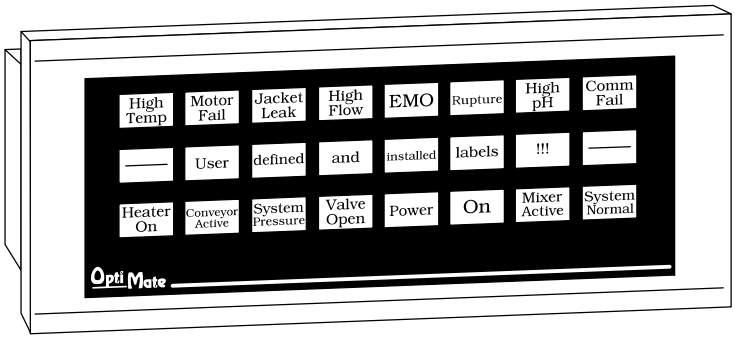
OP-1212

Lamp/Pushbutton Panel

Manual Number OP-1212-M



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Manual Revisions

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

Title: OP-1212 Lamp/Pushbutton Panel
Manual Number: OP-1212-M

Issue	Date	Effective Pages	Description of Changes
Original	11/96	41	Original Issue
Rev. A	5/98	10 15	Added cable OP-2CBL-1 Changes per MU-OP-001, 5/7/97
Rev. B	5/2010	All	Updated manual to present date

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OP-1212 Pushbutton Panel

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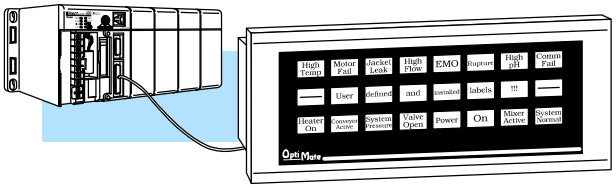
- Getting Started
- Preparing the Labels
- Installing the Panel
- Applying Ladder Logic

Getting Started

The Purpose of this Manual

This manual shows you how to install, operate and maintain the OP-1212 Lamp Pushbutton Panel. It includes wiring diagrams and power requirements, as well as the information you need for selecting the proper connecting cables.



Configuration Software

All OptiMate panels are configured using the OptiMate OP-WINEDIT configuration software.
OP-WINEDIT software is compatible with computers running Windows 95/98/2000/NT/XP.
OP-WINEDIT is ordered as a separate item from the OptiMate panel from AutomationDirect.
The software is loaded onto your personal computer and simple follow the setup instructions in the supplied user manual and the built-in HELP screens.
The software allows setup of your complete application, including the type of PLC being used.
Note that OP-WINEDIT is also used to configure the OP-9001, Communications Master panel. The software can be used with Allen-Bradley PLCs.

Supplemental Manuals

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

- Respective PLC User Manual for the PLC(s) you are using with the OptiMate panel.
- 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.
- ***Direct***SOFT™ User Manual-Shows you how to use the ***Direct***SOFT Windows software to write your ladder logic for ***Direct***LOGIC™ PLCs.

Technical Assistance

If you are not successful with implementing the information in this manual, you may call Automation***Direct*** technical support at (800) 633-0405, Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. The technical support team will work with you to answer 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.

How the OP-1212 Works

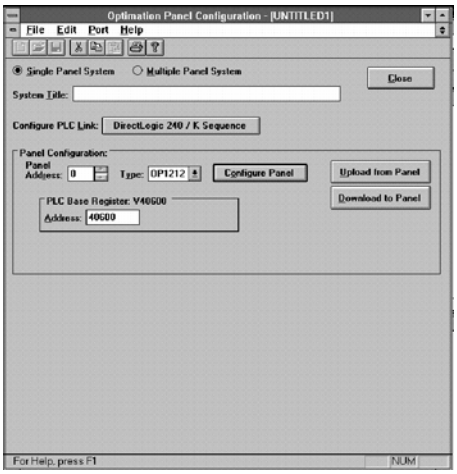
The purpose of the panel is to provide you with both pushbuttons (12) and lamps (12) so that you can have status and control functions that will work with your PLC. An additional benefit of this panel is found in the LEDs that are in the upper left hand corner of each pushbutton. These LEDs can operate as indicators to reflect the status of the individual pushbutton, or they can operate independent of the pushbutton status. The LEDS can turn ON or OFF and even flash for added attention.

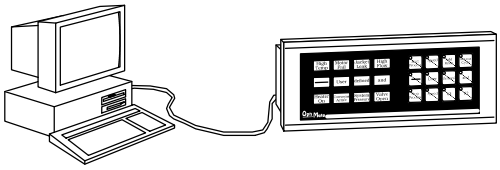
To link the pushbuttons, LEDs, and lamps to your PLC, the OP-1212 uses a technique called “memory mapping”. This technique ties the pushbuttons, LEDs, and lamps to specific reserved areas of memory in the PLC. You can use any available memory as long as it is consecutive.

The base register address is entered during configuration using the OPWinEdit software. Each of the functions for the pushbuttons, LEDs, and lamps are controlled by the status of their assigned bits within the memory words that you have reserved. You interface these words of memory through your ladder logic.

Automation*Direct*

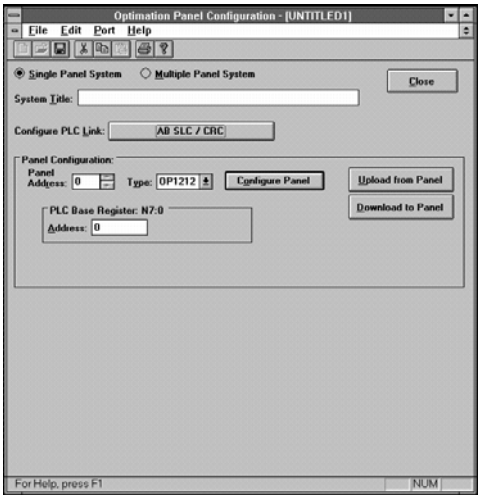
Prior to connecting the OP-1212 to your PLC, load the OP-WINEDIT configuration software onto your personal computer, and begin to define how you want to use the functions that have been designed into the panel. Among other decisions, you are prompted to fill in a base register address. In the example we have shown here, we have used V40600 as the start of the mapped memory addresses.

