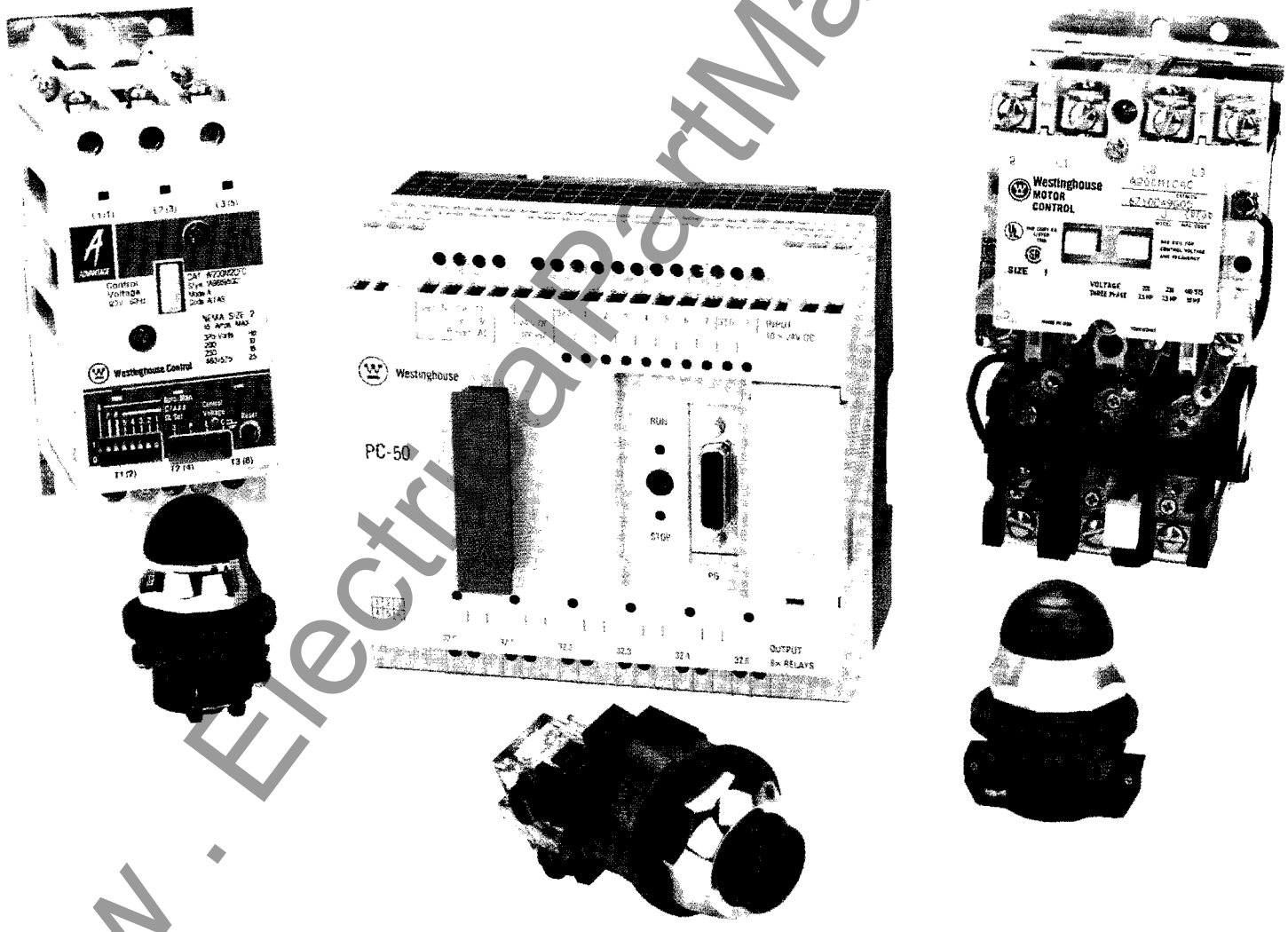
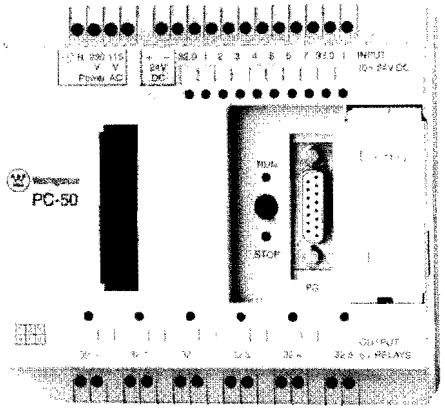
PC-50 Programmable Logic Controller



