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OP-1124

Lamp Annunciator Panel

Manual Number OP-1124-M

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To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and usually change with time. It is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation is in compliance with the latest revision of these codes.

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If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 1-800-633-0405.

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Manual Revisions

If you contact us in reference to this manual, remember to include the revision number.

Title: OP-1124 Lamp Annunciator Panel User Manual
Manual Number: OP-1124-M

Issue	Date	Effective Pages	Description of Changes
Original	11/95	Cover/Copyright Contents Manual Revisions 1 — 31 Index	Original Issue
Rev. A	2/96	8	Pinout diagram for OP-4CBL-1 cable showed the wrong pins tied together
Rev. B	6/98	Entire Manual Various Manual Revisions	Downsize to spiral Minor changes Rev. B

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NOTE: Products with CE marks perform their required functions safely and adhere to relevant standards as specified by EC directives provided they are used according to their intended purpose and that the instructions in this manual are adhered to. The protection provided by the equipment may be impaired if this equipment is used in a manner not specified in this manual. Only replacement parts supplied by **PLC***Direct* or its agents should be used. A listing of international affiliates is available at our Web site http://www.plcdirect.com

Technical Support

If you need technical assistance, please call the technical support group at **PLC***Direct (3505 Hutchinson Rd., Cumming, GA 30040, U.S.A.)* at 800-633-0405. They are available Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. Their Web Site address is http://www.plcdirect.com

SELV Circuits

All electrical circuits connected to the communications port receptacle are rated as Safety Extra Low Voltage (SELV).

Environmental Specifications

Operating Temperature	0° to 50° C
Storage Temperature	-20° to 70° C
Operating Humidity	95% (non-condensing)
Air Composition	No corrosive gases permitted

Preventative Maintenance and Cleaning

No preventative maintenance is required. To clean the exterior of the panel disconnect the input power and carefully wipe the panel with a cloth moistened with plain water.

External Fuse Protection for Input Power

There are no internal fuses for the input power circuits, so external circuit protection is needed to ensure the safety of service personnel and the safe operation of the equipment itself. To comply with EU specifications, the input power must be fused. Use a fuse rated at **twice** the input current rating of the panel. For example, if the panel has an input current rating of 0.5 amperes, use a fuse rated for 1 ampere.

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1

OP-1124 Pushbutton Panel

In This Manual. . . .

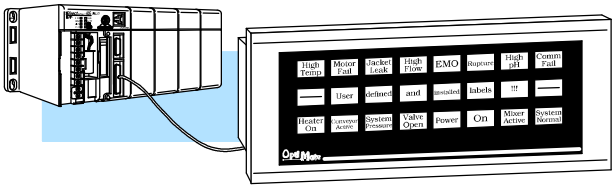
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- Preparing the Lamp Labels
- Installing the Panel
- Configuring the Panel
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Getting Started

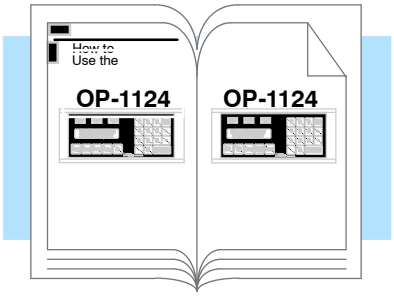
The Purpose of this Manual

This manual shows you how to install and operate your OP-1124 Lamp Annunciator Panel. It includes wiring diagrams and power requirements, as well as the information you need for selecting the proper connecting cables.



Contents of the Manual

In this manual you will learn how to use the OPEditor configuration software (purchased separately) to configure your panel. And in the back of this manual, we will show you some simple ladder logic that demonstrates the versatility of the panel, both for PLC***Direct***™ and Allen-Bradley products.



Additional Manuals

There are several other manuals you will find helpful or necessary:

- ***Direct***SOFT™ User Manual–Shows you how to use the ***Direct***SOFT Windows software to write your ladder logic for PLC***Direct*** programmable controllers.
- Respective PLC User Manuals–Shows you the memory conventions, programming instruction sets, data or file types, communications protocol, etc.
- OP–9001–M Communications Master User Manual provides details of how to use the OP-9001 for connecting multiple OP-Panels to a single CPU.

Technical Assistance

After completely reading this manual, if you are not successful with implementing the OP-1500 or OP-1510, you may call PLC***Direct*** at (800) 633-0405, Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. Our technical support group will work with you in answering your application questions. If you have a comment or question about our products, services, or manuals which we provide, please fill out and return the suggestions card included with this manual.

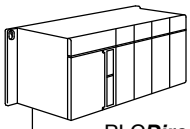
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How the OP-1124 Works

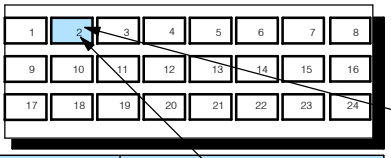
The purpose of the panel is to have individual lamps turn ON or OFF in response to specific actions that take place within your PLC ladder logic. To accomplish this, the OP-1124 uses a process called “memory mapping”. This process ties the panel lamps to specific reserved areas of memory in the PLC.

Using our OPEditor configuration software, you determine which PLC location to use. Each one of the lamps is controlled by the status of its assigned bit within the memory words that you have reserved.

You can also make any or all of the lamps flash. If you choose the flashing option, the software will automatically reserve additional consecutive words of memory. We’ll show more details in the final section of this manual. Below is a quick example for turning ON an individual lamp, without using the flash option.

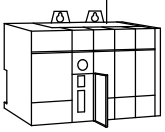


PLC*Direct*



Mapped Memory Location	Function
m (such as V40600) C0-C17	Lamps 1-16 ON/OFF
m+1 (such as V40601) C20-C27	Lamps 17-24 ON/OFF
m+2 (such as V40602) C40-C57	Lamps 1-16 flash
m+3 (such as V40603) C60-C77	Lamps 17-24 flash

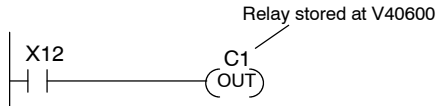
Allen-Bradley



Mapped Memory Location	Function
m (such as N7: 0/0– 0/15)	Lamps 1-16 ON/OFF
m+1 (such as N7: 1/0 1/15)	Lamps 17-24 ON/OFF
m+2 (such as N7: 2/0 2/15)	Lamps 1-16 flash
m+3 (such as N7: 3/0 3/15)	Lamps 17-24 flash

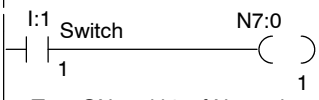
Example: Turning ON Lamp No. 2

PLC*Direct*



The DL205 and DL405 PLCs have internal relays mapped into memory starting at V40600. C1 is the 2nd relay bit in the 16-bit register.

Allen-Bradley

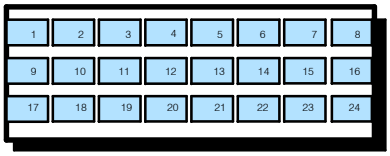


Turn ON 2nd bit of N7:0 when I:1/1 closes.
(N7:0=starting address of mapping)

Using the Lamp Annunciator Panel...5 Easy Steps

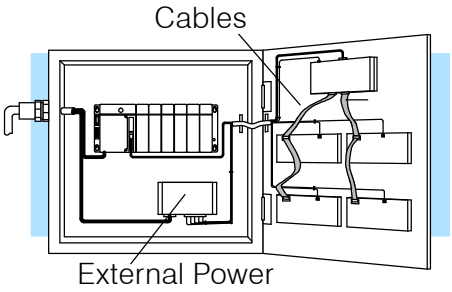
Step 1: Prepare Your Lamp Labels and Exchange LEDs (Pages 5-6)

First, you need to prepare the labels for each of the lamps. The labels insert into plastic sleeves behind the main cover. The units are shipped with all red LEDs. You can access these by removing the label frame from the housing. The frame is held to the panel with double-sided tape strips. You can purchase yellow and green LEDs separately and replace any of the red ones. You will probably want to exchange any LEDs at the same time you insert the label text.



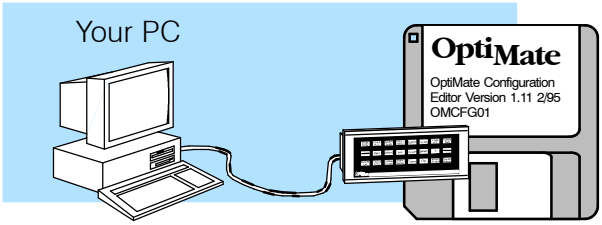
Step 2: Install the Panel (Pages 7-14)

Preparing for installation, you will want to check the individual specifications. These include dimensions, power requirements, cabling requirements, NEMA ratings. We include information you will need for mounting; i.e. cutout dimensions, cabling requirements, components needed, etc.



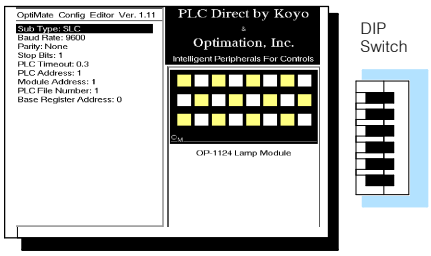
Step 3: Load the OPEditor Software (Page 15)

You need the OptiMate™ OPEditor software in order to configure your panel. At the time of publication, we have a DOS version with the introduction of a Windows version due in early 1996. This software is the same regardless of whether you are connecting to PLC***Direct*** or Allen-Bradley product.



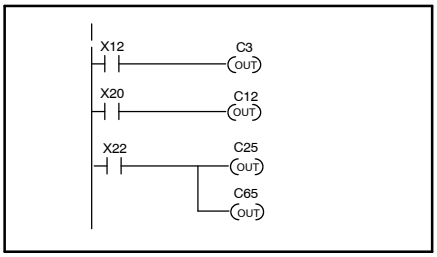
Step 4: Configure the Panel to Work with your CPU (Pages 16-19)

After setting a DIP switch on the rear of the panel and attaching the programming cable, you are ready to configure your panel. The simple and easy-to-follow screens make configuration a painless process.



Step 5: Write the Ladder Logic (Pages 20-33)

The amount of ladder logic programming knowledge you need is very basic. In most cases, you are already familiar with the elements of logic that are required. We'll give you examples in the final section of this manual, and you will see right away just how easy it is.



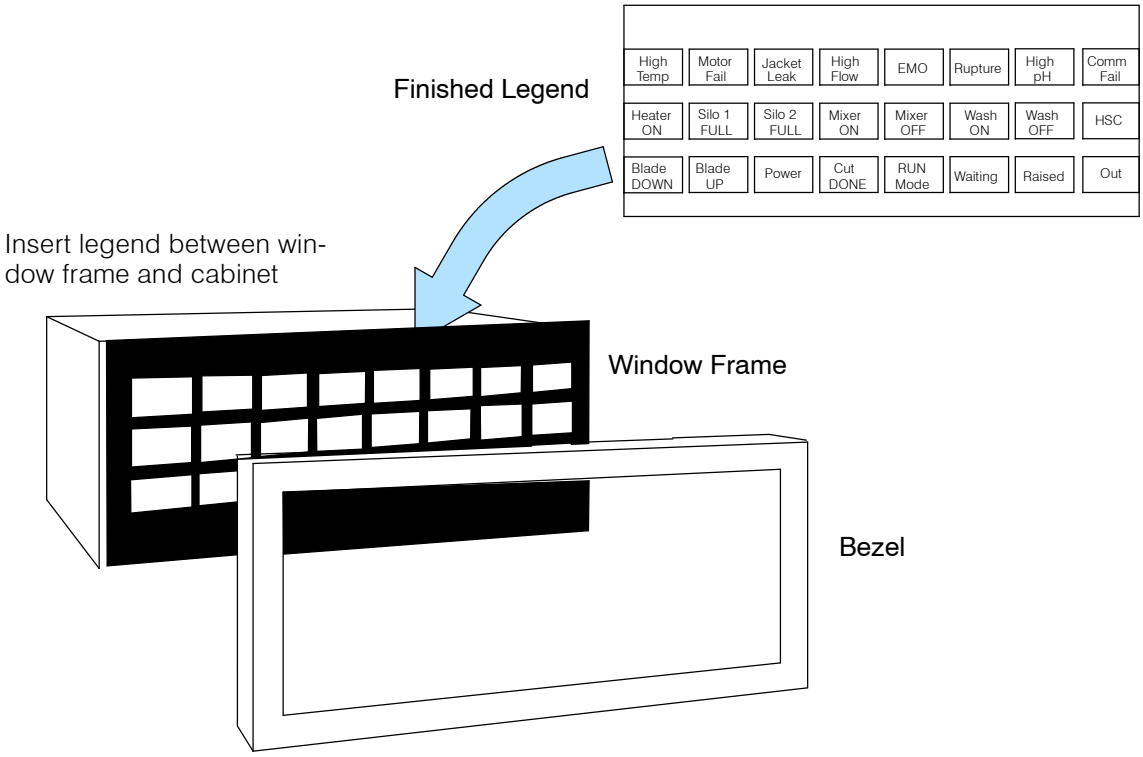
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Preparing the Lamp Labels

Applying Text to Each Label

Preparing the lamp labels for the OP-1124 panel requires you to slide a legend transparency into a pocket in the panel overlay. Use the following procedure:

1. Remove the bezel from the module by unsnapping the four tangs that hold the bezel to the module frame.
2. Create a legend transparency. There are several ways of doing this. A pattern is provided on the next page that gives you the available dimensions. The nicest legends result from using a computer graphics program and a laser printer to create the transparency.



