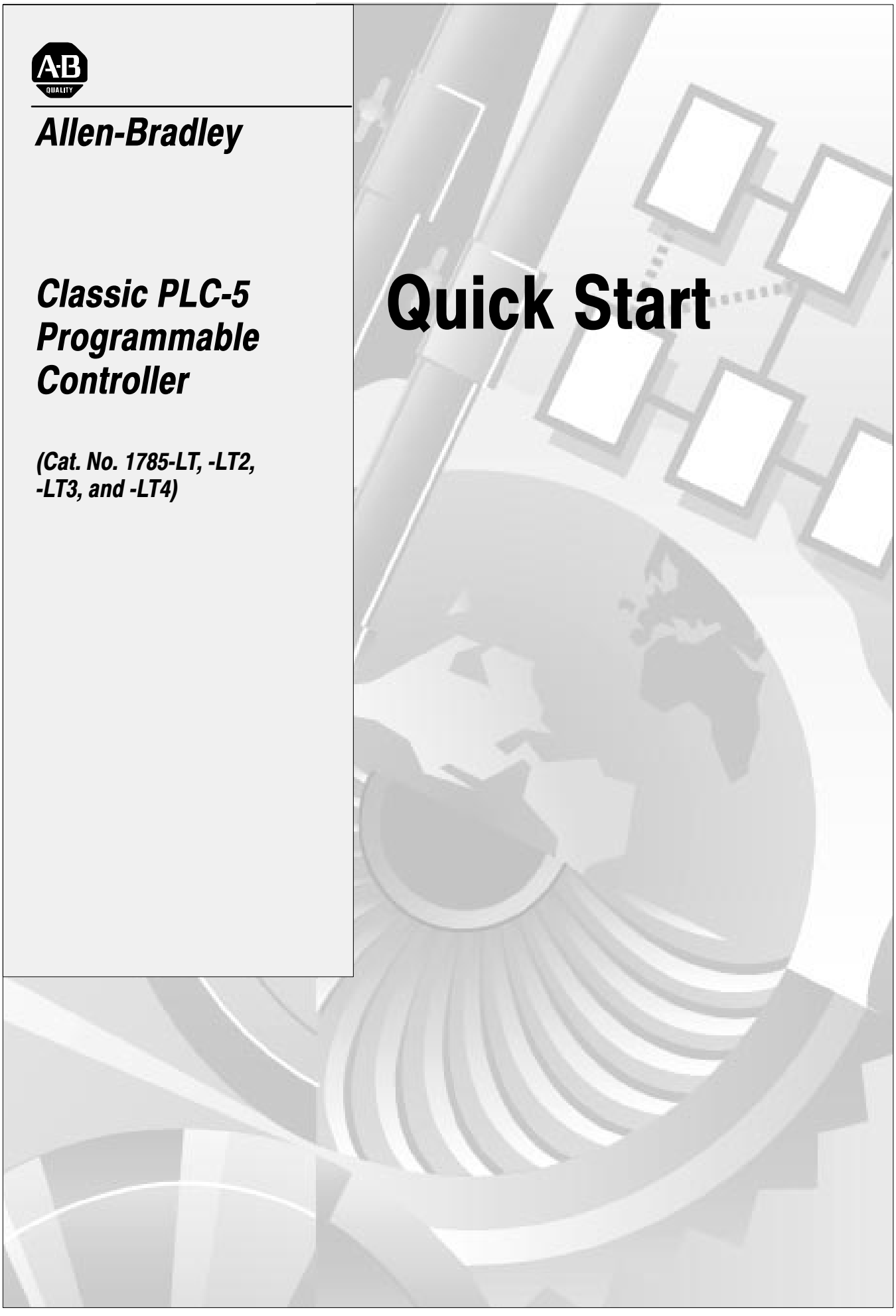


Allen-Bradley

# Quick Start

## Classic PLC-5 Programmable Controller

(Cat. No. 1785-LT, -LT2, -LT3, and -LT4)

## Important User Information

Because of the variety of uses for the products described in this publication, those responsible for the application and use of this control equipment must satisfy themselves that all necessary steps have been taken to assure that each application and use meets all performance and safety requirements, including any applicable laws, regulations, codes and standards.

The illustrations, charts, sample programs and layout examples shown in this guide are intended solely for purposes of example. Since there are many variables and requirements associated with any particular installation, Allen-Bradley does not assume responsibility or liability (to include intellectual property liability) for actual use based upon the examples shown in this publication.

Allen-Bradley publication SGI-1.1, *Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Control* (available from your local Allen-Bradley office), describes some important differences between solid-state equipment and electromechanical devices that should be taken into consideration when applying products such as those described in this publication.



Throughout this manual we use notes to make you aware of safety considerations:

**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage or economic loss.

Attention statements help you to:

- identify a hazard
- avoid the hazard
- recognize the consequences

**Important:** Identifies information that is critical for successful application and understanding of the product.

# Table of Contents

# Preface

Read this preface to familiarize yourself with the rest of the manual. This preface covers the following topics:

- who should use this manual
- the purpose of this manual
- how to use this manual
- conventions used in this manual
- Allen-Bradley support

## Who Should Use This Manual

To use this manual, you should understand programmable controllers and be able to interpret the ladder logic instructions required to control your application. For more information, see the documents listed on the following page or contact your local Allen-Bradley representative.

