



Allen-Bradley PLC-3 Programmable Controller System

Product Data



Introducing the PL C-3 Programmable Controller

The PLC-3 programmable controller introduces a new dimension to the automation of industrial machinery and processes. In addition to performing traditional controller functions, the PLC-3 controller includes many advanced capabilities contributing to improved production operations and efficiency. Powerful, yet easy to use, flexible and versatile, the PLC-3 controller can be interfaced with a wide variety of industrial automation applications, ranging from individual machine or process control to integrated manufacturing lines and plant automation.

What is the PLC-3 Controller?

The PLC-3 controller is a modular, multiple processor, field expandable industrial controller. It is designed to improve production operation and efficiency for complex and large scale processes. You can use its flexible design to tailor the power of the system to meet your machine and process control needs.

AB Parts

What Components make up the PLC-3 Controller?

A PLC-3 controller can have up to eight basic system components:

- main processor chassis
- front panel
- power supply
- industrial terminal
- main processor module . I/O scanner modules
- memory modules
- expansion system

You may or may not use all of these components, depending upon your particular application. Each of the eight components is described below.

Main Processor Chassis

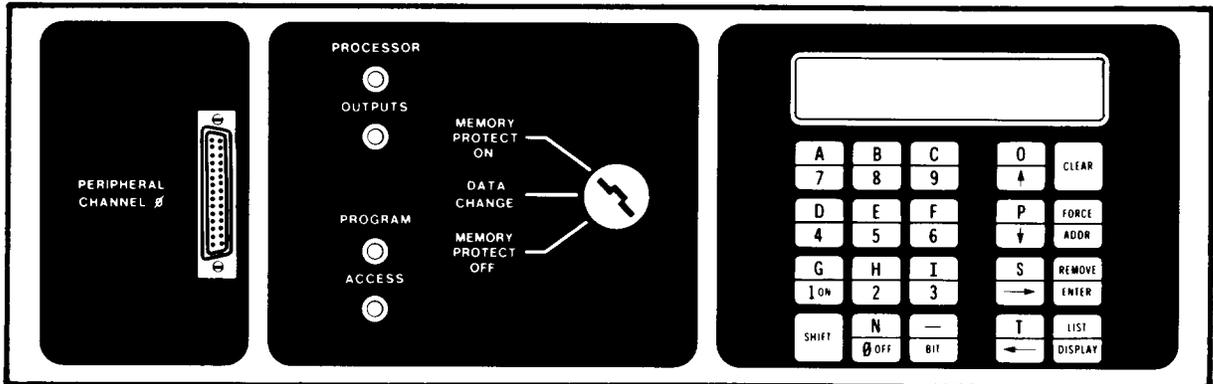
The PLC-3 Main Processor Chassis (cat. no. 1775-A1) houses and protects your individual modules. The main chassis provides six module slots and contains the front panel. The benefits, features, and functions for the chassis are:

Benefits	Features	Functions
Reliable processor operation	Rugged cast aluminum construction	Protects PLC-3 controller from environment
Operates in a variety of industrial environments	Convention cooling	Provides air circulation for components of PLC-3 system
Prevents damage to PLC-3 modules	Power interlock bar	Prevents removal of modules while power is on
Protect module circuitry	Module covers	Protect against RFI electrical noise and contaminants
Easy troubleshooting	Module status indicators	Indicate pass/fail status of modules
On-site enhancement of your PLC-3 system when needed	Field expandability	Enables you to easily install expansion chassis and/or additional modules

Front Panel

The PLC-3 front panel furnishes control and diagnostic features and provides:

- direct connection to the industrial terminal
- four system status indicators
- three levels of memory protection
- display of diagnostic and status messages
- data entry and monitoring



The benefits, features, and functions for the front panel are:

Benefits	Features	Functions
Ability to address data table or configure system without an industrial terminal	Keypad	Provides: <ul style="list-style-type: none"> ▪ data entry ▪ I/O forcing ▪ LIST configuration
Ability to monitor system without an industrial terminal	16-character alphanumeric display	Displays information on system: <ul style="list-style-type: none"> ▪ diagnostics ▪ data table ▪ LIST configuration
Selectable degree of memory access	Keyswitch	Three levels of memory protection
Easy troubleshooting	Status indicators	Monitor system operation
Allows easy access for programming terminal	Peripheral channel 0	Direct connection to industrial terminal

Power Supply

The PLC-3 Power Supply (cat. no. 1775-P1) provides DC power for the logic circuits in the PLC-3 controller. The power supply accepts a power source of 120V AC or 220/240V AC and supplies +5V, +15V, and -15V AC power. The benefits, features, and functions for the power supply are:

Benefits	Features	Functions
Can power up to two fully loaded processors	Large capacity	Supplies: <ul style="list-style-type: none"> ▪ 60 amp 5V ▪ 6 amps ± 15V
Guards against over-current conditions	Circuit breaker	Limits the amount of current drawn

Industrial Terminal

The Industrial Terminal (cat. no. 1770-T4) is a programming terminal Industrial Terminal that you can use to load, edit, and monitor program instructions and report generation messages. You can also use the industrial terminal as a general purpose data terminal.

