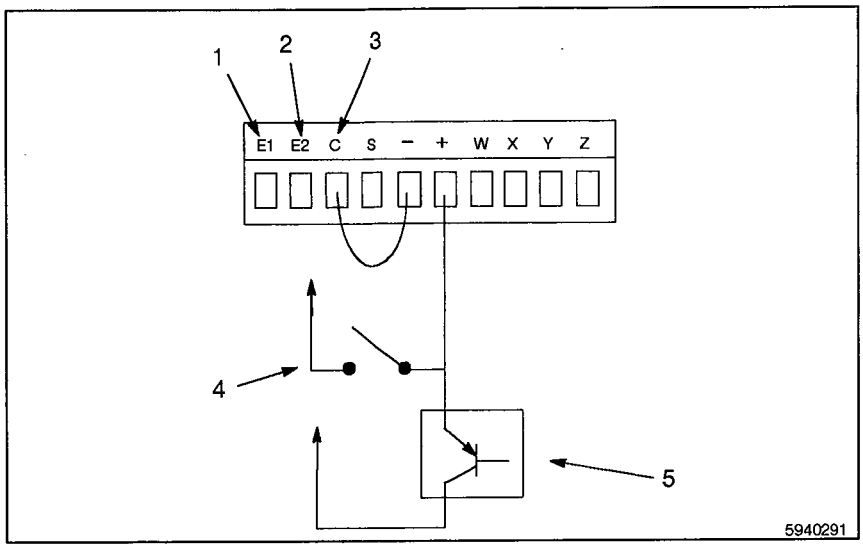

Fig. 3-23 Program Enable – Sourcing

1. Master program enable
2. Operator program enable
3. Enable common
4. Switch (to E1 or E2)
5. Sourcing device (to E1 or E2)

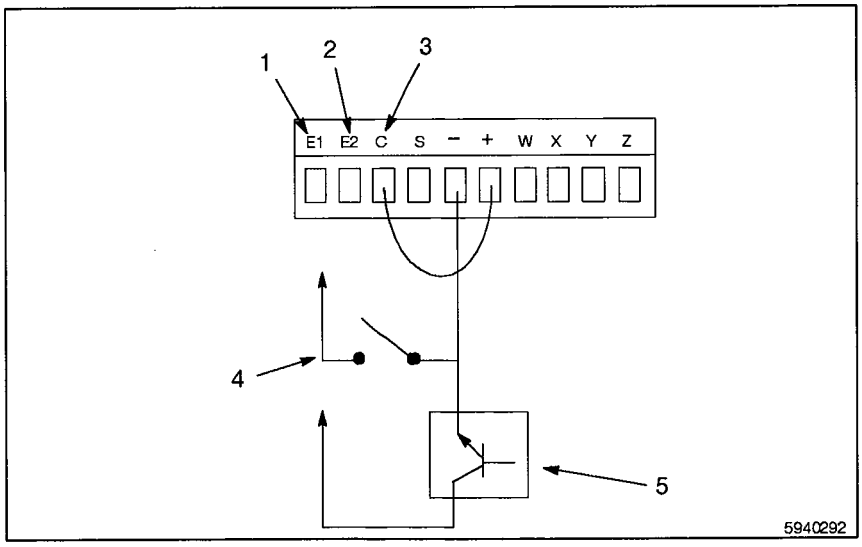

Fig. 3-24 Program Enable –Sinking

1. Master program enable
2. Operator program enable
3. Enable common
4. Switch (to E1 or E2)
5. Sinking device (to E1 or E2)

4. Setting the DIP Switches

The keypad and controller DIP switch is shown in Figure 3-25.

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. Although 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 keypad.

Setting all three address switches (B0 – B3) off (up) forces the controller to address 1, 9600 baud. Baud rate is set on power up, so you must cycle power after setting all three switches off. This feature is used when the controller is used with a man-machine interface and does not have the keypad. In an installation without the keypad, you may need to establish the communications settings so that you can upload or download.

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 Figure 3-26 for controller and keypad DIP switch settings.

NOTE: Communication termination switches 4–5 and 6–7 must all be set the same.

4. *Securing the DIP Switches (contd.)*

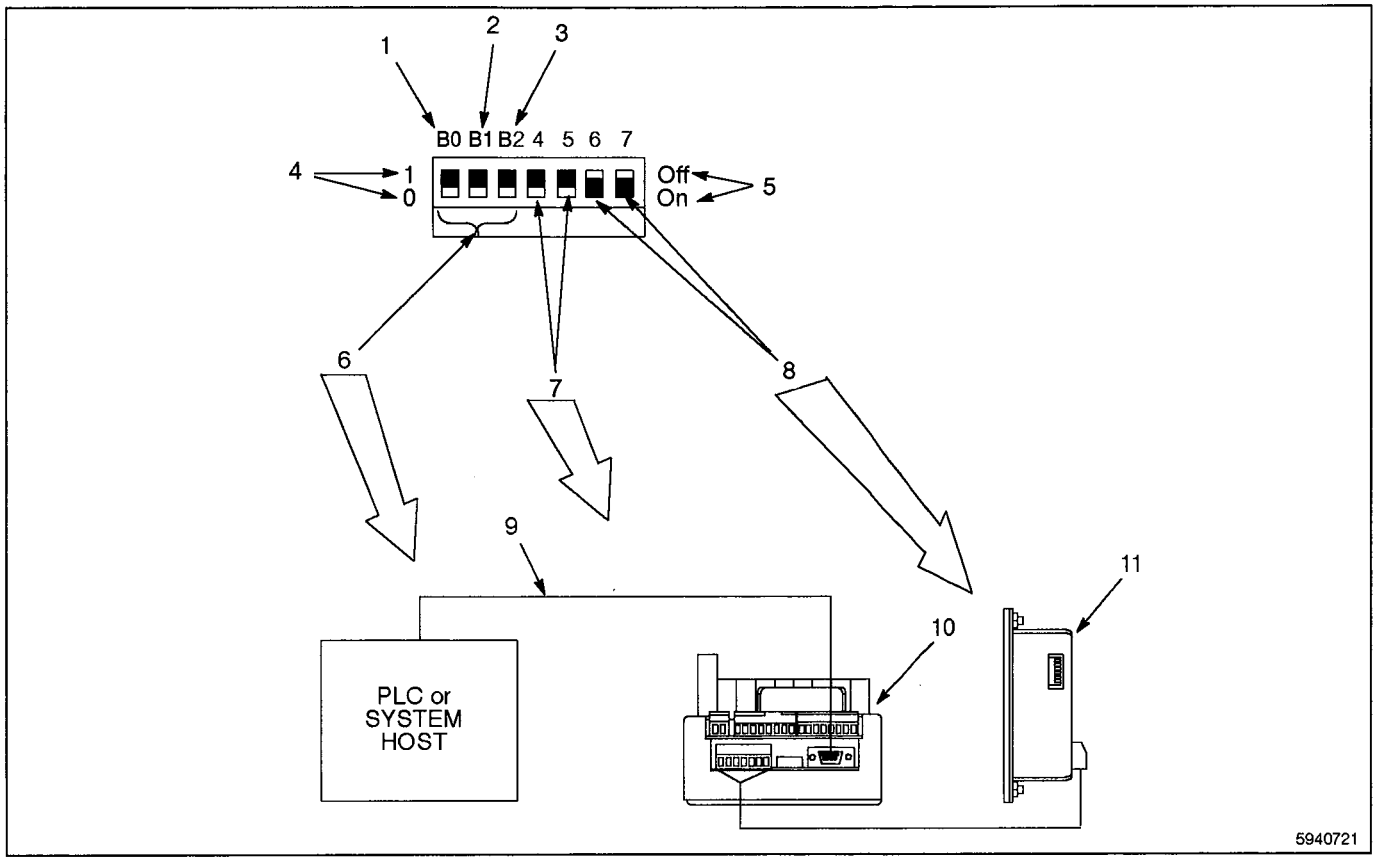

Fig. 3-25 Controller DIP Switch Identification

1. 1's digit
2. 2's digit
3. 4's digit
4. For address settings
5. For termination settings
6. Address for system communications (B0, B1 and B2)
7. Termination for system communications (RS-485 only, 4 and 5)
8. Termination request for keypad communications (6 and 7)
9. RS-232 or RS-485 system communications
10. Controller
11. Keypad

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 Figure 3-26 for DIP switch settings.

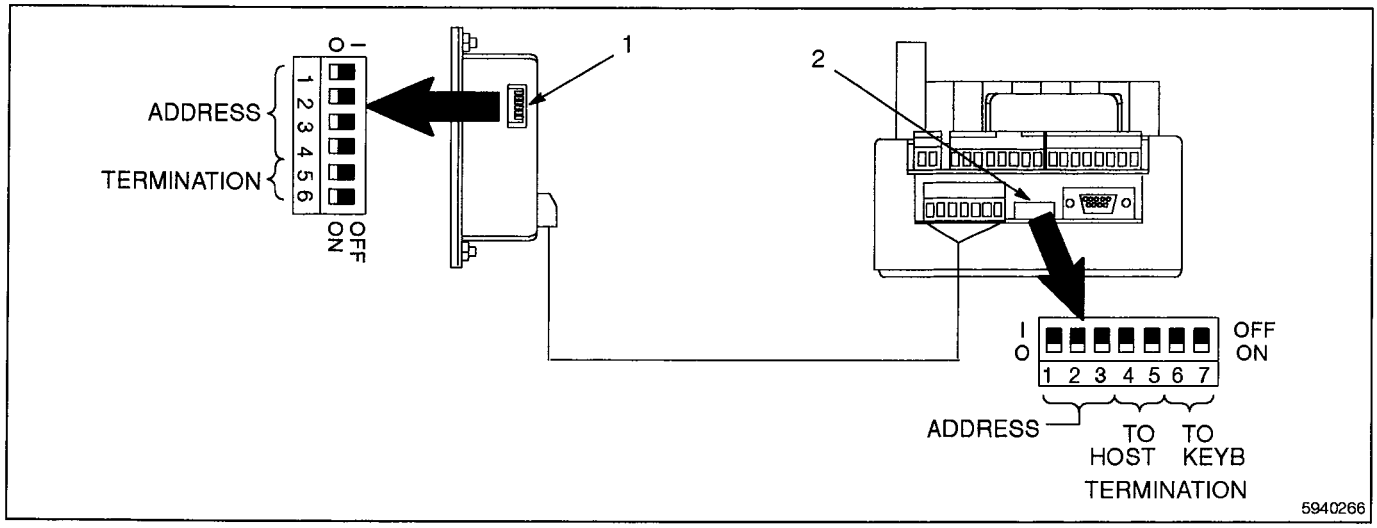

Fig. 3-26 Keypad and Controller DIP Switch Settings

1. Keypad DIP switches: termination on (5,6) and address 0 (1–4)
2. 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 Figure 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 PC56 controller to a system host.

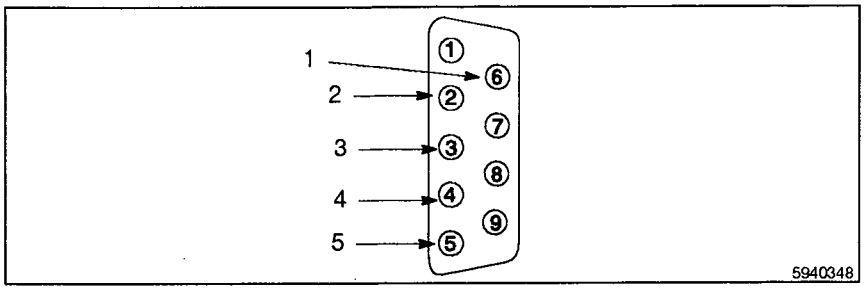

Fig. 3-27 Female Connector on Controller – RS-232 Signals

1. Data terminal ready
2. Transmit data to host
3. Receive data from host
4. Clear to send (not used)
5. Signal common

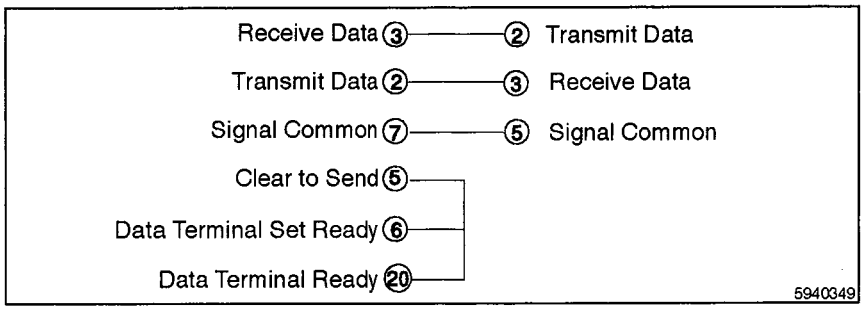

Fig. 3-28 RS-232 Cable Wiring – DB-25 (Host) to DB-9F (Controller)

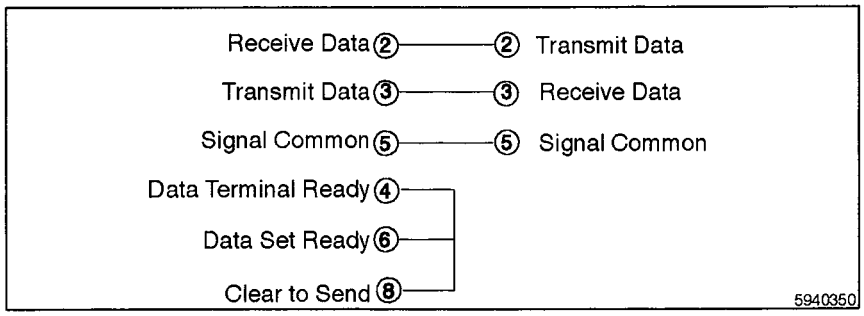

Fig. 3-29 RS-232 Cable Wiring – DB-9 (Host) to DB-9F (Controller)

RS-485

RS-485 is used for multi-drop networks where more than one controller is connected to the system host.

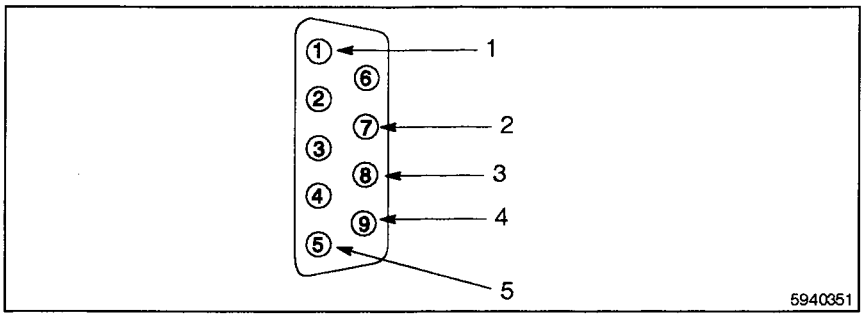

Fig. 3-30 DB-9 Female Connector on Controller – RS-485 Signals

1. Receive data from host (–)
2. Transmit data to host (–)
3. Transmit data to host (+)
4. Receive data from host (+)
5. Signal common

6. Installing Options

Washdown Boot

The washdown boot (P/N 188 105) is a clear silicon rubber boot that fits over and around the keypad area to protect the keypad during caustic chemical washdown. The transparent and pliable boot allows the keypad to be viewed and operated through it. In addition to preventing contamination from harsh chemicals, the boot protects the keypad from grease, oil, dirt, and normal wear that could otherwise shorten keypad life.

The boot is available separately and can be installed on existing controls in the field.

Installing the Washdown Boot

Use the following procedure to install the washdown boot.

1. Remove the nuts and regular black rubber gasket from the keypad.
2. Carefully slip the silicone rubber boot over the keypad. Slowly work it over the mounting studs, being careful not to cause any tears in the boot.

   NOTE: Silicone rubber is very notch sensitive, tearing easily.

3. Smooth the boot into position so no stretching takes place. It should be able to move into position easily.
4. Install the keypad into the panel. The nut tightening sequence is important.

   - Start with a corner of the unit, holding the rubber boot snugly to the edge of the keypad while bringing the nut to a finger tightness.
   - Select the next nut, again tightening while holding the boot snugly to the keypad edge.
   - When all the nuts are in place, tighten each nut a little more, tightening one at a time. The silicone rubber tends to extrude from under the keypad if the bolts are not tightened in an even sequence or if they are over torqued.

CAUTION: Risk of damage to the seal. Tighten the nuts carefully.

Program Enable and Program Select Switches

Available as an option on PC56 controllers, program enable (P/N 188 108) and program select (P/N 188 107) switches prevent unauthorized programming changes to the controller and allow remote selection of the active program.

Program Enable Switch

The switch is wired to the master program enable terminal on the back of the keypad. A second switch may be wired to operator enable.

For the program enable switch, either sourcing or sinking wiring may be used. Figures 3-31 and 3-32 illustrate keypad terminal block sinking and sourcing wiring for programming enable.

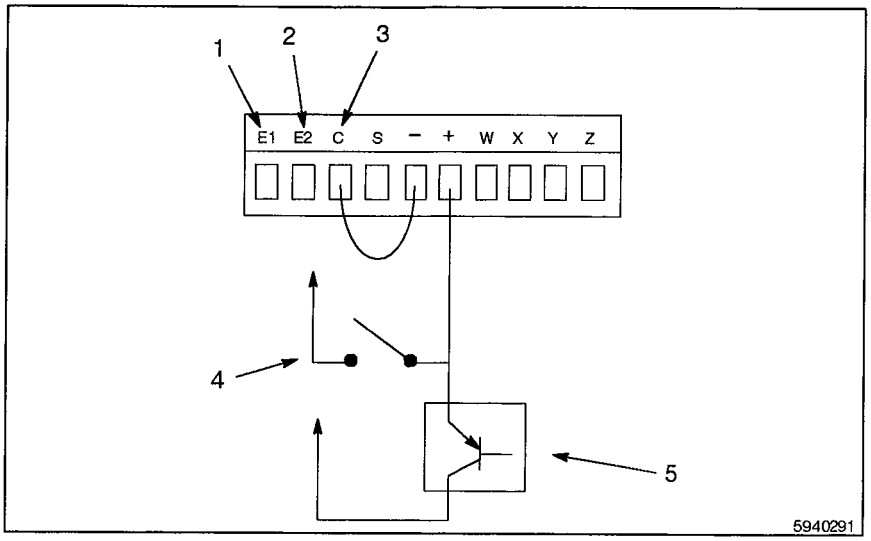

Fig. 3-31 Program Enable – Sourcing

1. Master program enable
2. Operator program enable
3. Enable common
4. Switch (to E1 or E2)
5. Sourcing module – PLC or other electronic output. Connect to E1 or E2.

Program Enable Switch (contd.)

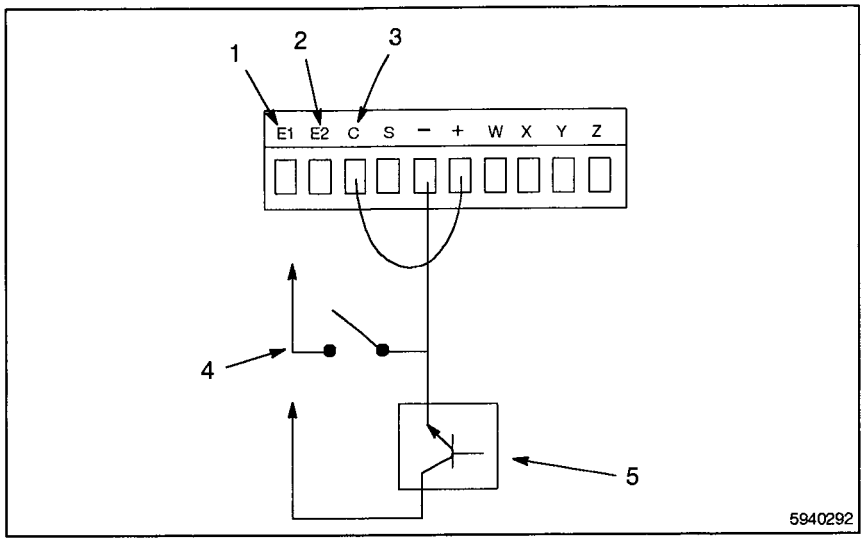

Fig. 3-32 Program Enable – Sinking

1. Master program enable
2. Operator program enable
3. Enable common
4. Switch (to E1 or E2)
5. Sinking module – PLC or other electronic output. Connect to E1 or E2.