## Purpose of This Manual

This manual is for users of the classic PLC-5® processor. It:

- presents you with the basic information you need to get your system up and running
- provides “memory jogger” information, such as specific bit and switch settings for modules
- includes high-level procedures with cross-references to other manuals for more detail

## Related Documentation

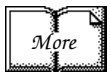
The following documents contain additional information concerning the products discussed in this manual.

| For more information about: | See this document: | Publication number: |
|---|---|---|
| Classic PLC-5 programmable controllers | Classic PLC-5 Programmable Controllers User Manual | 1785-6.2.1 |
| To obtain a free copy of this manual, complete and send in the User Manual Request Card that came packaged with this quick start.  | | |
| Classic PLC-5 programmable controllers | Classic PLC-5 Programmable Controllers Hardware Installation Manual | 1785-6.6.1 |
| Universal 1771 I/O chassis | Universal I/O Chassis Installation Instructions | 1771-2.10 |
| power supply | Redundant Power Supplies (1771-P4R, -P6R) Installation Data | 1771-2.166 |
| DH+® network | Enhanced and Ethernet PLC-5 Programmable Controllers User Manual | 1785-6.5.12 |
| | Data Highway/Data Highway Plus/Data Highway II/Data Highway-485 Cable Installation Instructions | 1770-6.2.2 |
| communication cards | 1784-KT*x* Communication Interface Card User Manual | 1784-6.5.22 |
| | Allen-Bradley Publication Index (for your specific communication card) | SD499 |
| cables | Classic PLC-5 Programmable Controllers User Manual | 1785-6.2.1 |
| batteries | Allen-Bradley Guidelines for Lithium Battery Handling and Disposal | AG-5.4 |
| grounding and wiring Allen-Bradley programmable controllers | Allen-Bradley Programmable Controller Wiring and Grounding Guidelines | 1770-4.1 |
| current Allen-Bradley documentation, including ordering instructions | Allen-Bradley Publication Index | SD499 |
| terms and definitions | Allen-Bradley Industrial Automation Glossary | AG-7.1 |

## Common Techniques Used in This Manual

We use the following conventions throughout this manual:

- Bulleted lists provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.




We use this symbol to indicate additional references you can use when you need more information about a particular topic.

## Allen-Bradley Support

Allen-Bradley offers support services worldwide, with over 75 sales/support offices, 512 authorized distributors, and 260 authorized systems integrators located throughout the United States alone, plus Allen-Bradley representatives in every major country in the world.

### Local Product Support

Contact your local Allen-Bradley representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

### Technical Product Assistance

If you need to contact Allen-Bradley for technical assistance, call your local Allen-Bradley representative.

### Your Questions or Comments about This Manual

If you discover a problem with this manual, please notify us of it by completing and sending the enclosed Publication Problem Report (at the back of this manual).

If you have any suggestions about how we can make this manual more useful to you, please contact us at the address below:

Allen-Bradley Company, Inc.
Automation Group
Technical Communication
1 Allen-Bradley Drive
Mayfield Heights, OH 44124-6118

Telephone: (216) 646-5000

FAX: (216) 646-3083

# Overview

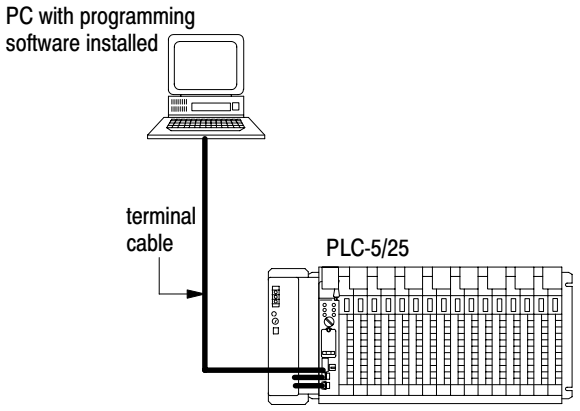
This quick start is designed to provide you with the information you need to get your system up and running quickly. Use this document if you are knowledgeable about Classic PLC-5 products, but may not have used one or more of them recently. The information we provide is geared to "jog your memory."

## What You Need to Do

*Set up the hardware (Chapter 2)*

*Set up the software (Chapter 3)*

*Troubleshoot the Processor System (Chapter 4)*




## Components You Need

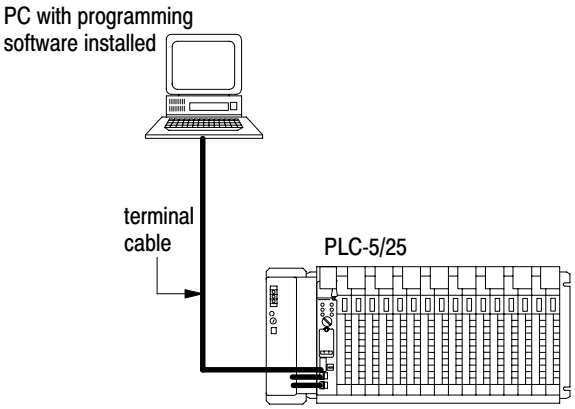
| Product name: | Catalog number: |
|---|---|
| **Hardware** | |
| Classic PLC-5 processor with 2 keys | 1785-LT4, -LT3, -LT2, -LT |
| Lithium Battery (in a clear bag) | 1770-XY |
| I/O chassis | 1771-A1B, -A2B, -A3B1, -A4B (panel mount)<br>1771-A3B (rack or panel mount) |
| Memory modules | 1785-MJ<br>1785-MK (PLC-5/25 only) |
| Power supply | 1771-P1, -P2 -P3, -P4, -P4S, -P4S1, -P4R, -P5, -P6S, -P6S1, -P6R, -P7, -PS7 |
| **Programming System** | |
| PC | Check your programming software documentation for system requirements, such as memory, etc. |
| PLC-5 programming software | Choose a programming software package that is compatible with Classic PLC-5 processors. |
| communication module | DH+ interface and interconnect cable |