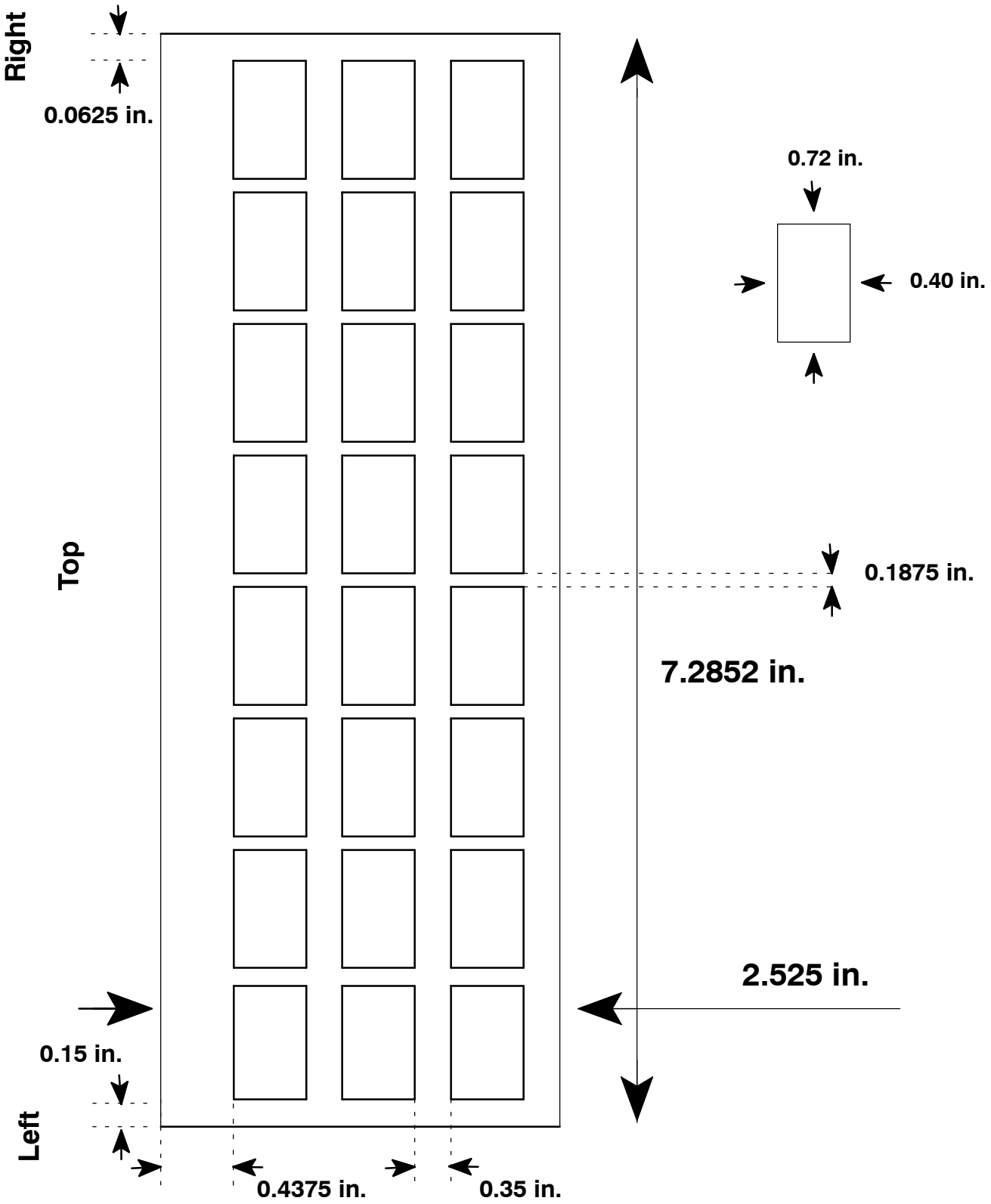
3. Use the pattern on the next page to cut out the legend from the transparency sheet.
4. Slide the finished legend into the pocket space between the window frame and LED bars.
5. Re-attach the bezel by snapping the bezel onto the case.

Replacing LED Bars

The OP-1124 comes with red LED light bars installed in all positions. If you need other colors, the light bars are socketed and can be changed. Yellow and green light bars are available from PLC***Direct*** in packs of four, so you can create any color scheme you wish.

You can access the light bars by gently removing the window frame from the cabinet. It is held to the cabinet with double-sided strips of tape. To remove one of the light bars, alternately pry each end of the light bar up, going from side to side using a pocket knife or small screwdriver until it pops out of its socket. To insert the light bar into its socket, carefully align the pins on the back of the light bar with the socket openings and gently push the light bar into the socket.

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Installing the Panel

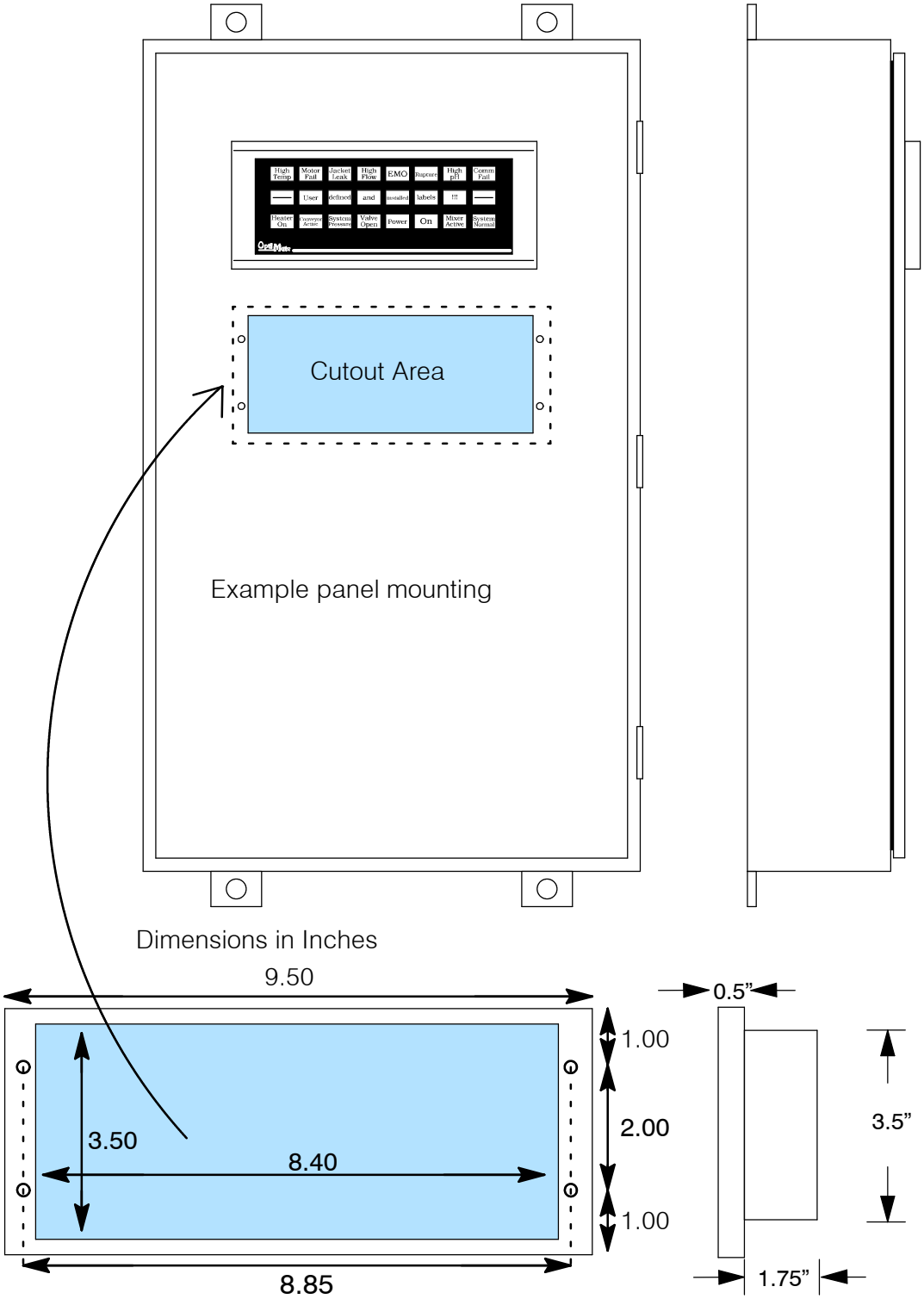
In this section, you will be given all of the information you need to install the panel. Before actually installing the OP-1124 panel, it may be helpful to examine the specifications and make sure that the requirements of your application are met.

Panel Specifications:

Physical Specifications	Weight	22 ounces
	Panel Fasteners	Four 6x32 threaded studs
	NEMA Rating	NEMA 4
Environmental Specifications	Operating Temperature	0° to 50° C
	Storage Temperature	–20° to 80° C
	Operating Humidity	5 to 95% (non-condensing)
	Air Composition	No corrosive gases permitted
Operating Specifications	Power Budget Requirement	11 VA @ 8 – 30 VDC 280 mA @ 12 VDC (all lamps OFF) 890 mA @ 12 VDC (all lamps ON) 140 mA @ 24 VDC (all lamps OFF) 450 mA @ 24 VDC (all lamps ON)
	Power Connector	Removable Terminal Block 2 position
	Absolute Maximum Voltage	32 VDC
	Diagnostics	Power On, CPU
	Communication Link	RS232 or RS422 4800, 9600 and 19200 baud 15 pin female D type connector *Only 4800 and 9600 baud will work with Allen-Bradley PLCs.

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Dimensions for Mounting



Power and Cabling Requirements

What Are Your Application Needs?

Your communication cable requirements really depend on your particular application. There are two types of configuration possibilities. Point-to-point — a single operator interface connected to a CPU. Multi-drop — multiple operator interfaces connected to a CPU.

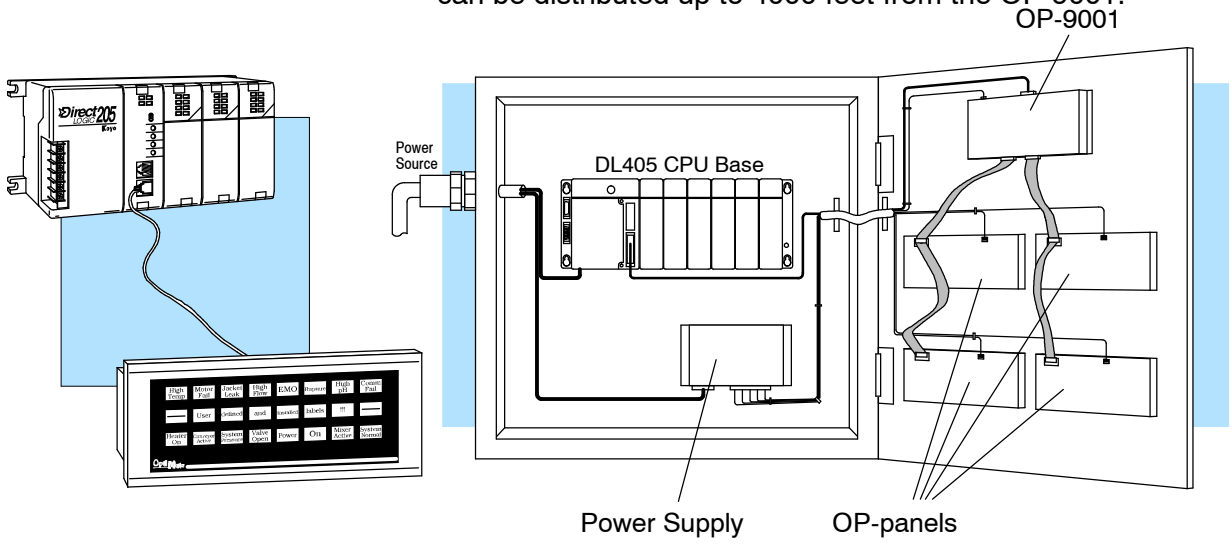
- **Point-to-Point –** If you only need one operator interface connected to one CPU, then just choose the appropriate cables from the chart on Page 11, and you're ready to go!
- **Multi-drop –** By using an OptiMate OP–9001 Communications Master, you can connect multiple Optimate units up to a single CPU. Up to 31 individual units can be connected in a daisy-chain fashion to the OP–9001. Communications are via RS422 between the OP–9001 and the operator interfaces. If you use a good quality shielded cable, you can have a total distance of up to 4000 feet between the OP–9001 and the last operator interface unit in the chain. If you only have a short distance (up to 30 feet), you can use ribbon cable and easy-to-install crimp-on ribbon connectors.

1. Point-to-Point

A single cable connection from the PLC to the panel gives you access to the PLC's data registers and ladder logic.

2. Multi-drop

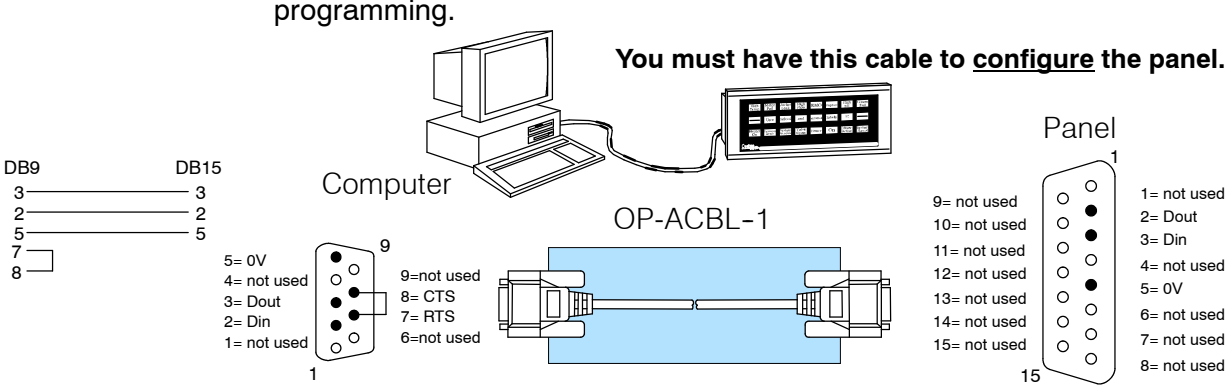
Multiple OP-panels can be interfaced to a single PLC. This requires the use of the OP-9001 Communications Master. With the Communication Master, up to 31 panels can be interfaced to a single CPU port. Each can be programmed for entirely different functions. Panels can be distributed up to 4000 feet from the OP-9001.



Programming Cable

The OP-ACBL-1 is used to connect your OP-1124 panel to your computer for programming.