Program Select Switch

The program select switch, which allows remote control of the active program, allows the operator to change programs but does not allow changing setpoints in the output channels. The switch provides access to eight programs in the active program bank.

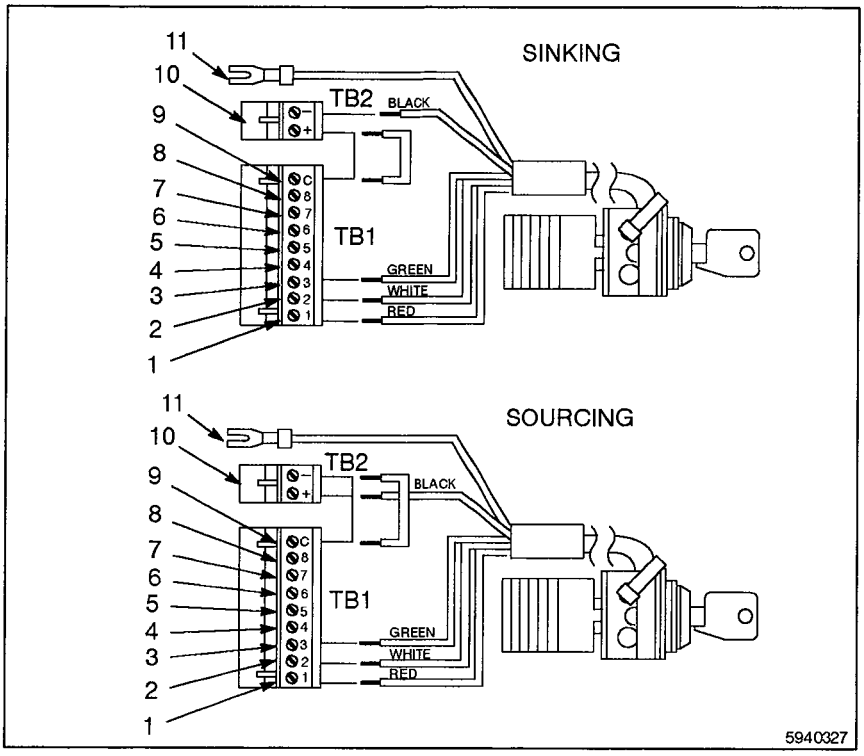

Fig. 3-33 PC56 Program Select Switch Wiring

1. Group 1 input
2. Group 2 input
3. Program select 1
4. Program select 2
5. Program select 3
6. Program select 4
7. First cycle enable
8. Remote enable
9. Input common
10. DC power out for inputs
11. Chassis ground

7. Bench Test

Test the PC56 controller prior to installation, following the steps below:

1. Verify that output modules are plugged into the controller beginning with Position 1. See Figure 3-12.
2. Verify resolver connection. See Figure 3-7 and Figure 3-8.
3. Verify keypad wiring connection to the controller. See Figure 3-12 for location and Figure 3-22 for wiring connections.
4. Verify the controller DIP switches 6 and 7 are set to ON, as shown in Figure 3-25.
5. Verify the keypad DIP switch is set to address 0 and termination ON, as shown in Figure 3-26.
6. Use the factory set password of 3 to set the programming access level to MASTER.
7. Verify DC input power. See Figure 3-11.

   NOTE: Supply a trigger for the PC56 input terminal.

8. Experiment 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 LEDs, you can observe the effects of programming setpoint values.

Section 4

Programming

Section 4
Programming

1. Introduction

This section provides the basic steps required for programming the PC56 controller. Explanations for controller functions and capabilities are provided in Section 2, *Description*. PC56 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.

1. *Introduction* (contd.)

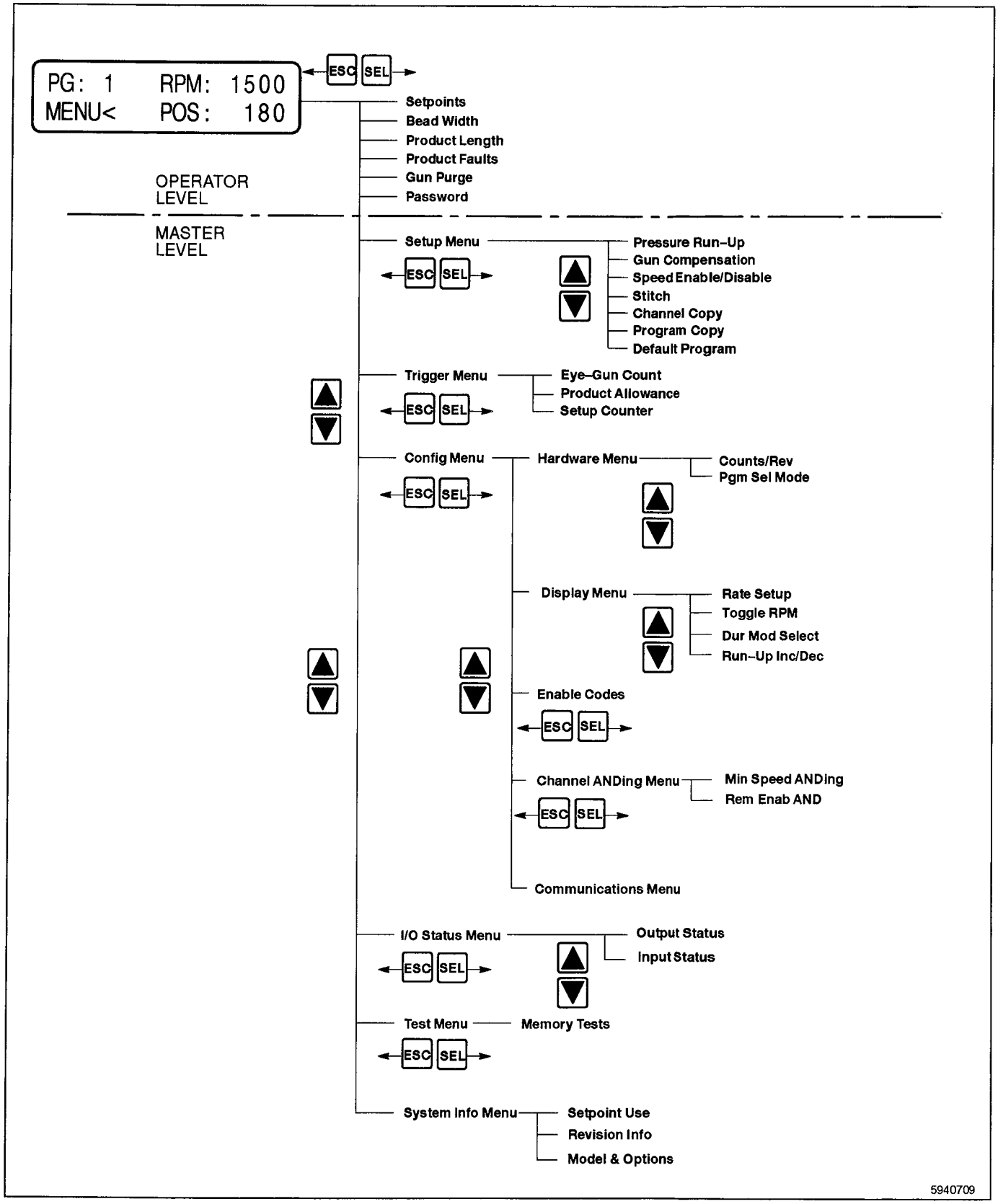

Fig. 4-1 PC56 Controller Program Menu Tree

2. Initial Programming

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 menu needed and making the programming changes. The following table outlines the initial tasks to be programmed.

Table 4-1 Initial Programming

Step	Task	Menu Path
1	Set counts/revolution of resolver	Config Hardware Counts/Rev
2	Set eye to gun distance	Trigger Eye–>Gun Count
3	Set product length	Product Length
4	Set product length allowances	Trigger Prod Allowance
5	Set glue patterns If stitching...	Setpoints Setup Stitch
6	Set speed enable/disable	Setup Spd Enab/Disab
7	Set channel minimum speed ANDing	Config Chn ANDing Min Speed AND
8	Set gun compensation times	Setup Gun Comp
9	Set run-up	Setup Run-Up

Main Screen

On power up or after five minutes of keypad inactivity the controller displays the main menu screen.

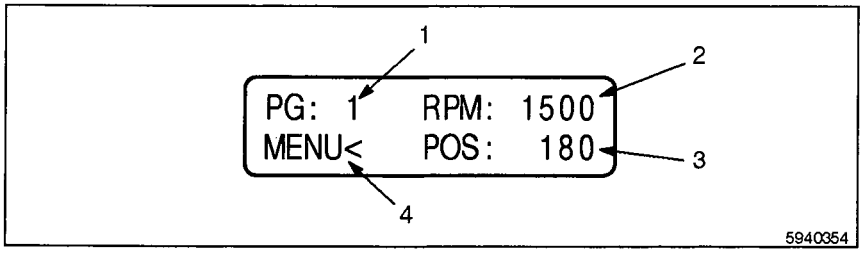

Fig. 4-2 Main Menu Screen

1. Active program
2. Machine rate
3. Machine position
4. Menu tree entry

Active Program

The PC56 controller can store 32 programs in its memory. The active program is the program currently controlling the output channels. To change the active program, use the arrow keys to move the cursor to the active program, enter the new program number using the numeric keys, then press ENT (enter).

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.

Controller Input Wiring in Section 3, *Installation,* provides information on using hardware inputs to select the active program.

Machine Rate

When the machine is moving, machine rate is able to display either line speed (XPM), parts per minute (P/M), or total parts (CNT). You can toggle between the three values during operation by moving the cursor to the rate field and pressing the SEL key. Program the machine rate by following the menu path from the config menu to the display menu to rate set-up. Units for the rate display are in the form XPM, where X may represent any letter of the alphabet.

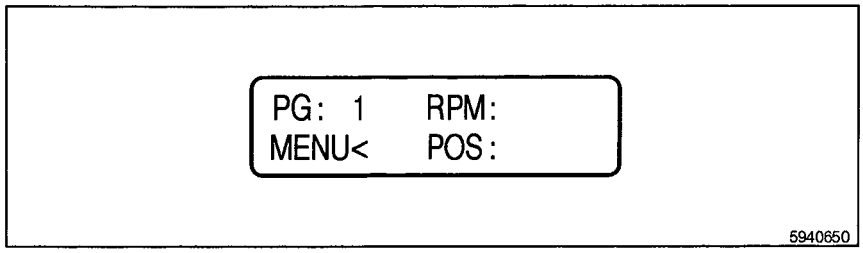

Fig. 4-3 Main Screen with Rate

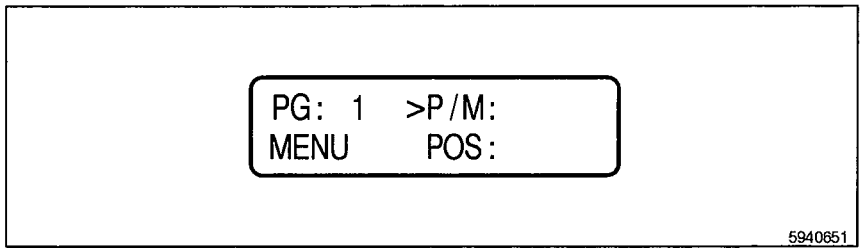

Fig. 4-4 Main Screen with Parts Per Minute

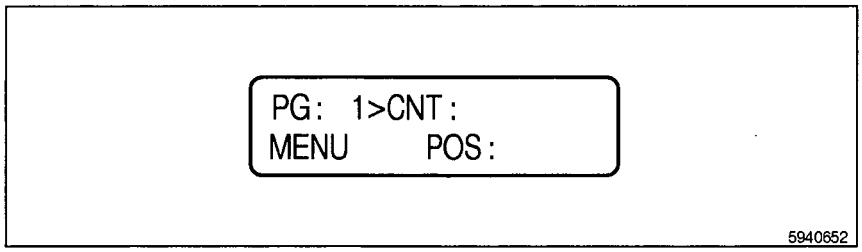

Fig. 4-5 Main Screen with Product Count

Machine Position

Machine position is displayed only when the resolver speed is below the toggle rpm speed. At higher speeds machine position is blank.

Menu Tree Entry

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,* and *Toggle RPM.*

3. Operator Level Menu Selections

The PC56 controller has six functions that are operator accessible:

- setpoints
- bead width
- product length
- product faults
- gun purge
- password

The sections that follow describe each of these menu selections.

Setpoints

Setpoints are the counts at which a channel turns on or off and are programmed into a channel through the keypad.

At the main screen with the cursor at MENU:

1. Press SEL.
2. At SETPOINTS, press SEL.

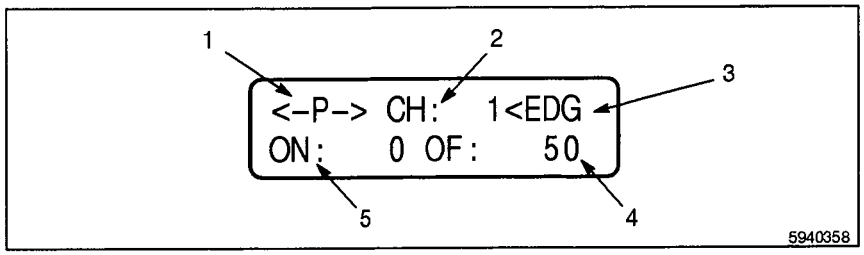

Fig. 4-6 Setpoint Screen with Duration Mode Select On

1. <–P–> for multiple durations (blank if only 1 duration)
2. Channel
3. Edge mode
4. Off setpoint
5. On setpoint

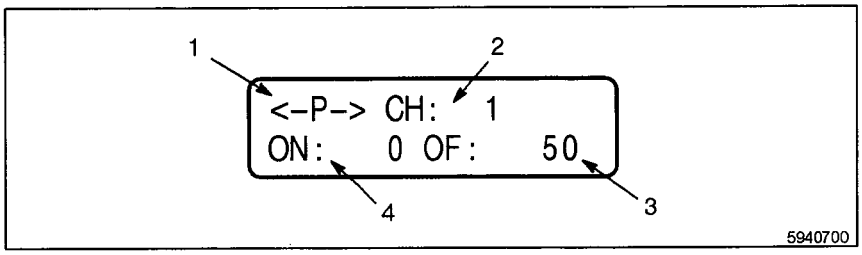

Fig. 4-7 Setpoint Screen with Duration Mode Select Off

1. <–P–> for multiple durations (blank if only 1 pulse in display)
2. Channel
3. Off setpoint
4. On setpoint

Setpoints *(contd.)*

Setpoint programming only affects the program currently running. A duration mode select screen allows you to enable or disable the EDG/DUR/CHN window in the upper right corner of the setpoint programming screen. When enabled, this window allows you to select the duration programming mode like PC54/55 controllers.

When disabled, the mode window does not appear in the setpoint programming window, and only EDG programming is allowed (you cannot move both edges of a duration and you cannot move all durations in a channel.)

The mode select screen allows you to toggle the duration programming mode on or off. The path to this function is from the config menu to the display menu to duration mode select.

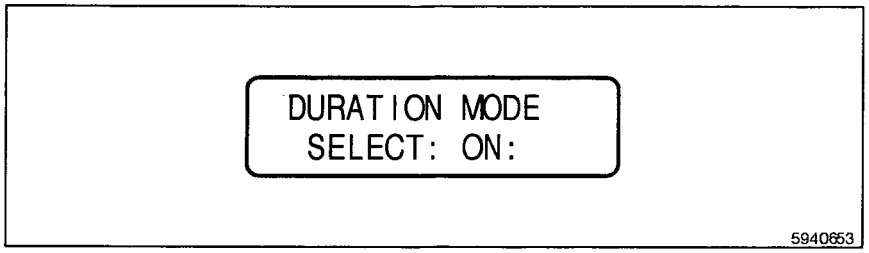

Fig. 4-8 Duration Mode Select Screen

Channel to Edit

With the cursor to the right of channel number (number 2 in Figure 4-6), use the numeric keypad and ENT to select the channel to program.

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 the cursor is at the off setpoint, or by pressing the left cursor key when the cursor is at the on setpoint.
- If a channel contains no durations, the on and off setpoints are 0 (Figure 4-9, number 1).
- If a channel is always on, both the on and off setpoints are 1.

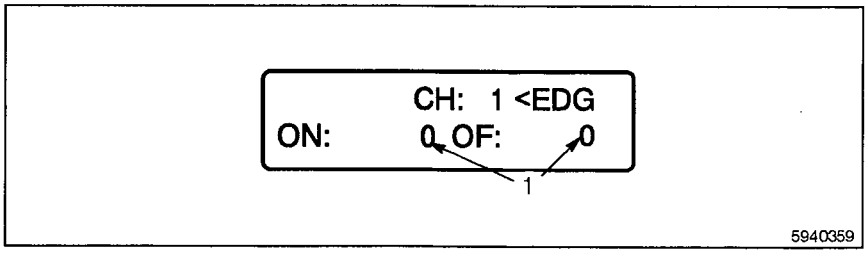

Fig. 4-9 Channel Display

1. On and off setpoints

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.

Recording Setpoints

Record setpoints as they are established for each program.

Durations

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 setpoints (number 1, Figure 4-10); the cursor (number 2, Figure 4-10) points 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 ENT.

NOTE: To stop entering a duration at any time, press ESC.

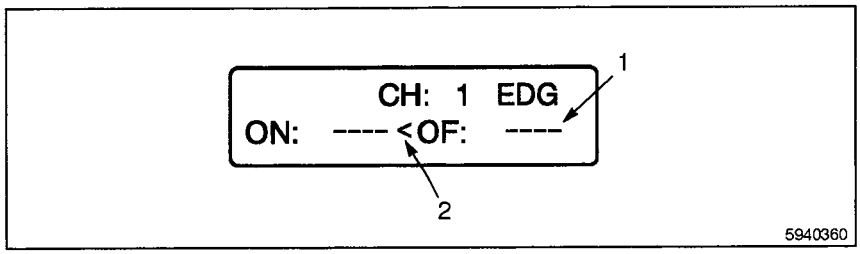

Fig. 4-10 Adding Durations

1. Blank on and off setpoints
2. Cursor

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 will overlap** is displayed on the screen.

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 increased or decreased simultaneously.
- In CHN mode, all on and off setpoints for all durations in the channel are increased or decreased simultaneously.

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.

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 from the moment a product triggers the eye until the product length count is reached by entering a new duration with both on and off values equal to 1.

Bead Width

The bead width function is provided to allow the operator to increase or decrease the run-up output. The amount of increase or decrease is expressed as a percent.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to BEAD WIDTH, press SEL.

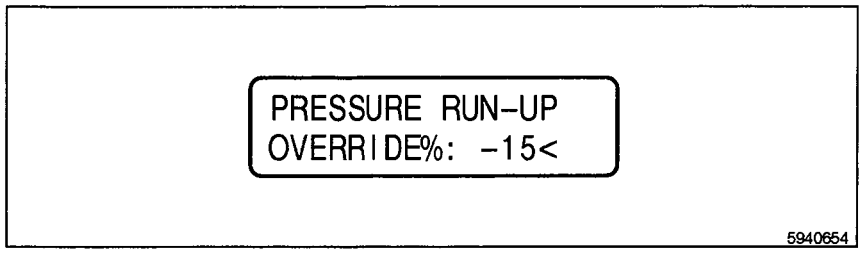

Fig. 4-11 Bead Width Screen

The bead width function acts as a run-up output override and can be a plus or minus value. It causes the run-up output to follow a new profile as if all setpoint values had been increased or decreased by the percent specified. The override value does not change the run-up setpoints.

Use the numeric keys to input values and then press ENT. A negative value is entered by pressing the numeric key, pressing the +/– key, then pressing ENT. You can also press the DEC key until the value displayed shows the negative value you want.

NOTE: When you use the DEC key to decrement this setting, it will decrement in increments that you set up under the run-up override programming function.