The benefits, features, and functions for the industrial terminal are:

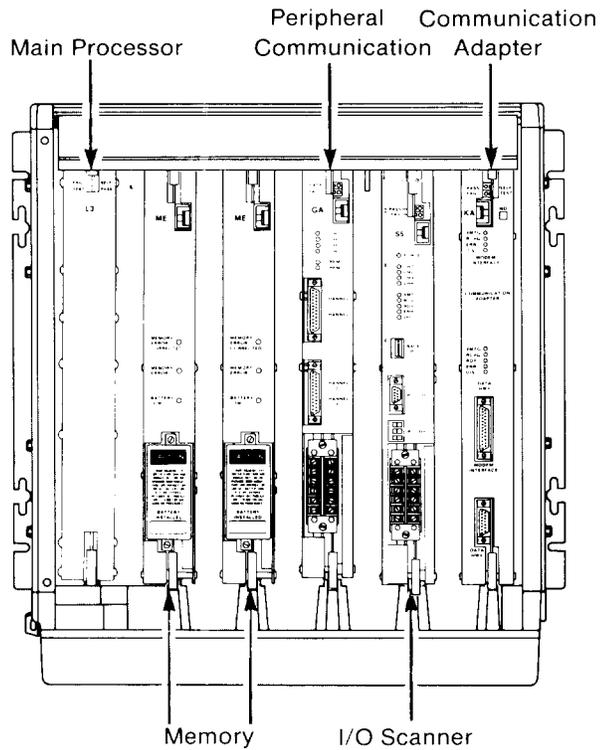
Benefits	Features	Functions
Easy to develop your own programs	Familiar relay-type instructions	Used for ladder logic programming
Make changes and test your program without stopping your process	On-line: <ul style="list-style-type: none"> ▪ programming ▪ test editing 	Insert alterations into an existing program
Allows you to monitor: <ul style="list-style-type: none"> ▪ data ▪ files 	Data table display	Displays up to 80 values
Allows different people to write different parts of a program	Multiple program appending	Compiles program segments together
Your program is easy to: <ul style="list-style-type: none"> ▪ maintain ▪ troubleshoot ▪ document 	Rung comments	Text that describes the function of individual program rungs
Flexibility of industrial terminal	Industrial terminal used as an ASCII terminal	Can be used for: <ul style="list-style-type: none"> ▪ report generation ▪ GA Basic

Main Processor Module

The PLC-3 Main Processor Module (cat. no. 1775-L3) provides:

- program execution
- memory management
- inter-module communication control

The main processor module requires one module slot in the processor chassis. The main processor module in the PLC-3 chassis is shown below:



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The benefits, features, and functions for the main processor module are:

Benefits	Features	Functions
Provides over 70 ladder diagram instructions for efficient programming	Multiple instruction types	Ten different kinds of instructions
Only available memory limits the amount of data that you can use	Completely flexible data table	Can expand to accommodate data
Achieves highest efficiency program scan time	High speed program scan	Quickly determines if outputs are: <ul style="list-style-type: none"> ▪ true ▪ false
Gives you complete control over program execution	Program control: <ul style="list-style-type: none"> ▪ JMP ▪ JSR ▪ MCR 	Enables you to change order of program execution
Can perform real-time events	Real-time interrupt routine	Can request a subroutine on real-time basis

Benefits	Features	Functions
Allows you to react to a major fault, possibly preventing processor from halting	Programmable fault response	Executes a routine before processor halts
Extended computational ability	Data tables: <ul style="list-style-type: none"> ▪ floating point ▪ high order integer ▪ integer 	Can handle extremely large and small numbers
Enables you to quickly change from one program to another	Multiple contexts	Can store multiple programs in one processor
Does not need external means for timed program events and reports	Real-time: <ul style="list-style-type: none"> ▪ clock ▪ calendar 	Your program and procedures have access to: <ul style="list-style-type: none"> ▪ time ▪ date

I/O Scanner-Communication Adapter Module

The PLC-3 I/O Scanner-Communication Adapter Module (cat. no. 1775-S5) provides communication channels for:

- 2,048 inputs and 2,048 outputs per scanner
- programming and monitoring
- peer-to-peer communication
- Data Highway or Data Highway Plus communication