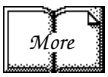
**Important:** In this manual, we assume you are using a brand-new Classic PLC-5 processor out of the box.

# Set up the Hardware

1 Install the hardware
(page 2–2)

2 Connect the programming terminal and the PLC-5 processor to the communication card
(page 2-6)



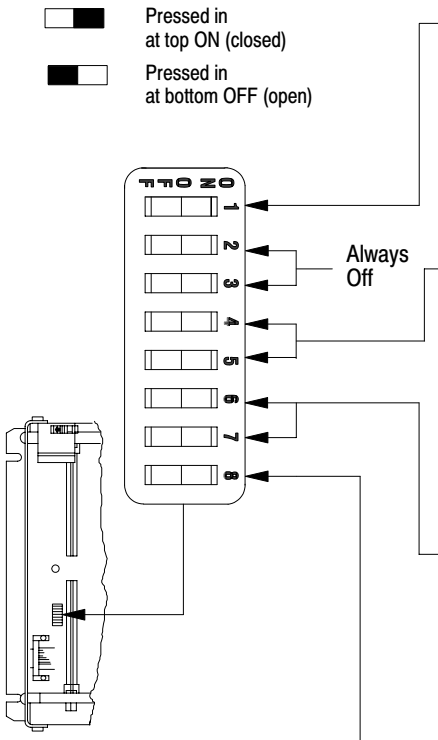




For more information, see the Classic PLC-5 Programmable Controllers Hardware Installation Manual, publication number 1785-6.6.1.

## Install the Hardware

### Configure the I/O Chassis

**1** *Set the backplane switches.*




| Switch 1 | Last State |
|---|---|
| ON | Outputs of this I/O chassis remain in their last state when a hardware failure occurs. [1] |
| OFF | Outputs of this I/O chassis are turned off when a hardware failure occurs. [1] |

| Switches 4 | Switches 5 | Addressing |
|---|---|---|
| OFF | OFF | 2 – slot |
| OFF | ON | 1 – slot |
| ON | OFF | 1/2 – slot |
| ON | ON | Not allowed |

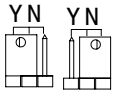
| Switches 6 | Switches 7 | EEPROM transfer |
|---|---|---|
| OFF | OFF | EEPROM memory transfer to processor memory at powerup. [2] |
| ON | ON | EEPROM memory transfers to processor memory if processor memory not valid. |
| ON | OFF | EEPROM memory does not transfer to processor memory. [3] |

| Switch 8 | RAM memory protection |
|---|---|
| OFF | RAM memory protection disabled. |
| ON | RAM memory protection enabled. [4] |

1. Regardless of this switch setting, outputs are reset when any of the following occurs:
   - processor detects a runtime error
   - an I/O chassis backplane fault occurs
   - you select program or test mode
   - you set a status file bit to reset a local rack
2. If an EEPROM module is not installed and processor memory is valid, the processor's PROC LED indicator blinks, and the processor sets S:11/9, bit 9 in the major fault status word.
3. A processor fault occurs if processor memory (solid red PROC LED) is not valid.
4. You cannot clear processor memory when this switch is on.

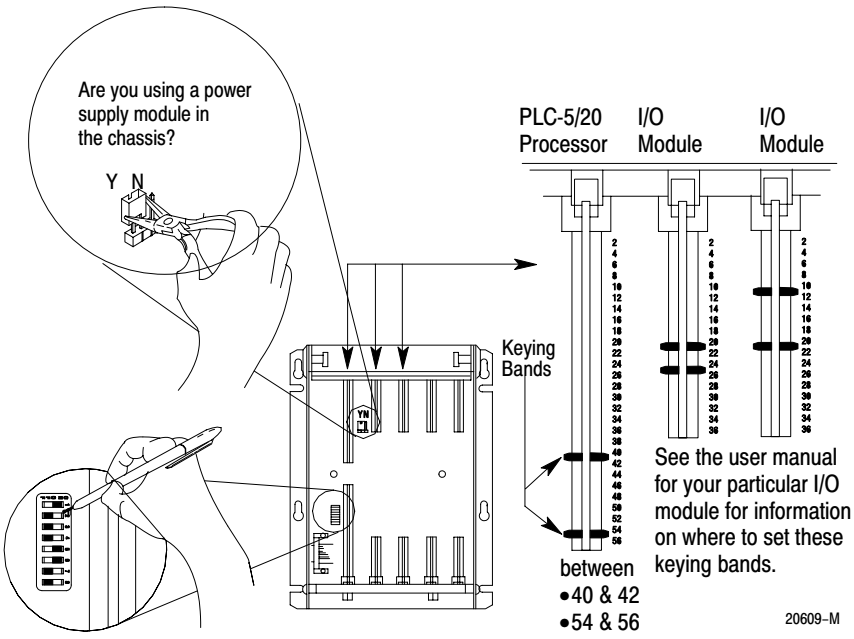
19309

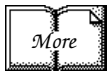
**2** *Set the power supply configuration jumper.*




Set Y when you install a power supply module in the chassis; set N (the default) when you use an external power supply.