Product Length

The product length selection allows you to specify the length of the product. This value, the distance between the trigger eye and the glue gun, and the product length allowance are then used by the PC56 controller to generate a product fault output and turn the glue guns off if the product is overlapped or skewed on the conveyor line.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to PRODUCT LENGTH, press SEL.
3. Use the numeric keys to input values and then press ENT.

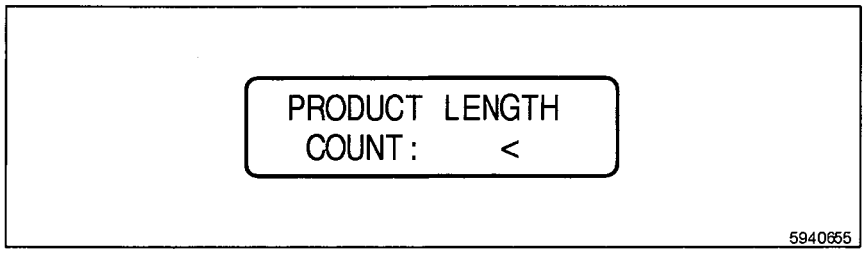

Fig. 4-12 Product Length Screen

Product Faults

The product faults function displays the number of products that the PC56 controller found to be too short or too long.

It can be useful to reset these values to zero on a periodic basis (once per day, once per shift, etc.) so that the number and types of product faults can be observed and corrected.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to PRODUCT FAULTS, press SEL.
3. Use the numeric keys to input values and then press ENT.

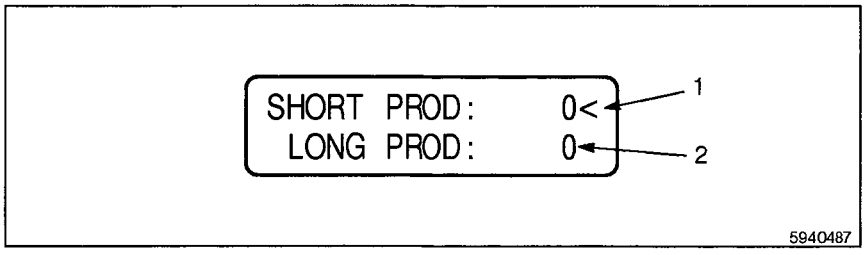

Fig. 4-13 Product Faults Screen

1. Number of short products
2. Number of long products

Gun Purge

The gun purge screen allows you to turn on one output at a time with temporarily increased run-up output for the purpose of purging the gun that is connected to that output. The CHN window specifies the channel to be purged, the STAT window shows the output status of the channel, and the PURGE OP% window specifies the temporary run-up output value in percent of full scale.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to GUN PURGE, press SEL.
3. Use the arrow keys to move the cursor between the CHN, STAT, and PURGE OP% windows.
4. Use the numeric keys to input values for CHN or PURGE OP% and then press ENT. Use the SEL key to change STAT.

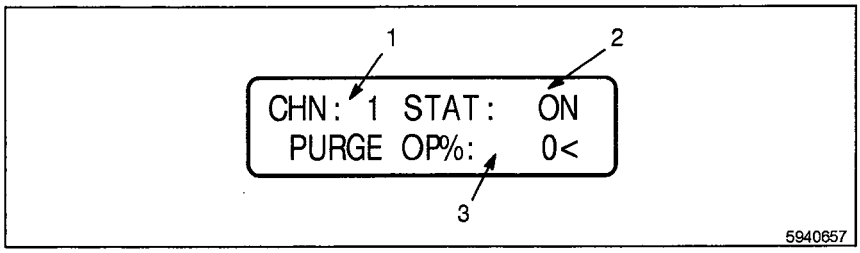

Fig. 4-14 Gun Purge Screen

1. Channel to be purged
2. Status of channel (on or off)
3. Purge percent

Entering a Password

The password selection allows you to enable access to either the operator or master programming level by entering a numeric password on the keypad. From the factory, the operator level password is 1 and the master level password is 3. To change the factory supplied passwords, refer to *Enable Codes*.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to PASSWORD, press SEL.
3. The screen displays the current programming access level. Enter a 1–4 number password.

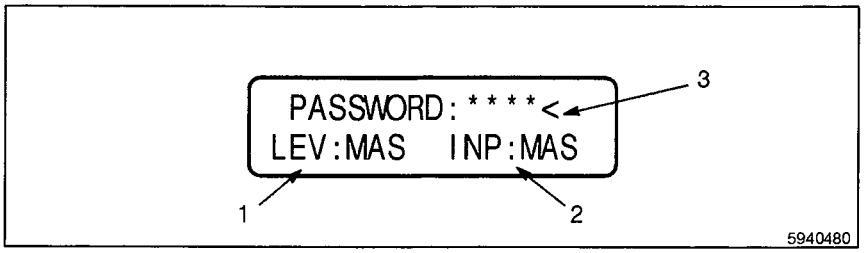

Fig. 4-15 Password Screen

1. Level of programming access
2. Level of programming input
3. Password entry

4. *Master Level Programming Access*

The programming functions that are available under the master level are controlled by password access or by jumpers on the back of the keypad connector. Programming levels can also be activated by terminals E1 and E2 on the back of the keypad. Refer to Section 3, *Keypad Wiring* for more information.

5. Setup Menu

The setup menu allows you to program the PC56 controller for the adhesive pattern you want on the substrate.

Pressure Run-Up

The run-up output is programmed in two segments and is defined by three setpoints which specify the run-up output at specific line speeds. Run-up output is specified in percent of full scale (4–20 mA or 0–10 VDC). Line speed is specified for each of the three setpoints; however, line speed for the first setpoint is fixed at 0.

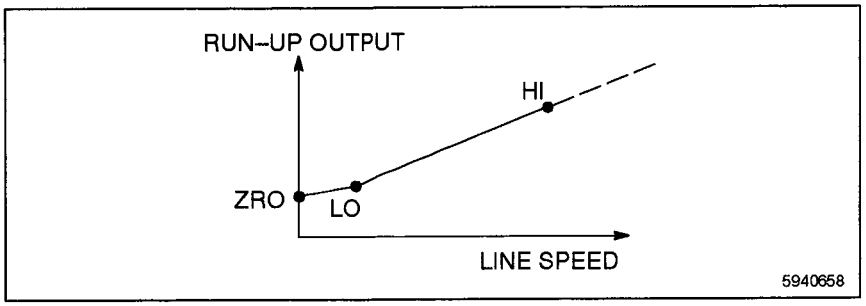

Fig. 4-16 Run-Up Output Versus Line Speed

This approach allows you to program a 0 speed pressure, a low speed pressure, and a high speed pressure. Run-up control is linear between setpoints.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to SETUP MENU, press SEL.
3. At PRESSURE RUN-UP, press SEL. The setpoint screen is displayed.

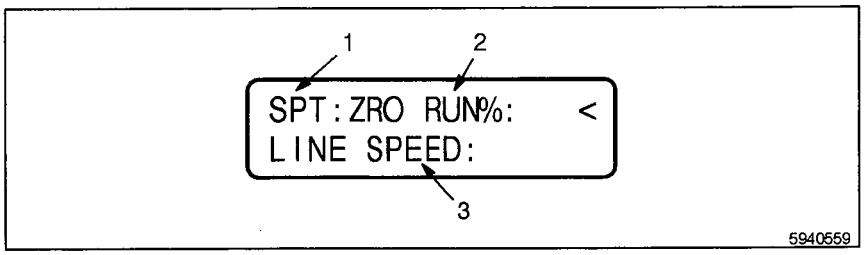

Fig. 4-17 Run-Up Setpoint Screen

1. Setpoint window (zero, low, high)
2. RU% (run-up percent) window
3. Line speed window

Pressure Run-Up (contd.)

4. Use the arrow keys to move the cursor to the SPT window and press SEL to toggle between the setpoint values.

5. Move the cursor to RU%, use the numeric keypad to enter the desired value, and press ENT.

6. Move the cursor to LINE SPEED, use the numeric keypad to enter the desire value, and press ENT.

7. Repeat the above for each of the three setpoints.

If you are incrementing or decrementing an existing value in the RU% or LINE SPEED windows, you can use INC/DEC and you do not need to press ENT.

Gun Compensation

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 and off setpoints of a specified output channel as the parent machine speeds up, maintaining proper synchronization at all speeds.

PC56 controllers can be programmed with pull in/drop out compensation, so that the leading and trailing edges in a channel can have different gun compensation values. This allows machine operators to define how close to the leading and trailing edges adhesive is applied.

At the main screen with the cursor at MENU:

1. Press SEL.

2. Scroll down to SETUP MENU and press SEL.

3. Scroll down to GUN COMP and press SEL.

The GUN COMP screen appears, showing the leading edge (LE) and trailing edge (TE) values for the displayed channel.

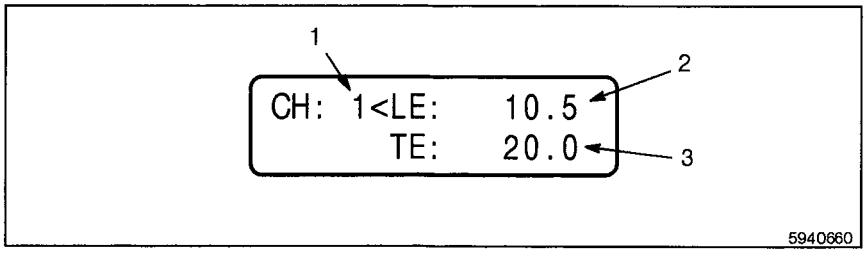

Fig. 4-18 Gun Compensation Screen

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

Gun Compensation *(contd.)*

4. Use the arrow keys to move the cursor to the CH window, then use the numeric keys to input the desired channel number, and press ENT (or use the INC/DEC keys).

5. Move the cursor to LE, then use the numeric keypad to enter the desired value, and press ENT (or use the INC/DEC keys).

6. Move the cursor to TE, then use the numeric keypad to enter the desire value, and press ENT (or use the INC/DEC keys)

   NOTE: To enter tenths of milliseconds, use the decimal point. (The decimal point is not needed, however, when entering whole number milliseconds. For example, when 12 is entered and ENT pressed, the resulting value is 12.0.)

Setting Pull In/Drop Out Gun Compensation

1. If the gun's on and off response times are known, jog the parent machine to determine on and off setpoints at zero line speed.

2. Enter the gun compensation values through GUN COMP programming.

CAUTION: When setting gun compensation on a system where zero speed setpoints are established, always adjust the gun comp value. Do not adjust the individual output setpoints as this may cause inconsistent adhesive distribution from carton to carton at varying machine speeds.

Setting Gun Compensation with Unknown Response Time

1. Jog the line to determine on and off setpoints at zero speed.

2. Estimate gun response times for on and off and enter them through the GUN COMP function. The on timing value controls pull in, while the off timing value controls drop out.

3. Start the parent machine and run product through the adhesive station at a fixed speed. Adjust each gun compensation value as required for proper application. This can be done while the line is in motion.

4. Once the on and off setpoints are programmed, vary the line speed to confirm proper operation at all speeds. Fine tune the GUN COMP values if necessary.

Setting Gun Compensation When Parent Machine Can't Be Jogged:

NOTE: GUN COMP must be set to zero, for both pull in and drop out, while establishing the setpoints.

1. Run the line at a fixed speed, setting the gun on and off operating setpoints as required. Write down the programmed on and off setpoints.

2. Increase the line speed, adjusting the gun on and off operating setpoints to restore proper application.

   NOTE: Do not adjust gun compensation values when adjusting on and off setpoints. The first setpoints were adjusted at fixed speed with zero compensation. Changing the gun comp value now changes the first pair of setpoints.

3. Write down the second pair of setpoints.

4. Calculate separate pull in and drop out gun comp values as shown in the example in Table 4-2.

Setting Gun Compensation When Parent Machine Can't Be Jogged: *(contd.)*

Table 4-2 Example for Calculating Pull In and Drop Out

Example Data	RPM	Pull In (Glue On)	Drop Out (Glue Off)	Difference
1st Line Speed	200	73	156	83
2nd Line Speed	680	49	144	95

NOTE: The length of the duration is 83 at 200 RPM and 95 at 680 RPM. This means that the leading and trailing edges require different speed compensation values.

COUNTS/REV: 1,000 as programmed through the menu tree.

Formula

Gun Compensation in Milliseconds = A(60,000) / B

Where A = Difference in Count / Difference in RPM

Where B = COUNTS/REV as programmed

Leading Edge (Pull In)

Difference in Position: 73 – 49 = 24
Difference in Speed: 680 RPM – 200 RPM = 480 RPM

Gun Compensation Value = A(60,000)/B
= (24/480)(60,000) / 1000
= 3 milliseconds

Enter 3.0 into the on value for GUN COMP.

Trailing Edge (Drop Out)

Difference in Position: 156 – 144 = 12
Difference in Speed: 680 RPM – 200 RPM = 480 RPM

Gun Compensation Value = A(60,000) / B
= (12/480)(60,000) / 1000
= 1.5 milliseconds

Enter 1.5 into the off value for GUN COMP.

5. Gun compensation settings programmed in step 4 affect the on and off setpoints programmed in step 1. Restart the parent machine line and run it at a constant speed while adjusting the on and off setpoints, as required, for proper adhesive application.

Once new on and off setpoints are programmed for the line running at constant speed, vary the line speed and confirm proper adhesive application at all speed ranges.

Speed Enable/Disable

Speed enable/disable establishes one or two speed ranges, with low and high values. The two ranges are independent of each other and each output channel can be ANDed with either speed 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.

The speed enable/disable function establishes 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.

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.

To program a low and high rpm value for the speed enable/disable function, use the following procedure:

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to SETUP MENU, press SEL.
3. Scroll down to SPEED ENABLE/DISABLE, press SEL.

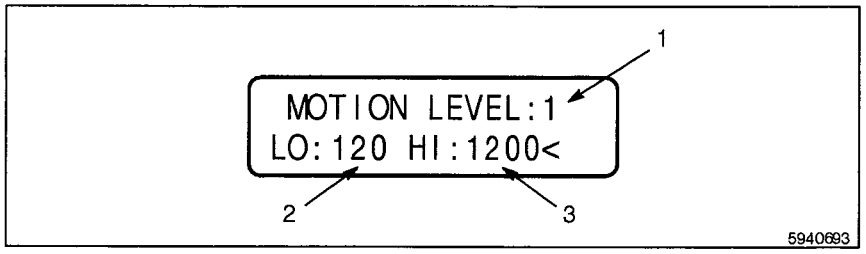

Fig. 4-19 Speed Enable/Disable Screen

1. Motion level (L1 or L2)
2. Low RPM value
3. High RPM value

4. Use the INC/DEC keys to select the motion level (1 or 2).
5. Use the arrow keys and move the cursor to LO. Use the numeric keypad or the INC/DEC keys to enter the desired value, and press ENT.
6. Move the cursor to HI. Enter the value, and press ENT.

These values may be obtained by running the parent machine at a minimum and maximum production speed while observing the rpm readout on the main screen.

NOTE: All channels in use should be MIN SPEED ANDed to one of the two levels under SPD ENAB/DISAB so that glue flow from the guns stop if the parent machine should stop while the gun is in its duration cycle.

Stitch

Stitch allows programming a series of durations into a channel without having to enter on and off setpoints for each duration.

At the main screen with the cursor at MENU Press SEL.

1. Scroll down to SETUP MENU, press SEL.

2. Scroll down to STITCH, press SEL.

STITCH prompts for the beginning and ending setpoints for the durations; the number of durations per stitch pattern; and the length of time for each duration. STITCH requires navigating through eight screens.

Stitch then divides the designated portion of the counter into the specified number of stitch durations, evenly dividing the unused portion of the segment between the durations.

To illustrate the STITCH function, the following procedure will generate the following stitch pattern represented in Table 4-3.

Table 4-3 Stitch Pattern Setpoints

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.

NOTE: If the STITCH pattern is entered into a channel with existing setpoints (durations), the PC56 controller will not allow an overlapping of the existing setpoints.

***Stitch** (contd.)*

1. Input the number for the channel that is to have the stitch pattern, press ENT, then SEL to go to next screen.

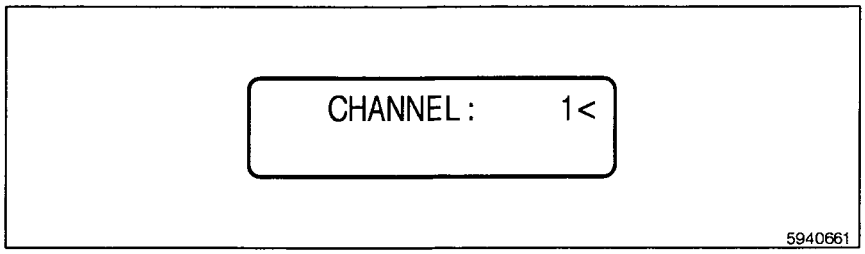

Fig. 4-20 Stitch Screen 1 – Channel Select

2. Enter the on setpoint of leading edge of first duration, press ENT, then press SEL to go to the next screen.

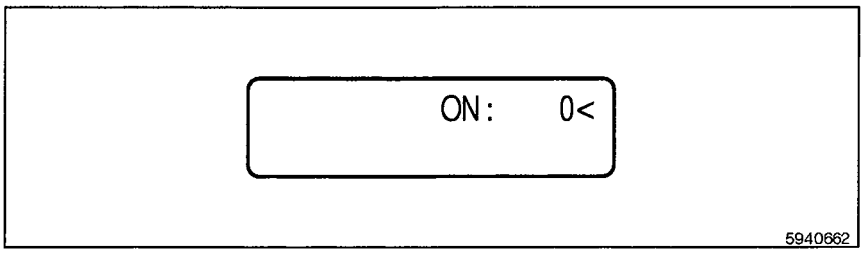

Fig. 4-21 Entering On Setpoint

3. Enter off setpoint of trailing edge of last duration, press ENT, then press SEL to go to the next screen.

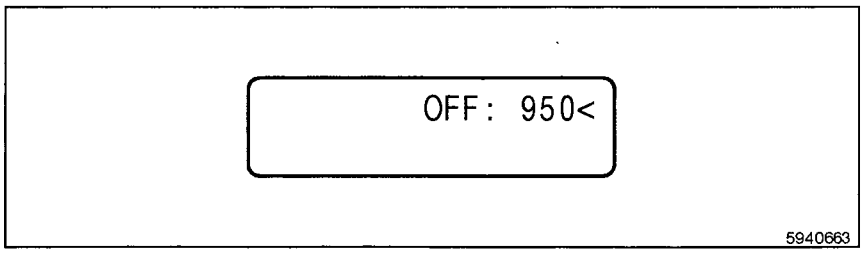

Fig. 4-22 Stitch Screen 3 – Entering Off Setpoint

Stitch *(contd.)*

4. Enter total number of durations to be added, press ENT, then press SEL to go to next screen.

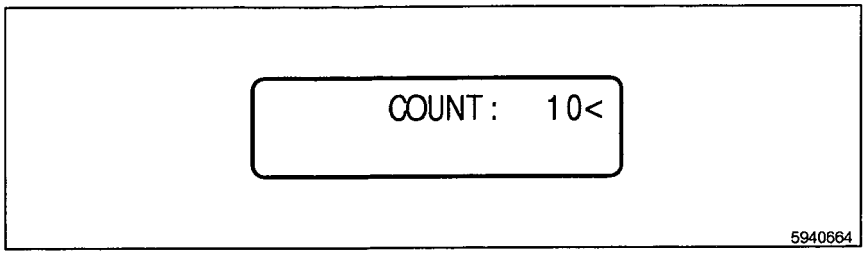

Fig. 4-23 Stitch Screen 4 – Entering Total Number of Durations

5. Enter the length of each duration to be added, press ENT, then press SEL to go to next screen.

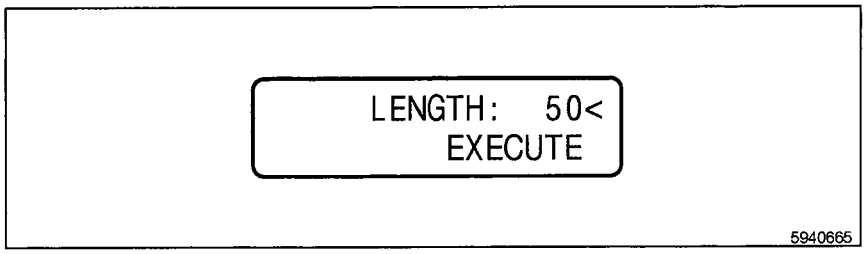

Fig. 4-24 Stitch Screen 5 – Entering Length of Durations

6. Move cursor to EXECUTE and press SEL to generate the stitch pattern.

   NOTE: To review values before executing, move cursor to top row and press SEL as needed.