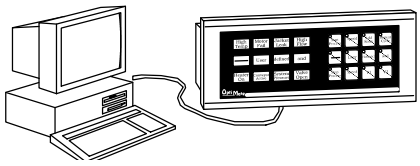




Allen-Bradley

The same OP-WINEDIT configuration software used for the Automation***Direct*** product is also used for the Allen-Bradley product. As you move through the screens, one of the key items you complete is the base register address for storing data relative to the pushbuttons. In the example, we have used N7:0 as the start of the mapped memory addresses. This means the PLC file number is 7 and the base address is 0.

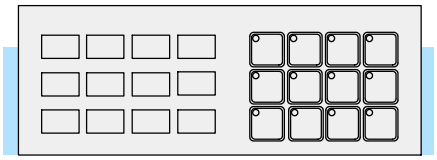




Using the Pushbutton Panel...5 Easy Steps

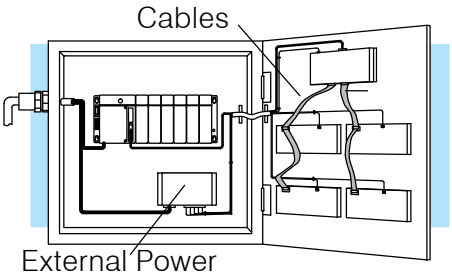
Step 1: Prepare Your Labels (Pages 5-6)

First, you need to prepare the labels for each of the pushbuttons and lamps. The labels insert into plastic sleeves behind the main cover. To access the sleeve, you merely snap loose the front bezel.



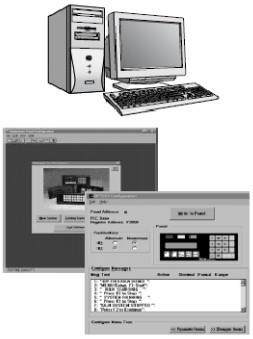
Step 2: Install the Panel (Pages 7-14)

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



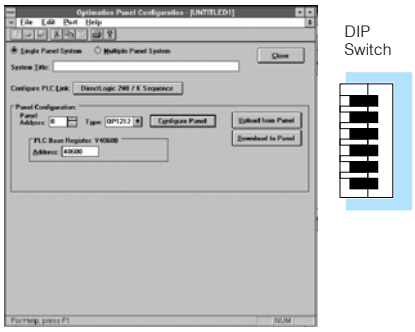
Step 3: Use OP-WINEDIT Software

You will need the OP-WINEDIT configuration software in order to configure the panel and PLC. OP-WINEDIT is ordered as a separate item from the OptiMate panel from Automation***Direct***.
The software is used for both ***Direct***LOGIC and Allen-Bradley PLCs.



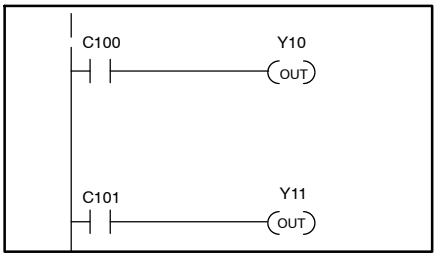
Step 4: Configure the Panel to Work with your PLC (Pages 15)

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 19-31)

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.