**3** *Install the keying bands.*

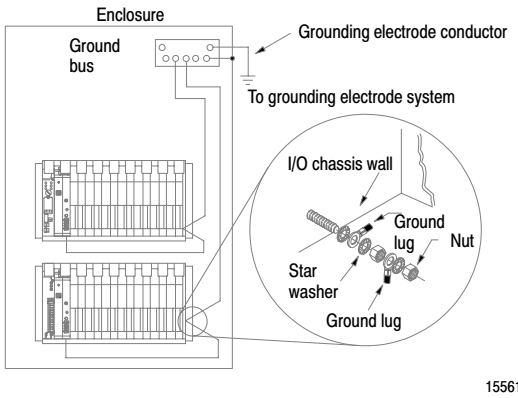


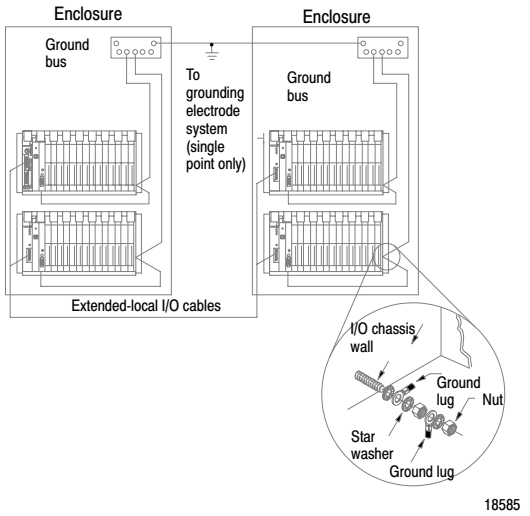

For more information, see the Universal I/O Chassis Installation Instructions, publication number 1771-2.10.

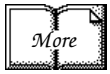
## Ground the I/O Chassis

(for remote I/O systems)



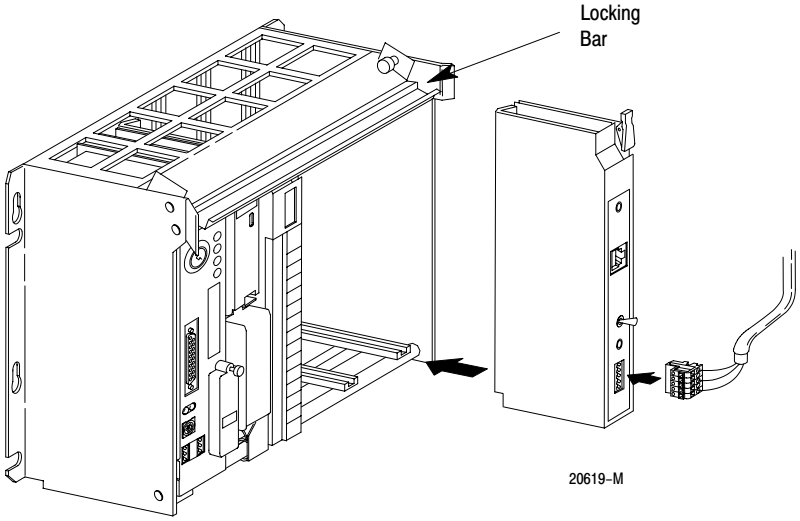

(for extended-local systems)



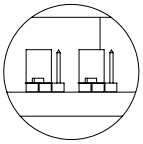




For more information, see the Allen-Bradley Programmable Controller Wiring and Grounding Guidelines, publication number 1770-4.1.

## Install the Power Supply

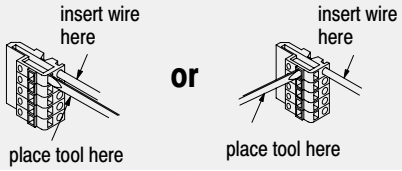



**1** *Set the jumpers on the back side of the power supply like this:*

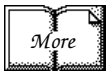


**2** *Connect the power cord to the 120V ac connector of the power supply module.*

This side plugs into connector on the module.