The scanner module requires one module slot in the PLC-3 processor chassis. The benefits, features, and function of the I/O scanner module are:

Benefits	Features	Functions
Flexibility in system layout	Remote I/O configuration	I/O chassis can be up to 10,000 feet from the processor
Faster processor update of selected I/O chassis	I/O scan priority	Can scan I/O chassis in order that you determine
Prevent major fault from shutting down your application	Backup system capability	Transfers control to a backup PLC-3 system
Built-in low-cost communication network	Peer-to-peer capability	Communication between PLC-3 systems
Ability to access Allen-Bradley industrial communication networks	Data Highway or Data Highway Plus capability	Communication with up to 64 stations. A station can be an Allen-Bradley controller or a computer
Direct communication with PLC-5 family remote programming from 1784-T50 programming terminal	Data Highway Plus	Allows T50 to program PLC-5 or PLC-3 on the same link

Memory Modules

The PLC-3 Memory Modules (cat. no. 1775-ME4, -ME8, -MEA, -MED) store the program, data table, and other information needed for processor operation. All four memory modules have error detecting and correcting (EDC) capability. The difference between the memory modules is the amount of memory each contains:

Cat. no	Memory size (words)
1775-ME4	16K
1775-ME8	32K
1775-MEA	64K
1775-MED	128K

Each memory module requires one module slot in the processor chassis.

The benefits, features, and functions for the memory modules are:

Benefits	Features	Functions
Allows you to choose what you need for your application	Four memory sizes	Memory available (words): <ul style="list-style-type: none"> ▪ 16K ▪ 32K ▪ 64K ▪ 128K
Avoids unplanned shutdowns due to memory errors	Error detecting and correcting (EDC) memory	Can detect and correct single-bit memory errors
Gives you choice of battery backup to save memory contents when memory module is not being powered by the PLC-3 controller	Lithium or NiCad batteries	Long- or short-term memory backup

Expansion System

The PLC-2 expansion system increases the number of available module slots that you can use. The major expansion system components are:

- PLC-3 Expansion Chassis (cat. no.1775-A2)
- PLC-3 Expansion Chassis (cat. no.1775-LX); one per PLC-3 processor chassis

You can expand a PLC-3 controller to include as many as four processor chassis.

Operating a Hot Backup System

You can use a hot backup system to help avoid unexpected and costly process shutdowns. If you have two PLC-3 controllers configured for backup and the primary controller faults, the backup controller takes control before your process shuts down.

The PLC-3 controller offers two versions of backup. One version is standard and requires no additional hardware. The second version uses two Memory Communication Modules (cat. no. 1775-MX).

Using an Alternative Language

In addition to ladder diagram programming, the PLC-3 controller supports an alternative language. This language is a high level language that gives you extra information coprocessing ability. The PLC-3 controller supports this alternative language in two modules:

- The I/O Scanner-Message Handling Module (cat. no. 1775-S4B) supports report generation capability.
- The Peripheral Communication Module (cat. no. 1775-GA) supports the GA Basic programming language.

Generating Reports through the PLC-3 Controller

You can generate reports by using a 1775-S4B scanner module. Report generation allows you to manipulate important information and use it in a variety of ways.

The 1775-S4B scanner module has an RS-232-C port channel for input and/or output of data. To execute message procedures, you can use a data terminal or a message instruction in your ladder diagram program.

Report format is flexible which enables you to display or print out text and data or display graphic images on a CRT data terminal.

Operating a Peripheral Communication System

A peripheral communication system gives you the ability to obtain, organize, store, and retrieve information concerning production data and plant operation. Peripheral devices that you can use with the system include:

- computers
- printers
- CRT data terminals
- graphic display terminals
- modems

To construct a peripheral communication system, you can use the following hardware:

Cat. No.	Product	Function
1775-GA	Peripheral Communication Module	Provides extensive communication features, including mass storage interface, data cartridge recorder (cat. no. 1770-SB) interface, GA Basic programming, and ladder logic programming
1775-RM	Peripheral Interface Adapter Module	Enables communication features to the peripheral communication module up to 10,000 cable feet away
1770-M11	Mass Storage System	Allows you to create a library of programs and procedures on micro-floppy or Winchester disk and can provide trending capability

Operating a Data Highway

By using a Communication Adapter Module (cat. no. 1775-KA), the PLC-3 controller can communicate with other Allen-Bradley programmable controllers and/or computers through the following media:

- Allen-Bradley Data Highway
- RS-232-C communication link

The Allen-Bradley Data Highway is an industrial communication network that links together as many as 64 distinct stations. Each station can consist of a programmable controller (such as the PLC-3), a computer, or an intelligent RS-232-C device. The central trunkline of the data highway can be up to 10,000 feet long, and each station can be as far as 100 feet away from the trunkline.