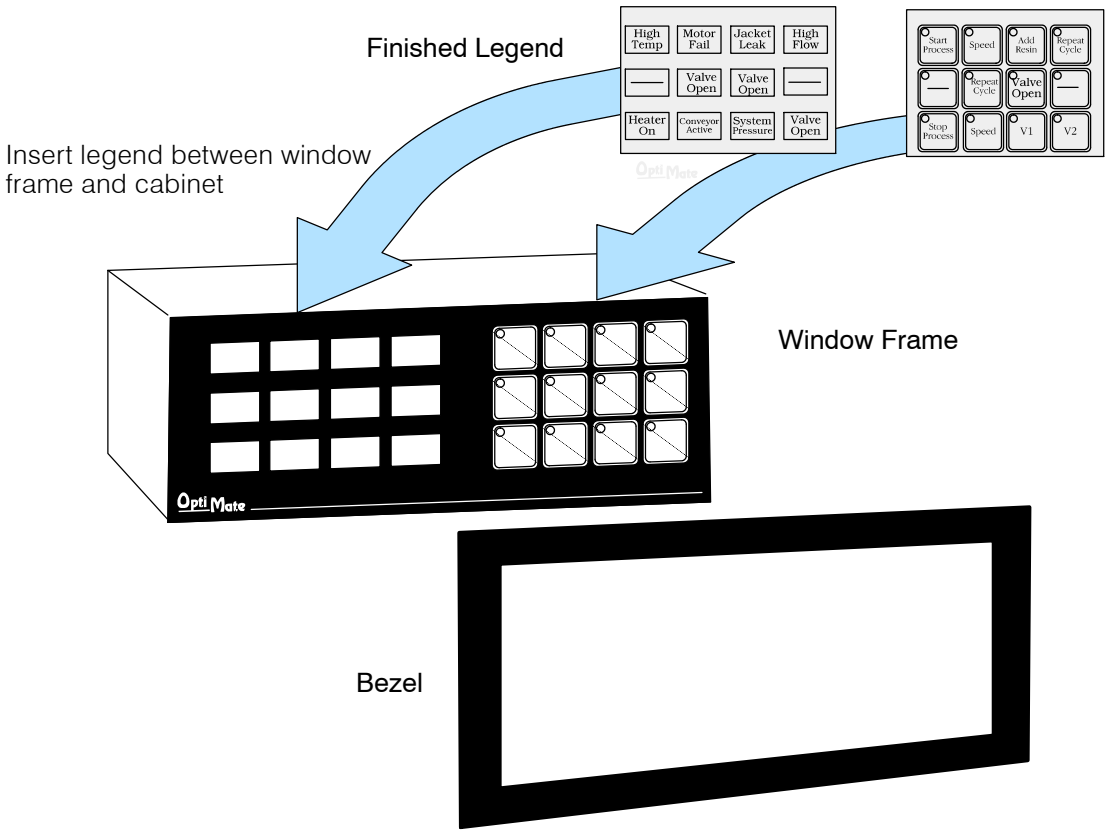


Preparing the Labels

Applying Text to Each Label

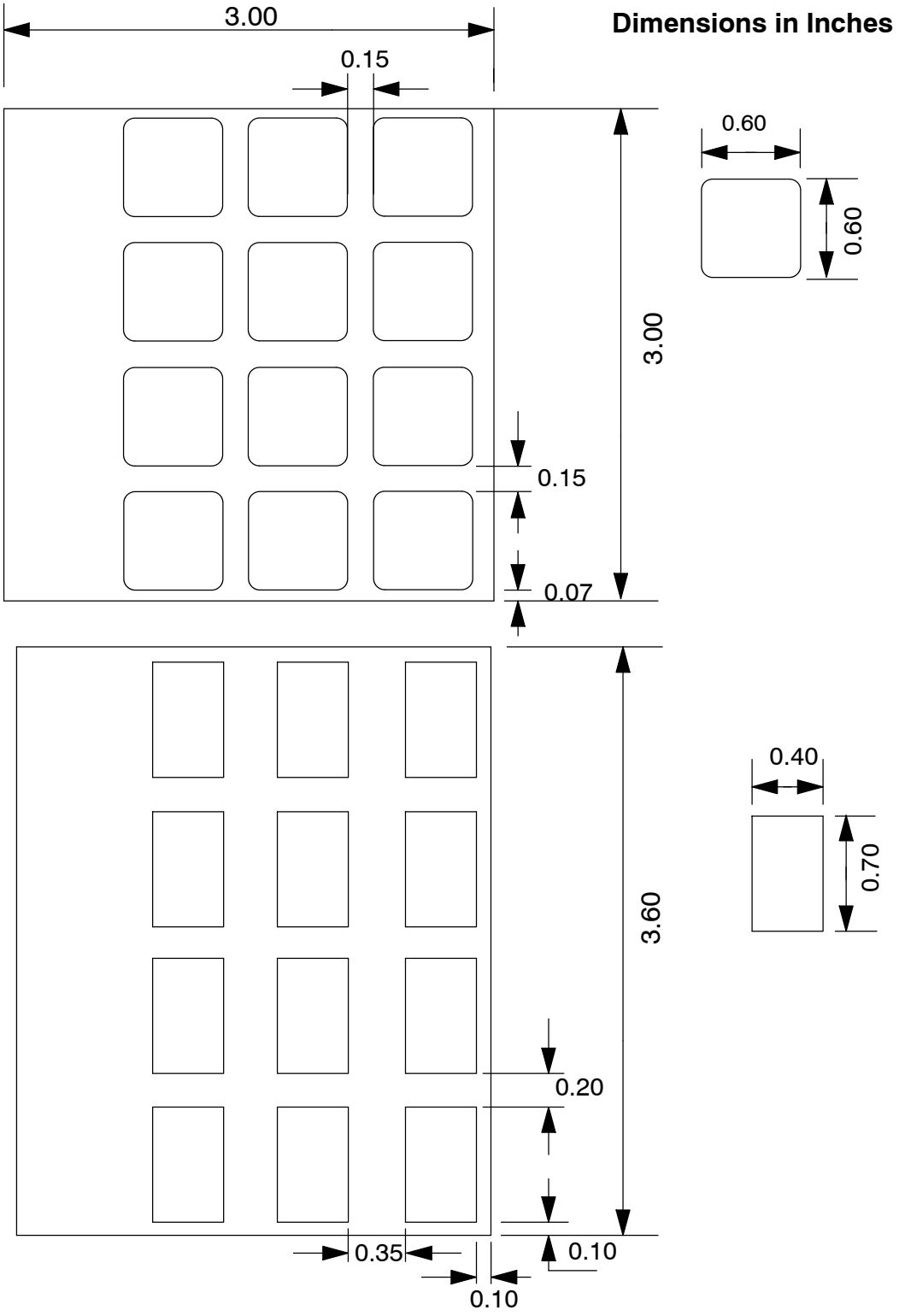
Preparing the labels for the OP-1212 panel requires you to slide a legend transparency into two pockets in the panel overlay. Use the following procedure:

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 template 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. Slide the finished legend into the pocket space between the window frame and LED bars.
4. Re-attach the bezel by snapping the bezel onto the case.