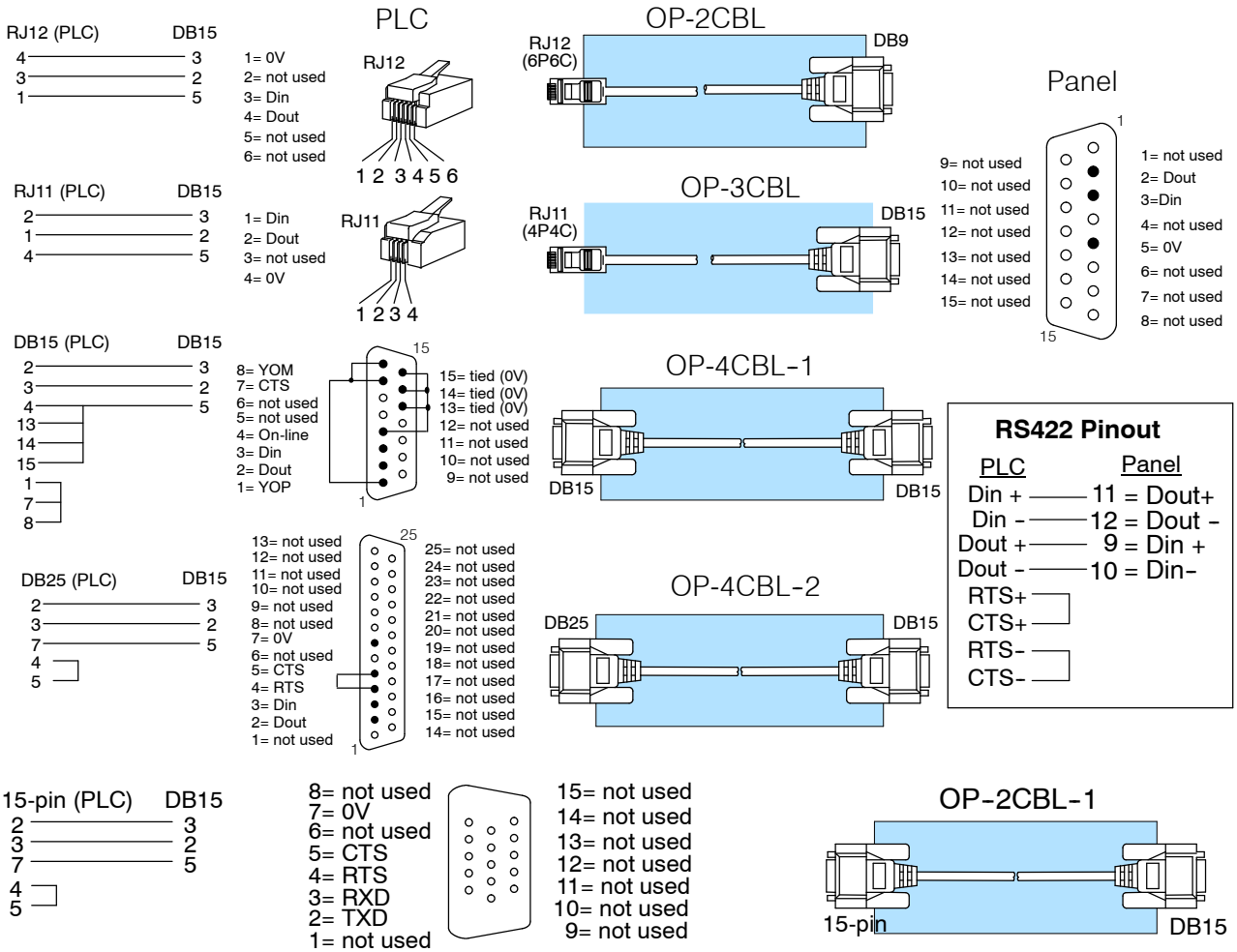
You must have this cable to configure the panel.



PLC to Panel Cable

The OP-ACBL-1 (shown above) is also used to connect Allen-Bradley SLC 5/03 and 5/04 PLCs to an OP-1124 panel. Since the OP-1124 is compatible with all of the ***PLCDirect*** and compatible CPUs, your cabling requirements wll vary depending on the CPU type you are using. Refer to the table on the next page for matching the proper cable to your PLC. Pin diagrams refer to the ends of the cables and not the communication ports.

See the next page for matching your PLC to the correct cable.



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Choosing the Proper Connecting Cables

OptiMate Panel Cables

Depending on which PLC you are using, you may require as many as two cables–one to connect the panel to a personal computer for configuration; and one to connect the panel to the PLC. Here are the requirements:

- **OP-ACBL-1:** *all* units require this cable for configuration. This is a 9-pin male to 15-pin male cable that connects your personal computer to the OptiMate unit. (This cable is also used to connect an OptiMate panel to the Allen-Bradley SLC–500 CPU.
- **CPU Cables:** You will also need the appropriate cable to connect your CPU to the OptiMate unit. Use the chart shown to the right to choose the correct communications cable.

OP–9001 Cable Connectors

If you're planning to use multiple panels and an OP–9001, then you'll need to build your own custom cables. Since the proper cable choice really depends on your application, we offer the following connectors.

- **OP–CMCON–1** — pack of 4 ribbon cable connectors.
- **OP–CMCON–2** — pack of 4 solder-type connectors.

For electrically noisy environments, we recommend a good shielded cable, such as Belden 9729 or equivalent. This type of cable will require the solder-type connectors. If you're going 30 feet or less, you can use ribbon cable. For ribbon cable, we recommend Belden 9L28015 or 3M 3365/15.

OptiMate Cables

Family	CPU (or other device)	Port	Cable
DirectLOGIC™ DL105	DL130	Only port	OP–2CBL
DirectLOGIC™ DL205	DL230	One port (RJ12)	OP–2CBL
	DL240	Top port (RJ12)	OP–2CBL
		Bottom port (RJ12)	OP–2CBL
DirectLOGIC™ DL305	DL330	Requires DCU*	OP–4CBL–2
	DL330P	Requires DCU*	OP–4CBL–2
	DL340	Top port (RJ11)	OP–3CBL
	DL340	Bottom port (RJ11)	OP–3CBL
	DL350	Top port	OP–2CBL
		Bottom port	OP–4CBL–2
DirectLOGIC™ DL405***	DL430	Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	DL440**	Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	DL450	Phone Jack (RJ12)	OP–2CBL
		Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	D4–DCM (module)	One port (25-pin)	OP–4CBL–2
	Slice I/O panels	One port (15-pin)	OP–4CBL–1
GE® Series 1	IC610CPU105	Requires DCU*	OP–4CBL–2
	IC610CPU106	Requires DCU*	OP–4CBL–2
TI305™ / SIMATIC® TI305™	325–07, PPX:325–07	Requires DCU*	OP–4CBL–2
	330–37, PPX:330–37	Requires DCU*	OP–4CBL–2
	325S–07 (or 325 w/ Stage Kt)	Requires DCU*	OP–4CBL–2
	330S–37, PPX:330S–37	Requires DCU*	OP–4CBL–2
	335–37, PPX:335–37	Phone Jacks (RJ11)	OP–3CBL
		If DCU is used*	OP–4CBL–2
TI405™ / SIMATIC® TI405™	425–CPU, PPX:425–CPU **	One port (15-pin)	OP–4CBL–1
	430–CPU, PPX:430–CPU	Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	435–CPU, PPX:435–CPU **	Top port (15-pin)	OP–4CBL–1
		Bottom port (25-pin)	OP–4CBL–2
	Smart Slice™ I/O panels	One port (15-pin)	OP–4CBL–1
Allen-Bradley SLC500	5/03 5/04	Bottom port	OP–ACBL–1
Allen-Bradley	MicroLogix	Only port	OP–ACBL–2

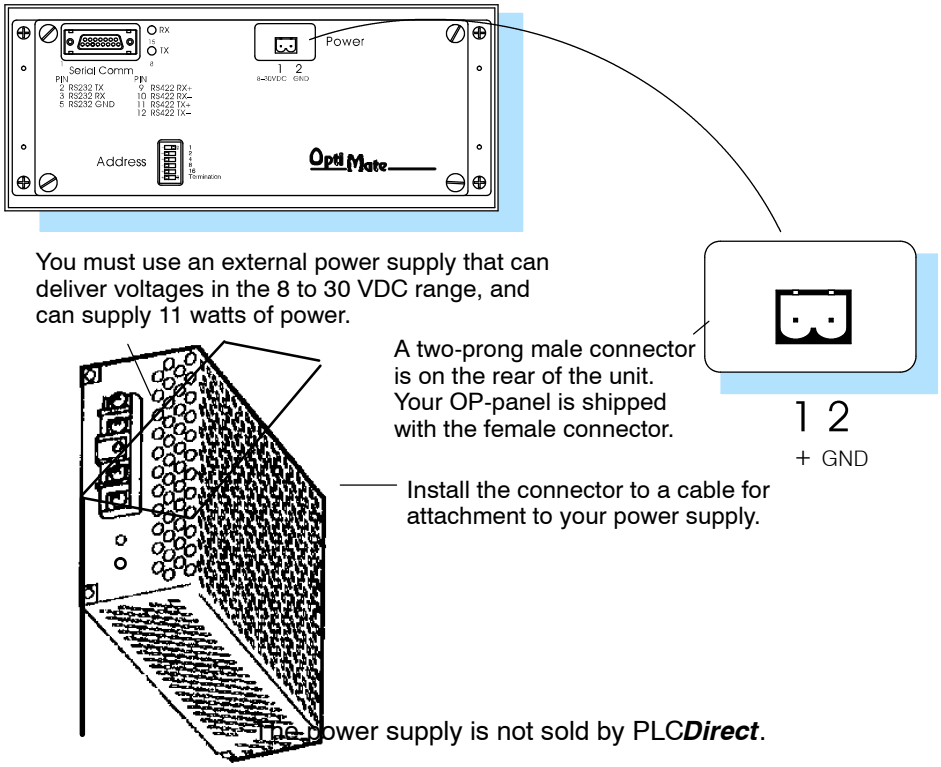
* — requires RS232 Data Communications Unit (D3–232–DCU)
**–also DC versions

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Connecting a Power Supply

Power Supply Connections

The OP-1124 panel can operate on DC voltages between 8 and 30 VDC rated at 11 watts. Connect the panel to a power supply (within the required voltage range and wattage) using the terminal block connector supplied. The connector is polarized to prevent reversing the connections. The male receptacle on the rear of the panel will only connect in one way with the female connector that is supplied with your OP-1124 panel. Pin 1 is the positive connection, while Pin 2 is the negative, or ground, connection.



NOTE: The majority of the power consumed by the panel is used in the LED light bars. The current drawn by the panel is shown in the specifications below. **Do not attempt to use the 24 volt power output of the CPU and/or the PLC base instead of using a proper external power supply. With all the lamps lit, the current drawn by this panel will exceed the current rating of the CPU or base and could damage your equipment.**

Model	Current Consumed at 12VDC	Current Consumed at 24VDC
OP-1124	0.28A (all lamps OFF)	0.14A (all lamps OFF)
	0.89A (all lamps ON)	0.45A (all lamps ON)

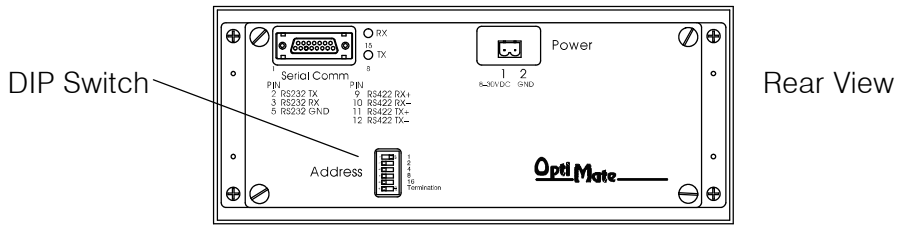
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Connecting the Panel to your Personal Computer

Assigning an Address to the OP-1124

A 6-position DIP switch on the rear of the OP-1124 allows you to assign a hardware address to your panel. Each panel must have a unique address. You can use any address between 0 and 30 when communicating between a panel and a PLC or the OP-9001 Master Communications panel. Address 31, however, is reserved. See the note that follows.

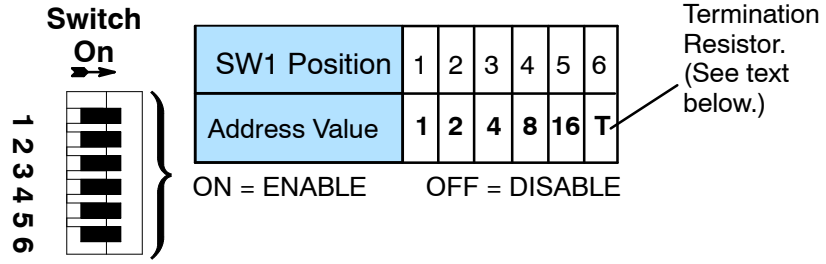
NOTE: You must use Address No. 31 when you are using the OPEditor software to download to your OP-1124 panel. No other address will work for the configuration process. In a similar manner, if you are connecting more that one OP-panel to a single CPU (through an OP-9001), then the OP-9001 needs to know which set of configuration parameters belong to which OP-panel. You do this by assigning an address in the range of 0 to 30 to each panel connected. Each panel must have a different address.



How to Set the Address

To set the address on the OP-1124, simply set the apppropriate switches on the dip switch to the desired address. The figure below shows the binary weighting of each switch position. Notice that it is in decimal format. To select address 14 for example, you would press switches 2, 3 and 4 down to the right, and switches 1, 3 and 5 to the left (2 + 4+ 8 = 14). Any address between 0 and 30 is valid for the OptiMate-to-CPU (or to OP9001) communications. Address 31, however selects the configuration mode. Use this mode when you connect your personal computer to the panel for configuration. To select address 31, turn switches 1 through 5 ON.

NOTE: Please note that when the dip switches are changed, the OP-1124 must be power cycled before the new settings will take effect.



The Termination Resistor

Switch position 6 enables or disables an internal termination resistor. The OptiMate panels communicate via an RS232 or RS422 communcations network. If you are using a single panel that will be located less than 50 feet from the CPU, then you can use RS232 and are not required to use a termination resistor (i.e. switch position 6 is turned OFF).