Westinghouse PC-50 Programmable Logic Controller



Introduction

Programmable Logic Controllers (PLCs) have long been accepted by industry as reliable, easy-to-use devices capable of replacing the control relays, timers and counters found in most motor sequencing and control applications.

The Westinghouse PC-50 is a small PLC that provides a cost efficient control solution for applications requiring as few as 2-3 timers, counters or control relays. The input/output circuits provided can handle up to 6 motor starters.

The PC-50 can monitor up to 10 input signals, and control up to 6 output devices. Inputs typically come from pushbuttons or limit switches, devices that control when a specific motor or machine should operate. Outputs are wired directly to motor starters, pilot lights, or solenoids.

In addition, two of the PC-50 inputs can be configured for special applications. One can be configured to count high speed, short duration inputs typical of conveyor control or positioning applications. The other can interrupt the basic control logic and trigger a special "interrupt" routine.

The 2K Words of internal memory provide the capability for up to 2,000 logic operations to be stored in the PC-50. Instructions can range from simple logic commands to timer and counter functions.

Thirty-two internal timers are available, each having the ability to time between .01 to 9990 seconds with accuracy of up to 1/100th of a second. Thirty-two counters provide for up/down counts from 0 to 999.

To allow for internal logic typically performed by auxiliary contacts and control relays in hardwired systems, the PC-50 has 1024 internal coils available.

Motor sequencing and control logic is loaded into PLC memory using a Personal Computer and simple ladder logic based software.

The control logic can be kept secure during power outages by either battery or nonvolatile EEPROM memory, both available as options.

Motor Control Applications

The PC-50 is suited for applications using both conventional motor starters as well as Westinghouse ADVANTAGE starters. Page 5 of this publication shows typical wiring diagrams and PLC logic for a standard three wire control application.

Since the ADVANTAGE motor starter has the ability "seal in" without the need for an external holding circuit, both the wiring and PLC logic can be simplified. Typical ADVANTAGE applications are shown on pages 5 and 6.

PC-50 Features

10 digital inputs (24 VDC) and 6 relay outputs. Ideal for many small control applications.

Input/output signals compatible with all ADVANTAGE motor starters.

Powered directly from 120 VAC or 230 VAC source for easy installation and wiring.

24 VDC is provided via screw terminals on the PC-50. No external power supply needed for inputs.

2K Words of memory provide up to 2,000 logic operations.

2 msec/K scan time for high speed response.

32 timers and 32 counters available for more complex sequencing applications.

High speed counter input for conveyor control or positioning applications.

Logic programs are entered using a Personal Computer and easy-to-use ladder logic based programming language. No special hardware or training is required.

Can be either panel mounted or rail mounted for additional installation flexibility.

5.7" x 5.3" x 3.6" compact package takes up less panel space than even two hardwired components.

The PC-50 and accessories are UL listed, CSA certified and meet applicable IEC and VDE standards.

Westinghouse PC-50 Programmable Logic Controller

PC-50 Starter Kit

The PC-50 is available in a Starter Kit package. A starter kit includes a PC-50, back-up battery, programming software and cable, and four snap-in mounting brackets; along with a systems manual and a Quick Start Guide. This package provides a new user with all the equipment and information needed to easily mount, wire and program a Westinghouse PC-50.

The Quick Start Guide features step-by-step instructions and easy to follow examples covering basic motor control functions.

PC-50 and Accessories

PC-50 PLC Processor with I/O
2K Word PLC processor with 10 inputs and 6 outputs.

NLB-50 Battery
Provides back-up power to retain processor memory during power outages.

NLSW-3103 Programming Software
Personal Computer based programming software. Provides ladder logic programming functions. Also includes complete program documentation and labeling features.