The RS-232-C communication link can interface the PLC-3 controller and an intelligent RS-232-C compatible device. By using this link, you could interface a PLC-3 controller:

- with another PLC-3 controller through a modem link
- with a computer (either directly or through modems)
- with a remote data highway through a modem link
- as a slave station on a multipoint modem link

Operating a Data Highway II

By using a Communication Interface Module (cat. no. 1779-KP3, -KP3R), you can link a PLC-3 controller with an Allen-Bradley Data Highway II. Data Highway II is an industrial area network designed for the plant environment. This network offers you high-speed, peer-to-peer communication, and high throughput for supervisory control and fast data acquisition. Data Highway II is well-suited for plant floor machinery because of its high noise immunity and easy connection to control devices.

With a transmission rate of one million bits per second, Data Highway II is ideal for time-critical operations where the status or position of one device may affect another device or even an entire production line.

The 1779-KP3 module requires one slot in the PLC-3 processor chassis and makes the PLC-3 controller a station on a Data Highway II. By using the message instruction (MSG) in your ladder diagram program, you can perform all Data Highway II functions. Some of these functions include:

- data table read/write
- program upload/download
- diagnostic commands

The 1779-KP3R module performs the same functions as the 1779-KP3 module, but contains an additional port for redundant Data Highway II cabling.

As a station on a Data Highway II, the PLC-3 controller can communicate with many devices, including:

- computers
- color graphic systems
- other Allen-Bradley programmable controllers
- Allen-Bradley numerical controls
- robots
- non-intelligent devices such as terminals and printers.

Related Publications

For detailed information on the PLC-3 Programmable Controller, refer to the following publications:

- Product Data Sheets

Title	Publication
PLC-3 Power Supply (cat. no. 1775-P1)	1775-2.4
I/O Scanner Modules (cat. no. 1775-S4A, -S4B)	1775-2.5
Communication Adapter Module (cat. no. 1775-KA)	1775-2.7
PLC-3 Expansion Systems	1775-2.10
Memory Communication Module (cat. no. 1775-MX)	1775-2.12
Peripheral Communication Module (cat. no. 1775-GA)	1775-2.13
PLC-3 Memory Modules (cat. no. 1775-ME4, -ME8, -MEA, -MED)	1775-2.15
Main Processor Module (cat. no. 1775-L3)	1779-2.6
Communication Interface Module (cat. no. 1779-KP3, -KP3R)	1779-2.6

- Manuals

Title	Publication
PLC-3 Backup Concepts Manual	1775-6.3.1
PLC-3 Programming Manual	1775-6.4.1
Communication Adapter Module User's Manual	1775-6.5.1
I/O Scanner-Programmer User's Manual	1775-6.5.2
I/O Scanner-Message Handling Module User's Manual	1775-6.5.3
Peripheral Communication Module	1775-6.5.4
PLC-3 Installation and Operation Manual	1775-6.7.1
Communication Interface Module User's Manual	1779-6.5.5

Specifications

<p>I/O Capacity</p> <ul style="list-style-type: none"> ■ 4096 inputs and 4096 outputs maximum 	<p>Input Voltage Range to the 1775-P1 Power Supply</p> <ul style="list-style-type: none"> ■ 120V AC: 97 to 132V AC ■ 220/240V AC: 194 to 264 V AC
<p>Memory Capacity</p> <ul style="list-style-type: none"> ■ 1.92M words maximum ■ 16 bits per word 	<p>Memory Type</p> <ul style="list-style-type: none"> ■ Error Detecting and Correcting (EDC)
<p>Data Table Size</p> <ul style="list-style-type: none"> ■ Expandable (limited only by available memory) 	<p>Alternate Language Modules</p> <ul style="list-style-type: none"> ■ 1775-S4B scanner module ■ 1775-GA module
<p>Scan Time (nominal)</p> <ul style="list-style-type: none"> ■ 1 ms per 1K words of relay-type instructions ■ 2.5ms per 1K words (typical) 	<p>Environmental Conditions</p> <ul style="list-style-type: none"> ■ Operational Temperature: 0 to 60°C (32 to 140°F) ■ Storage Temperature: -40 to 85°C (-40 to 185°F) ■ Relative Humidity: 5 to 95% (without condensation)



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As a subsidiary of Rockwell International, one of the world's largest technology companies — Allen-Bradley meets today's challenges of industrial automation with over 85 years of practical plant-floor experience. More than 11,000 employees throughout the world design, manufacture and apply a wide range of control and automation products and supporting services to help our customers continuously improve quality, productivity and time to market. These products and services not only control individual machines but integrate the manufacturing process, while providing access to vital plant floor data that can be used to support decision-making throughout the enterprise.

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