Template for Creating Labels



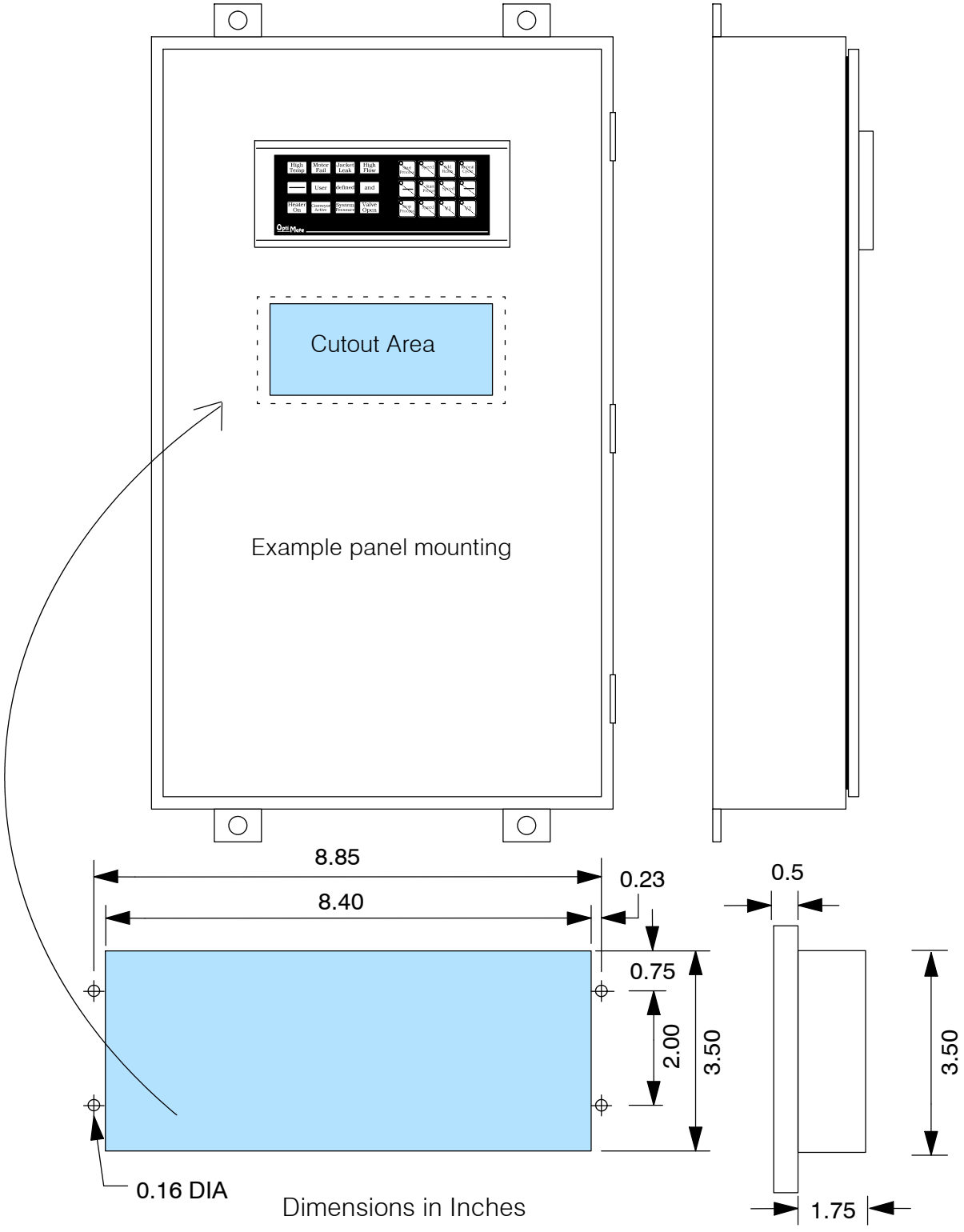
Installing the Panel

In this section you will be given all of the information you need to install the panel. Before actually installing the OP-1212 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	18 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	7 VA @ 8 – 30 VDC 570 mA @ 12 VDC (all Lamps and LEDs ON) 285 mA @ 24 VDC (all Lamps and LEDs 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.

Dimensions for Mounting



Power and Cabling Requirements

What Are Your Application Needs?

Your communication cable requirements depends on your particular application. There are two types of configuration possibilities: point-to-point (a single operator interface connected to a PLC) and multi-drop (multiple operator interfaces connected to a PLC).

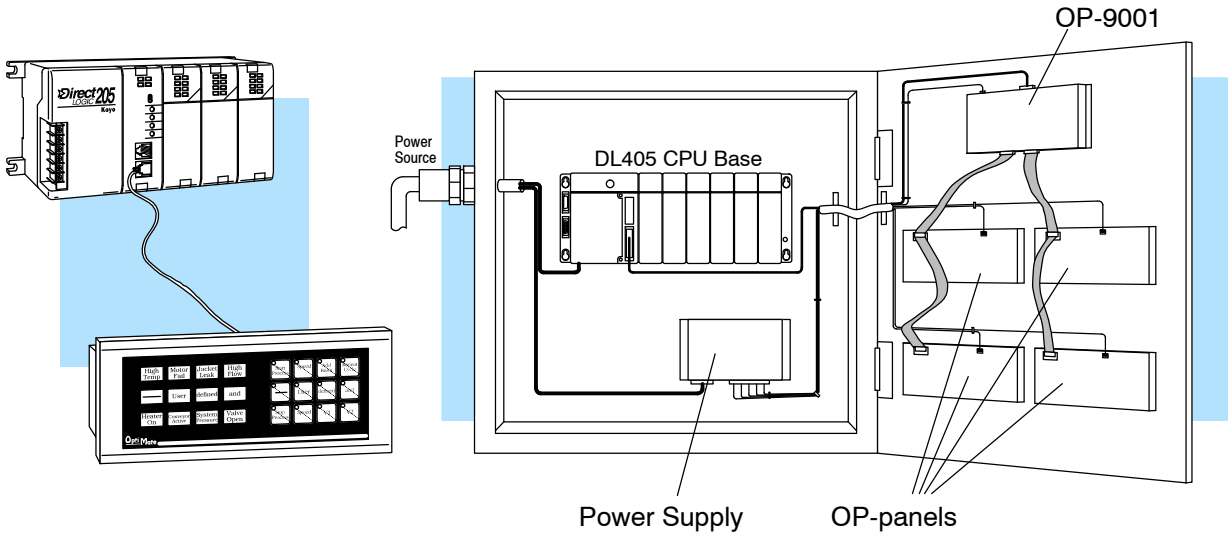
- **Point-to-Point –** If you only need one operator interface connected to one PLC, then choose the appropriate cables from the chart on page 11.
- **Multi-drop –** By using an OptiMate OP–9001 Communications Master, multiple Optimate units can be connected to a single PLC. Up to 31 individual units can be connected in a daisy-chain fashion to the OP–9001. Communications are via RS422 between the OP–9001 and the operator interfaces. When using a quality shielded cable, a total distance of up to 4000 feet between the OP–9001 and the last operator interface unit in the chain can be achieved. If the distance is 30 feet or less, a ribbon cable with easy-to-install crimp-on ribbon connectors can be used.