NLCC-3100 Programming Cable
PC-50 to Personal Computer COM port cable. Allows programming of PLC via a Personal Computer.

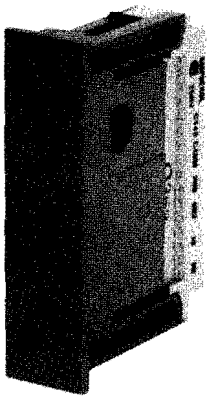
NLEE-50 EEPROM Memory Cartridge
2K plug-in EEPROM cartridge for non-volatile memory protection.

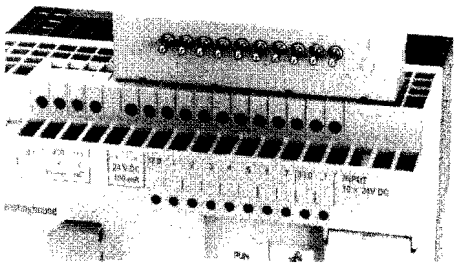
NLR-50 Snap-in Mounting Brackets
Four snap-in mounting brackets to allow easy flat panel mounting. The PC-50 can also be mounted on standard ¼" deep mounting rail.

NL-59 Input Simulator
Provides digital input simulation for all PC-50 inputs. Requires no external power connections.

Catalog Numbers and List Price

Catalog Number	Description	List Price
PC50-KIT1	PC-50 Starter Kit including: PC-50 PLC Processor NLB-50 Battery NLSW-3103 Software NLCC-3100 Cable NLR-50 Mounting Brackets NLAM-B50 Systems Manual NLAM-B51 Quick Start Guide	**$960**
PC-50	PLC Processor with I/O	**460**
NLB-50	Battery	**20**
NLSW-3103	Programming Software	**290**
NLCC-3100	Cable	**150**
NLR-50	Snap-in Mounting Brackets	**20**
NL-59	Input Simulator	**141**
NLEE-50	EEPROM Memory Module	**210**
NLAM-B50	Systems Manual	**10**
NLAM-B51	PC-50 Quick Start Guide	**10**





Westinghouse PC-50 Programmable Logic Controller

Technical Specifications

Catalog Number	PC-50
Feature	
• Internal RAM memory	2K Words
• Approximate scan time	2msec/K
• Supply Voltage	115VAC (93-127V) 230VAC (187-253V)
• I/O Power Supplied	24 VDC 100 ma
• Coils –Total – Retentive	1024 512
• Timers – Quantity – Time Range	32 0.01 to 9990 sec
• Counters – Total – Retentive – Range	32 8 0 to 999
• Data Blocks	2..63
• Program Blocks	0..63
• Function Blocks	0..63
• Organizational Blocks	OB1 Cyclic Scan OB3 Interrupt Scan OB21 Scan on Run OB22 Scan on Power Up
• Dimensions (W x H x D) inches mm	 5.7 x 5.3 x 3.6 145 x 135 x 91
• Back-up Battery – Back-up time – Service life (at 25°C/77°F)	 Min. 1 year Approx. 5 years