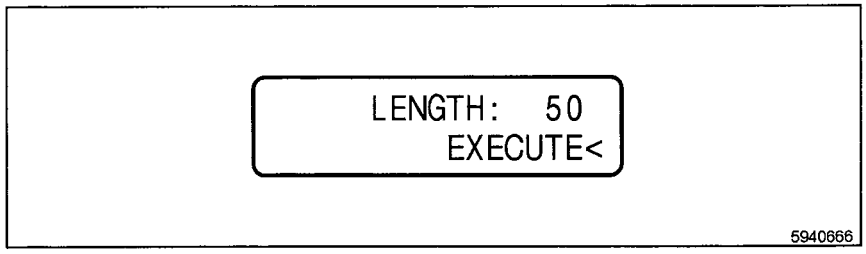

Fig. 4-25 Stitch Screen 6 – Execute Screen

Stitch *(contd.)*

7. Press ESC after COMPLETE screen displays; your stitch pattern is completed.

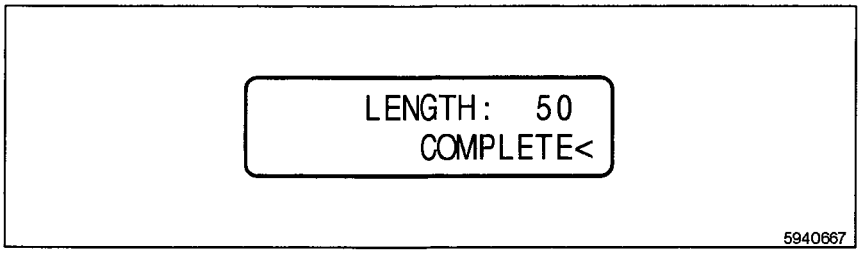

Fig. 4-26 Stitch Screen 7 – Complete Screen

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

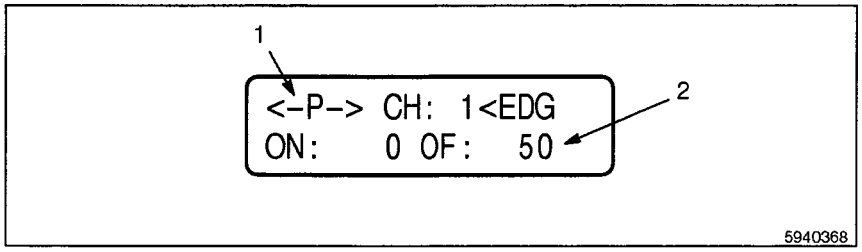

Fig. 4-27 Stitch Verification

1. <–P–> indicates multiple durations in channel
2. Move cursor to OF and use right or left arrow keys to review duration setpoints.

Channel Copy

Channel copy allows copying all of the durations from one channel to another channel in the same program. This is especially useful for cartoning or other applications where complex patterns must be applied to parallel flaps as cartons travel past the guns.

At the main screen with the cursor at MENU Press SEL.

1. Press SEL.
2. Scroll down to SETUP MENU, press SEL.
3. Scroll down to CHANNEL COPY, press SEL.
4. Enter number for source channel to copy from, press ENT, then SEL to go to next screen.

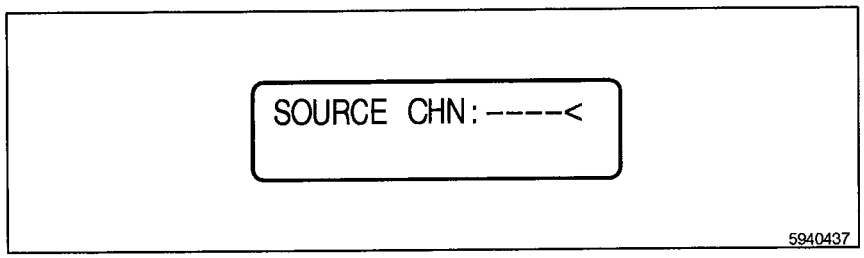

Fig. 4-28 Entering Source Channel Number

5. Enter number for destination channel to receive copy, then press ENT to go to next screen.

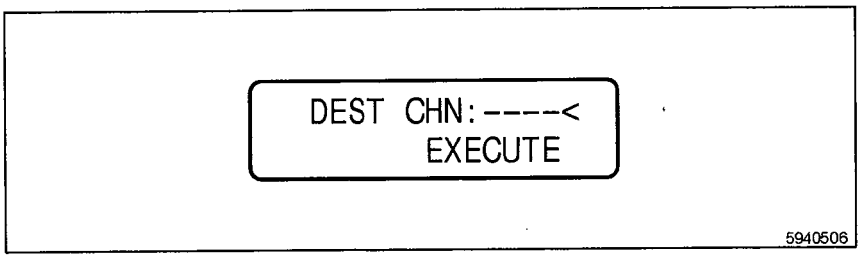

Fig. 4-29 Entering Destination Channel Number

6. Execute the channel copy by using the arrow keys to move the cursor to EXECUTE, then press SEL.

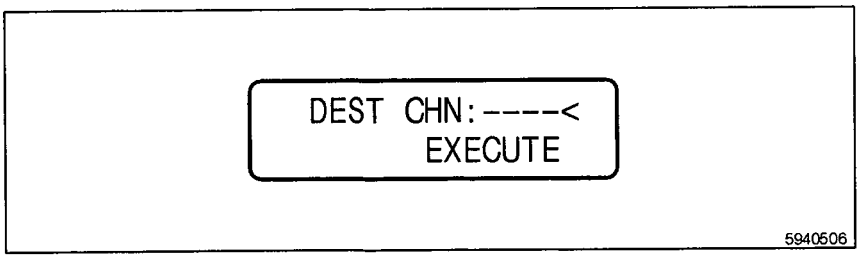

Fig. 4-30 Executing the Channel Copy

Channel Copy *(contd.)*

7. Press ESC after the complete screen displays; your channel copy is completed.

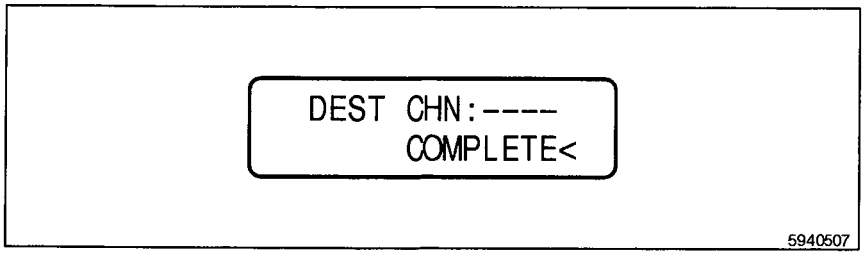

Fig. 4-31 Channel Copy Confirmation

Program Copy

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.

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.

At the main screen with the cursor at MENU Press SEL.

1. Scroll down to SETUP MENU, press SEL.
2. Scroll down to PROGRAM COPY, press SEL.
3. Select a source program to copy from.

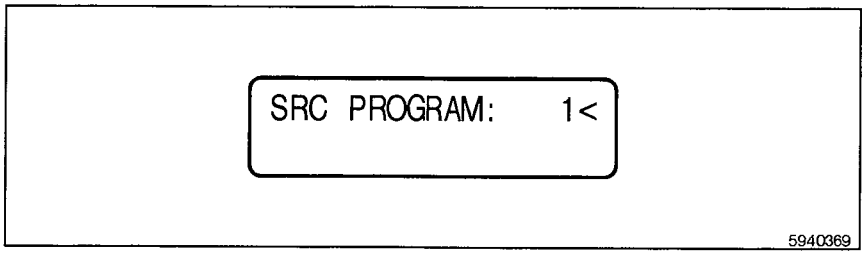

Fig. 4-32 Copying from a Source

Program Copy *(contd.)*

4. Select destination program to receive program copy, then press ENT.

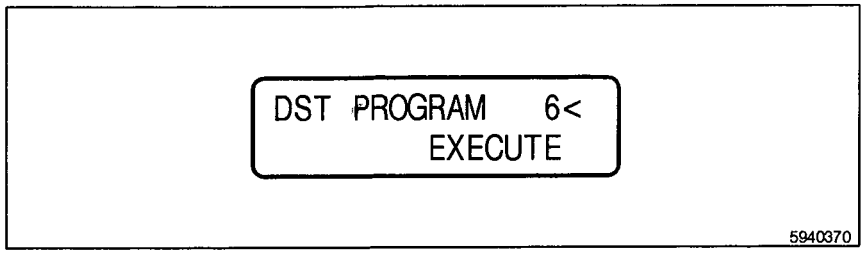

Fig. 4-33 Copying to a Destination

5. Move cursor to EXECUTE, then press SEL to copy program.

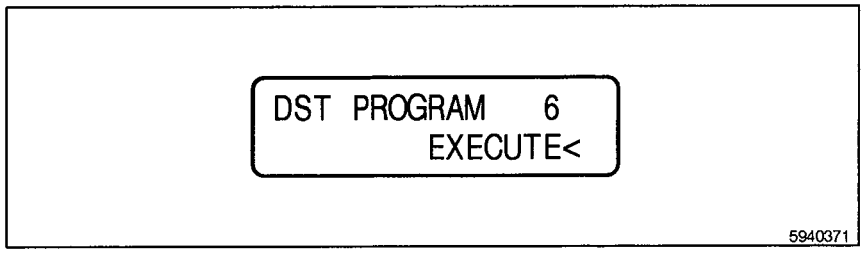

Fig. 4-34 Copying Program

6. Press ESC after the COMPLETE screen displays; your program copy is completed.

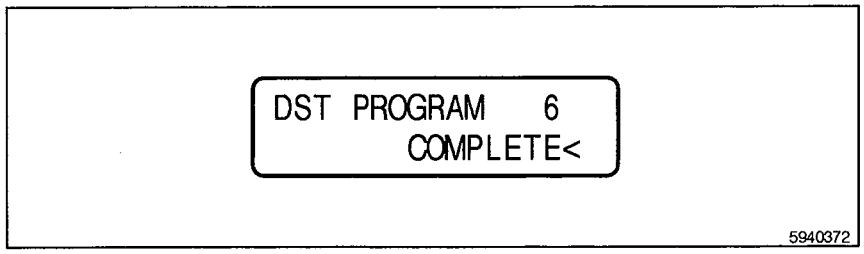

Fig. 4-35 Copying Complete

Default Program

The default program is the program that controls the output channels when the program select terminals (terminals 3–7 of TB1) are off.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll to SETUP MENU, press SEL.
3. Scroll to DEFAULT PROGRAM, press SEL.

The following screen is displayed:

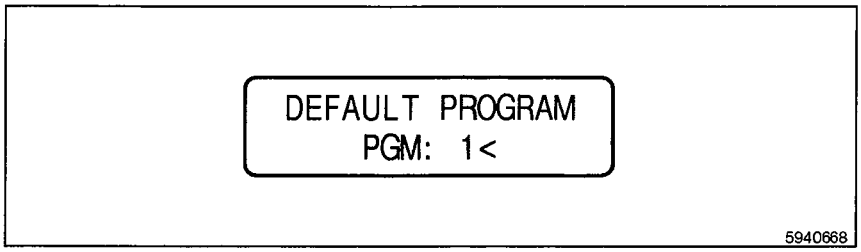

Fig. 4-36 Default Program Screen

NOTE: The PC56 controller can store 32 programs in its memory.

The active program is the program number currently controlling the output channels. If there are program select inputs on TB1, 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 TB1 are not used, the default program is always the active program.

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.*

Trigger Menu

The trigger menu provides the means of entering values which allow the PC56 controller to detect products that are too long, too short, or are skewed on the conveyor line. By knowing the distance between the trigger eye and the glue gun, the length of the product, and the product length allowance, the PC56 controller can generate a product fault output and turn the glue guns off if the product is overlapped or skewed on the conveyor line.

NOTE: The number of counts between the eye and the (last) gun must be less than 14 times the sum of the product length and the product length allowance.

Eye–>Gun Count

The eye-gun count value specifies the distance between the trigger eye and the (last) glue gun.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to TRIGGER MENU, press SEL.
3. At EYE–>GUN COUNT press SEL.
4. Use the numeric keys to input values and then press ENT.

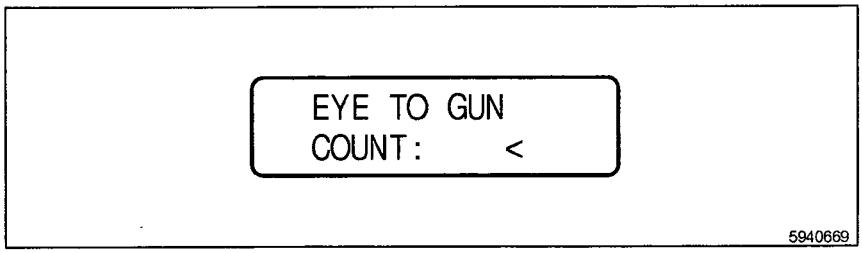

Fig. 4-37 Eye-To-Gun Count Screen

Product Allowance

Product length allowance specifies the tolerances for the length of a product. A product may be shorter or longer than the product length by the amount specified in the product length allowance.

Product allowance and product length are used to determine if a product is of the correct length. Products that are too short or too long cause the product fault output (channel 8) to drop out for 50 ms and the outputs and position counter to be disabled.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to TRIGGER MENU, press SEL.
3. Scroll down to PROD ALLOWANCE, press SEL.
4. Use the numeric keys to input values and then press ENT.

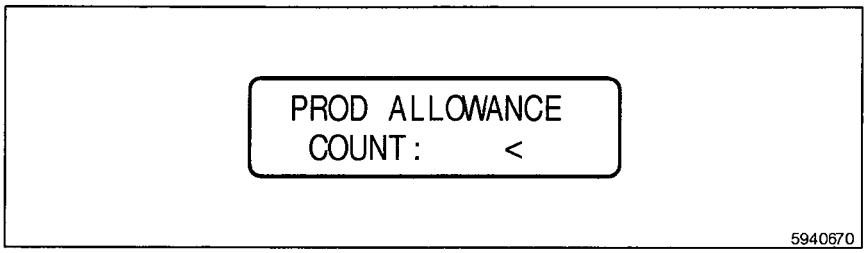

Fig. 4-38 Product Allowance Screen

Setup Counter

The setup counter can be used during machine set up to determine product length and the distance between the trigger eye and the glue gun. It increments with each count, regardless of the trigger input status or resolver rotational direction. This counter can be viewed and modified at any time.

For example, at machine set up the line would be jogged while observing the setup counter. When the trigger eye first sees the product the setup counter is set to zero. The line is then moved until the product begins to go under the glue gun. The value on the counter is the eye–>gun distance. At this time, the counter is again set to zero and the line advanced until the product is just leaving the gun and another reading is taken from the counter. This is the product length distance.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to TRIGGER MENU, press SEL.
3. Scroll down to SETUP COUNTER, press SEL.
4. Use the numeric keys to input values and then press ENT.

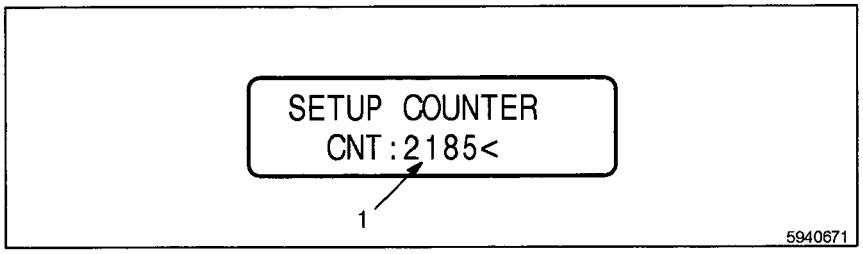

Fig. 4-39 Setup Counter Screen

1. Current count value

6. Config Menu

Submenus falling under the config menu include the following:

- hardware menu
- display menu
- enable codes menu
- chn ANDing menu
- communications menu

Many of these sub-menus require access only during original controller programming.

Hardware Menu

Initial programming of the controller begins with selections in this menu.

Counts/Rev

This function controls the number of increments (or counts) into which one resolver revolution is divided. A counts/rev of 1000 divides one revolution of the resolver into 1000 increments (or counts). In some applications the counts/rev value can be set so each increment equals a unit of linear travel of the product.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. At the HARDWARE MENU, press SEL.
4. At COUNTS/REV, press SEL.
5. Use the numeric keys to input the count value then press ENT.

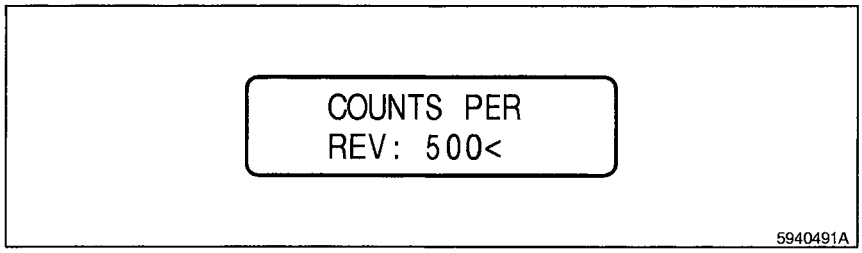

Fig. 4-40 Counts/Revs Screen

Program Select Mode

The program select inputs can operate in binary, BCD, or gray code formats. See *Controller Input Wiring* for more information.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. At the HARDWARE MENU, press SEL.
4. Scroll down to PGM SEL MODE, press SEL.

WARNING: Risk of equipment damage or injury. Program the default program with settings that will not cause harm in the event of sudden activation.

5. Use the SEL key to toggle the input format between BIN (binary), BCD (binary coded decimal) and GRAY (gray code).

If the input signals controlling program selection are lost due to a malfunction, the default program activates. Sudden changes in machinery operation may damage equipment or injure personnel.

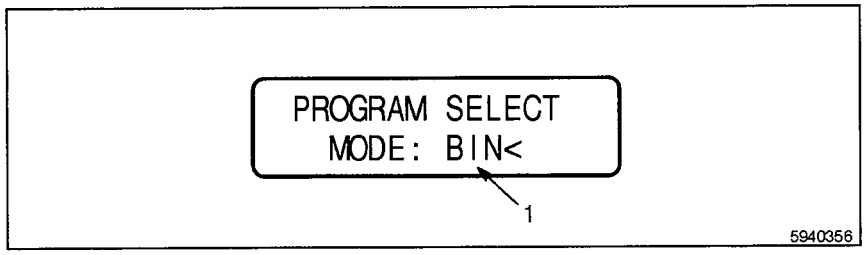

Fig. 4-41 Program Select Screen

1. Format selection

Display Menu

The display menu allows you to configure the RPM display, toggle between RPM settings, and select the duration mode.

Rate SetUp

RATE SETUP allows you to configure the RPM display on the main screen. Three parameters can be programmed: rate, units, and decimal points.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to DISPLAY MENU, press SEL.
4. Scroll down to RATE SETUP, press SEL.

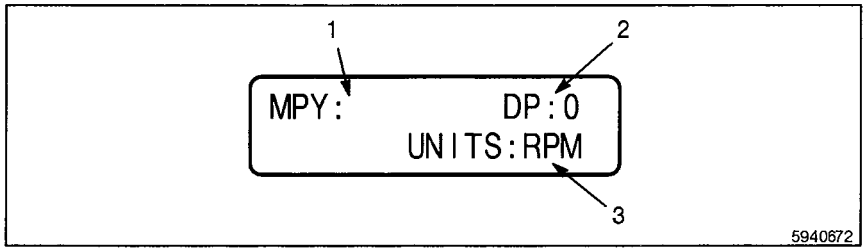

Fig. 4-42 Rate Setup Screen

1. Multiplier
2. Decimal places
3. Units

Rate SetUp *(contd.)*

Table 4-4 Rate SetUp Functions

Function	Description	To Program
Rate	The ratio of displayed RPM to actual resolver RPM. This ratio is a decimal number consisting of a multiplier (MPY) between .001 and 9.999.	Move the cursor to MPY and use the numeric keys followed by ENT to enter a value.
Units	The main screen can label the resolver speed as units per minute. The first digit is programmable with a letter from A–Z. Commonly used choices include revolutions (RPM), bags (BPM), inches (IPM), and cartons (CPM).	Move the cursor to the units field and use SEL to toggle between values.
Decimal Points	The controller divides the rate by 1, 10, 100, or 1000 to display 0, 1, 2, or 3 decimal places.	Move the cursor to DP and press SEL to toggle between values.