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.



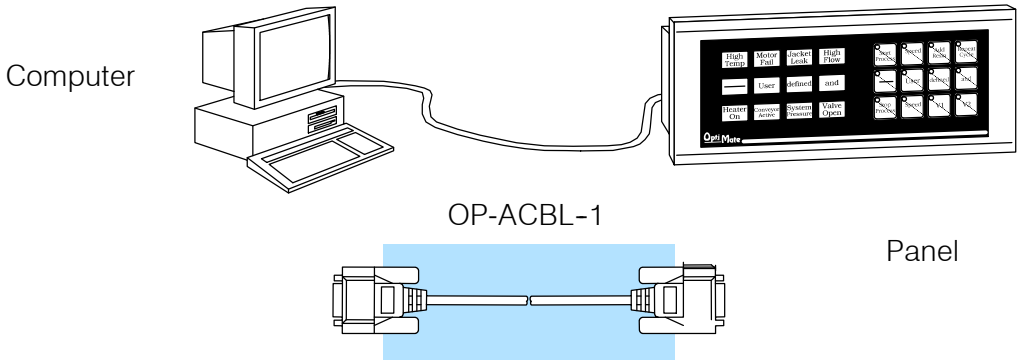
***NOTE:** Please read and follow the cabling requirements in the OP-9001 User Manual (OP-9001-M) when using multiple panels. Failure to follow the guidelines of the User Manual may affect the integrity of the RS422 link, resulting in communication errors.

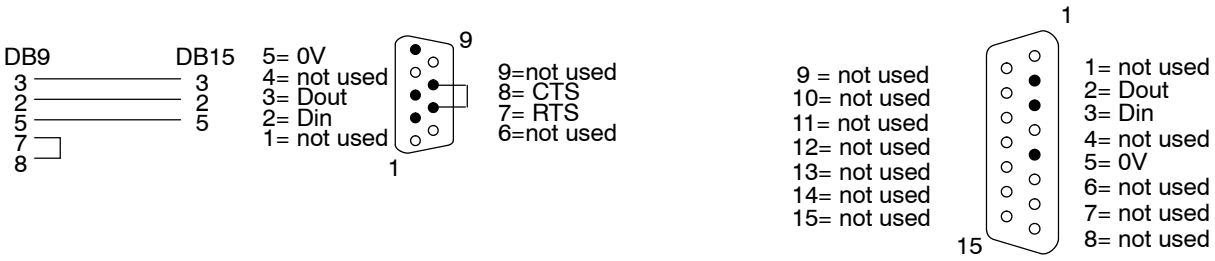
The diagrams shown below give the connector specifications including the pinouts for each end of the available connecting cables.

Programming Cable

The OP-ACBL-1 is used to connect your OP-1212 panel to your computer for programming.

This cable must be used to <u>configure</u> the panel.





PLC to Panel Cable

The OP-ACBL-1 (shown above) is also used <u>to connect Allen-Bradley SLC 5/03 and 5/04 PLCs</u> to an OP-1212 panel. Since the OP-1212 is compatible with all of the ***Direct***LOGIC PLCs, the cabling requirements will vary depending on the PLC type being used. 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.

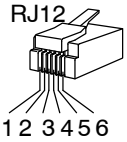
See the next page for matching your PLC to the correct cable.

RJ12 (PLC) DB15

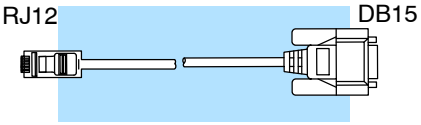
4 — 3
3 — 2
1 — 5

PLC

1= 0V
2= not used
3= Din
4= Dout
5= not used
6= not used



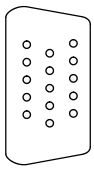
OP-2CBL



15-pin (PLC) DB15

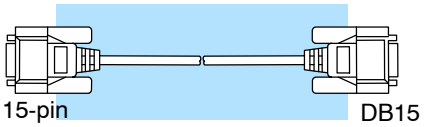
2 — 3
3 — 2
7 — 5
4
5

8= not used
7= 0V
6= not used
5= CTS
4= RTS
3= RXD
2= TXD



15= not used
14= not used
13= not used
12= not used
11= not used
10= not used
9= not used

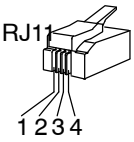
OP-2CBL-1



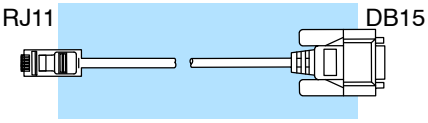
RJ11 (PLC) DB15

2 — 3
1 — 2
4 — 5

1= Din
2= Dout
3= not used
4= 0V



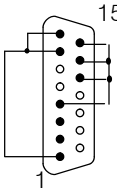
OP-3CBL



DB15 (PLC) DB15

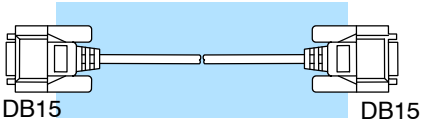
2 — 3
3 — 2
4 — 5
13
14
15
1
7
8

8= YOM
7= CTS
6= not used
5= not used
4= On-line
3= Din
2= Dout
1= YOP



15= tied (0V)
14= tied (0V)
13= tied (0V)
12= not used
11= not used
10= not used
9= not used

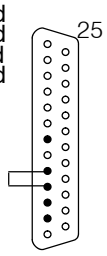
OP-4CBL-1



DB25 (PLC) DB15

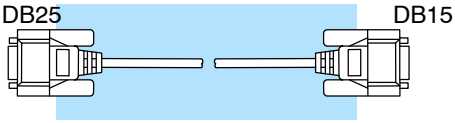
2 — 3
3 — 2
7 — 5
4
5

13= not used
12= not used
11= not used
10= not used
9= not used
8= not used
7= 0V
6= not used
5= CTS
4= RTS
3= Din
2= Dout
1= not used