I/O Technical Specifications

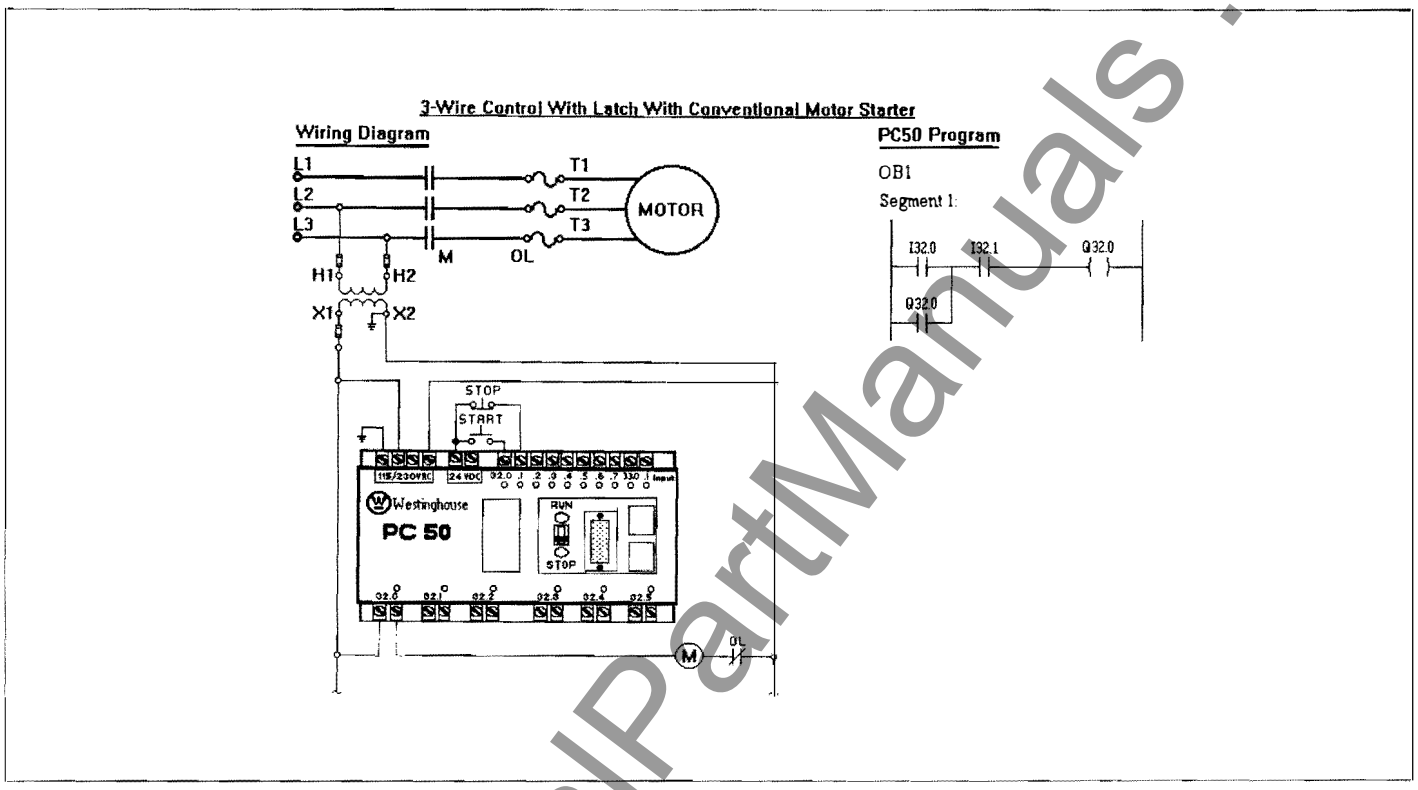
I/O Type	PC-50
Digital Inputs	
Number of inputs	8
Inputs per common	All
Input voltage	
Rated	24 VDC
OFF voltage level	0 to 5 VDC
ON voltage level	13 to 30 VDC
Input loading	8.5 ma
Response Time	
OFF to ON (typ.)	2.8 ms
ON to OFF (typ.)	3.6 ms
Interrupt Inputs	
Number of interrupt inputs	1
Response time	
OFF to ON (typ.)	40 µs
ON to OFF (typ.)	180 µs
Min. pulse duration	500 µs
Counter Inputs	
Number of counters	1
Counter frequency	1 kHz
Response time	
OFF to ON (typ.)	40 µs
ON to OFF (typ.)	180 µs
Min. pulse duration	500 µs
Relay Outputs	
Number of relay outputs	6
Isolated in groups of	1
Contact Rating	
Resistive load (max.)	3A at 250 VAC 1.5A at 30 VDC
Inductive load (max.)	0.5A at 250 VAC 0.5A at 30 VDC