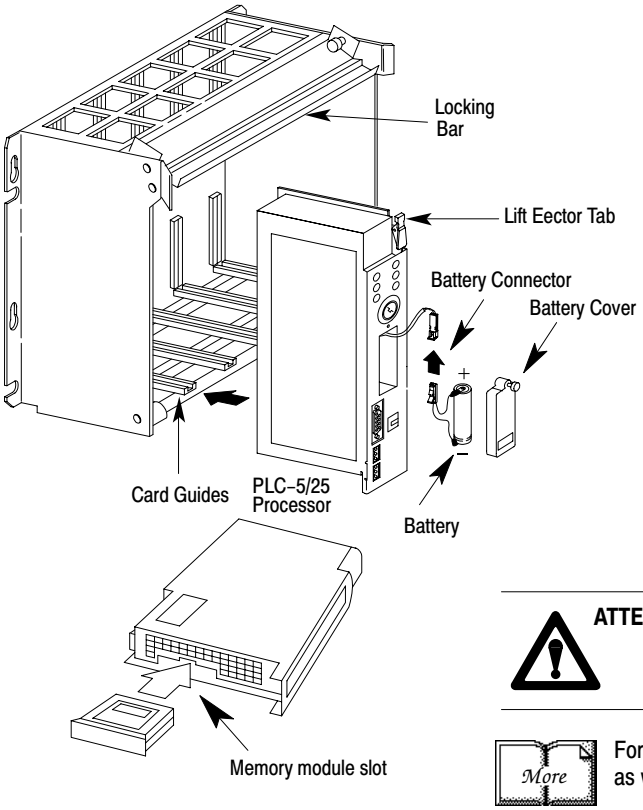



**3** *Install the power supply in the chassis and snap the module-locking bar over the modules.*

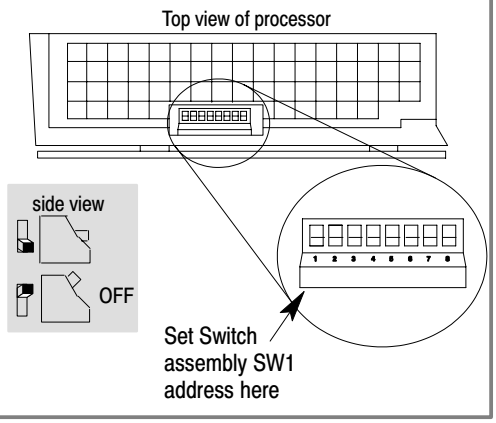



For more information, see the Redundant Power Supplies (1771-P4R, -P6R) Installation Data, publication number 1771-2.166.

## Install the PLC-5 Processor




**1** *Define the DH+ Station Address of Channel 1A by setting switch assembly SW-1 on the back of the processor.*




**2** *To install the battery, slide the battery-side connector into the processor-side connector until you hear them snap together, and attach the battery cover.*

**3** *If you plan to install an EEPROM, install it now.*

**4** *Install the processor.*

**ATTENTION:** Do not insert or remove the EEPROM under power. Insertion or removal under power can result in loss of program memory and a processor fault.

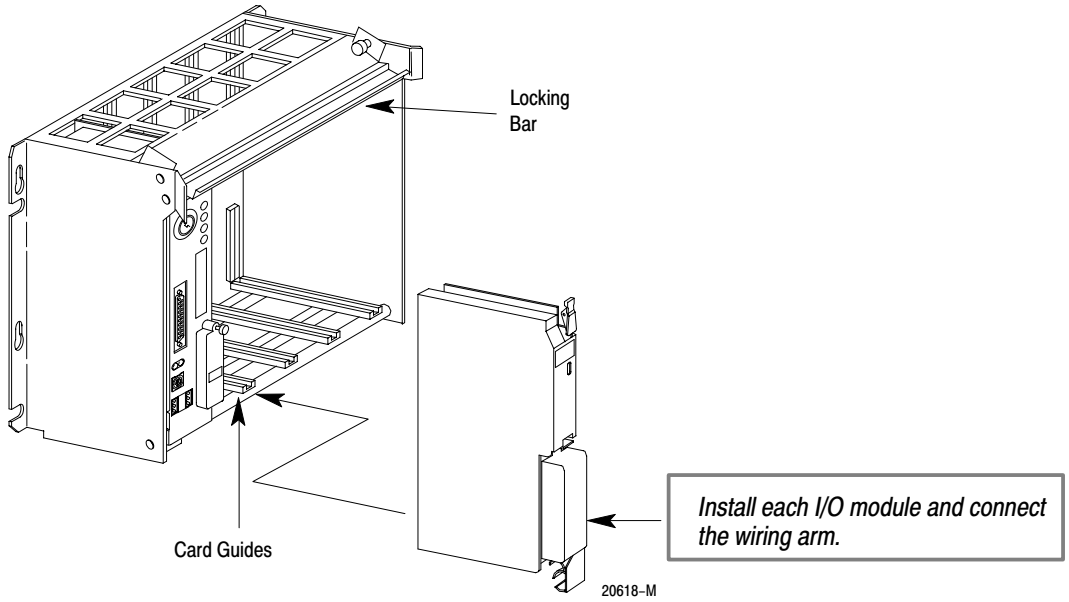
More — For detailed information about handling and disposing of the battery as well as other important guidelines, see publication AG-5.4.

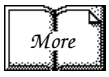
More — For more information, see the Classic PLC-5 Programmable Controllers Hardware Installation Manual, publication number 1785-6.6.1.

## Powerup the System

Powerup the system. Check the LED display on the processor. If your system is operating properly, the PROC LED should be steady red. If the PROC LED is not red, see chapter 4 for troubleshooting information before you install the I/O modules.

### Install the I/O Modules



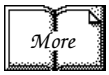




For more information, see the installation instructions or user manual for the particular module you are installing.