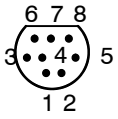
25= not used
24= not used
23= not used
22= not used
21= not used
20= not used
19= not used
18= not used
17= not used
16= not used
15= not used
14= not used

OP-4CBL-2

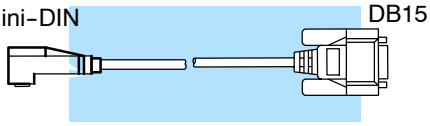


8 Pin Mini DIN DB15

7 — 3
4 — 2
2 — 5



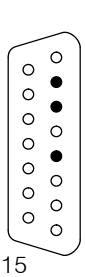
OP-ACBL-2



RS422 Pinout

PLC		Panel
Din +	——	11 = Dout+
Din –	——	12 = Dout –
Dout +	——	9 = Din +
Dout –	——	10 = Din–
0V	——	5 =0V
RTS+		
CTS+		
RTS–		
CTS–		

Panel



9= not used
10= not used
11= not used
12= not used
13= not used
14= not used
15= not used

1= not used
2= Dout
3=Din
4= not used
5= 0V
6= not used
7= not used
8= not used

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 isa 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 PLC.
- **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-ACBL-2:** The 8 Pin Mini-DIN is a non standard connector used for the Micrologix 1000. We recommend using the OP-ACBL-2 cable and modifying the length for any applications between 6.56 - 50 ft.

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. See Page 14 for more information.

OptiMate Cables

Family	CPU (or other device)	Port	Cable
DirectLOGIC DL05	DL05: D0-05	Port 1 (RJ12)	OP-2CBL
		Port 2 (RJ12)	OP-2CBL
DirectLOGIC DL06	DL06: D0-06	Port 1 (RJ12)	OP-2CBL
		Port 2 (15 pin)	OP-2CBL-1
DirectLOGIC DL105	DL105: F1-130	One port (RJ12)	OP-2CBL
DirectLOGIC DL205	D2-230	One port (RJ12)	OP-2CBL
	D2-240	Top port (RJ12)	OP-2CBL
		Bottom port (RJ12)	OP-2CBL
	D2-250-1 D2-260	Top port (RJ12)	OP-2CBL
		Bottom port (15 pin)	OP-2CBL-1
	D2-DCM (module)	Only one (25 pin)	OP-4CBL-2
DirectLOGIC DL305	D3-330	Requires DCU*	OP-4CBL-2
	D3-330P	Requires DCU*	OP-4CBL-2
	D3-340	Top port (RJ11)	OP-3CBL
		Bottom port (RJ11)	OP-3CBL
	D3-350	Top port	OP-2CBL
		Bottom port	OP-4CBL-2
DirectLOGIC DL405	D4-430	Top port (15-pin)	OP-4CBL-1
		Bottom port (25-pin)	OP-4CBL-2
	D4-440	Top port (15-pin)	OP-4CBL-1
		Bottom port (25-pin)	OP-4CBL-2
	D4-450	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, 106	Requires DCU*	OP-4CBL-2
GE® Series 90/30	All models (311-351)	RS422 serial port	Not available
GE® Fanuc™ Series 90 Micro	All models	RS422 serial port	Not available
MODICON	ModBus	RS45	OP-MCBL-1

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

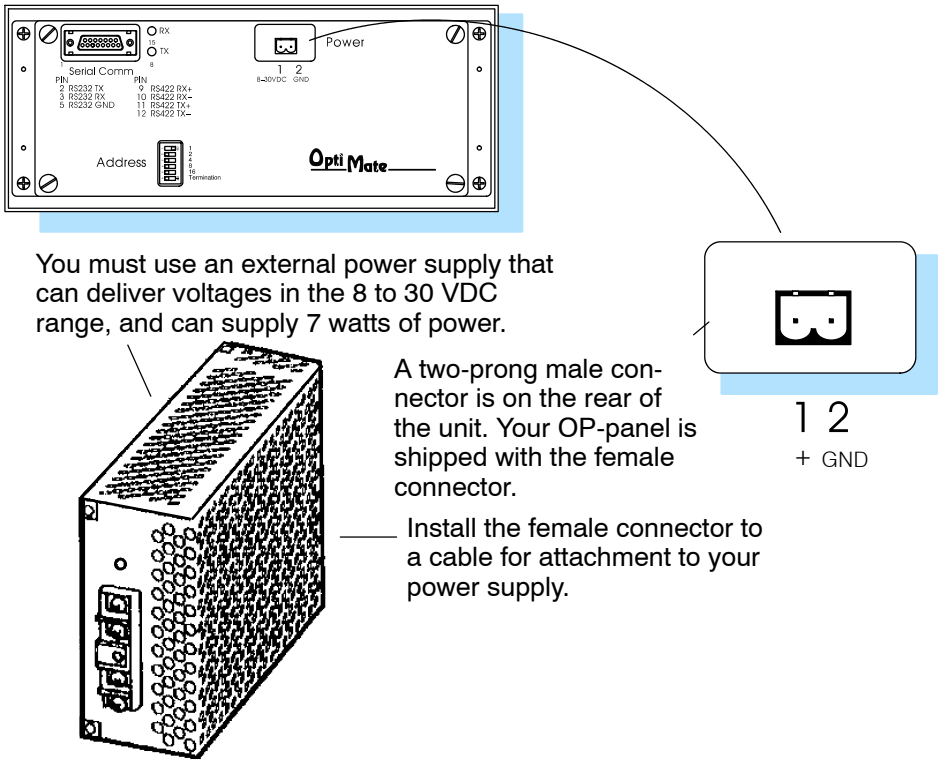
OptiMate Cables (cont'd)			
Family	**CPU (or other device)**	**Port**	**Cable**
TI305™ / SIMATIC® TI305™	325-07, PPX:325-07	Requires DCU*	OP-4CBL-2
	330-37, PPX:330-37	Requires DCU*	OP-4CBL-2
	325S-07 (or 325 w/ Stage Kt)	Requires DCU*	OP-4CBL-2
	330S-37, PPX:330S-37	Requires DCU*	OP-4CBL-2
	335-37, 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-CBL-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	Micrologix1000/1200/1500	One port (8-pin Mini Din)	OP-ACBL-2

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

Connecting a Power Supply

Power Supply Connections

The OP-1212 panel can operate on DC voltages between 8 and 30 VDC rated at 7 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-1212 panel. Pin 1 is the positive connection, while Pin 2 is the negative, or ground, connection.