Environmental Specifications

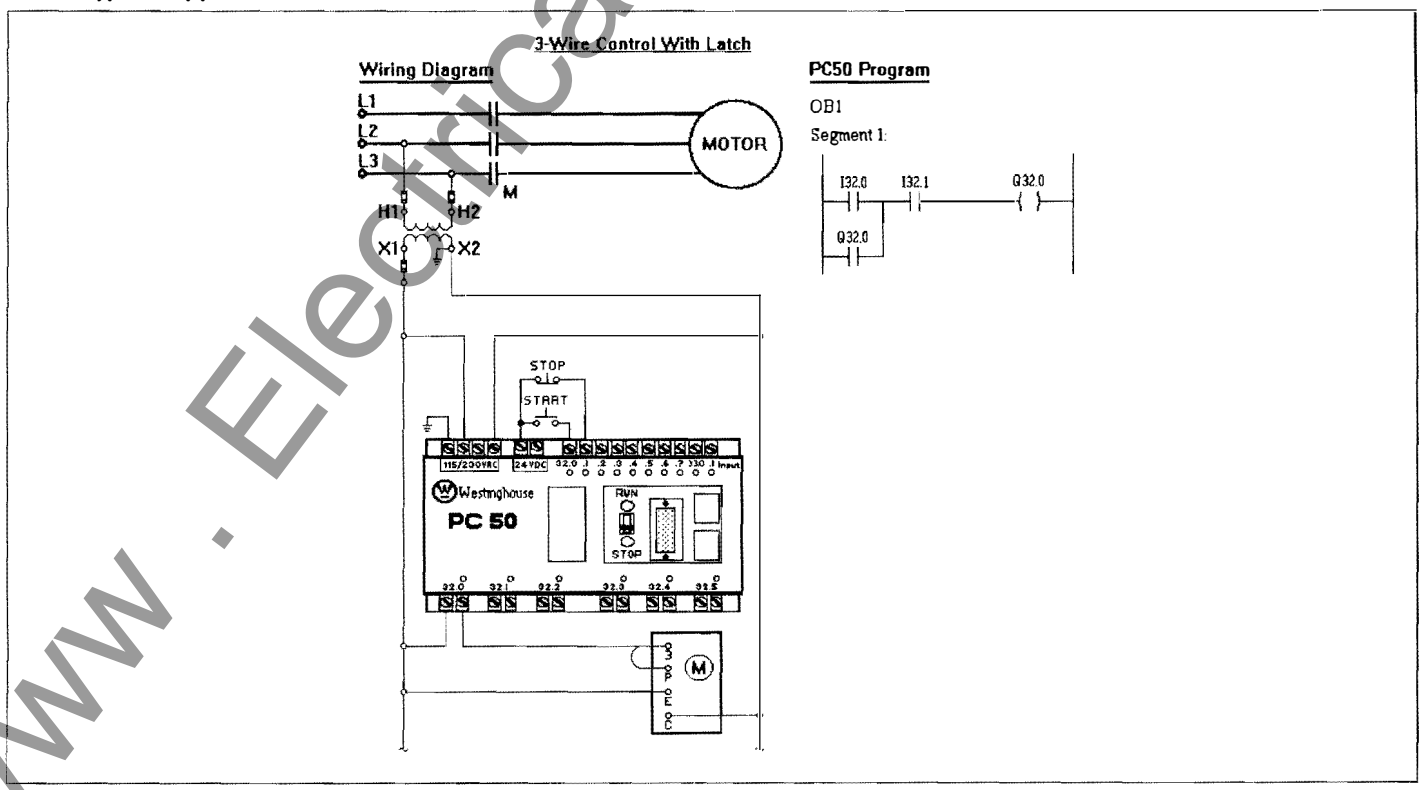
Ambient Temperature	
• Rail horizontal	0 to 60°C (32 to 140°F)
• Rail vertical	0 to 40°C (32 to 104°F)
Transportation and storage temperature	–25 to 70°C (–13 to 160°F)
Humidity Rating	15 to 95%, Indoors
Mechanical	
• Vibrations tested with	IEC 68-2-6 10 to 57 Hz (amplitude 0.15 mm)
• Shock tested with	IEC 68-2-27 12 shocks (semisinusoidal, 15 g, 11 ms)
• Free fall tested with	IEC 68-2-32 Height of fall 1 m (3 ft.)