Following are a few examples in Table 4-5 of the relationships between multiplier (MPY), decimal points (DP), actual resolver speed, and displayed resolver speed.

Table 4-5 Rate Set Up Examples

MPY	MPY/DIV	Resolver Speed	Display
0.500	*0*	100 RPM	50 RPM
0.500	*1*	100 RPM	5.0 RPM
0.500	*2*	100 RPM	0.50 RPM
0.500	*3*	100 RPM	0.050 RPM
1.000	*0*	100 RPM	100 RPM
1.000	*1*	100 RPM	10.0 RPM
1.000	*2*	100 RPM	1.00 RPM
1.000	*3*	100 RPM	0.100 RPM
2.000	*0*	100 RPM	200 RPM
2.000	*1*	100 RPM	20.0 RPM
2.000	*2*	100 RPM	2.00 RPM
2.000	*3*	100 RPM	0.200 RPM

Toggle RPM

After a certain speed, the position digits (POS) on the main screen 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.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to DISPLAY MENU, press SEL.
4. Scroll down to TOGGLE RPM, press SEL.
5. Use the numeric keys and ENT to enter an RPM setting at which the position display will blank.

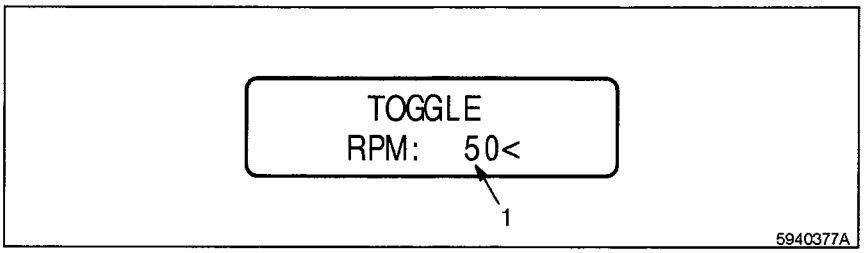

Fig. 4-43 Toggle RPM Screen

1. Toggle RPM (resolver RPM)

Duration Mode Select

The duration mode select function allows you to enable or disable the EDG/DUR/CHN window in the upper right corner of the setpoint programming screen. When enabled, this window allows the user to select the duration programming mode like that in the PC54/55 controllers.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to DISPLAY MENU, press SEL.
4. Scroll down to DUR MOD SEL, press SEL.
5. Use the SEL key to toggle DUR MODE SEL between on and off.

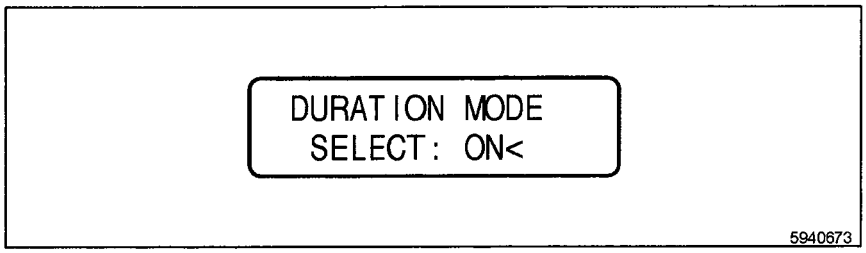

Fig. 4-44 Duration Mode Select Screen

Run-Up Increment/Decrement

The run-up increment/decrement function allows you to specify how much the run-up output override value is changed when INC and DEC are pressed when in the bead width screen. The INC and DEC keys add or subtract the specified amount from the run-up output.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to DISPLAY MENU, press SEL.
4. Scroll down to RUN-UP INC/DEC, press SEL.
5. Use the numeric keys to input a value between 1 and 10, then press ENT.

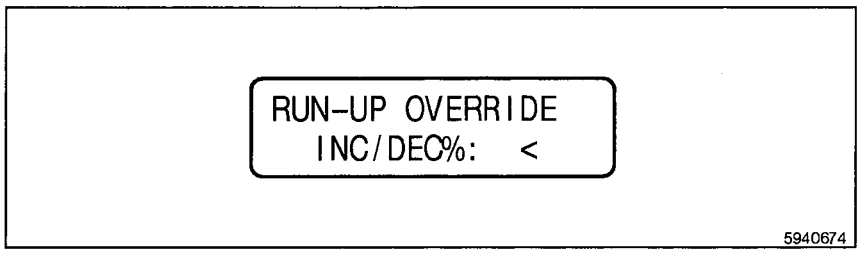

Fig. 4-45 Run-Up Increment/Decrement Screen

Enable Codes

This screen is used to establish the numbers that will be used as passwords to enable the operator and master levels.

Each programming level can have only one password and that password is stored in the controller. If a password is entered into a keypad that has a programming terminal energized, the access level is the higher of the two.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to ENABLE CODES, press SEL.
4. Use the SEL key to toggle between enable levels.
5. Use the numeric keys, followed by ENT to assign codes.

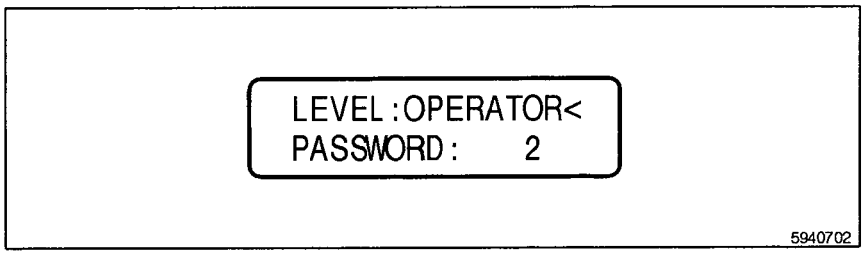

Fig. 4-46 Enable Codes – Operator Level

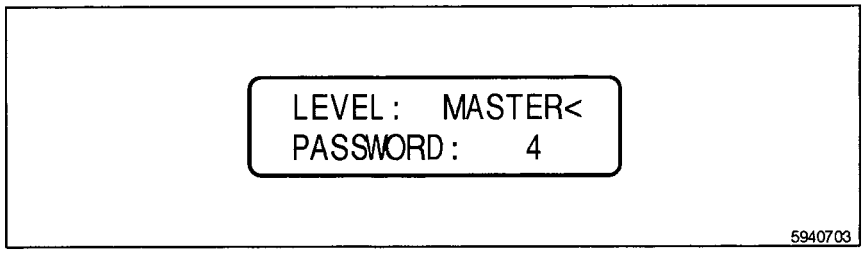

Fig. 4-47 Enable Codes – Master Level

Enable Codes *(contd.)*

The operator and master level of programming can be enabled by entering the password or by activating terminal E1 or E2 on the back of the keypad. Refer to *Programming Access* in Section 3, *Installation.*

Table 4-6 indicates what items can be accessed or viewed from the operator and master level of access.

Table 4-6 Programming Access Levels

Menu Item	Display	Operator Level	Master Level
Setpoints	View	Program	Program
Bead Width	View	Program	Program
Product Length	View	Program	Program
Product Faults	View	Program	Program
Gun Purge	View	Program	Program
Password	–	Enter	Enter
Setup menu	–	–	Program
Trigger menu	–	–	Program
Config menu	–	–	Program
I/O status menu Output Input	 – –	 – –	 Force View
Test menu	–	–	Program
System info menu	–	–	View

Channel ANDing Menu

The channel ANDing menu allows you to link an output channel to a speed function or to an input terminal.

Min Speed ANDing

The minimum speed AND function links the operation of an output channel to the speed enable/disable level programmed through speed enable/disable. Each output channel may be ANDed with either speed enable/disable level.

If an output is minimum 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. Outputs that must always operate, regardless of machine speed, should not be ANDed with a speed enable/disable level.

The minimum speed ANDing screen displays the channel number and the speed enable/disable level for minimum speed ANDing: L1, L2, or off. The channel is not minimum speed ANDed if the enable is off.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to CHN ANDING MENU, press SEL.
4. At MIN SPEED AND, press SEL.
5. Select a new channel by pressing the INC/DEC keys, or through direct numeric entry followed by ENT.
6. Press the SEL key to toggle the ANDing to L1, L2, or off.

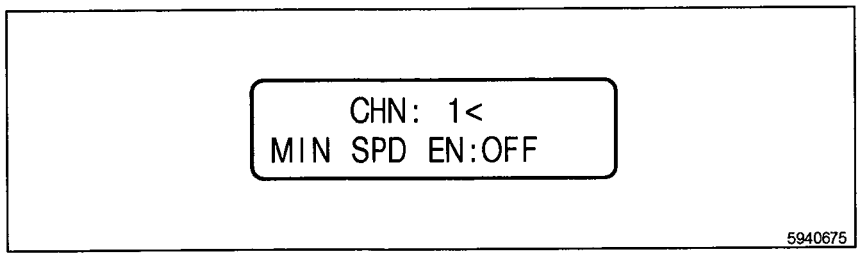

Fig. 4-48 MIN SPEED AND Screen

Min Speed ANDing (contd.)

Follow these guidelines for using min speed ANDing:

- 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.

Remote Enable ANDing

Remote enable ANDing allows ANDing any output channel with input terminal 8. An output channel's programmed setpoints ANDed with input terminal 8 are enabled *only* while the terminal is energized.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to CHN ANDING MENU, press SEL.
4. Scroll down to REM ENAB AND, press SEL.
5. Select a new channel by pressing INC/DEC, or using the numeric keys followed by ENT.
6. Use the SEL key to toggle ANDing on and off.

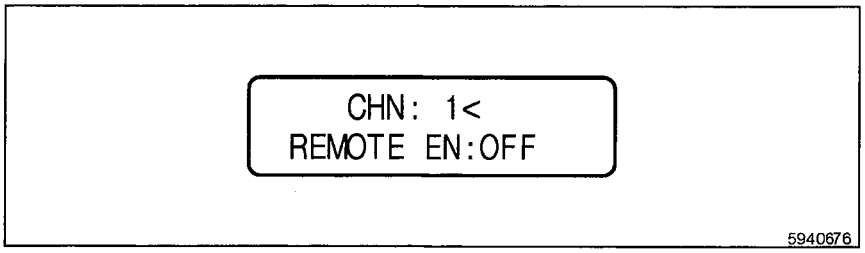

Fig. 4-49 Remote Enable ANDing Screen

Communications

Communications programming configures a RS-232/485 serial port to match the requirements of the host computer or programmable logic controller (PLC). This function sets the communications type, controller address, and baud rate.

Serial communications can be used in two ways:

- To exchange operating data and parameters with a host computer using standard ModBus ASCII protocol
- To upload or download PC56 controller programs using Nordson's optional communications software

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

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.

Communications Type

Configure the communications port for RS-232 or RS-485 type 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 on the controller are set to an address value of zero. The DIP switch can set a maximum address of 7, and the communications function can set addresses ranging from 0–255.

NOTE: Setting all three address switches (B0 – B3) off (up) forces the controller to address 1, 9,600 baud. Baud rate is set on power up, so you must cycle power after setting all three switches off. This feature is used when the controller is used with a man-machine interface and does not have the keypad. In an installation without the keypad, you may need to establish the communications settings so that you can upload or download.

Baud Rate

Choose between the available baud rates of 4,800, 9,600, 19,200, and 38,400 bps. The baud rate must match that of the host computer.

Termination

The TRM window is used with RS-485 multidrop communications. In a multidrop link where multiple controllers are connected, one of the controllers must have TRM on and all the other controllers must have TRM off.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to CONFIG MENU, press SEL.
3. Scroll down to COMMUNICATIONS, press SEL.
4. Press SEL with the cursor at TYPE to toggle between RS-232 and RS-485 communications.
5. Use the numeric keys to enter the address, then press ENT.
6. Use SEL to toggle between the available baud rates of 4,800, 9,600, 19,200, and 38,400 bps.
7. Use the arrow keys to move the cursor to TRM, then use SEL to toggle between on and off.

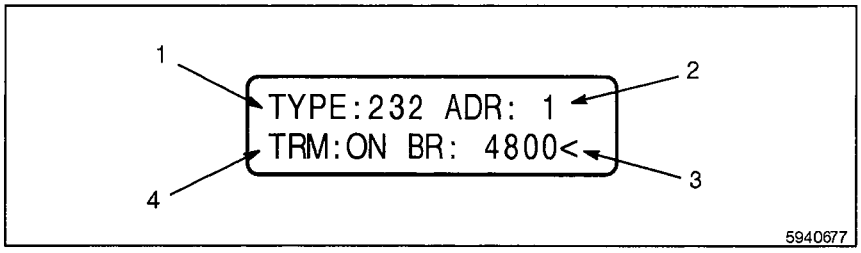

Fig. 4-50 Communications Screen

1. Communications type
2. Address
3. Baud rate
4. Terminate on/off

7. I/O Status Menu

The I/O status menu displays the status of the inputs and outputs.

Output Status

The screen displays the on and off state of the output channels. The 0 indicates off; the 1 indicates on. Output number 9 is dedicated to run-up and shows an R instead of 0 or 1.

Use this screen to force outputs on or off for diagnostic purposes.

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

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to I/O STATUS MENU, press SEL.
3. At OUTPUT STATUS, press SEL.
4. Press the left arrow to access output 1, causing the 0 to blink. Press SEL to force this output on. The 0 changes to a 1.
5. 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.
6. Press ESC to return to output status selection. Outputs remain forced until you leave the output status screen

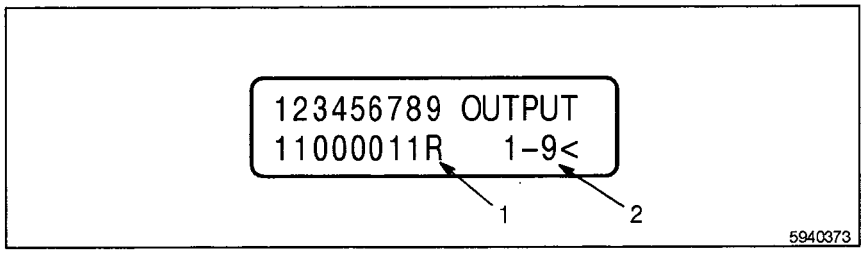

Fig. 4-51 Output Status Screen

1. Output on/off status line
2. Output numbers 1–9

Input Status

The input status screen displays the on and off status of the inputs on TB1. The on and off status is shown under the input number; 0 indicates off and 1 indicates on.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to I/O STATUS MENU, press SEL.
3. Scroll down to INPUT STATUS, press SEL.

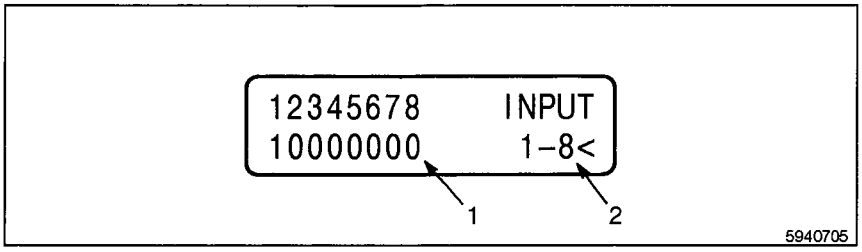

Fig. 4-52 Input Status Screen

1. Input on/off status line
2. Input numbers 1–8

8. Test Menu

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.

CAUTION: Risk of equipment damage or injury. Do not continue operating the controller if the controller fails the watchdog timer test.

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.

Memory Tests

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to TEST MENU, press SEL.
3. At MEMORY TESTS, press SEL.
4. Perform one of the memory test functions by using the numeric keys to enter a function number, then pressing SEL.

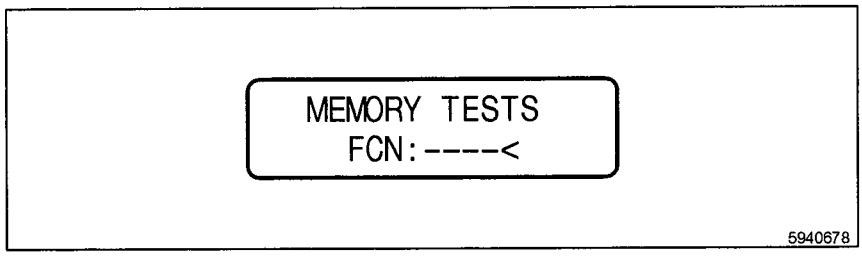

Fig. 4-53 Memory Tests Screen

Memory Tests *(contd.)*

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

Table 4-7 Test Functions

Function	Description
7000	Clears all setpoints and configuration settings from the controller's EEPROM. After clearing the settings, the controller reloads the factory default settings.
7001	Clears all configuration settings from the controller's EEPROM, including all programming performed through the set-up menu and the config menu on the menu tree. When finished, the controller reloads the factory default settings.
7002	Clears all setpoints from the controller's EEPROM, including any on and off setpoints programmed through SETPOINTS. All other settings are preserved.
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. Tests the Watchdog Timer. When operating properly, the controller resets. If the controller does not reset, failure has occurred and *the controller must be replaced.*

9. System Information Menu

The system information menu provides information about the PC56 controller. There are no programmable selections for this menu.

Setpoint Use

The setpoint use screen displays:

- The total number of setpoint on and off pairs, or durations available for programming (1228 pairs for the PC56 controller).
- 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.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to SYSTEM IF MENU, press SEL.
3. At SETPOINT USE, press SEL.

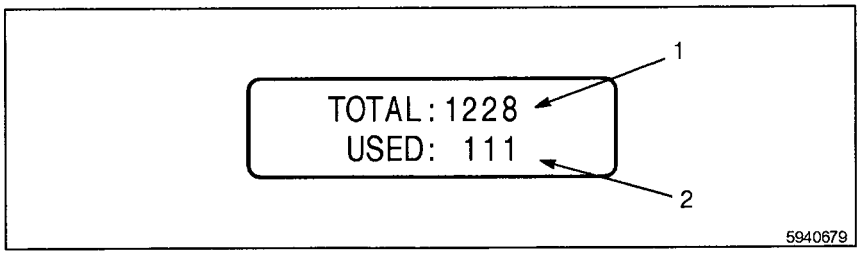

Fig. 4-54 Setpoint Use Screen

1. Total durations available
2. Total durations in use

Revision Info

The firmware version number and map version number are displayed on the screen. This information may be useful if the unit needs to be returned for service.

Values cannot be changed in this screen.

At the with the cursor at MENU:

1. Press SEL.
2. Scroll down to SYSTEM IF MENU, press SEL.
3. Scroll down to REVISION INFO, press SEL.

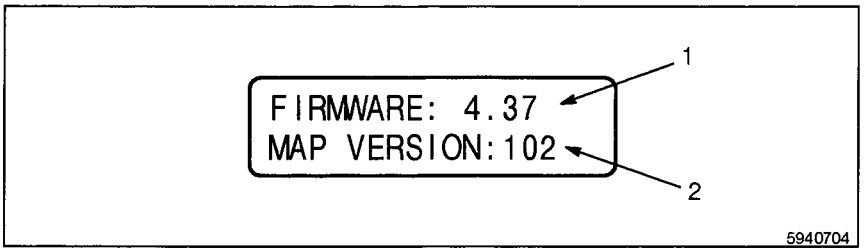

Fig. 4-55 Firmware Version Screen

1. Firmware major revision level
2. Firmware base revision level

Model & Options

This screen provides the model designation for the controller and option information. This information may be useful if the unit needs returned for service.

Values cannot be changed in this screen.