*If a panel will be located more than 50 feet from the CPU or you want to use multiple panels, you **must** use RS422.* For single panel installations, this means that switch 6 must be enabled (ON). For multi-drop installations, this means **the last panel only** must have switch 6 enabled (ON). All other panels must have switch 6 disabled (OFF). A more detailed description of multiple panel installations is given in the OP-9001-M User Manual.

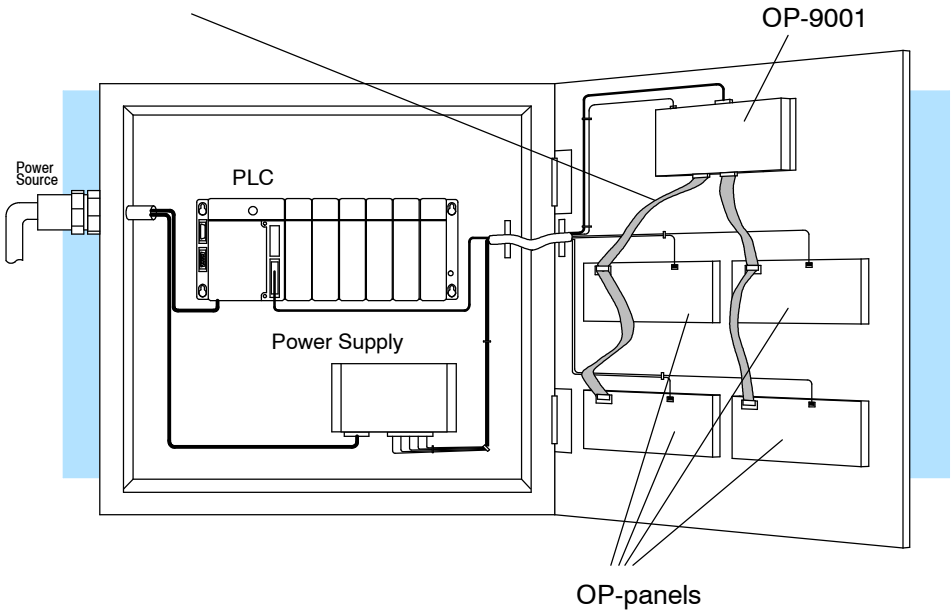
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Using the OP-9001 to Connect Multiple Panels

With the addition of the OP-9001 Communications Master panel, you can connect up to 31 panels per a useable CPU port of the PLC. Shown below are the connection requirements. For specifics of the OP-9001 panel itself, please refer to the Communications Master User Manual (OP-9001-M).

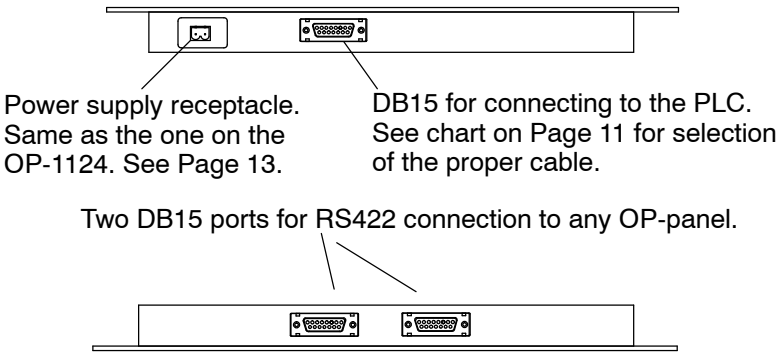
NOTE: The OP-9001 must be used in a multiple panel configuration. Each OP-1124 acts as a master to initiate data transfers to and from the CPU. Since the PLC system will only allow one master to talk to the CPU at any one given time, the OP-9001 must be installed to coordinate these data transfers.

Ribbon cable with DB15 male connectors attached.
Panels can be connected directly to the OP-9001 ports or be daisy-chained to other OP-panels.



Note: Panels can be located as far away as 4000 feet from the OP-9001 when using shielded cable (Belden 9729 or equivalent). Flat ribbon connections can be used for a distance of 30 feet maximum. For ribbon cable, we recommend Belden 9L28015 or 3M 3365/15.

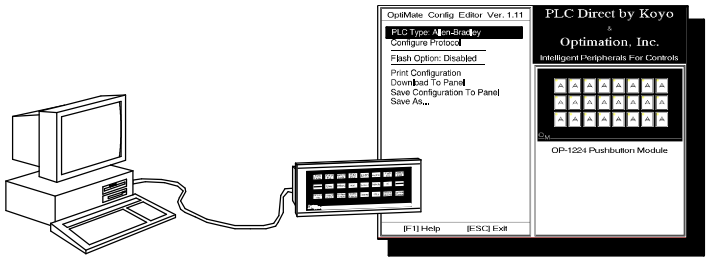
Belden 9729 Specifications	
No. twisted pairs	2
Nom. Impedance (ohms)	100
Nom. Capacitance (pF/m)	41
Wire Gauge (AWG)	24



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Configuring the Panel with the OPEditor Software

You configure the OP-1124 by loading the OPEditor software on a personal computer and selecting the appropriate options. The setup options answer basic questions concerning your system configuration such as type of PLC being used, communications protocol, and the type of panel being used. The same software is used for all of the Optimate panels; so once you've set up one panel, you understand most of the procedures required to configure any of the other panels.



System Requirements

In order to use the OPEditor software, you must have the following components:

- IBM 386 (or better) compatible computer
- VGA or SVGA video board and color monitor
- DOS 5.0 or higher and 3 1/2" disk drive
- At least 1 meg of hard drive space and 1 meg of RAM

At the time of publication of this manual, we are providing a DOS version of the OptiMate OPEditor configuration software. In early 1996, we will have a Windows version available.



There is only one installation disk for this software. You must have a 3-1/2 inch drive in order to install it. We suggest you make a backup copy of this disk before making the installation.

How to Install

Here are the easy steps for successful installation of the software:

1. Insert the disk in the 3 1/2" floppy drive of your computer.
2. From the DOS prompt, log onto the drive where you have the disk and execute the INSTALL.EXE file. For example, if the disk is in drive A:

   . . . . . **A: install** press <**Return**>
3. You will be prompted to accept the default directory (C:\OP) or change it. Make the choice and press Enter.
4. The software will automatically insert files in the directory you have named. These will use about 400 kilobytes of hard drive space. You should view the OPTITEXT.WRI file to take advantage of demo files and other useful information. The main file is OPEDITOR.EXE. The other files are for fonts and configuration information. Two subdirectories are created: (1) modules, and (2) systems. These are used to store your configuration data.
5. You will automatically be returned to the DOS prompt after the files and directories have been created, and you press the Return key. Installation is now complete!

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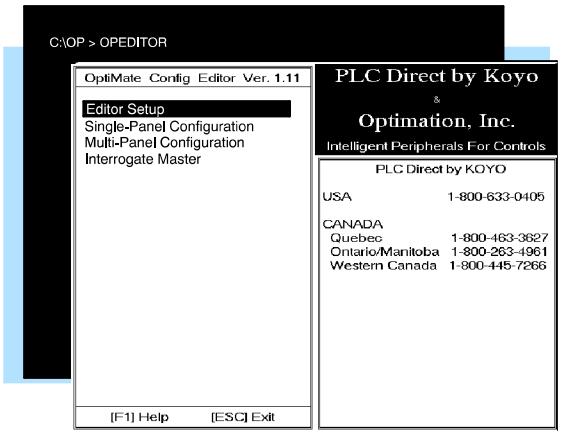
Step-by-Step Procedure

NOTE: You do not have to be connected to the OP-panel in order to design your configuration. You can save it to disk and download it to the panel later.

Step 1
Load the OPEditor and Complete the Editor Setup

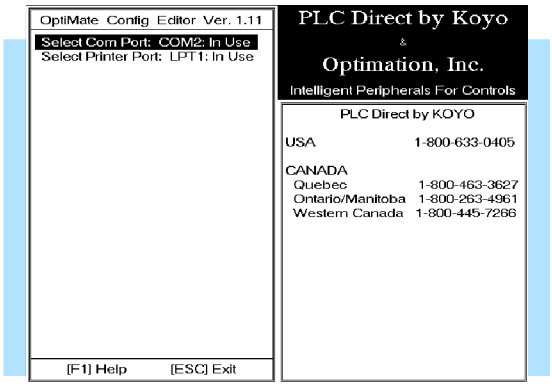
You can operate the OPEditor as a DOS program out of DOS only. Do not attempt to operate the program out of Windows. If you are in Windows, close Windows completely, change to the directory in which you have stored the OPEditor executable file (default is C:\OP), and then type the file name (OPEDITOR) from the DOS prompt.

The first configuration screen has 4 choices. You should select the first choice, **Editor Setup**.



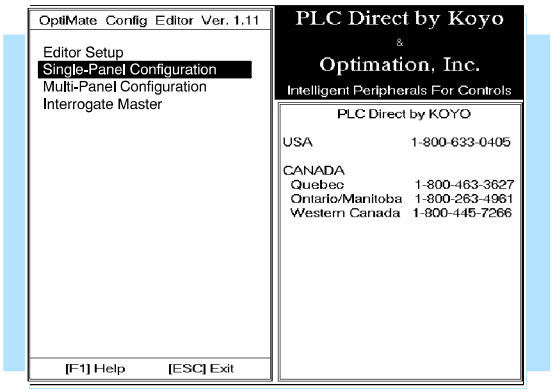
Step 2
Select the LPT and COM ports

The setup screen provides two serial port options: You must specify which of the serial ports (**COM1** or **COM2**) that you will be using when communicating with your OP-panel. The setup screen will also allow you to designate which parallel port (**LPT1** or **LPT2**) to use for printing your configuration.



Step 3
Choose from Single or Multiple Configurations

Next, you must press <**ESC**> to return to the first screen again. Here you will need to select either the **Single-Module Configuration** or the **Multi-Module Configuration**. For this example, we will use the “Single” choice, but the “Multi-Module” choice follows much the same way.



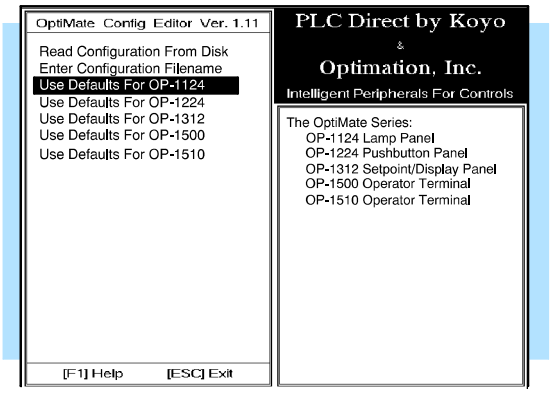
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Step 4
Select the Source for your Configuration

When you select either single or multi-module installation, another menu appears that allows you to choose from the following actions:

- Read a configuration from the OP subdirectory
- Enter a path and filename of another directory for reading a configuration.
- Create a new configuration (default).
- Upload configuration from the panel.

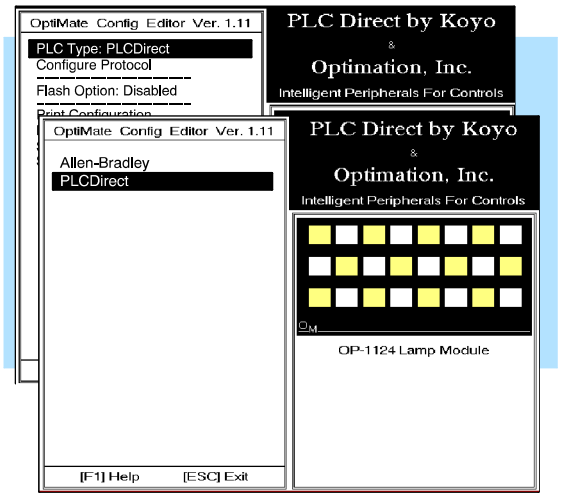
You will want to select **Use Defaults For OP-1124**, since you are creating a configuration file for the first time.



Step 5
Enter the Correct PLC Brand and Type

As soon as you make the above selection and press the <**Enter**> key, you will return to a screen that allows you to enter the type of PLC you will be using. It leads you to a second screen with two choices. Here you should select either **PLCDirect** or **Allen-Bradley**.

Press the <Enter> key to return to previous screen.



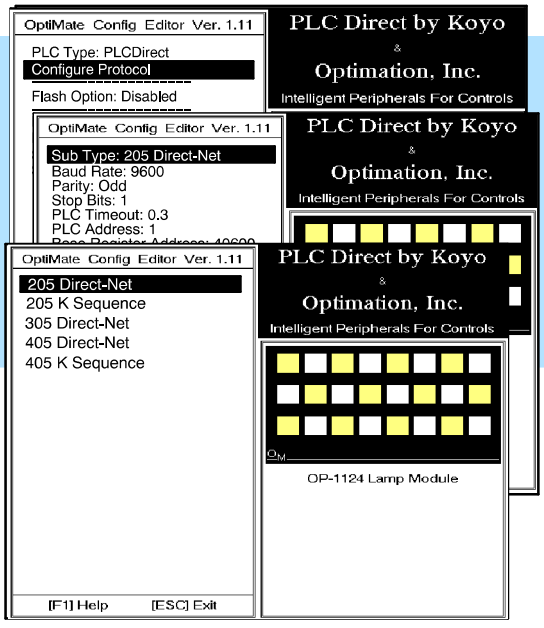
Step 6
Select Configure Protocol

Now select the second line, **Configure Protocol**.

This will take you to another screen that gives you a selection of **PLC Subtype**. The default subtype is indicated. In this example shown, the default is **205 Direct-Net**. To change this, press the <**Enter**> key.

Select the desired protocol for the CPU subtype that you are using. Refer to the appropriate CPU User Manual for the correct protocol corresponding to the communications port you are using.