## Connect the Programming Terminal and the PLC-5 Processor to the Communication Card

1 *Connect the industrial terminal end of the CP cable to the communication card.*

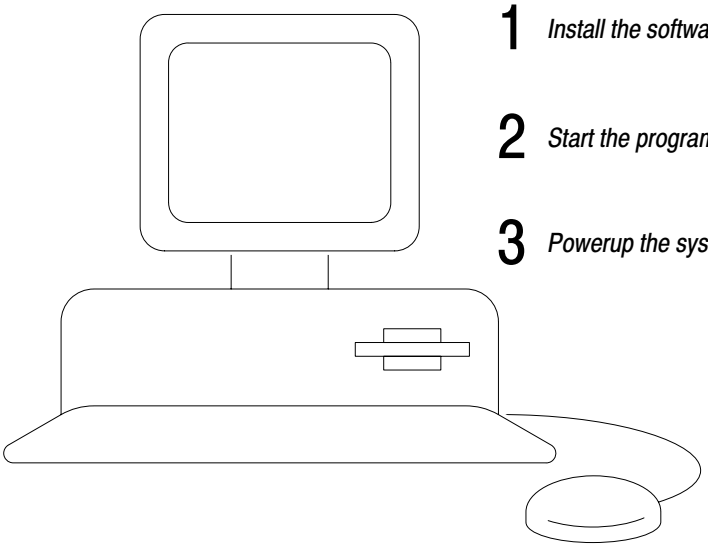
2 *Connect the CP cable to the connector on the PLC-5 processor.*

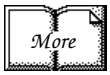



For more information, see:

- Classic PLC-5 Programmable Controllers Hardware Installation Manual, publication number 1785-6.6.1
- 1784-KT*x* Communication Interface Card User Manual, publication number 1784-6.5.22
- Data Highway/Data Highway Plus/Data Highway II/Data Highway 485 Cable Installation Manual, publication 1770-6.2.2

# Set up the Software




The following instructions are general. For specific information, see the documentation set for your particular software package.

## Install the Software and Set Up the Programming System

Before you install your programming software, make certain you meet the system requirements for that software – sufficient disk space, memory, etcetera. Then, follow the procedures outlined in the software documentation to install the software and configure communication.

## Start the Programming Software

Start the programming software by following the procedures described in your programming software documentation.

If you have difficulty, verify that the power supply is turned on.

To monitor your system as you configure and run it, check the LED display for the following indicators:

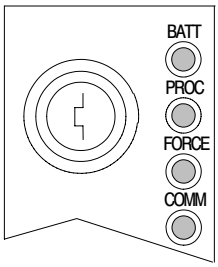
| This LED: | lights when: |
|---|---|
| COMM | you establish DH+ communication |
| BATT | no battery is installed or the battery voltage is low |
| REM I/O | you establish Remote I/O communication |
| ADAPT | the processor is in adapter mode |
| FORCE | forces are present in your ladder program |

## Powerup the System

Powerup the system if you have not done so already. Check the LED display on the processor. If your system is operating properly, the PROC LED should be steady red. See the following table to proceed. If the PROC LED is not red, turn to chapter 4 for troubleshooting information.

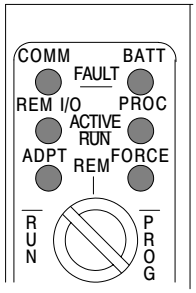
| If your keyswitch is in this position: | you see this message: | and then this occurs: |
|---|---|---|
| PROGRAM | Processor RAM is faulted. Press <Enter> to clear memory." | After you clear memory, the PROC LED turns off. The software is in Program mode. |
| REMOTE | Processor RAM is faulted. Press <Enter> to clear memory." | After you clear memory, the PROC LED turns off. The software is in Remote Program mode. |
| RUN | No access or privilege violation. | You see this message because you cannot clear memory in Run mode. Change the keyswitch position to Program or Remote and powerup the system again. |

# Troubleshoot the Processor System




1 *Use the PLC-5 Processor Status Indicators (page 4–1)*

## Use the PLC-5 Processor Status Indicators




| Indicator | Color | Description | Probable Cause | Recommended Action |
|---|---|---|---|---|
| PROC | green (steady) | processor in RUN mode and fully operational | normal operation | no action required |
| | green (blinking) | Processor memory being transferred to EEPROM | normal operation | no action required |
| | red (blinking) | major fault | run-time error | Check major fault bit in status file (S:11) for error definition. Clear fault bit, correct problem, and return to RUN mode. |
| | red (steady) | major fault | • user RAM has checksum error<br>• memory module error | • Clear memory and reload program.<br>• Check backplane switch settings and/or insert correct memory module. |
| | off | processor in program load or TEST mode or is not receiving power | | Check power supply and connections. |
| PROC<br>REM I/O | all red (steady) | | internal diagnostics have failed | Power down, reseat processor and power up. Then, clear memory and reload your program. Replace EEPROM with new program. Then, if necessary, replace the processor. |
| FORCE | amber (steady) | forces enabled | normal operation | no action required |
| | amber (blinking) | forces present, but not enabled | normal operation | no action required |
| | off | no forces present | normal operation | no action required |
| BATT | red (steady) | battery low | | Replace battery within 1-2 days (typical). |
| | off | battery is good | normal operation | no action required |
| ADPT (continues) | green (steady) | processor is in adapter mode | normal operation | no action required |