At the main screen with the cursor at MENU:

1. Press SEL.
2. Scroll down to SYSTEM INFO MENU, press SEL.
3. Scroll down to MODEL & OPTIONS, press SEL.

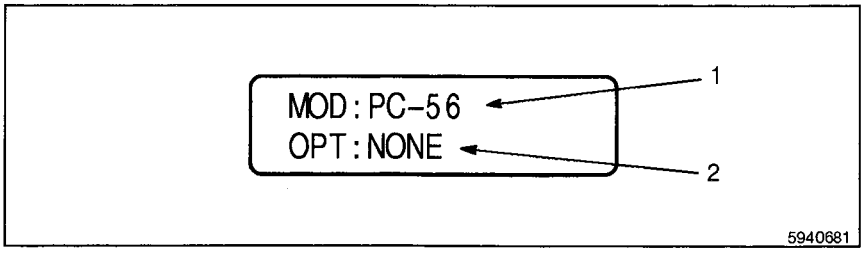

Fig. 4-56 Model & Options Screen

1. Controller model
2. Options

Section 5

Troubleshooting

Section 5
Troubleshooting

1. Introduction

In this section, you will find fault isolation and correction procedures. Obvious causes of malfunction such as broken or missing electrical pins or wires should be noted during daily visual inspection and corrected immediately.

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

WARNING: Risk of electrical shock. Disconnect and lock out line voltage to the PC56 controller before disconnecting or connecting any electrical plugs. Failure to observe may result in personal injury, death, or equipment damage.

PC56 controllers are not field repairable and must be returned to Nordson for replacement. Do not disassemble failed units.

2. Controller Diagnostics

The PC56 controller can be diagnosed with the status lights or the keypad.

Status Light Diagnostics

The PC56 controller has two lights mounted on the cabinet: a yellow status light and a green power light.

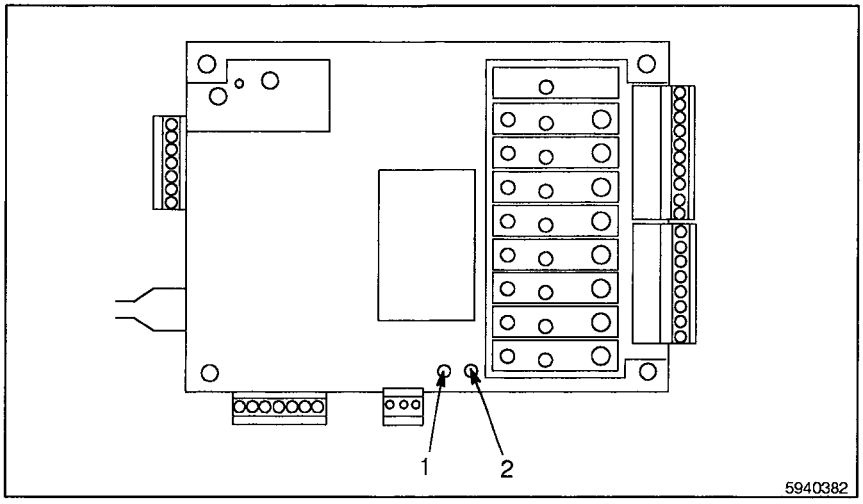

Fig. 5-1 PC56 Controller Status Indications

1. Yellow status light
2. Green power light

The yellow status light on the PC56 controller blinks in various patterns. Table 5-1 summarizes these blinking patterns.

Table 5-1 Blinking Patterns of the Status Light

Blinking Pattern	Status	Action Required
On and off rapidly	Normal operation	None
Off for one second, followed by four quick on blinks	Keypad not connected	Check keypad connections.
On for one second, followed by one or more quick blinks off	Internal errors	Power cycle the controller. If the pattern occurs again, remove the controller from service.
One off blink	Corrupt RAM	
Two off blinks	Corrupt EPROM	
Three off blinks	System error	
Four off blinks	System error	
Five off blinks	Internal error	Check for loose connections and fix any obvious noise problems. If the pattern occurs again, remove the controller from service.
Six off blinks	Internal error Possibly noise problems	

3. Keypad Diagnostics

The keypad for the PC56 controller has a fault light and a power light. If the fault light on the keypad comes on, turn the controller off, then back on. If the keypad fault light does not go off, the keypad microprocessor has malfunctioned. Return the keypad to Nordson for replacement.

WARNING: The keypad cannot be repaired in the field. If a unit fails, do not disassemble it. Return it to Nordson for replacement.

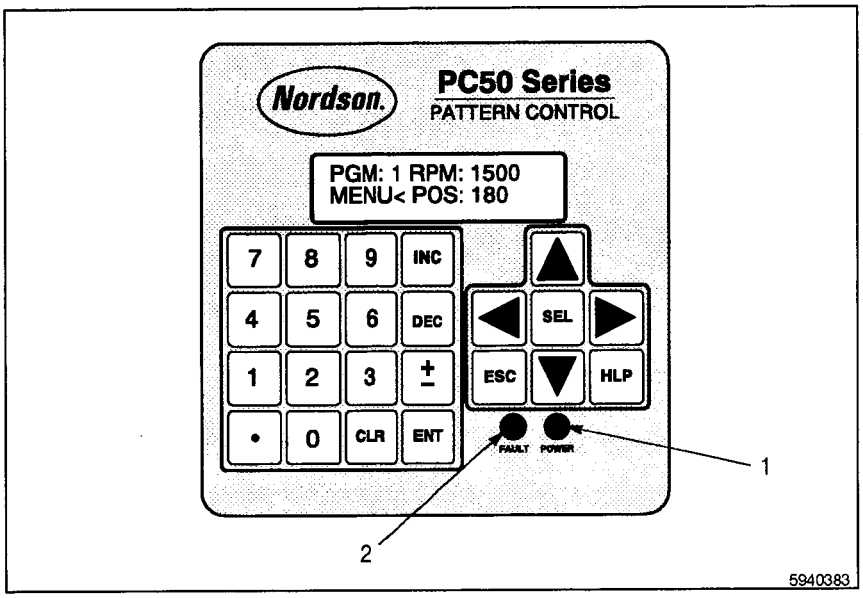

Fig. 5-2 Keypad Status Lights

1. Power indicator light
2. Fault indicator light

Keypad Diagnostics

The keypad includes a series of diagnostics that show the status of various keypad functions.

To start the diagnostics, turn the controller off, then restart the controller while pressing any key on the keypad.

NOTE: After each display, press the down arrow, then press SEL. A new screen appears. Press the up or down arrows to return to the menu.

1. The first screen displays the firmware revision number, the keypad firmware revision date and the keypad checksum. Press the down arrow, then SEL.

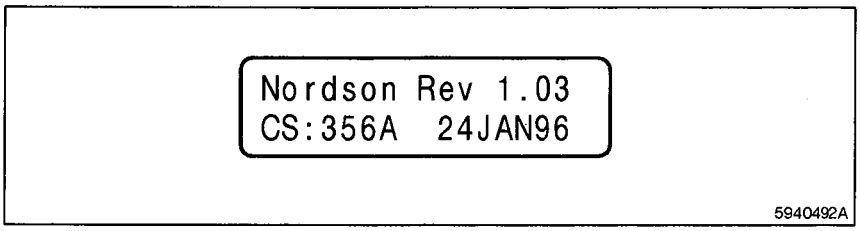

Fig. 5-3 Firmware Revision Level Screen

2. The fault light blinks on, then off, at one second intervals.

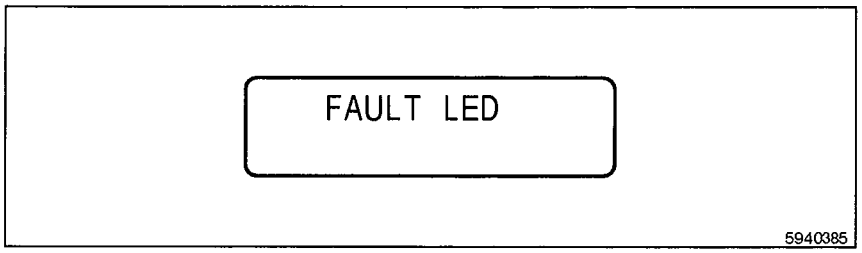

Fig. 5-4 Fault LED Screen

3. The number displayed indicates the jumpering on the keypad terminal block for sinking or sourcing wiring, as follows: 1 indicates E1 is jumpered, 2 indicates E2 is jumpered. (See *Programming Access* in Chapter 3, *Installation*, for wiring.)

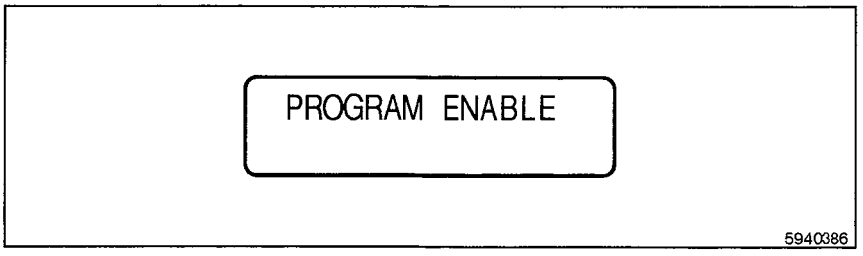

Fig. 5-5 Program Enable Level Screen

Keypad Diagnostics *(contd.)*

4. The address switches screen displays the keypad dipswitch address setting. (See *Keypad Settings* in Chapter 3, *Installation.*)

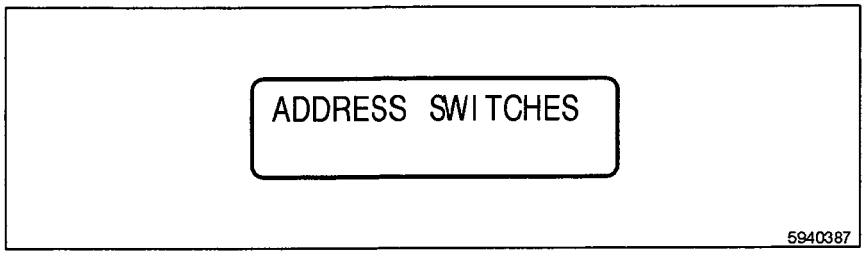

Fig. 5-6 Keypad Address Switches Screen

5. The comm port tests communications. Figure 5-10 illustrates how jumpers are placed in the keypad terminal block for testing.

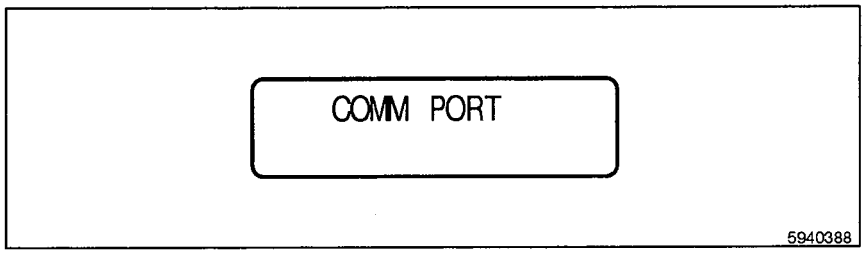

Fig. 5-7 Communication Port Test Screen

6. A complete character set scrolls across both lines. Press the up or down arrows to return to the menu.

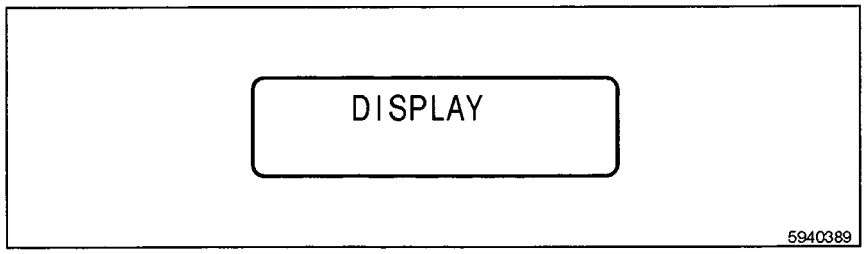

Fig. 5-8 Display Test Screen

Keypad Diagnostics *(contd.)*

7. The screen displays a unique key number for each key pressed. Press the hidden key on the keypad face, just below HLP to exit.

8. Power cycle the controller to return to the main menu screen.

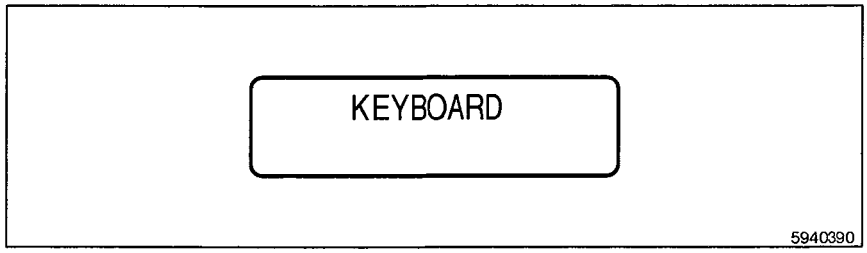

Fig. 5-9 Keyboard Test Screen

Keypad Communications Port Test Set Up

When the comm port diagnostic is run, with keypad terminals W, X, Y, and Z jumpered as illustrated in Figure 5-10, a string of plus signs scrolls across the display. When either jumper is removed, the scrolling stops.

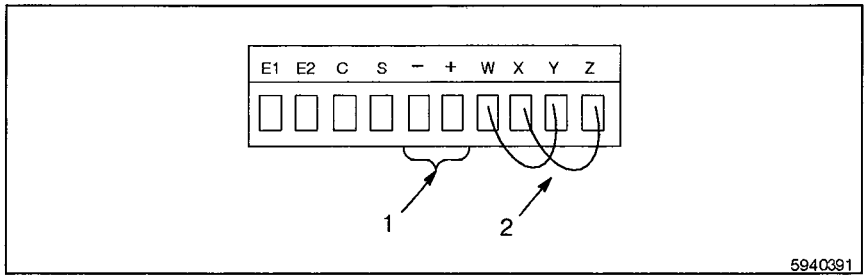

Fig. 5-10 Keypad Terminal Block

1. +20–30 VDC in
2. Jumpers for test

4. General Troubleshooting

Refer to Figure 5-12 for the PC56 controller cabinet general arrangement and Figures 5-13 and 5-14 for the cabinet wiring diagram.

WARNING: Controllers and keypad/displays cannot be repaired in the field. If a unit fails, do not disassemble it. Return the defective unit to Nordson for replacement.

WARNING: Risk of electrical shock. Disconnect and lock out line voltage to the PC56 controller before disconnecting or connecting any electrical plugs. Failure to observe may result in personal injury, death, or equipment damage.

Table 5-2 Troubleshooting Table

Problem	Possible Cause	Corrective Action
Controller & keypad dead	Main fuse blown.	Check main fuse.
	Defective power supply to controller.	Check controller power supply.
Keypad dead, but controller LEDs on	Incorrect wiring between keypad and controller.	Check wiring between keypad and controller.
Keypad fault LED on	Keypad microprocessor has malfunctioned.	Turn the controller off and back on. If the keypad fault LED does not go off, return the keypad to the factory.
	Performing processor-intensive programming tasks.	When performing processor intensive programming tasks, such as recalculating many setpoints due to a change in COUNTS/REV, or creating many setpoints through STITCH, the controller may briefly lose contact with the keypad. Once the calculations are complete, contact will be re-established. Press ESC to clear the error message.
COMM FAILURE-HOST TO KEYBOARD message	This message may flash briefly on power-up under normal conditions. If the message flashes after power up, defective keypad wiring connection may exist.	Check keypad wiring connections at keypad and controller.
	Incorrect DIP switch settings.	Check DIP switch settings.

4. General Troubleshooting *(contd.)*

Table 5-2 Troubleshooting Table *(contd.)*

Problem	Possible Cause	Corrective Action
Error: Analog Malfunction.	This is a non-fatal error indicating the controller's internal analog chip is not working. A bad or missing run-up module will not cause this message.	Replace the controller.
Error: resolver not connected message.	Resolver or resolver cable failure.	See *Resolver Troubleshooting* in this section.
POS (position) is erratic as resolver turns.	Resolver coupling not tight.	Verify that the resolver coupling is tight. Tighten if loose. See *Resolver Troubleshooting* in this section.
Serial communications not working	Type, baud rate, and address incorrectly set in communication programming selection.	Check communications programming to be sure type, baud rate, and address are correctly set.
	DIP switches for the controller-to-host communications are set incorrectly.	Be sure the DIP switches for the controller-to-host communications are set correctly.
	Defective communication cable wiring.	Check communication cable wiring.
Outputs cycling regularly at incorrect machine positions.	Incorrect program number is active.	Check that the correct program number is active.
	Incorrect setpoints of the output(s) in question.	Check the setpoints of the output(s) in question.
	Incorrect speed comp settings.	Check speed comp settings.
Erratic Operation	Watchdog timer failure.	Run the watchdog timer test described under *Memory Tests* in Section 4, *Programming.*
	Resolver problem.	See *Resolver Troubleshooting,* in this section.
Run-Up output not working.	Pressure run-up, bead width or run-up inc/dec is programmed incorrectly.	Check that pressure run-up, bead width or run-up inc/dec are programmed correctly.
		Check that run-up output module is located in position 9.
		Check that run-up output wiring is correct.
		Verify that run-up load device is within specifications for the Run-Up module.
		Try a different run-up output module.

4. *General Troubleshooting*
(contd.)

Table 5-2 Troubleshooting Table *(contd.)*

Problem	Possible Cause	Corrective Action
AC/DC module not working.	Incorrect program number is active.	Check that correct program number is active.
	Controller not activating the output(s) at the correct count.	Use OUTPUT STATUS to see if the controller is activating the output(s) at the correct position in the resolver revolution. If not, verify that the setpoints are correctly programmed. Programming that may prevent an output from energizing includes rem enab AND and min speed AND.
	Defective module.	If OUTPUT STATUS shows the output is on, but the LED on top of the module does not light, try replacing the module.
	Defective module fuse.	If the LED on the module lights but the output terminal does not energize, check the fuse built into the top of the module. Use the fuse tester built into the controller.
	Defective wiring or no power in circuit.	Check that load power is present in the circuit and correctly wired. Remember that modules do not supply power to loads; they simply switch the load circuit on and off.

5. Testing the Fuses

Figure 5-11 shows the location of the fuse test socket and LED used to test TR5 style fuses. The PC56 controller is shipped with a spare 4A fuse mounted in the test socket.

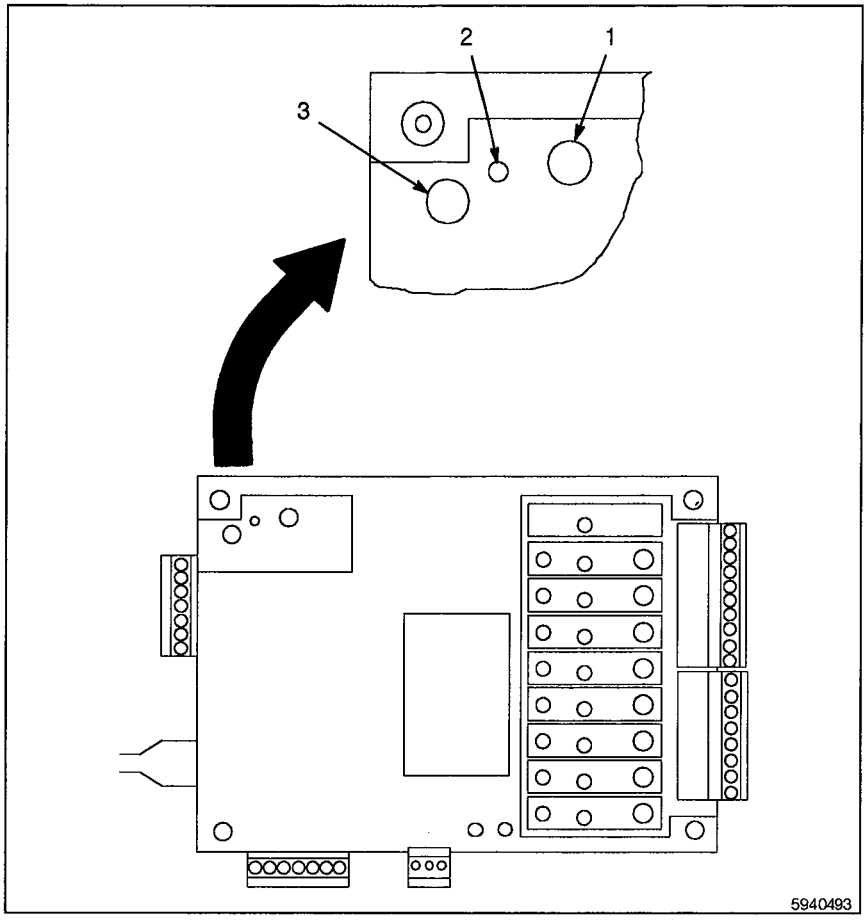

Fig. 5-11 Fuse Tester Location

1. 250 mA TR5 for power to inputs on TB2
2. LED lights if fuse in test socket is good
3. Test socket w/spare 4A TR5 fuse

6. Resolver Troubleshooting

Check the resolver for mechanical and electrical problems.