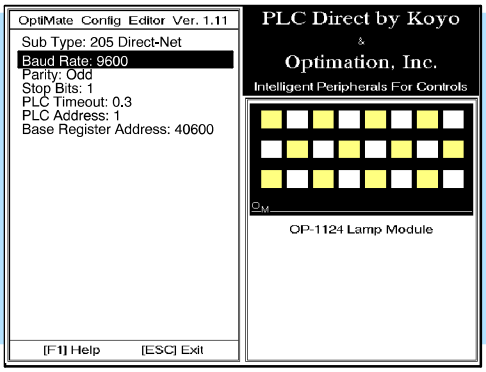
Make sure your choice here matches the CPU port into which you will actually be connected. On some models, one port is K-sequence and another may be DirectNet. On others, you may only have one protocol available.



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Step 7A Complete the Communications Information

You should now be looking at a screen similar to the one shown here. If you are using a PLC***Direct*** programmable controller, check the chart below for the proper **baud rate, parity and stop bit settings**. For other PLCs, check the respective User Manuals for the proper specifications. The OP-modules will support 4800, 9600 and 19200 baud. Other baud rates of the PLCs are not supported. The table shown below only includes those baud rates that are supported by the OptiMate panels.

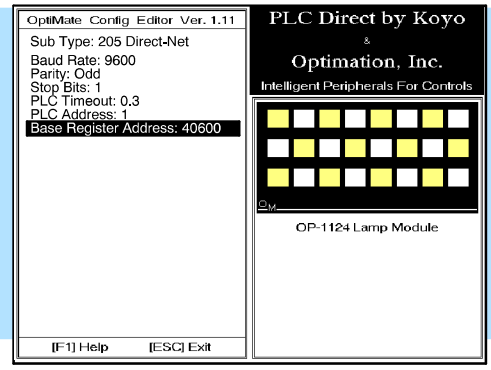


You also see a **PLC timeout** selection on the above screen. This means when the panel receives a communications error, it will wait a specified amount of time to receive a good transmission. If it does not receive a good transmission within this timeout period, it will acknowledge the error by flashing all of the LEDs on the panel at a 4 Hz rate. *The default is 0.3 seconds for the timeout period.* You can change this if you want–the valid range is from 0.3 seconds to 25.5 seconds.

PLC Model	Port/Baud Rates	Parity	Stop Bit
DL230/240	Top 9600	Odd	1
	Bottom (DL240 only) 1200/9600/19.2k	Odd/None	
DL330	DCU 1200/9600/19.2k	Odd/None	1
DL340	Top 1200/4800/9600/19.2k	None	1
	Bottom 1200/4800/9600/19.2k	None	
DL430/440	Top 9600	Odd	1
	Bottom 1200/9600/19.2k	Odd/None	
DL450	DB15 9600	Odd	1
	DB25 1200/4800/9600/19.2k	Odd/None	
	RJ12 1200/4800/9600/19.2k	Odd/None	

Step 7B Select the Base Register Address and File Number

Here you need to indicate a base register address in your PLC that will be used for the mapping process. You should read the next section of this manual and make sure you understand the mapping process and how it relates to your PLC and ladder logic. Read your respective PLC User Manual for details on CPU memory types and memory available.



For PLC***Direct*** and compatible CPUs, you will enter a **Base Register Address**. This is the V-memory (DL205/DL405) or R-memory (DL305) location where you want to store panel data. For example, you might choose V40600. You do not enter the letter V or R. You merely enter the starting memory number (i.e. 40600).

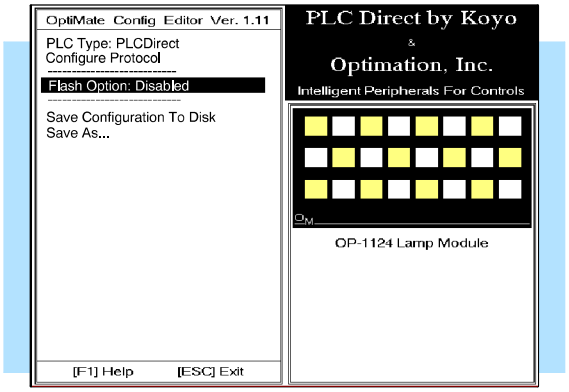
If you chose Allen Bradley as your **PLC Type**, you must now enter the **PLC File Number** in addition to a **Base Register Address**. The panel will only recognize integer file types N7 and pre-defined user file types N9 through N255. You enter only the number and not the prefix letter N. The **Base Register Address** is any number between 0 and 255. For example, if you want the starting address N7:0, you enter a **PLC File Type: 7** and a **Base Register Address: 0**.

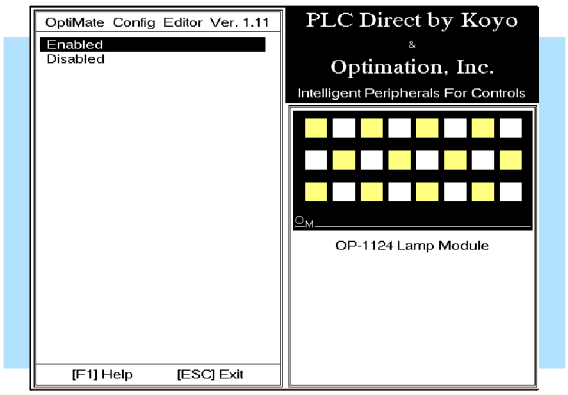
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Step 8
Set the Flash Option

After you have completed Step 7B, press the <**Escape**> key and you will be taken back to the same screen used for Step 6. Here you can select the flashing option if you plan to have any of the lamps flash during your ladder logic operation. Flashing can provide added emphasis to one or more lamps that you may want to stand out from the rest. Be aware you consume less PLC memory if you don't enable the flashing feature. Default is set for no flashing.

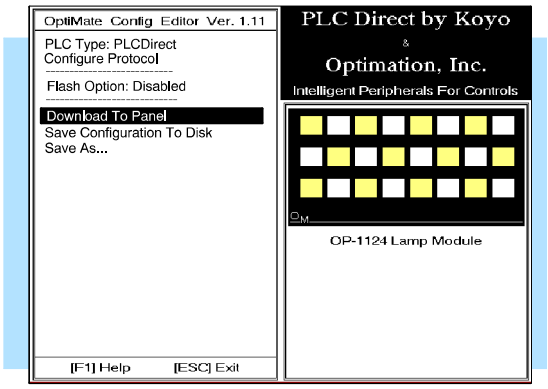
If you want to change the flashing option, position the cursor on **Flash Option:Disabled** (shown above) and then press the <**Enter**> key. The new screen (shown to the right) gives you a choice of **Enabled** or **Disabled**. Make your selection and press the <**Enter**> key again. This will return you to the original screen (top).





Step 9
Save and Download

If you have done your configuration without being connected to the OP-panel, then you can either save it to a disk and download it to the panel later; or you can connect to the panel now, and make your download. To download, select **Download to Panel** and press the <**Enter**> key. The panel will retain the configuration in its non-volatile EEPROM memory, but you should also save it to your hard drive or a disk.



NOTE: Remember that you must have the DIP switch on the rear of the OP-panel set to address 31 in order for the downloading of your configuration to take place.

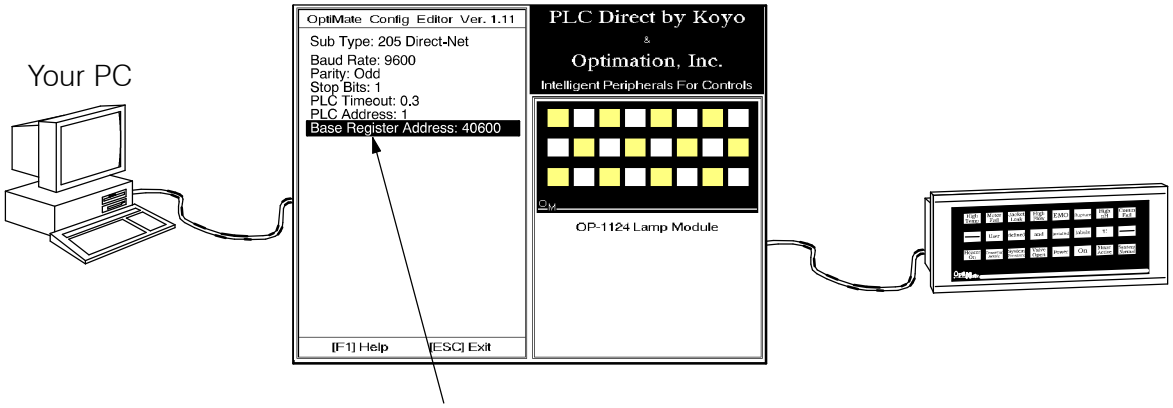
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Applying Ladder Logic

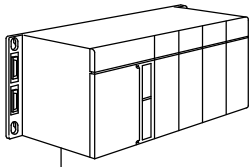
General Concepts

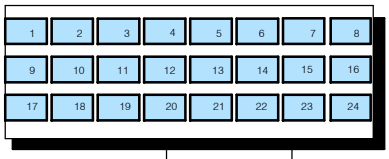
Memory Mapping

On Page 1 of this manual, we introduced you to the basic concept of memory mapping. The OP-1124 uses memory mapping in order to link itself to a PLC. Memory mapping is a technique that maps the memory of the OP-1124 into the memory of the PLC. During initial configuration, you indicate where in the PLC memory you want to start the mapping process (See Step 7B on Page 16). By knowing where the data of the specific panel is mapped, this data can be moved, changed or monitored using ladder logic.



During configuration, you determine the starting address for the memory mapping process.



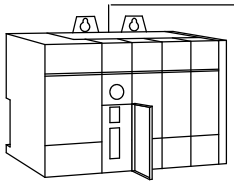


Mapping Assignments

PLC***Direct***

Memory Location	Function
m (such as V40600)	Lamps 1-16 ON/OFF
m+1 (such as V40601)	Lamps 17-24 ON/OFF
m+2 (such as V40602)	Lamps 1-16 flash
m+3 (such as V40603)	Lamps 17-24 flash

Allen-Bradley



Memory Location	Function
m (such as N7: 0/0– 0/15)	Lamps 1-16 ON/OFF
m+1 (such as N7: 1/0 1/15)	Lamps 17-24 ON/OFF
m+2 (such as N7: 2/0 2/15)	Lamps 1-16 flash
m+3 (such as N7: 3/0 3/15)	Lamps 17-24 flash

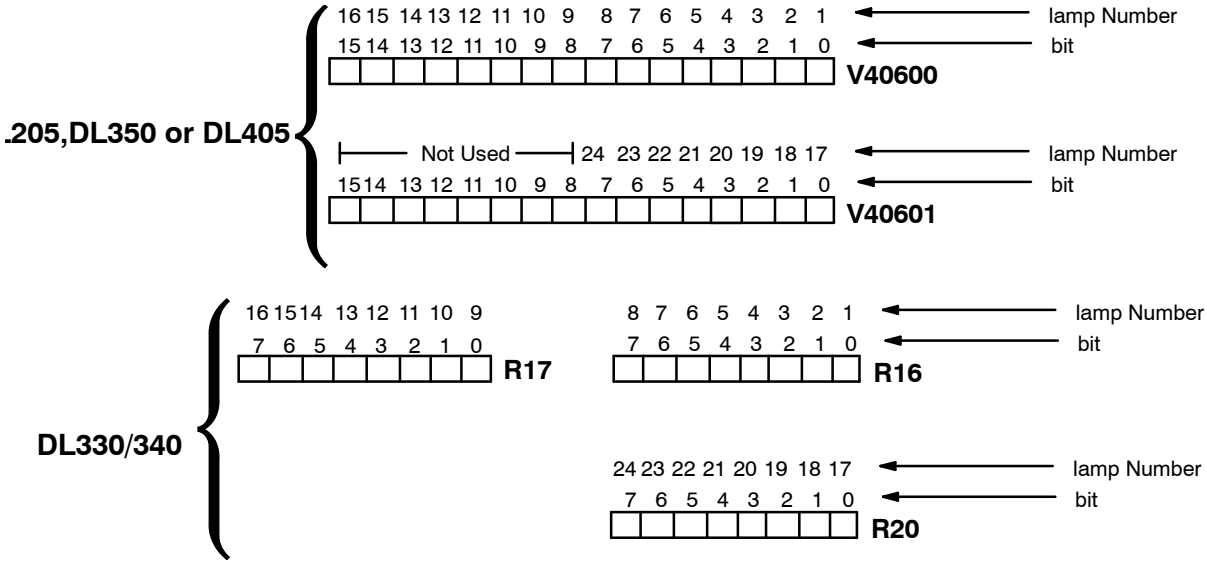
The lamps are numbered left to right starting in the upper left corner.

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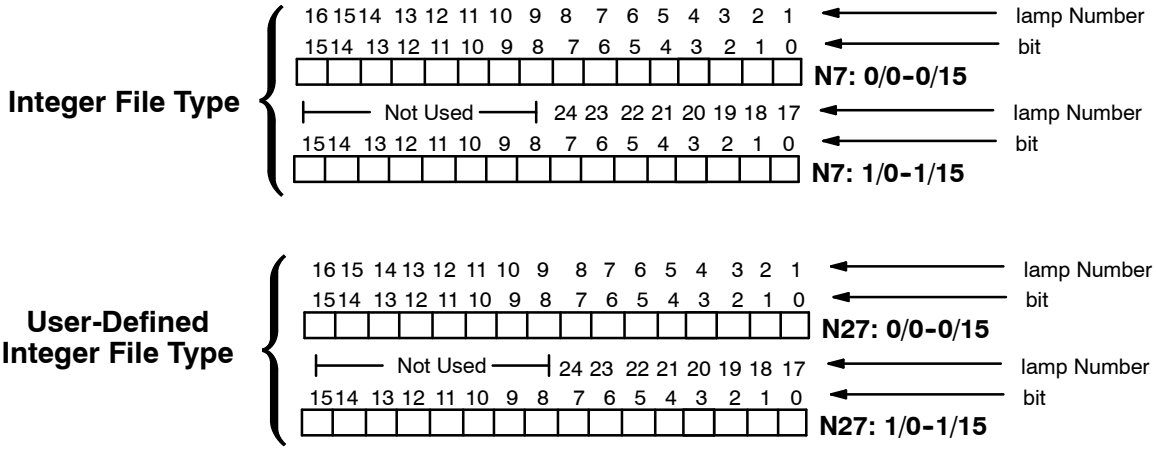
Addressing Conventions

Before we jump into ladder logic programming, let's take a moment to review and compare the addressing conventions used by PLC***Direct*** and Allen-Bradley.