| Indicator | Color | Description | Probable Cause | Recommended Action |
|---|---|---|---|---|
| ADPT | off | processor is in scanner mode | normal operation | no action required |
| REM I/O (in adapter mode) | green (steady) | active remote I/O link | normal operation | no action required |
| | green (blinking) | remote I/O active and host processor is in program load or TEST mode | normal operation | no action required |
| | red (steady) | no communication with host processor | duplicate station address selected | Correct station address. |
| | green (sporadic) | bad communication with host processor | | Check connections. |
| | off | no communication with host processor | | no action required |
| REM I/O (in scanner mode) | green (steady) | active remote I/O link | normal operation | no action required |
| | red (steady) | remote I/O link fault | wiring, adapter module(s) | • Check all connections, check adapter module(s).<br>• If you have programming software, put the processor in PROG mode and do an autoconfigure for remote racks. |
| | green/red (blinking) | partial remote I/O link fault | one or more remote I/O chassis faulted | • Check status bits in status file (element #7) to identify faulted chassis number; check wiring, adapter module(s), power supplies.<br>• If you have programming software, put the processor in PROG mode and do an auto configure for remote racks. |
| | off | no remote I/O selected | | no action required |
| COMM | green (blinking rapidly or slowly) | processor is transmitting or receiving on DH+ link | normal operation | no action required |
| | red (steady) | watchdog timeout | hardware error | Turn power off, then on. Check that the software configurations match the hardware set-up. Replace the processor. |
| | red (sporadic) | bad communication on DH+ link | duplicate station address selected | Correct station address. |
| | off | • If directly connected to processor, no communication on DH+ link<br>• If last processor on DH+ link, no communication on DH+ link | | • no action required<br>• Check DH+ wiring connections. |

# Specifications

## General

This table lists general specifications.

| | | |
|---|---|---|
| Weight | PLC-5/10 (1785-LT4) | 1336 g (47.12 oz.) |
| | PLC-5/12 (1785-LT3) | 1337 g (42.15 oz.) |
| | PLC-5/15 (1785-LT) | 1339 g (47.23 oz.) |
| | PLC-5/25 (1785-LT2) | 1337 g (42.15 oz.) |
| Backplane Current | 2.5A | |
| Environmental Conditions: | | |
| operating 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) | |
| Vibration (operating and non-operating) | 1 g @ 10 to 500 Hz<br>0.012 inches peak-to-peak displacement | |
| Shock | | |
| operating | 30 g peak acceleration for 11±1 ms duration | |
| non-operating | 50 g peak acceleration for 11±1 ms duration | |
| Time-of-Day Clock and Calender | | |
| maximum variations at 60° C | ± 3 min per month | |
| typical variations at 20° C | ± 20 s per month | |
| timing accuracy | one program scan | |
| Typical Discrete I/O Scan | • 1ms/local I/O rack<br>• 10 ms/remote I/O adapter communication at 57.6 kbps | |
| I/O Modules | Bulletin 1771 I/O including 8-, 16-, 32-pt., and intelligent modules | |
| Hardware Addressing: | | |
| 2-slot | • any mix of 8-pt modules<br>• 16-pt modules must be I/O pairs<br>• no 32-pt modules | |
| 1-slot | • any mix of 8- or 16-pt modules<br>• 32-pt modules must be I/O pairs | |
| 1/2-slot | any mix of 8-,16-, or 32-pt modules | |
| Communication | • DH+ 3,048 cable-m (or 10,000 cable-ft) max<br>• DH using 1785-KA | |
| Location | 1771-I/O chassis, left-most slot | |
| Keying | • between 40 and 42<br>• between 54 and 56 | |
| Agency Certification (when product is marked) | • CSA certified<br>• CSA Class I, Division 2, Groups A, B, C, D<br>• UL listed | |
| User Manual | publication 1785-6.2.1 | |