NOTE: Resolvers cannot be repaired in the field. If a unit fails, it must be replaced. Contact your local Nordson representative.

Mechanical Problems

If the resolver is generating erratic rpm or position readings, or the count appears to be erratic, check the mechanical coupling between the resolver and the machine.

If the coupling is not slipping, loosen the coupling and rotate the resolver shaft in both directions with sudden, jerky motions. If the controller displays unusual position or rpm readings, the resolver may need to be replaced.

Electrical Problems

Section 2, *Installation* provides installation procedures for the resolver and cables. If any wire in one of the three individually shielded pairs becomes disconnected, **ERROR: Resolver Not Connected** is displayed on the keypad screen.

The output channels will immediately be disabled until the resolver is reconnected. Pressing ESC clears the error message.

NOTE: ESC clears the message and restores access to keypad programming even if the resolver has not been reconnected.

Follow this procedure to troubleshoot electrical problems in the resolver:

1. Verify that the electrical connections at each end of the resolver cable are secure.

WARNING: Risk of electrical shock. Disconnect and lock out line voltage to the PC56 controller before disconnecting or connecting any electrical plugs. Failure to observe may result in personal injury, death, or equipment damage.

2. Disconnect the cable at the controller. Measure the resistance between all wires on the resolver cable terminal block. The paired wires should have the resistance shown in Table 5-3, while the resistance between every other combination of wires should be infinite. If the resistance values are correct, the controller may need to be replaced.

Table 5-3 Resolver Wire Resistance

Wire Pair	Resistance
White/black	15 to 25 ohms
Red/black	20 to 40 ohms
Green/black	20 to 40 ohms

Electrical Problems *(contd.)*

3. If the resistances in step 2 are incorrect, the problem may be in the cable or in the resolver. Disconnect the cable at the resolver and measure the resistances at the resolver pins. If the resistances are correct, the cable is bad. If the resistances are wrong, the resolver should be replaced.

7. Electrical Schematics and Wiring Diagrams

WARNING: Risk of electrical shock. Disconnect and lock out line voltage to the PC56 controller before disconnecting or connecting any electrical plugs. Failure to observe may result in personal injury, death, or equipment damage.

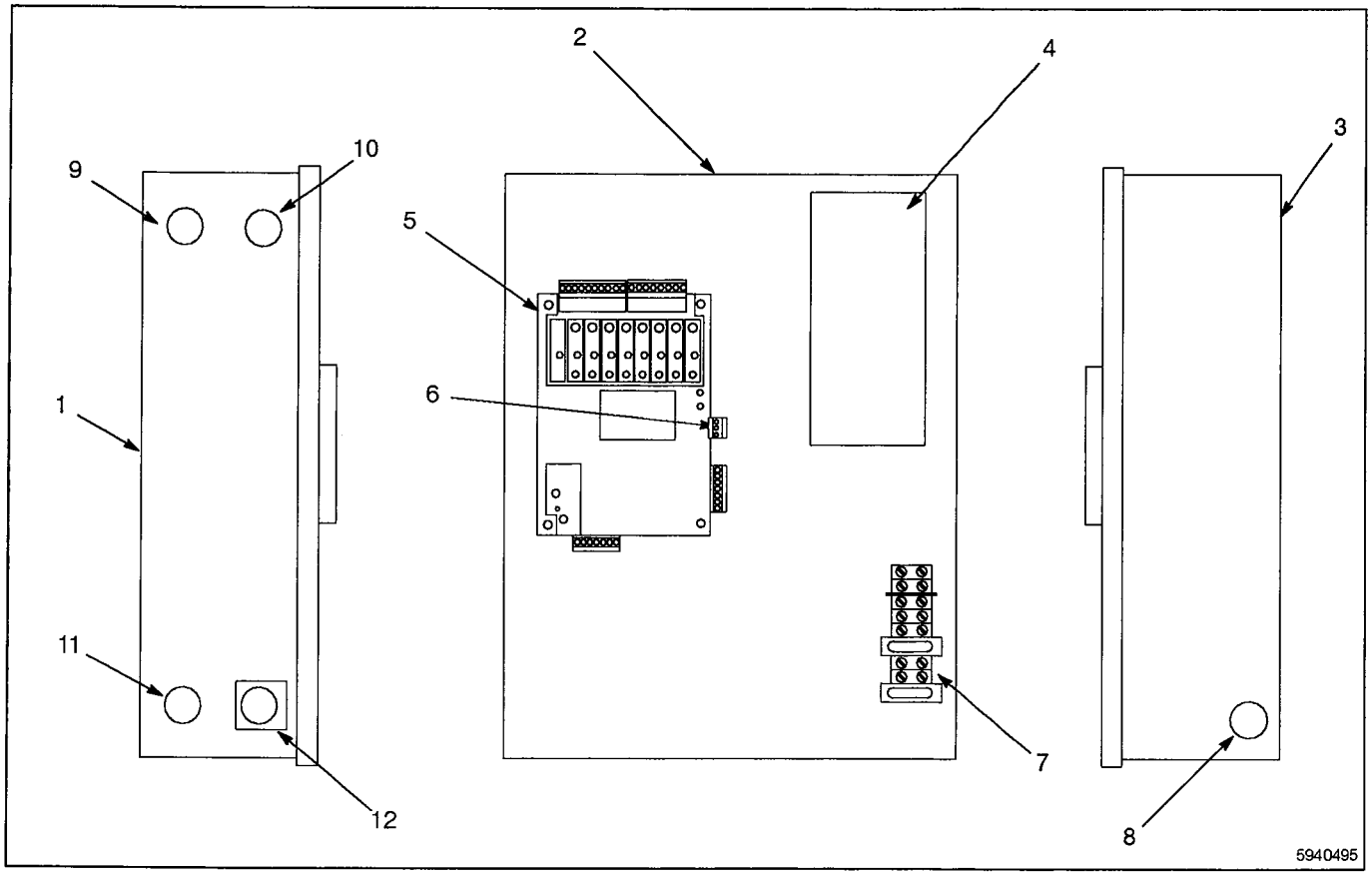

Fig. 5-12 Controller Cabinet Component General Arrangement

1. Left side exterior view
2. Front interior view
3. Right side exterior view
4. 24 VDC power supply
5. PC56 pattern controller
6. TB 8 terminal block
7. Input power terminal strip
8. Input power conduit entrance
9. Input/ output wiring conduit entrance
10. Resolver wiring conduit entrance w/ nylon fitting
11. Input/output wiring conduit entrance
12. Communications cable fitting

PC56 Controllers with 240 VAC Service

Controllers are shipped configured for 240 VAC single phase service.

Install 240 VAC single phase input power to the terminal strip as illustrated in Figure 5-13. F1 and F2 are 1 amp Slo Blo fuses for 240 VAC service.

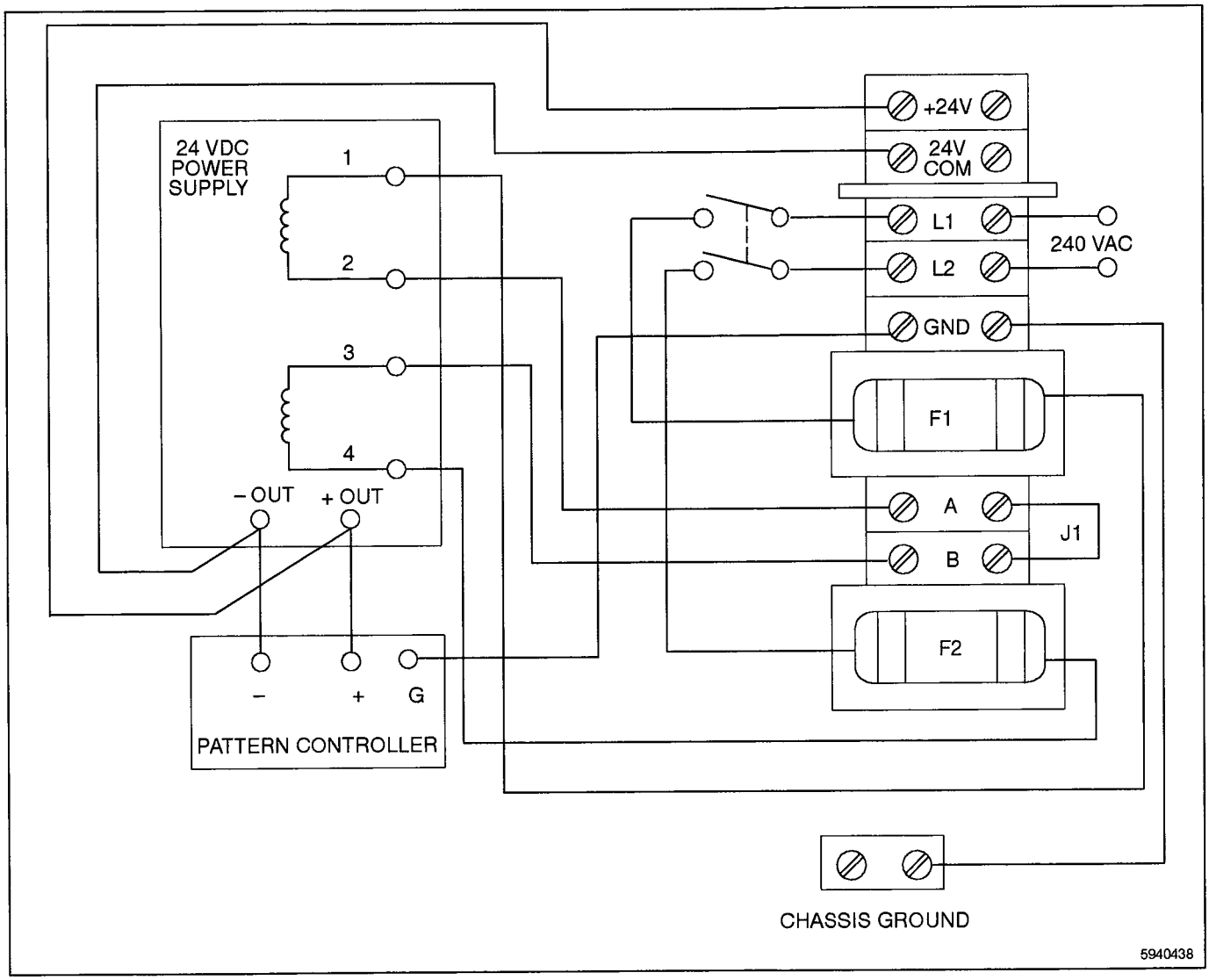

Fig. 5-13 Input Power Wiring Diagram (240 VAC)

PC56 Controllers with 120 VAC Service

Controllers are shipped configured for 240 VAC single phase service.

To reconfigure for 120 VAC service, remove J1 (see Figure 5-13) from terminals A and B, then install J2 from F1 to terminal B and J3 from F2 to terminal A as shown in Figure 5-14. Route the 120 VAC service to the terminal strip as illustrated in Figure 5-14.

F1 and F2 are 2 amp Slo Blo fuses for 120 VAC service.

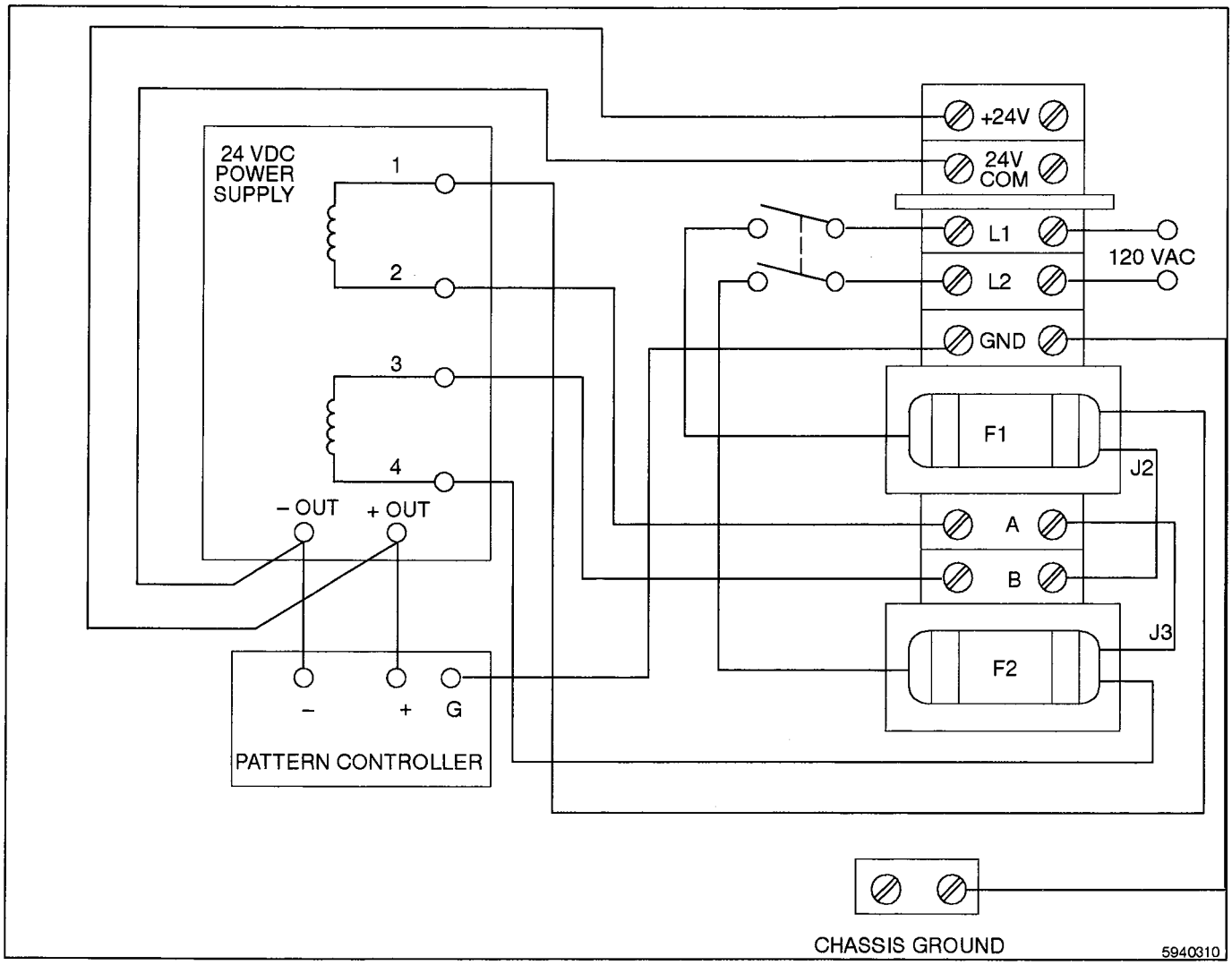

Fig. 5-14 Input Power Wiring Diagram (120 VAC)

Section 6

Parts

Section 6
Parts

1. Introduction

To order parts, call the Nordson Customer Service Center at 800–241–8777 or your local Nordson representative. Use this five-column parts list, and the accompanying illustration, to describe and locate parts correctly.

Numbers in the Item column correspond to numbers that identify parts in illustrations following each parts list. The code NS (not shown) indicates that a listed part is not illustrated. A dash (–) is used when the part number applies to all parts in the illustration.

The six-digit number in the Part column is the Nordson Corporation part number. A dash in this column (–) means the part cannot be ordered separately or refers you to the appropriate parts list.

The Description column gives the part name, as well as its dimensions and other characteristics when appropriate. Indentions show the relationships between assemblies, subassemblies, and parts.

Item	Part	Description	Quantity	Note
–	000 000	Assembly	1	
1	000 000	• Subassembly	2	A
2	000 000	• • Part	1	

- If you order the assembly, items 1 and 2 will be included.
- If you order item 1, item 2 will be included.
- If you order item 2, you will receive item 2 only.

The number in the Quantity column is the quantity required per unit, assembly, or subassembly. The code AR (As Required) is used if the part number is a bulk item ordered in quantities or if the quantity per assembly depends on the product version or model.

Letters in the Note column refer to notes at the end of each parts list. Notes contain important information about usage and ordering. Special attention should be given to notes.

2. PC56 Controller Parts Lists

PC56 Systems

Item	Part	Description	Quantity	Note
–	229 984	PC56 Pattern Controller System	–	
–	229 983	Controller Unit, PC56	–	

Controller Output Modules

Item	Part	Description	Quantity	Note
–	188 087	0–60 VDC, 0–3 Amp DC Output	–	
–	188 088	0–200 VDC, 0–1 Amp DC Output	–	
–	188 089	24–280 VAC, 3 Amp	–	

Controller Run-Up Modules

Item	Part	Description	Quantity	Note
–	188 091	0–10 VDC Run-Up Output Module	–	
–	188 092	4–20 mA Run-Up Output Module	–	

Resolvers and Resolver Cables

Item	Part	Description	Quantity	Note
–	188 065	Encoder, PC Resolvers, 3/4 Foot Mount, Rear Connector	–	
–	188 066	Encoder, PC Resolvers, 3/4 Foot Mount, Side Connector	–	
–	188 067	Encoder, PC Resolvers, 3/8 Flange Mount, Rear Connector	–	
–	188 068	Encoder, PC Resolvers, 3/8 Flange Mount, Side Connector	–	
–	188 069	Encoder, PC Resolvers, 5/8 Foot Mount, Right Side Conduit Fitting	–	
–	188 070	Encoder, PC Resolvers, 5/8 Foot Mount, Left Side Conduit Fitting	–	
–	188 071	Resolver, Cable	10 ft	
–	188 072	Resolver, Cable	30 ft	
–	188 073	Resolver, Cable	50 ft	
–	188 074	Resolver, Cable	100 ft	
–	188 075	Resolver, Cable	150 ft	
–	188 076	Cable, for Resolver, Stainless Steel	10 ft	
–	188 077	Cable, for Resolver, Stainless Steel	30 ft	
–	188 078	Cable, for Resolver, Stainless Steel	50 ft	
–	188 079	Cable, for Resolver, Stainless Steel	100 ft	
–	188 080	Cable, for Resolver, Stainless Steel	150 ft	

Power Supply

Item	Part	Description	Quantity	Note
–	188 099	Power Supply, PC, 24 VDC, 3 Amp	–	

Keypad/Display and Keypad /Display Cables

Item	Part	Description	Quantity	Note
–	188 093	Keypad/Display	–	
–	188 125	Cable, PC, Keypad/Display	2 ft	
–	188 081	Cable, PC, Keypad/Display	5 ft	
–	188 082	Cable, PC, Keypad/Display	10 ft	
–	188 083	Cable, PC, Keypad/Display	30 ft	
–	188 084	Cable, PC, Keypad/Display	50 ft	
–	188 085	Cable, PC, Keypad/Display	100 ft	

Terminal Blocks

Item	Part	Description	Quantity	Note
–	188 112	Terminal Block, PC Resolver Cable	1	
–	188 113	Terminal Block, PC Input Power	1	
–	188 115	Terminal Block, PC 20–30 VDC Input	1	
–	188 116	Terminal Block, PC Keypad/Display	1	
–	188 118	Terminal Block, PC Output 5–9	1	
–	188 123	Terminal Block, PC Output 1–4	1	
–	188 124	Terminal Block, PC, Input 1–8	1	

Spare Parts

Item	Part	Description	Quantity	Note
–	188 101	Fuse, PC, Output Module, 4 Amp	Pkg of 5	
–	188 102	Fuse, PC, PC56 Control, 1.25 Amp	Pkg of 5	
–	188 103	Fuse, PC, PC, Accessory Power, 0.25 Amp	Pkg of 5	
–	188 104	Strain Relief, PC, Cable		
–	188 111	Connector, PC, Resolver Cable		
–	–	Fuse, 1 Amp, Slo Blo (Controllers w/240 VAC input power to Terminal Strip)	–	
–	–	Fuse, 2 Amp, Slo Blo (Controllers w/120 VAC input power to Terminal Strip)	–	

Other Parts

Item	Part	Description	Quantity	Note
–	220 780	Overlay, PC56	–	
–	220 781	Feet, DIN Clip	–	
–	313 785	Photosensor, Fast Response	–	

Section 7

Communications

Section 7
Communications

1. Introduction

This section contains descriptions and operating requirements for PC56 controller communications packages.