PLC*Direct* Memory–A typical address within a PLC***Direct*** programmable controller is Vxxxx (such as V40600 for the DL205,DL350 or DL405 families) or Rxxx (such as R16 for the DL330/340 family). The V-memory in the DL205 and DL405 is divided into 16-bit boundaries, and the R-memory in the DL330/340 is divided into 8-bit boundaries. Refer to your individual User Manuals for complete memory information. The two diagrams below show you how the lamps of the OP-1124 could be mapped during configuration. In this example, we have arbitrarily chosen V40600 and R16 as starting boundaries to map the lamps ON/OFF function, but it could actually be any available user or internal relay memory areas as long as they are consecutive:



Allen-Bradley Memory–A typical address for Allen-Bradley might be N7:0/0 or N27:0/0. The OP-1124 will allow you to define your starting address for mapping purposes using either Allen-Bradley's integer (N7) file type or user-defined integer file types (N9–N255). *If you plan to use an integer file between N9 and N255, you must define these in the Allen-Bradley memory map before configuring the panel.* Below we have shown you how 16-bit integer files could be used to control the ON/OFF function of the individual lamps.



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Controlling Lamps with a PLC*Direct* PLC

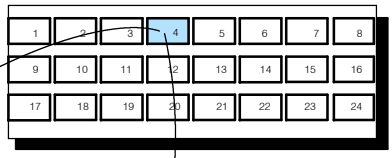
PLC*Direct* Internal Relays Controlling a Single Lamp

When you configure the OP1124, you must choose a base address in the CPU. You can choose any available user memory or control relay memory address. Programming is much easier for the OP-1124 if you choose "control relay memory". We will show you both the "user memory" and "internal control relay" methods, and then let you choose which method suits your application. Refer to the PLC User Manual for a listing of the total number of internal control relays and their memory locations. The control relays of the DL205 and DL405 families start at V40600 and the control relays of the DL330/340 family start at R16. In the examples below, we have chosen V40600 as the starting address for either a DL205,DL350 or DL405. We have chosen R16 as our starting address for the DL330/340. *Notice that the internal control relays are numbered in octal and not decimal.*

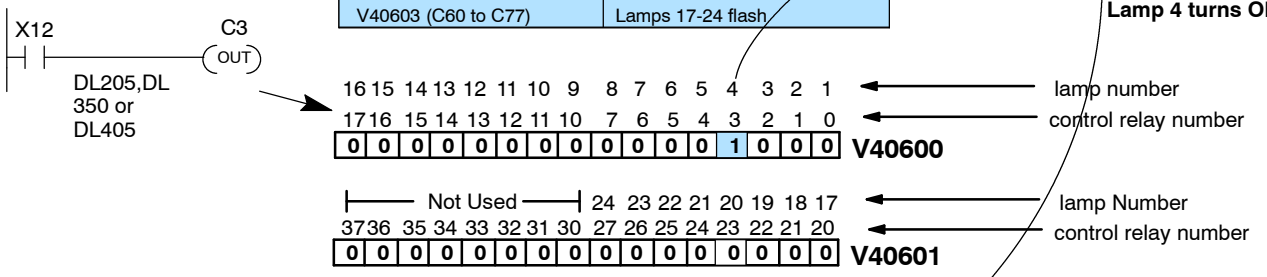
Example showing how to turn ON Lamp No. 4 with a PLC*Direct* PLC.

DL205,DL350 or DL405 Families

Example Memory Locations	Function
V40600 (C0 to C17)	Lamps 1-16 ON/OFF
V40601 (C20 to C37)	Lamps 17-24 ON/OFF
V40602 (C40 to C57)	Lamps 1-16 flash
V40603 (C60 to C77)	Lamps 17-24 flash

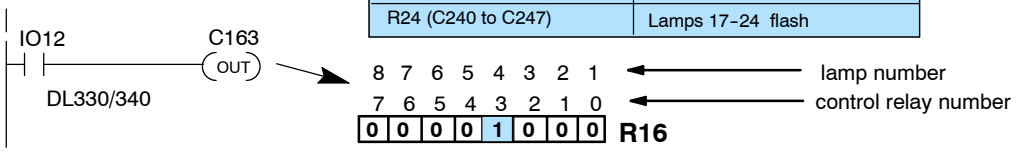


Lamp 4 turns ON



DL330/340 Family

Example Memory Locations	Function
R16 (C160 to C167)	Lamps 1-8 ON/OFF
R17 (C170 to C177)	Lamps 9-16 ON/OFF
R20 (C200 to C207)	Lamps 17-24 ON/OFF
R21 (C210 to C217)	Not Used
R22 (C220 to C227)	Lamps 1-8 flash
R23 (C230 to C237)	Lamps 9-16 flash
R24 (C240 to C247)	Lamps 17-24 flash



Note: To determine the control relay number, use the register number as the first two digits and the bit number as the last digit. For example, Bit 3 of R16 is referenced as C163.

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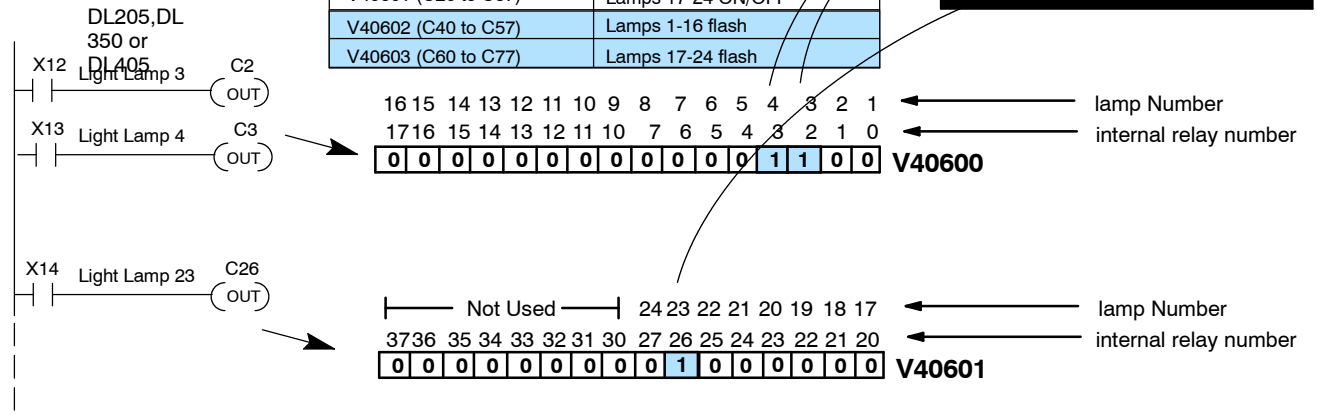
PLC*Direct* Internal Relays Controlling Multiple Lamps

You control multiple lamps just as you do individual lamps. Each lamp is controlled by an individual internal control relay. The example below shows how to control Lamps 3, 4 and 23.

DL205,DL350 or DL405 Families

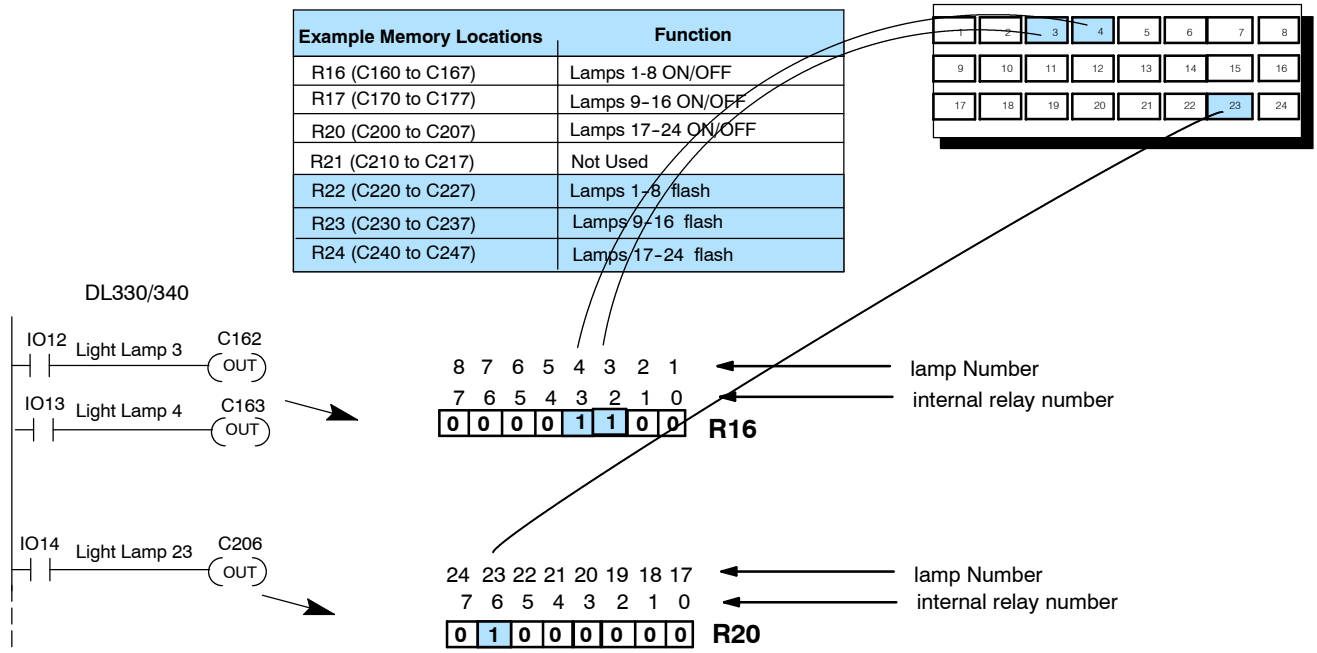
Example showing how to turn ON Lamp Nos. 3, 4 and 23 with PLC*Direct* PLC

Example Memory Locations	Function
V40600 (C0 to C17)	Lamps 1-16 ON/OFF
V40601 (C20 to C37)	Lamps 17-24 ON/OFF
V40602 (C40 to C57)	Lamps 1-16 flash
V40603 (C60 to C77)	Lamps 17-24 flash



DL330/340 Family

Example Memory Locations	Function
R16 (C160 to C167)	Lamps 1-8 ON/OFF
R17 (C170 to C177)	Lamps 9-16 ON/OFF
R20 (C200 to C207)	Lamps 17-24 ON/OFF
R21 (C210 to C217)	Not Used
R22 (C220 to C227)	Lamps 1-8 flash
R23 (C230 to C237)	Lamps 9-16 flash
R24 (C240 to C247)	Lamps 17-24 flash



Note: To determine the control relay number, use the register number as the first two digits and the bit number as the last digit. For example, Bit 3 of R16 is referenced as C163.

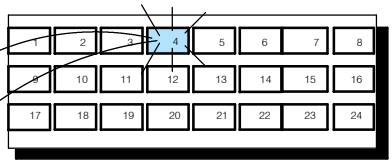
PLC*Direct* Internal Relays Used to Add Flashing

In the examples below, we are causing Lamp 4 to flash. Notice we go through two steps to accomplish this. We first turn ON the lamp with C3 or C163 (depending on PLC used), and then we add the flashing with C43 or C213. Which control relay you use in each case, depends on which lamp you are trying to illuminate and the particular PLC you are using.

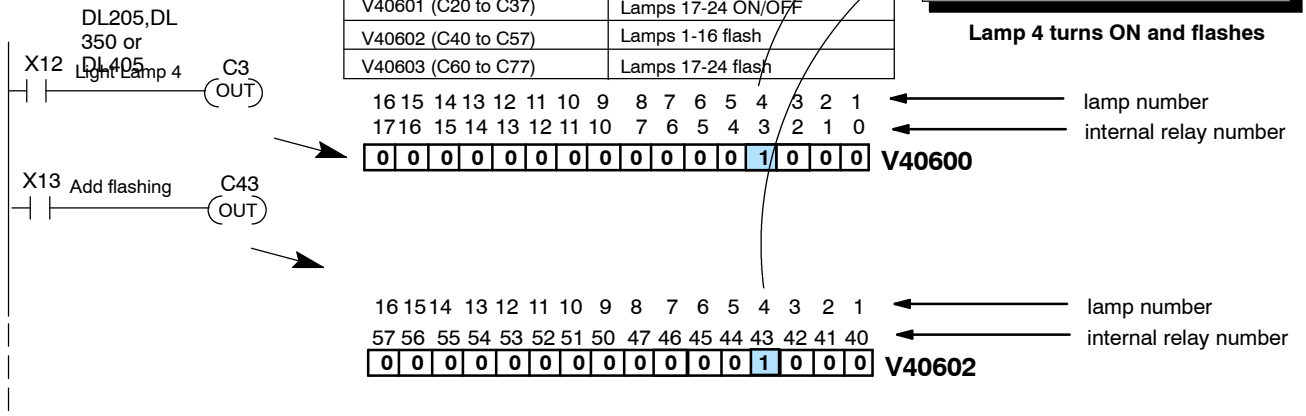
Example showing how to turn ON Lamp No. 4 and also make it flash using a PLCDirect PLC.