| **CSA Hazardous Location Approval** | **Approbation d'utilisation dans des emplacements dangereux par la CSA** |
|---|---|
| CSA certifies products for general use as well as for use in hazardous locations. **Actual CSA certification is indicated by the product label** as shown below, and not by statements in any user documentation. | La CSA certifie les produits d'utilisation générale aussi bien que ceux qui s'utilisent dans des emplacements dangereux. **La certification CSA en vigueur est indiquée par l'étiquette du produit** et non par des affirmations dans la documentation à l'usage des utilisateurs. |
| Example of the CSA certification product label   | Exemple d'étiquette de certification d'un produit par la CSA   |
| To comply with CSA certification for use in hazardous locations, the following information becomes a part of the product literature for CSA-certified Allen-Bradley industrial control products.<br>• This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only.<br>• The products having the appropriate CSA markings (that is, Class I Division 2, Groups A, B, C, D), are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CSA or the local inspection office having jurisdiction. | Pour satisfaire à la certification de la CSA dans des endroits dangereux, les informations suivantes font partie intégrante de la documentation des produits industriels de contrôle Allen-Bradley certifiés par la CSA.<br>• Cet équipement convient à l'utilisation dans des emplacements de Classe 1, Division 2, Groupes A, B, C, D, ou ne convient qu'à l'utilisation dans des endroits non dangereux.<br>• Les produits portant le marquage approprié de la CSA (c'est à dire, Classe 1, Division 2, Groupes A, B, C, D) sont certifiés à l'utilisation pour d'autres équipements où la convenance de combinaison (application ou utilisation) est déterminée par la CSA ou le bureau local d'inspection qualifié. |
| **Important:** Due to the modular nature of a PLC control system, the product with the highest temperature rating determines the overall temperature code rating of a PLC control system in a Class I, Division 2 location. The temperature code rating is marked on the product labelas shown. | **Important:** Par suite de la nature modulaire du système de contrôle PLC), le produit ayant le taux le plus élevé de température détermine le taux d'ensemble du code de température du système de contrôle d'un PLC dans un emplacement de Classe 1, Division 2. Le taux du code de température est indiqué sur l'étiquette du produit. |
| Temperature code rating   ← Look for temperature code rating here | Taux du code de température   ← Le taux du code de température est indiqué ici |
| The following warnings apply to products having CSA certification for use in hazardous locations. | Les avertissements suivants s'appliquent aux produits ayant la certification CSA pour leur utilisation dans des emplacements dangereux. |
| **ATTENTION:** Explosion hazard —<br>• Substitution of components may impair suitability for Class I, Division 2.<br>• Do not replace components unless power has been switched off or the area is known to be non-hazardous.<br>• Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.<br>• Do not disconnect connectors unless power has been switched off or the area is known to be non-hazardous. Secure any user-supplied connectors that mate to external circuits on an Allen-Bradley product using screws, sliding latches, threaded connectors, or other means such that any connection can withstand a 15 Newton (3.4 lb.) separating force applied for a minimum of one minute. | **AVERTISSEMENT:** Risque d'explosion —<br>• La substitution de composants peut rendre ce matériel inacceptable pour lesemplacements de Classe I, Division 2.<br>• Couper le courant ou s'assurer quel'emplacement est désigné non dangereux avant de remplacer lescomposants.<br>• Avant de débrancher l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.<br>• Avant de débrancher les connecteurs, couper le courant ou s'assurer que l'emplacement est reconnu non dangereux. Attacher tous connecteurs fournis par l'utilisateur et reliés aux circuits externes d'un appareil Allen-Bradley à l 'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens permettant aux connexions de résister à une force de séparation de 15 newtons (3,4 lb. - 1,5 kg) appliquée pendant au moins une minute. |

## Processor Specific

This table lists specifications of each Classic PLC-5 family processor.

| Processor | Maximum Local Racks Supported | Maximum Remote Racks Supported | I/O Capacity | Memory (Words) | Program Scan Time | Communication | Memory Modules (optional) | Battery |
|---|---|---|---|---|---|---|---|---|
| PLC-5/10 | 4 (1 resident chassis) | none | • 128 I/O with 8-pt modules [1]<br>• 256 I/O with 16-pt modules [1]<br>• 512 I/O with 32-pt modules [1] | 6 K | 2 ms/K words (bit logic)<br>8 ms/K words (typical) | standalone<br>DH+ | 8K EEPROM (1785-MJ) | 1770-XY |
| PLC-5/12 | 4 (1 resident chassis) | none | • 128 I/O with 8-pt modules [1]<br>• 256 I/O with 16-pt modules [1]<br>• 512 I/O with 32-pt modules [1] | | | standalone, adapter<br>DH+ | 8K EEPROM (1785-MJ) | |
| PLC-5/15 | 4 (1 resident chassis) | 3 (up to 12 physical devices) | • 512 I/O [1]<br>• 512 inputs and 512 outputs using 16- or 32-pt modules [2] | 6K (expands to 14K) | | standalone<br>scanner (local and remote I/O)<br>adapter<br>DH+ | • 4K RAM expansion, 1785-MR<br>• 8 K RAM expansion, 1785-MS<br>• 8K EEPROM (1785-MJ) | |
| PLC-5/25 | 4 (1 resident chassis) | 7 (up to 28 physical devices) | • 1024 I/O [1]<br>• 1024 inputs and 1024 outputs using 16- or 32-pt modules [2] | 13 K (expands to 21K) | 2 ms/K words (bit logic)<br>8 ms/K words (typical) | standalone<br>scanner (local and remote I/O)<br>adapter<br>DH+ | • 4K RAM expansion (1785-MR)<br>• 8 K RAM expansion (1785-MS)<br>• 8K EEPROM (1785-MJ)<br>• 16K EEPROM backup, 1785-MK | |

[1] Any mix of I/O.
[2] Maximum I/O possible using 16-pt modules with 2-slot addressing or 32-pt modules with 1-slot addressing. Modules must alternate IOIOIO in the chassis slots.

## Battery Specifications

### Battery Type

Classic PLC-5 processors use 1770-XY batteries, which contain less than 1/2 gram of lithium, or 3.6V, “AA” size Tadiran TL 5104 type AEL/S lithium batteries with pressure contact terminals.

### Average Battery Lifetime Specifications

| At this temperature: | Power off 100%: | Power off 50%: |
|---|---|---|
| 60°C | 329 days | 1.4 yrs |

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# Publication Problem Report

If you find a problem with our documentation, please complete and return this form.

Pub. Name Classic PLC-5 Programmable Controller Quick Start for the Experienced User

Cat. No. 1785-LT, -LT2, -LT3, -LT4 Pub. No. 1785-10.3 Pub. Date October 1996 Part No. 955126-54

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Publication 1785-10.3 –October 1996

PN 955126-54