Westinghouse PC-50 Programmable Logic Controller

PC-50 Typical Application – Conventional Motor Starter



PC-50 Typical Applications – ADVANTAGE Motor Starters

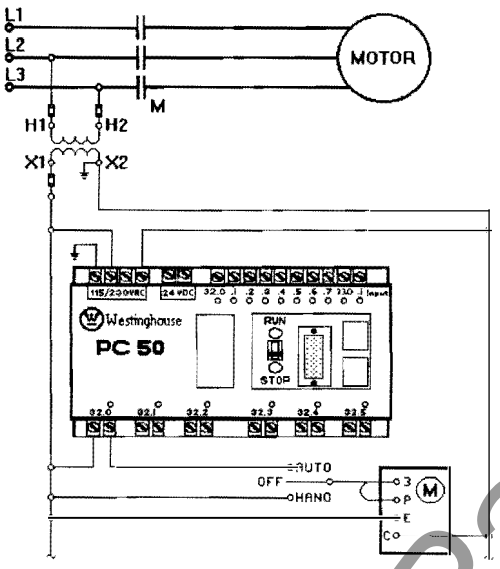


Westinghouse PC-50 Programmable Logic Controller

PC-50 Typical Applications – ADVANTAGE Motor Starters

2-Wire Control with Maintained HOA Switch With ADVANTAGE

Wiring Diagram

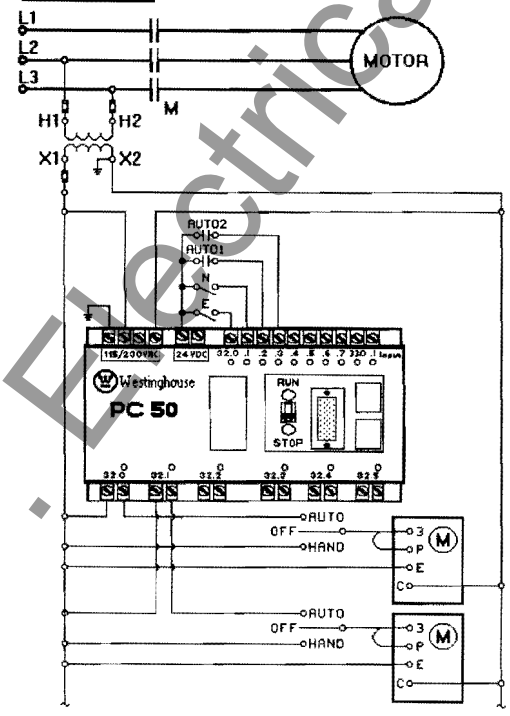


PC50 Program

The control of the motor while in the automatic mode can be selectively defined, operating off of such devices as limit switches, level sensors, temperature sensors, and so on.

Pumping Control Application with ADVANTAGE

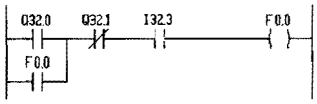
Wiring Diagram



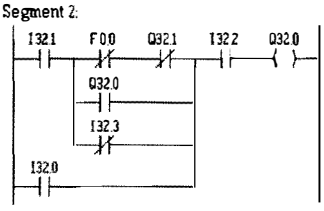
PC50 Program

OB1

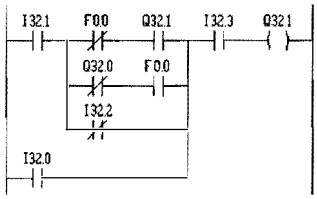
Segment 1:



Segment 2:



Segment 3:



Note: AUTO1 and AUTO2 are auxiliary contacts off of the HOA Auto switch.

Westinghouse PC-50 Programmable Logic Controller

Programming Language

The PC-50 logic program is configured with an easy-to-use, yet powerful programming language. Westinghouse PLC's feature two programming formats, Relay Ladder Logic and Statement List (STL).