Model	Current Consumed at 12VDC	Current Consumed at 24VDC
OP-1212	240mA (all Lamps and LEDs OFF)	120mA (all Lamps and LEDs OFF)
	570mA (all Lamps and LEDs ON)	285 mA (all Lamps and LEDs ON)

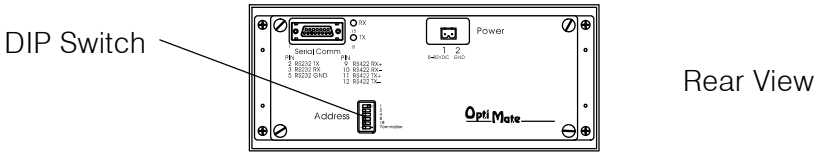
NOTE: Consult our catalog or website, www.automationdirect.com, to purchase a power supply.

Connecting the Panel to your Personal Computer

Assigning an Address to the OP-1212

A 6-position DIP switch on the rear of the OP-1212 is used to assign a hardware address to the panel. Each panel must have a unique address. Any address between 0 and 30 can be used 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.

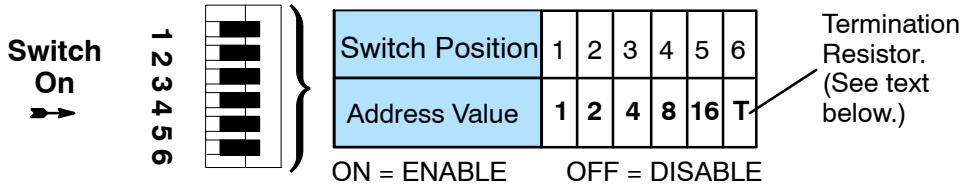
NOTE: You must use Address No. 31 when you are configuring your OP-1212 panel. No other address will work for the configuration process. In a similar manner, if you are connecting more that one OP-panel to a single CPU (through an OP-9001), then the OP-9001 needs to know which set of configuration parameters 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-1212, 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, press switches 2, 3 and 4 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-1212 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 a single panel is used located less than 50 feet from the PLC, use RS232 communication then a termination resistor will not be required (i.e. switch position 6 is turned OFF).

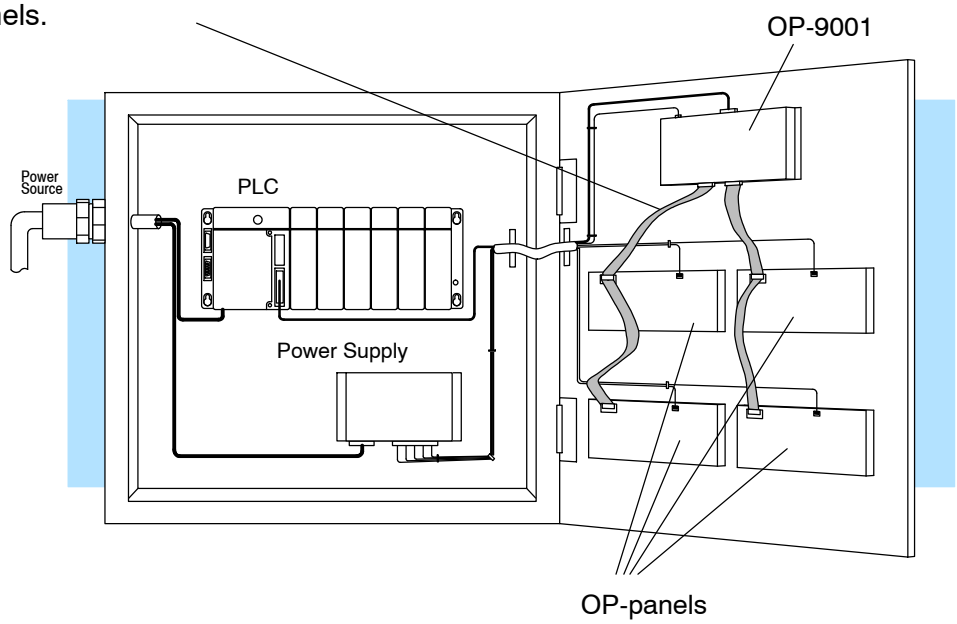
If a panel will be located more than 50 feet from the PLC or multiple panels are used, RS422 ***must*** *be used.* For single panel installations, this means that switch 6 must be enabled (ON). For multi-drop installations, this means **the last panel only** must have switch 6 enabled (ON). All other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

Using the OP-9001 to Connect Multiple Panels

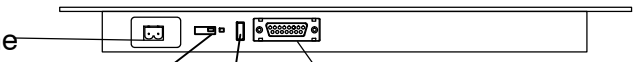
With the addition of the OP-9001 Communications Master panel, you can connect up to 31 panels per a useable CPU port of the PLC. Shown below are the connection requirements. For specifics of the OP-9001 panel itself, please refer to the Communications Master User Manual (OP-9001–M).

NOTE: The OP-9001 must be used in a multiple panel configuration.

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.



Power supply receptacle. Same as the one on the OP-1212. See Page 12.