DL205,DL350 or DL405 Families

Example Memory Locations	Function
V40600 (C0 to C17)	Lamps 1-16 ON/OFF
V40601 (C20 to C37)	Lamps 17-24 ON/OFF
V40602 (C40 to C57)	Lamps 1-16 flash
V40603 (C60 to C77)	Lamps 17-24 flash

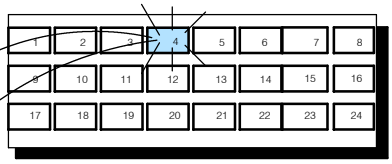


Lamp 4 turns ON and flashes

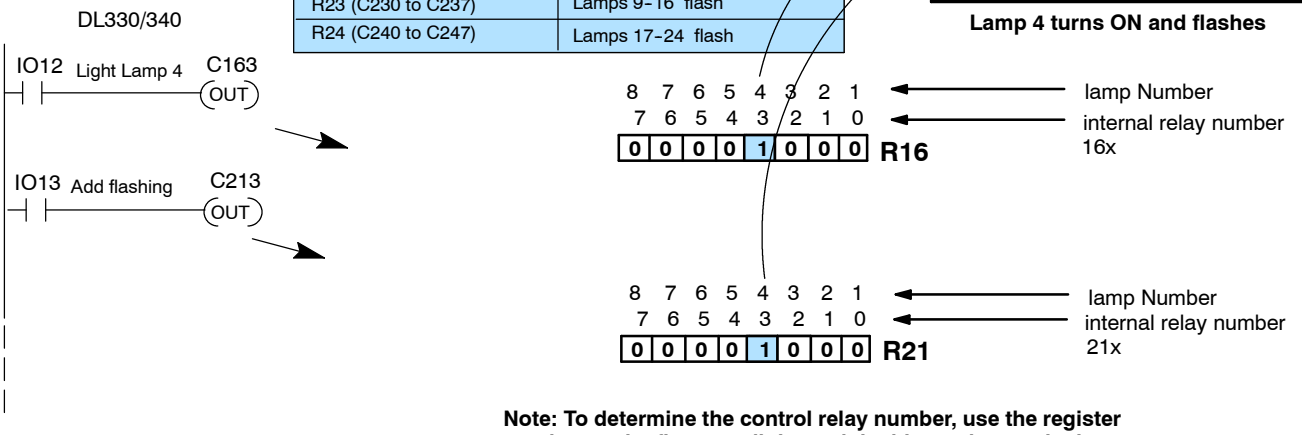


DL330/340 Family

Example Memory Locations	Function
R16 (C160 to C167)	Lamps 1-8 ON/OFF
R17 (C170 to C177)	Lamps 9-16 ON/OFF
R20 (C200 to C207)	Lamps 17-24 ON/OFF
R21 (C210 to C217)	Not Used
R22 (C220 to C227)	Lamps 1-8 flash
R23 (C230 to C237)	Lamps 9-16 flash
R24 (C240 to C247)	Lamps 17-24 flash



Lamp 4 turns ON and flashes



Note: To determine the control relay number, use the register number as the first two digits and the bit number as the last digit. For example, Bit 3 of R16 is referenced as C163.

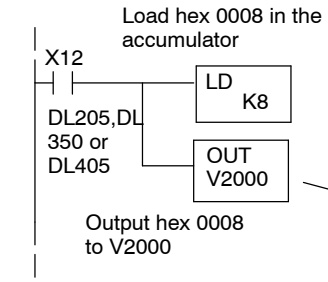
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PLC*Direct* Controlling a Lamp with User Memory (DL205/DL350/DL405 Only)

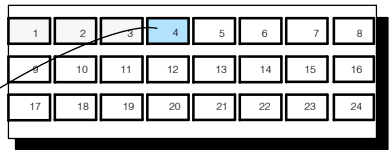
If you do not want to use internal control relays, the next six pages show examples of controlling the lamps with user memory locations. In all the examples that follow, we have chosen V2000 to be our base address. The 16-bits belonging to V2000 control the ON/OFF state of the first two rows of lamps. The next three consecutive memory words control the bottom row, and the flashing feature. Notice that the hexadecimal number formed is the sum of all the weights in the 16–bit register that are set to logical 1. For example, the value 0008 hexadecimal stored at V2000 will turn ON bit 3 controlling Lamp No. 4. The ladder logic shown below demonstrates how this takes place.

DL205,DL350 or DL405 Families

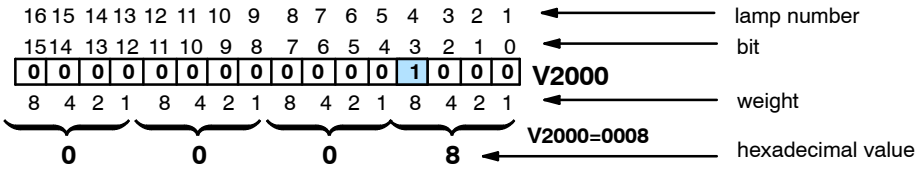
Example showing how to turn ON Lamp No. 4 with a PLC*Direct* PLC.



Example Memory Locations	Function
V2000	Lamps 1-16 ON/OFF
V2001	Lamps 17-24 ON/OFF
V2002	Lamps 1-16 flash
V2003	Lamps 17-24 flash



Lamp 4 turns ON

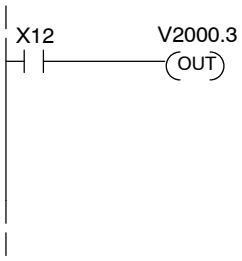


PLC*Direct* Controlling a Lamp with Bit-of-Word (DL250/350/450 Only)

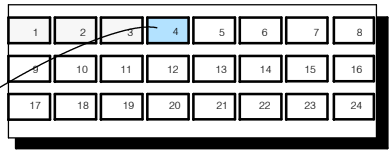
The DL450 has the additional advantage of allowing "bit-of-word" operations. This allows you to turn on individual bits without the the 2-step process of loading hexadecimal values into an accumulator and then outputting it to memory. With the DL450, you merely use the starting number of the 16-bit memory boundary (i.e. V2000) and then use a decimal point followed by the particular number of the bit you want to turn ON. In this example, we want to turn ON bit number 3 because it controls Lamp No. 4. Remember that bits number right to left starting with 0. You can trigger this output using the usual data types or nicknames for open and closed contacts. Here we have used X12 for example.

DL250/350/450 Only

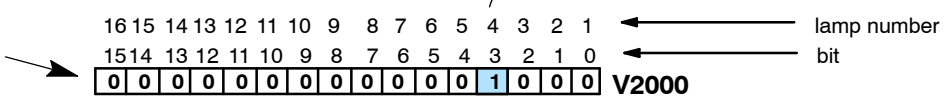
Example showing how to turn ON Lamp No. 4 with a PLC*Direct* DL450 PLC.



Example Memory Locations	Function
V2000	Lamps 1-16 ON/OFF
V2001	Lamps 17-24 ON/OFF
V2002	Lamps 1-16 flash
V2003	Lamps 17-24 flash



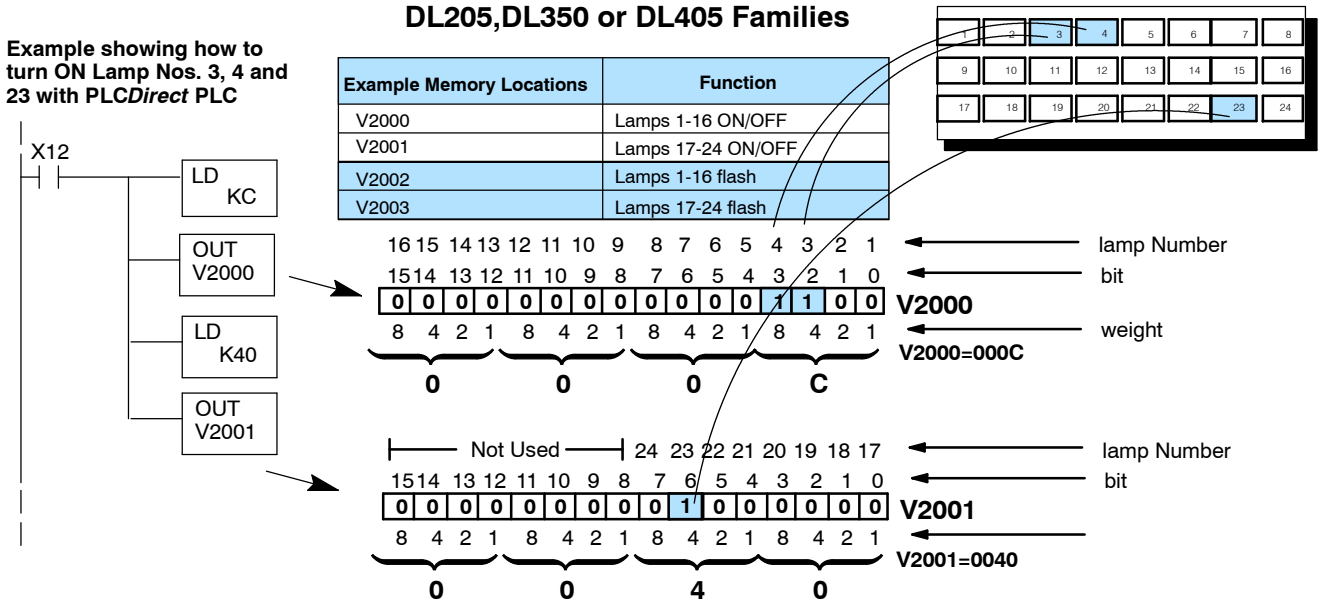
Lamp 4 turns ON



PLC*Direct* Controlling Multiple Lamps with User Memory (DL205/DL350/DL405 Only)

The same process is used for turning ON several lamps as for turning on one lamp. Notice that here we are using both words of memory reserved for ON/OFF control, because we are turning ON lamps in both the top row and the bottom row.

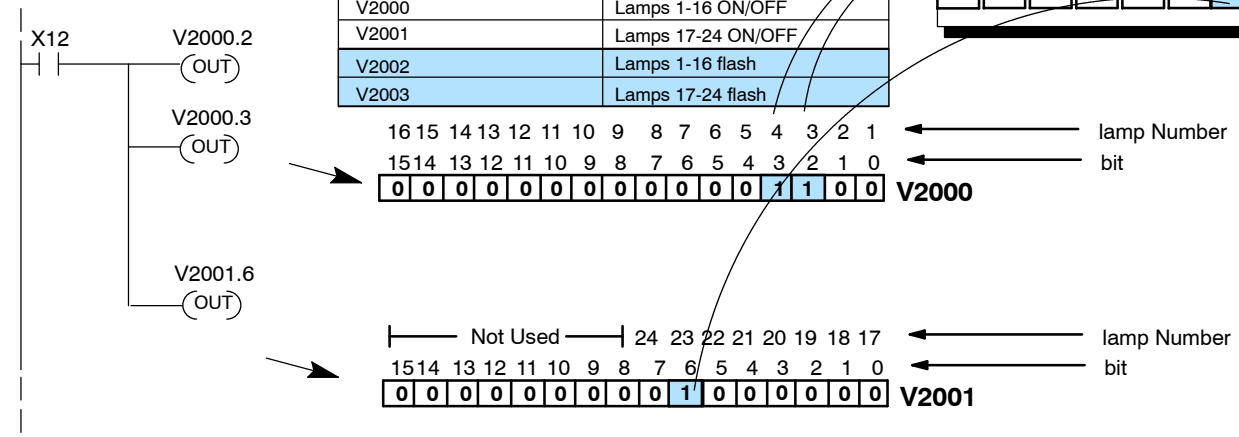
Example showing how to turn ON Lamp Nos. 3, 4 and 23 with PLC*Direct* PLC



PLC*Direct* Controlling Multiple Lamps with Bit-of-Word (DL250/350/450 Only)

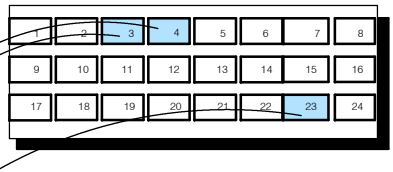
Turning ON more than one lamp when using the DL450 greatly simplifies matters. Because it allows you to use "bit-of-word" opeations, you do not have to calculate a hexadecimal value that will turn on the correct bits. With the DL450, you merely use the starting number of the 16-bit memory boundary (i.e. V2000) and then use a decimal point followed by the particular number of the bit you want to turn ON. In this example, we want to turn ON bit numbers 2, and 3 of V2000; and bit number 4 of V2001 because they control Lamp Nos. 3, 4 and 23. Remember that bits number right to left starting with 0. You can trigger this output using the usual data types or nicknames for open and closed contacts. Here we have used X12 for example.

Example showing how to turn ON Lamp Nos. 3, 4 and 23 with PLC*Direct* DL450 PLC



DL250/350/450 Only

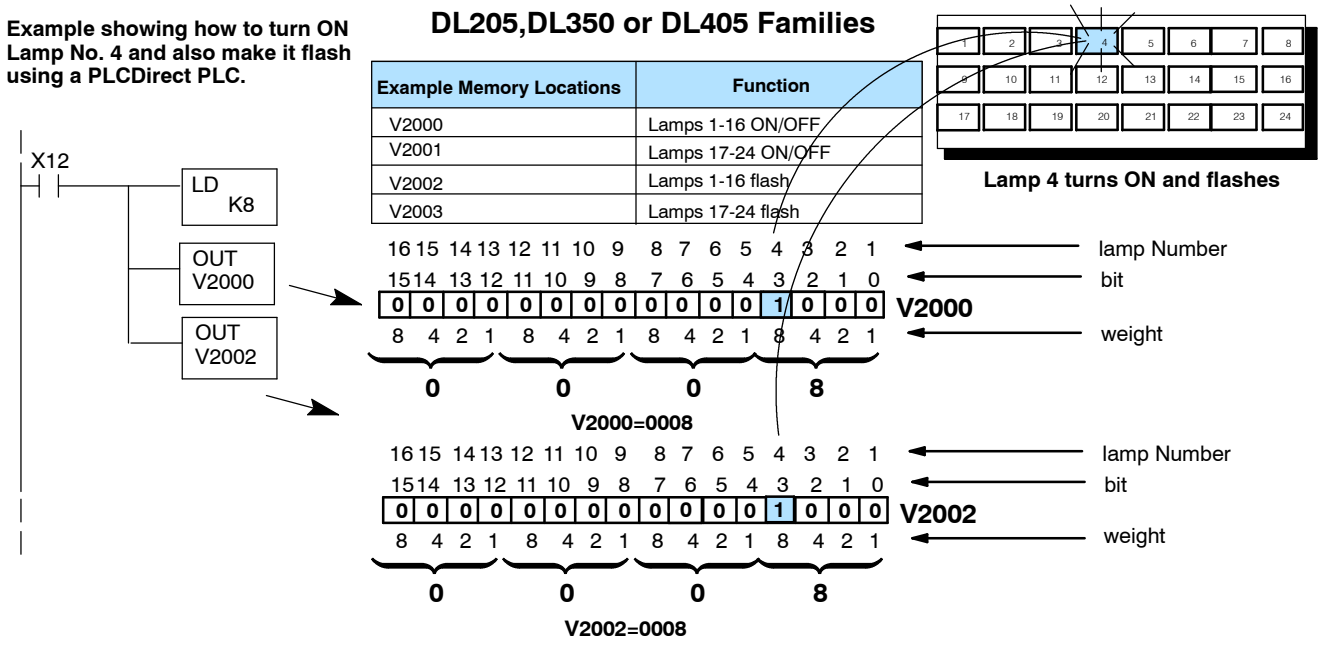
Example Memory Locations	Function
V2000	Lamps 1-16 ON/OFF
V2001	Lamps 17-24 ON/OFF
V2002	Lamps 1-16 flash
V2003	Lamps 17-24 flash



PLC*Direct* Adding the Flashing with User Memory (DL205/DL350/DL405 Only)

Remember from our table on the previous page that bits in V2002 and V2003 control the flashing feature. Notice that you must first turn ON a lamp before you can also make it flash. In other words, in this example, it would not be enough to just turn ON bit 3 in V2002 in order to have the 4th lamp flash. You have to turn ON the bit in V2000 also.