Relay Ladder Logic is familiar to everyone in the electrical controls industry. It is a graphical representation of the PLC program which is very similar to the format used for hardwired electromechanical control drawings. Westinghouse PLC's offer the following Ladder functions:

Contact: N.O., N.C., One-shot
Coil, Latch, Unlatch
Timers: Pulse, Extended Pulse, On Delay, Stored On Delay, Off Delay, Reset Timer
Counters: Count Up, Count Down, Set Counter, Reset Counter
Comparisons: =, >, > <, <, > <
Add, Subtract
Shift Right, Shift Left
Move, Immediate Input, Immediate Output
Ones Complement, Twos Complement
AND Word, OR Word, XOR Word
Jump to block
Block End, Temporary Block End

Statement List is a text based language which begins with simple logic instructions and extends up to powerful "machine language" type commands. An STL program defines the control logic as a series of statements. Each statement consists of an Operation (what is to be done) and an Operand (address to act on). Programs written in STL can provide greater flexibility and functionality, with more efficient memory usage, than Ladder programs.

All programs written in Ladder can be easily converted to STL with one key stroke on the program loader. Programs written in STL can exceed the limits of Ladder notation so they may not always be convertible to Ladder.

Personal Computer Software

The Westinghouse NLSW-3103 software package convert a Personal Computer into a versatile program loader. Features include on-line and off-line programming, full documentation capabilities, print functions and disk operations.

The software is completely menu driven. The bottom of the screen indicates the operation of each function key. In addition, over 100 help screens are available to describe every software function.

Ladder logic rungs may extend up to 32 elements in series and over 50 elements in parallel. Rungs can be easily created, edited and copied.

A properly documented program can eliminate many system maintenance frustrations. The NLSW-3103 software makes documentation easy and complete. There are five methods annotating a program.

Block Titles provide comments on the function or operation of a block.

Segment Commends describe the function or operation of a rung.

Statement Comments provides information about a Statement List instruction or Data Block register.

Symbols are 30 character labels assigned to a PLC address.

Symbol Comments are 19 line by 70 character descriptions assigned to a Symbol.

The length of block titles and segment comments are only limited by the amount of memory available in the computer.

Symbols can be created before or during programming. Once a symbol is created, it can be used in place of the actual PLC address when programming. In ladder format, the symbol appears above the ladder element. In statement list, the symbol appears in place of the operand.

The Data Screen allows monitoring of register data and I/O status. It can also be used for data entry. Any address in the PLC may be displayed. Register data can be displayed in signed and unsigned decimal, hex, ASCII and binary formats.

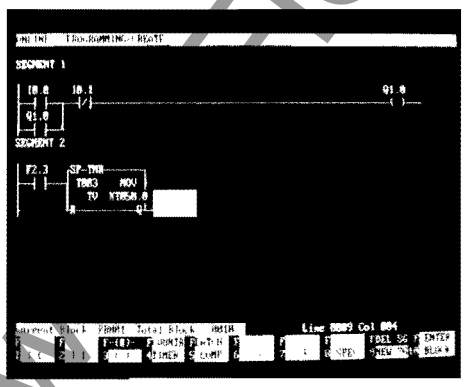
The printer function supports a variety of options. Print all or portions of a program with output sent directly to a printer or to disk. Printer setup codes can be specified prior to printing.

Other features include a complete set of disk operations, search functions and cross reference options.

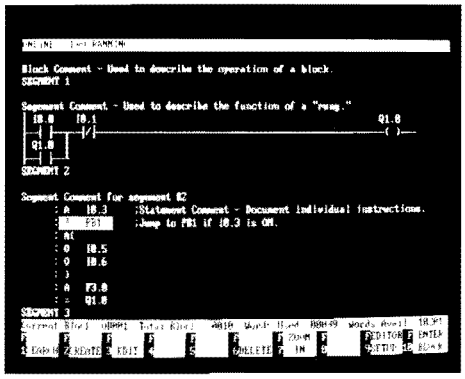
Computer requirements:
- Personal Computer with 80286 or higher microprocessor
- Minimum 640K of RAM (expanded or extended memory is supported)
- Standard COM port (serial interface) for communication with the PLC
- LPT port (parallel interface) for connection of the printer
- A hard disk and one floppy disk drive

An RS-232 to current loop converter is required to interface the COM port of the computer to the programmer port of the PLC. The cable and converter are included in the NLCC-3100 communication cable kit.

The NLSW-3103 software package includes 3.5" and 5.25" disks and manual.