Nordson Communication Software

If the optional Nordson Communication Software package is ordered, insert the instruction sheet and diskette holder with diskettes at the indicated place at the end of this section.

Modbus Communication Software

Modbus Communication software is a standard feature of PC56 controllers. Insert the diskette holders and diskettes at the end of the Modbus software discussion.

NOTE: Modbus Communication is provided as a tool for customers familiar with Modbus and experienced with computer programming and developing control device interfaces. Modbus communications capability on the PC56 provides a means for other control devices to interrogate the PC56. This section provides the discrete I/O elements and memory register addresses.

2. Modbus Communications

Introduction

Modbus communication provides a serial interface using Modbus ASCII protocols and allows interface with a variety of compatible machine controllers. Compatible controllers can interrogate the PC56 for configuration, or other operating data, and can change the data.

Due to the relatively slow speed of serial communication, applications are usually limited to supervisory functions, such as selecting programs of settings during a product changeover, rather than used to monitor real time parameters such as machine position or rpm.

NOTE: Modbus protocol used in the PC56 is Modbus ASCII. Modbus Plus or other variations will not work.

NOTE: When using serial communications, the host device must be set for seven (7) data bits, two (2) stop bits and no parity.

Data Organization

The two types of data available through Modbus communications are Discrete I/O and Registers.

- Discrete I/O – These elements represent input/output status. They include coils which can be forced on or off. Forcing outputs is used mainly for troubleshooting or diagnostic purposes.

- Registers – All controller data such as Duration Setpoints, Gun Compensation values and configuration settings are available through registers. Values may be read from registers and changes in controller configuration may be made by writing to registers.

Some data is represented by more than one register. ON and OFF points, for example, for a particular duration are referenced through five separate registers: Program Index (40264), Channel Index (40265), Duration Index (40266), Duration On (40267), and Duration Off (40268).

In order to read the on and off setpoints for a duration, data must first be written to the three index registers to specify which duration is to be read.

Data reading from the controller has been streamlined by providing, special Data Display registers. By mapping a particular indexed element to a Data Display register, the values for that element can be read without always writing the appropriate index values.

EXAMPLE:

To map a specific duration to a Data Display register:

1. Specify the program, the channel, and the duration by writing to Program Index (40264), Channel Index (40265) and Duration Index (40266).

2. Using the Duration Mapping register, (40261), specify the Data Display registers that reference this duration.

Data Organization (contd.)

Once this duration is mapped to these Data Display registers, reading the registers returns the on and off setpoints of the mapped duration, regardless of later changes to the values in the Index registers.

Careful use of the mapping registers allows a device to quickly read a series of data from the PC56 without first having to specify the Index registers for each element being read.

NOTE: Data Display registers will not accept mapping values until the Map Limit register (40296) has been programmed with a value greater than zero (0).

NOTE: When reading or writing to registers, no more than 32 consecutive registers may be referenced at one time.

DOS Utilities

On the diskette, furnished with the software package, are two (2) DOS utilities for use with serial communications to set and read registers directly and to upload mapping parameters.

NOTE: When reading or writing to registers, use only the last three (3) digits of the register.

- For example, to read or write to register 40305 (keyboard quantity), type 305 when prompted. *Do not enter 0305 or 40305.*

NOTE: When using Mapping registers to specify a Data Display register, do not add any leading zeroes (0) to the Data Display value.

- For example, to map an element to Data Display 40017, enter 17 when prompted by the program. *Do not enter 017 or 40017.*

MODMAP. EXE

Unlike Discrete I/O elements and registers which are dedicated to specific parameters, the Data Display registers must be mapped for a specific application in order to be useful. MODMAP. EXE is a utility designed to simplify the programming and storage of Data Display mapping.

MODMAP. EXE can be used to upload the Data Display mappings that have been established using MODCOM.EXE, or another program, from the PC56 controller to an IBM compatible computer. The mappings can be saved as a text file and can be reviewed, edited and then downloaded to other PC56 controllers. The file can also be saved for archival purposes.

Included with MODMAP. EXE is a text file called MAPPING.FMT which can be opened in MODMAP and studied. This file explains the formats used by MODMAP and includes a mapping example which can be downloaded to a PC56 controller. The menus in MODMAP are self-explanatory.

Modbus Register Map

This section provides a list of PC56 controller addresses for Discrete I/O elements and memory registers.

Discrete I/O Inputs

10001 – 10016 DC Inputs

These points represent the status of the DC inputs.

Outputs

00001 – 00100 Channel Outputs

These coils represent the status of the channel outputs. Forcing these coils directly will set/clear the appropriate ORing and ANDing coils as required.

The Channel Output Coil status before OR/ANDing is determined by setpoints, speed compensation, motion ANDing, enable input ANDing, timed outputs, and resolver fault status.

ORing and ANDing

00101 – 00200 Channel ORing Setting

Setting these coils to 1 will force the corresponding channel Output Coil ON.

00201 – 00300 Channel ANDing

Setting these coils to 1 will force the corresponding Channel Output Coil OFF.

Special Purpose (00301–00400)

301 Global Unforce

Clears all OR and AND coils when set from 0 to 1 (edge active).

302 Duration Register Enable

When 1, this coil enables the creation of new durations through writes to the New Off Register. When this coil is 0, writes to New Off Register do not create a new duration.

303 Create New Duration

Creates a new duration defined by the New On and New Off registers when set from 0 to 1 (edge active). This coil is ignored if coil 302 is 1.

304 Move Both Edges of Duration

When 1, this coil causes both edges of a duration to move when either the leading or trailing edge is changed by 1 (incremented or decremented).

305 Move All Durations in Channel

When 1, this coil causes all edges of all durations in a channel to move when either the leading or trailing edge is changed by 1 (incremented or decremented).

314 NAK Bad Address Reads

When 1, this coil causes the controller to NAK attempted reads to non-existent registers. when this coil is 0, reads to non-existent registers return a value of zero.

315 Execute Special Function

Executes the special function defined by the contents of the Special Purpose Registers (4001–40017) when set from 0 to 1.

0316 Auto Increment

When 1, this coil enables the auto increment feature on index registers. This feature allows sequential reading of indexed values without changing the index register.

Special Purpose and Data Display Registers

40001 Message and Special Function (16 registers)

The first 16 registers (001 – 016) are used for entering data used by special functions.

40017 Data Display (240 registers)

These registers (017 – 256) are used by the Mapping functions to display individual instances of indexed data.

RPM

40257 RPM

Read only

Returns the current RPM.

Position

40304 Position Mapping

Read/Write

Values: 1–6

Specifies the output group whose position is displayed in the Position Register.

40258 Position Index

Read/Write

Values: 17 – 256

Specifies the general purpose register used to display the position for the output group specified by the Group Index Register.

40259 Position

Read only

Values: 0 – (Scale Factor – 1)

Returns the current position for the output group specified by the Group Index Register.

Pulse Programming

40260 Total Pulse Count

Read only

Values: 0 – n

Returns the total number of pulses for all channels. Writing a value of 0 to this register erases all pulses. You can only write to this register when the Stop register is a 1.

40261 Channel Pulse Count

Read/Write

Values: 0 – n

Returns the number of pulses in the channel defined by the index registers below.

40262 Program Index

Read/Write

Values: 0 – Max Program Number

Contains the current program number for pulse access. Writing to this register resets the Channel index register and the Pulse Index Register to 1. When this register is 0, the current active program is used for setpoint access and for mapping (setpoints mapped with a program index of 0 automatically change when the active program changes).

40263 Channel Index

Read only

Values: 1 – Max Channel Number

Contains the current channel number for pulse access. Writing to this register resets the Pulse Index Register to 1. This register is reset to 1 when the Program Index Register is changed.

40264 Pulse Index

Read/Write

Values: 1 – n

Contains the current pulse number for pulse access. This register is reset to 1 when the Program Index Register or Channel Index Registers are changed.

Pulse Programming (contd.)

40265 Pulse On

Read/Write

Values: 0 – (Scale Factor – 1)

Pulse on value.

40266 Pulse Off

Read/Write

Values: 0 – (Scale Factor – 1)

Pulse off value.

40267 New On

Read/Write

Values: 0 – (Scale Factor – 1)

New Pulse on value. Writing to this register loads the on setpoint of a new pulse for the program and channel specified by the index registers above.

40268 New Off

Read/Write

Values: 0 – (Scale Factor – 1)

New Pulse off value. Writing to this register loads the off setpoint of a new pulse for the program and channel specified by the index registers above. The pulse is stored when the off value is written if the Pulse Register Enable Coil is set to 1; otherwise, the pulse is stored when the Create New Pulse Coil is changed from 0 to 1 (edge active).

Active Program and Default Program

40269 Active Program

Read/Write

Values: 1 – Max program number

Returns to program currently active; determined either by hardware inputs or by the value of the default program. If hardware inputs are active, writes to this register change the default program, but the active program does not change.

40270 Default Program

Read/Write

Values: 0 – Max program number

Defines the program that is active if no hardware program select inputs are active.

Speed Compensation

40306 Speed Comp Mapping

Read/Write

Values: 17 – 255

General Purpose register used for mapping speed compensation values. Two registers are used; the first contains the leading edge value, the second contains the trailing edge value.

40271 Channel Index

Read/Write

Values: 1 – Max channel number

Channel index for speed compensation values.

40272 leading Edge Comp

Read/Write

Values: 0 – n (.1 ms)

Specifies the trailing edge speed compensation value.

40273 Trailing Edge Comp

Read/Write

Values: 0 – n (.1 ms)

Specifies the trailing edge speed compensation value.

Motion Detection

40309 Motion Detection Mapping

Read/Write

Values: 17 – 255

General purpose register used for mapping low and high motion detection values. Two registers are used; the first contains the low motion detection rpm value, the second contains the high motion detection rpm value.

40278 Channel Index

Read/Write

Values: 1, 2

Motion detect level index for high and low motion detection values.

40279 Low Motion Detection RPM

Read/Write

Values: 0 – n

Motion detection low limit for level specified by the index register.

40280 High Motion Detection RPM

Read/Write

Values: 0 – n

Motion detection high limit for the level specified by the index register.

Analog Output

40310 Analog Output Mapping

Read/Write

Values: 17 – 255

General purpose register used for mapping analog setpoints. Four registers are used: analog channel, setpoint number, line speed, and percentage.

40281 Analog Channel Index

Read/write

Values: 1,2

Analog channel index for line speed and output percentage.

Analog Output (contd.)

40282 Analog Setpoint Index

Read/Write

Values: 1 – max. analog setpoints/channel

Analog setpoint index for analog values.

40283 Analog Rate

Read/Write

Values: 0 – 3000

Line speed for analog setpoint.

40284 Analog Percentage

Read/Write

Values: 0 – 100

Analog output at the specified line speed, expressed as a percent of full scale.

Analog output Override values

40311 Override Mapping

Read/Write

Values: 17 – 255

GP register mapping for analog output override.

40285 Override Index

Read/Write

Values: 1 – max. analog channel

Analog channel index.

40286 Override Percentage

Read/Write

Values: +/– 0 – 50

Percent increase or decrease applied to analog output at all speeds.

Analog Output Purge Registers

40287 Purge Output Percentage

Read/Write

Values: 0 – 100

Percent of analog output used in purge function.

40288 Analog Channel Index

Read/Write

Values: 1 – max. analog channel

Selects the analog channel used for purge function.

40289 Output Channel Index

Read/Write

Values: 1 – max. channel

Selects the output channel index for purge function.

40290 Output Channel On/Off

Read/Write

Values 0/1 (0 = off, 1 = on)

On/off status of purge function.

Product Setup

40312 Product Setup Map

Read/Write

Values: 17 – 254

General purpose register for mapping of product set up data.

40291 Product Setup Index

Read/Write

Values: 0 – max. program number

Index (per program) for trigger setup.

40292 Eye to Gun Count

Read/Write

Values: 0 – 4096

Distance between eye and gun.

Product Setup (contd.)

40293 Product Length

Read/Write

Values: 0 – 4096

Product length.

40294 Product Allowance

Read/Write

Values: 0 – 4096

Allowable variation of product length.

Mapping Registers

40300 Map Limit

Read/Write

Values: 0 – 256

Sets the maximum number of data mappings.

40301 Map Quantity

Read/Write

Values: 0 – 256

Returns the number of data mappings active in the controller.

NOTE: Writing a 0 to this register deletes all data mappings.

40302 Map Store

This register is only for use by utility programs.

40303 Map Recall

This register is only for use by utility programs.

Model Information

40313 Model

Read only

Returns the model number.

40314 Revision

Read only

Returns the major software revision.

40315 Output Quantity

Read only

Returns the number of output channels (8, 9, 16, 17, 25, etc.).

40316 Option Index

Read/Write

Values: 1 – n

Used as index for reading installed controller options through the Option Register.

40317 Option

Read only

Values: 0 – n

Returns installed controller options as specified through the Option Index Register. A value of 0 at index 1 means no options are installed.

Hardware Configuration

40318 Keyboard Quantity

Read only

Values: 1

Number of keyboards attached to controller.

40319 Counts Per Revolution

Read only

Values: 17 – 4096

Sets the number of counts per revolution of the resolver shaft.

40320 Analog Quantify

Read only

Values: 1

Specifies the number of analog modules active.

40321 Program Select Mode

Read only

Values: 0 = Binary, 1 = Gray code, 2 = BCD

Specifies how the program select inputs determine the active program.

40322 Time Base

Read only

Values: 0 = 1 ms, 1 = .5 ms, 2 = .2 ms

Returns the timer interrupt rate.

40323 Termination Resistor One

Read/Write

Values: 0 = off, 1 = on

Termination resistor on/off RS-485.

40324 Termination Resistor Two

Read/Write

Values: 0 = off, 1 = on

Termination resistor on/off RS-232/RS-485.

Display Configuration

40325 Rate Multiplier

Read/Write

Values: 1000 – 9999

RPM rate multiplier, assumed decimal point at x.xxx.

40326 Rate Decimal Point Position

Read/Write

Values: 0 – 3.

Rate decimal point position

40327 Rate Units

Read/Write

Values: A – Z (decimal 65 – 90)

Rate display units

40328 Rate Display Mode

Read/Write

Values: 0 – 2

Rate display mode value: 0 = scaled rpm w/dp & units; 1 = product/min.; 2 = product count.

40329 Toggle RPM

Read/Write

Values: 0 – n

Specifies RPM which causes position display to blank.

40330 RPM Update Rate

Read/Write

Values: 0 = 1/Sec., 1 = 2/Sec., 2 = 10/Sec.

Rate at which the RPM display is updated.

40331 Speed Comp Display Mode

Read/Write

Values: 0 = one, 1 = L/T

Specifies whether speed comp values are displayed as one value for both leading and trailing edges, or as a value for each.

Display Configuration (contd.)

40332 Duration Mode Select

Read/Write

Values: 0 = Disabled, 1 = Enabled

Specifies whether EDG / DUR / CHN window appears when programming setpoint on/off values.

40333 Analog Override Increment Amount

Read/Write

Values: 0 – 10

Amount added to analog override value when INC/DEC keys pressed while in that screen.

Password ID Numbers

40334 Operator ID

Read/Write

Values: 0 – n

Specifies the Operator ID number used to enable the Operator access level for programming.

40335 Master ID

Read/Write

Values: 0 – n

Specifies the Master ID number used to enable the Master access level for programming.

Motion ANDing

40336 Channel Index

Read/Write

Values: 1 – Max Channel Number

Channel index for the Motion Enable Level Register.

40337 Motion Enable Level

Read/Write

Values: 0 = Off, N = Motion Detection Level

Output Enable ANDing

40338 Output Enable Index

Read/Write

Values: 1 – Max Channel Number

Channel index for the Output Enable Register.

40339 Output Enable

Read/Write

Values: 0 = Channel not ANDed, 1 = Channel ANDed

Specifies whether a channel is ANDed with the Enable Input.

40344 Stop Control

Read/Write

Values: 0 = Running, 1 = Stopped

When the PC56 is stopped, changes written to registers do not update the checksum in EEPROM memory. Changes are faster when unit is stopped, but you must read from the Checksum Register when changes are complete to establish a valid checksum. Writing a 1 value to this register places the PC56 in Stopped Mode. Writing a 0 to this register restarts the PC56 via a watchdog timer reset.

40345 EEPROM Checksum

Read only

Returns the current checksum of EEPROM memory. If computed checksum of EEPROM memory does not match the current value (i.e. if changes were made while PC56 was stopped), a new value is written to EEPROM memory.

40346 EEPROM Changed

Read only

Values: 0 = No Change, 1 = Changed

A value of 1 in this register means that the EEPROM has been changed (through the keypad) since the last time this register was read. Reading this register sets it to 0.

Product Counters

40347 Product Count Low

Read/Write

Values: 0 – 65535

Low word: number of active trigger edges.

40348 Product Count High

Read/Write

Values: 0 – 65535

High word: number of active trigger edges.

40349 Product Rate

Read only

Values: 0 – n

Number of active trigger edges per minute.

40350 Setup Counter

Read/Write

Values: 0 – 65535

Setup counter, always incremented when resolver changes position.

40351 Short Count

Read/Write

Values: 0 – 65535

Number of products that were short.

40352 Long Count

Read/Write

Values: 0 – 65535

Number of products that were long.

I/O Control

40360 – 40379 Input Status

Read Only

Values: 0 – 65535

Each register represents the status of 16 inputs.

40370 – 40379 Output Status

Read/Write

Values: 0 – 65535

Each register represents the status of 16 outputs. The least significant bit of the register corresponds to the lowest numbered output. Writing to one of these registers forces 16 outputs. The ORing and ANDing registers (and coils) reflect the forced conditions.

40380 – 40389 ORing Bits

Read/Write

Values: 0 – 65535

Each register represents the status of 16 ORing bits. The least significant bit of the register corresponds to the lowest numbered output. When a 1 is present in an outputs' bit position, the output is forced on. The Output Status register reflects the forced condition.

40390 – 40399 ANDing Bits

Read/Write

Values: 0 – 65535

Each register represents the status of 16 ANDing bits. The least significant bit of the register corresponds to the lowest numbered output. When a 1 is present in an outputs' bit position, the output is forced off. The Output Status register reflects the forced condition.

Host Communication Setup

40400 Communication Type (RS-485/RS-232)

Read/Write

Values: 0/1 (0 = RS-485, 1 = RS-232)

Determines the communication type used by the controller. This register may only be written to when the controller is stopped (via the Stop Control register).

40401 Communication Baud Rate

Read/Write

Values: 2/3/4/5 (2 = 4800, 3 = 9600, 4 = 19200, 5 = 38400)

Determines the baud rate used by the controller. this register can only be written to when the controller is stopped (via the Stop Control register).

40402 Communication Address

Read/Write

Values: 1 – 255

Determines the address used by the controller. This register can only be written to when the controller is stopped (via the Stop Control register).

NOTE: If the three address switches on the input board are all up (address 7), the controller is automatically configured to be RS-232, 9600 baud, address 1. Use this feature to enable communications with a controller if no keyboard is available or if you are unsure of the communication parameters currently in use.

Register Map Version

49999 Returns the Register Map Version 102

This register must be read before any other operations take place. Until this register is read, writes are ignored and read operations return 0.

3. Nordson Communication Software

Remove this page and insert the instruction sheet and diskette holder provided with the optional Nordson Communication Software package.