Example showing how to turn ON Lamp No. 4 and also make it flash using a PLCDirect PLC.



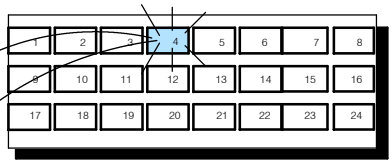
PLC*Direct* Adding Flashing with Bit-of-Word (DL250/350/450 Only)

To add flashing when using the DL450, you can use the "bit-of-word" operation. This precludes you from having to load a hexadecimal number in the accumulator followed by an output to memory. Instead, you merely use the decimal point convention coupled with the V-memory location to designate the bit you want turned ON. In this example, we want to turn ON bit number 3 of V2000 and bit number 3 of V2002. One memory location controls turning ON the lamp, and the other controls adding the flashing feature.

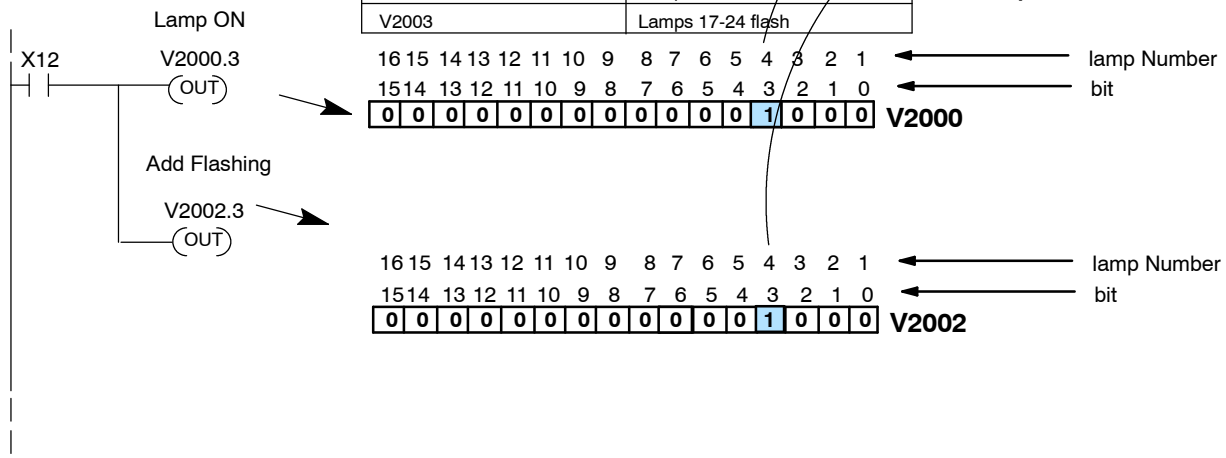
Example showing how to turn ON Lamp No. 4 and also make it flash using a PLCDirect DL450 PLC.

DL250/350/450 Only

Example Memory Locations	Function
V2000	Lamps 1-16 ON/OFF
V2001	Lamps 17-24 ON/OFF
V2002	Lamps 1-16 flash
V2003	Lamps 17-24 flash



Lamp 4 turns ON and flashes

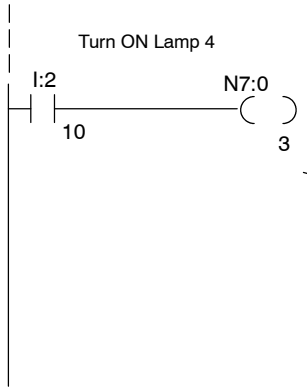


Controlling Lamps with an Allen-Bradley PLC

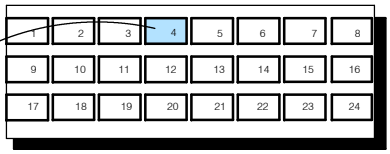
Allen-Bradley Example

The Allen-Bradley interface works much the same as with PLC***Direct***. Although the addressing conventions are quite different, both systems still use consecutive memory words controlling the ON/OFF and flashing of the lamps. In this Allen-Bradley example, we are using an integer file type (N7) with the starting address at 0/0.

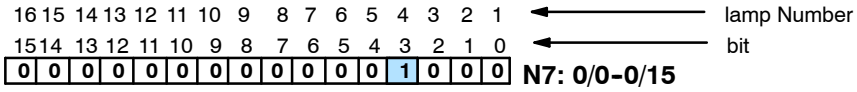
Example showing how to turn ON Lamp No. 4 with an Allen-Bradley PLC.



Memory Location	Function
N7: 0/0–0/15	Lamps 1-16 ON/OFF
N7: 1/0–1/15	Lamps 17-24 ON/OFF
N7: 2/0–2/15	Lamps 1-16 flash
N7: 3/0–3/15	Lamps 17-24 flash



Lamp 4 turns ON

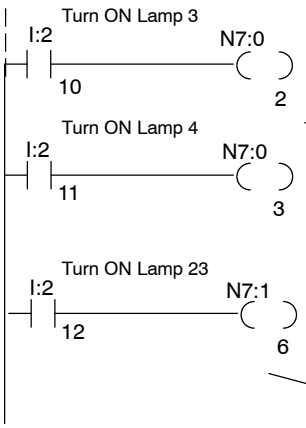


Turning ON Multiple Lamps (Allen-Bradley PLC)

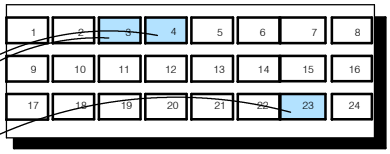
Allen-Bradley Example

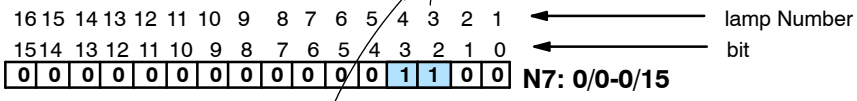
You turn ON multiple lamps in the same manner as turning ON individual lamps. In this example, we are turning ON bits 2 and 3 of N7:0 and turning ON bit 6 in N7:1.

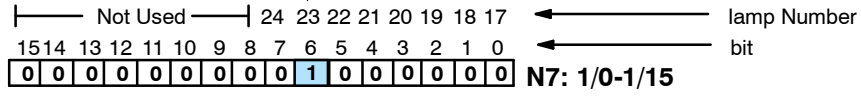
Example showing how to turn ON Lamp Nos. 3, 4 and 23 with Allen-Bradley PLC



Memory Location	Function
N7: 0/0–0/15	Lamps 1-16 ON/OFF
N7: 1/0–1/15	Lamps 17-24 ON/OFF
N7: 2/0–2/15	Lamps 1-16 flash
N7: 3/0–3/15	Lamps 17-24 flash





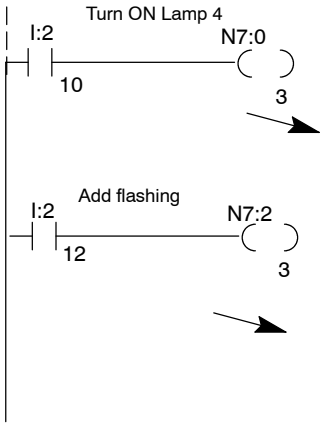


Adding the Flash Option (Allen-Bradley PLC)

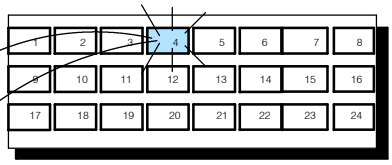
Allen-Bradley Example

Bits in N7:2 and N7:3 control the flashing feature. Notice that you must turn ON the lamp before the flash can be added.

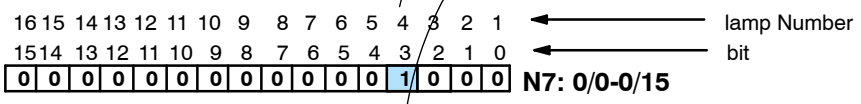
Example showing how to turn ON Lamp No. 4 and also make it flash using an Allen-Bradley PLC.

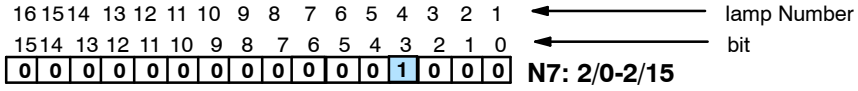


Memory Location	Function
N7: 0/0–0/15	Lamps 1-16 ON/OFF
N7: 1/0–1/15	Lamps 17-24 ON/OFF
N7: 2/0–2/15	Lamps 1-16 flash
N7: 3/0–3/15	Lamps 17-24 flash



Lamp 4 turns ON and flashes

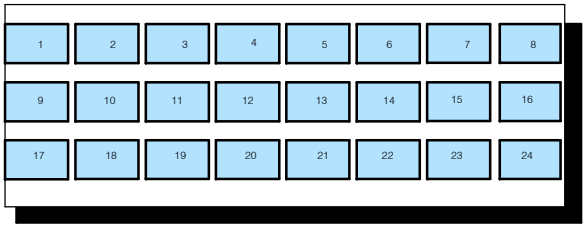




Test Routine for Checking Lamp Operation

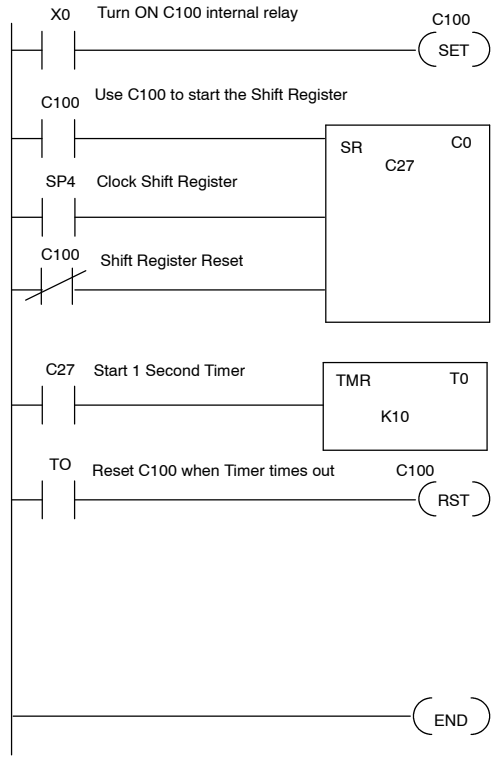
This is a simple test routine for checking the lamp operation for your OP-1124 panel. Notice for PLC***Direct*** we have chosen to use the starting address V40600 which is the starting address for internal control relays (C0–C17). By using the internal control relays, you can avoid having to load hexadecimal values into an accumulator and outputting to V-memory. When the shift register is turned ON, each lamp should turn ON sequentially starting with Lamp 1 and proceeding to Lamp 24. When the Shift Register finally turns ON C27 (Lamp 24), it resets to zero.

For the Allen-Bradley, we are using a starting address of N7:0/0. We have created a Bit Shift Left Register with 25 bits. We are sequentially turning ON bits from left to right in the shift register. This turns on Lamps 1 through 24 one at a time. When the 25th bit is reached, the shift register is reset by loading 0's in each of the bit positions.



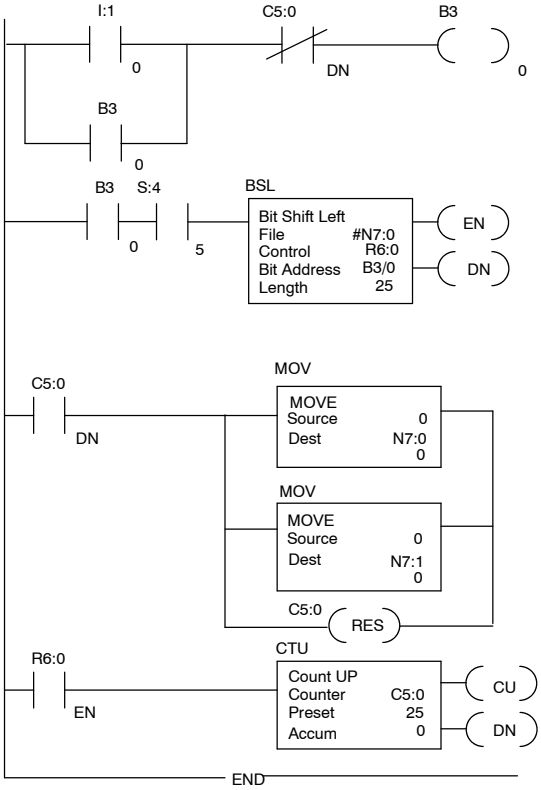
PLC*Direct* Ladder Logic

Control	Row	Address	Relay Bits
ON/OFF	1 and 2	V40600	C0–C17
	3	V40601	C20–C27



Allen-Bradley Ladder Logic

Control	Row	Address
ON/OFF	1 and 2	N7:0/0–0/15
	3	N7:1/0–1/7



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