NLSW-3100 Ladder Entry Screen



STL and Ladder Display with Documentation

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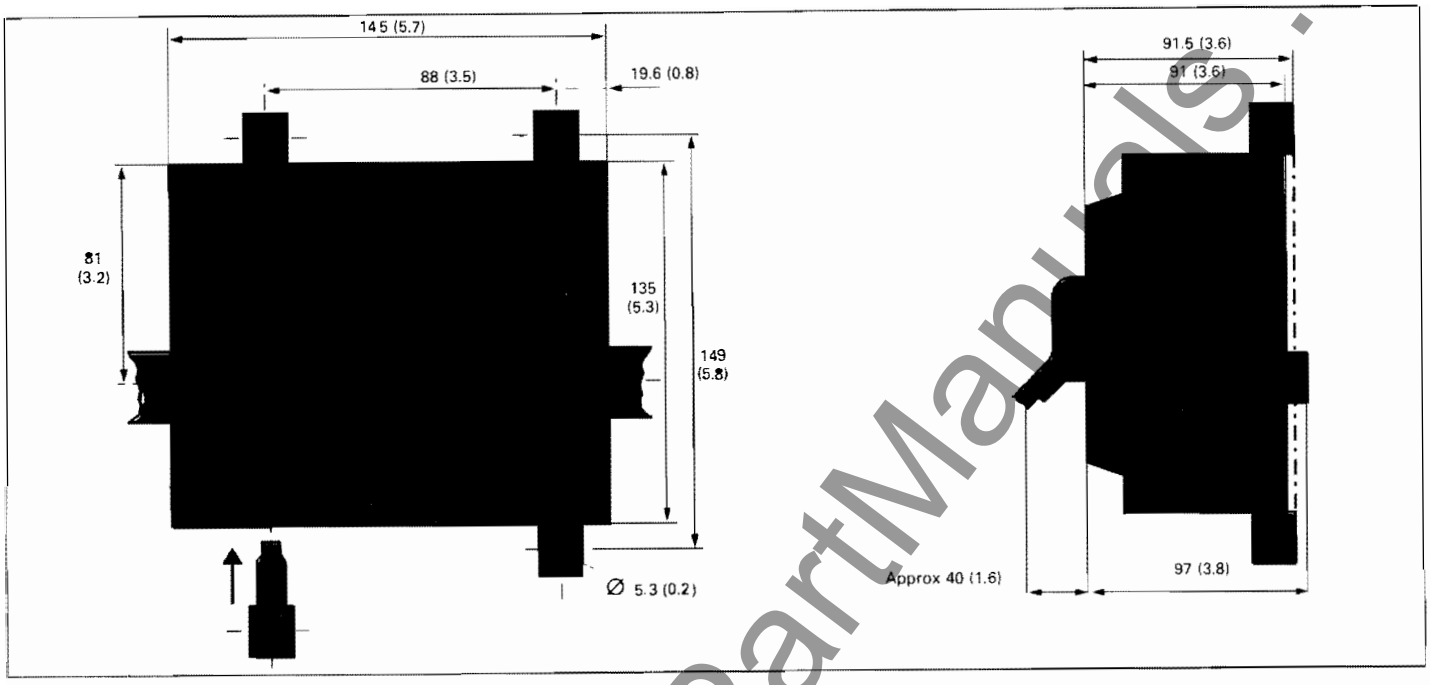
PC-50 Dimensions



Local Distribution
The Westinghouse PC-50 and accessories are sold and supported by your local Westinghouse Electrical Distributor.

Factory Assistance
Westinghouse also provides factory application and technical assistance to its customers. Available by telephone, Westinghouse personnel quickly respond to customer needs, including troubleshooting, analyzing system operation, and coordinating component repair or replacement.

Factory assistance may be obtained by telephoning 800-542-7883 or 412-937-6790.

Training
Westinghouse provides comprehensive training on all aspects of Westinghouse programmable controllers from its Pittsburgh Training Center. Courses include system configuration and design, programming, troubleshooting and maintenance. The Training Center also offers on-site training for all its courses.

Westinghouse Electric Corporation
Distribution and Control Business Unit
Electrical Components Division
Pittsburgh, Pennsylvania, U.S.A. 15220

Printed in U.S.A.

March 31, 1992