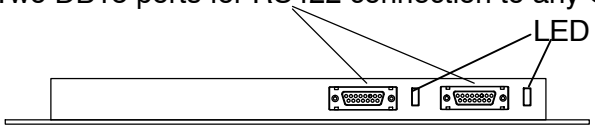


Configuration Jumper

LED

DB15 for connecting to the PLC. See chart on Page 11 for selection of the proper cable.

Two DB15 ports for RS422 connection to any OP-panel.



Belden 9279 Specifications	
No. twisted pairs	2
Nom. Impedance (ohms)	100
Nom. Capacitance (pF/m)	41.0
Wire Gauge (AWG)	24

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.

Understanding the OP-1212 Panel

Overview

The OP-1212 Lamp/Pushbutton panel provides various features and options that can be used together or stand alone with your logic program. The link to the PLC is one of the important aspects of the configuration process. Part of this link is called "memory mapping". Once the panel has been mapped and configured correctly, you will be able to use the many functions the OP-1212 provides. This section will discuss the functions and get you more familiar with the panel itself before showing the actual configuration and programming examples.

Memory Mapping

Memory mapping is a technique that tells the panel what part of the PLC memory you want to use. These memory areas are frequently referred to as registers. Once you have selected a memory address, you will be able to manipulate the data via your ladder logic program. The OP-1212 will occupy a bank of 6 contiguous registers as illustrated in the tables below. In the first table, **m+0** represents the first register of the bank of memory required for mapping the OP-1212. This can be any address in your PLC that can be used for data storage. The second table shows the bit orientation for each panel feature. These mapping assignments will be the same for any PLC type, the only difference being the address location selected for mapping. The information for specific PLC types will be discussed in the ***Applying Ladder Logic*** section.

MSB LSB

				12	11	10	9	8	7	6	5	4	3	2	1		
				12	11	10	9	8	7	6	5	4	3	2	1	**m+0**	← Indicator Lamp
				12	11	10	9	8	7	6	5	4	3	2	1	**m+1**	← Indicator Lamp Flash
				12	11	10	9	8	7	6	5	4	3	2	1	**m+2**	← Button LEDs ON/OFF
				12	11	10	9	8	7	6	5	4	3	2	1	**m+3**	← Button LEDs Flash
				12	11	10	9	8	7	6	5	4	3	2	1	**m+4**	← Button ON/OFF
M1	M2	M3		12	11	10	9	8	7	6	5	4	3	2	1	**m+5**	← Force Data & Comm

Pushbuttons

The 12 pushbuttons on the OP-1212 panel provide a means of control for any process connected to your PLC. The pushbuttons can be configured as either **momentary** or **maintained** (also called alternate). The momentary pushbuttons remain ON for as long as you are manually pressing them while the maintained will change status every time you press them. You can select either operation for each pushbuttons when you are configuring the panel. When the PLC and panel are properly mapped, the pushbuttons are used just like relay contacts. If you refer to the table above, the pushbuttons status will be determined by the status of the bits in the **m+4** memory register.

Lamps

There are 12 Lamps available on the OP-1212 panethat are arranged in 3 rows of four. The panel is shipped with all red Lamps, however, you can order additional red, green, and yellow packs of lamps for more customized arrangements. Refer to our catalog for the lamp kit part numbers and prices.

After the PLC and panel have been properly mapped, the lamps can be activated by writing a 1 to its associated bit in the **m+0** address location. The bit is turned on via your ladder logic usually through activation of a contact. The contact can also be one of the 12 pushbuttons on the OP-1212 panel. We will provide examples of these applications in the ***Applying Ladder Logic*** Section of this manual.

Flashing the Lamps

Another feature of the Lamps is there ability to flash. This feature is also controlled via your ladder logic. The flashing feature requires that the lamp is activated first, then the corresponding bit in memory location **m+1** is activated. Again, this accomplished by activating a coil.

LEDs and Separation Mode

Each of the 12 pushbuttons on the OP-1212 have corresponding LEDs located on the upper left hand corner. The LEDs are usually used as an indication of the pushbutton status however, they can be configured to work independently. When configuring the OP-1212 panel, you have the option to select **LED separation mode**. If this option is selected, the LEDs will work in the same manner as the Lamps using the ladder logic to control the status of the LED. Also, the pushbutton itself **must be configured as a momentary pushbutton**. To activate an LED in this configuration, the appropriate bit in memory location **m+2** must be energized.

Flashing the LEDs

Just like the Lamps, the LEDs have the ability to flash. This feature is also controlled via your ladder logic. The flashing feature requires that the LED is activated first (memory location **m+2**), then the corresponding bit in memory location **m+3** is activated. Again, this is accomplished by activating a coil. As mentioned previously, the LED is used for the status of its associated pushbutton unless it is configured for **LED separation mode**. This also applies to flashing the LEDs independently of the pushbuttons.

Force Functions

The OP-1212 has the capability to "force" a pushbutton ON or OFF through your ladder logic. For example, you might have a pushbutton that starts a process, and you want to turn it off after the process has completed. Pressing the pushbutton would start the process (turns the pushbutton ON) and the ladder logic would turn the pushbutton OFF after the process was complete. Since the pushbuttons **must be configured as maintained (alternate)** for the force function to work, the process would be halted until the pushbutton was activated again. The force function feature and pushbutton option is enabled during the configuration of the panel.

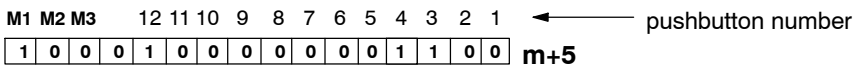
There are three modes of force function available which are located in the three most significant bits of memory location **m+5**.

Mode 1 (M1)-forces all Pushbuttons to reflect the status stored in **m+5**. For example, the data shown below would force Pushbuttons 3, 4 and 12 to ON and all the others would be forced OFF. Notice that bit M1 of **m+5** is set to 1 for this mode. M2 and M3 are set to 0's.

Mode 2 (M2)-forces ON only those Pushbuttons matching the bits set in register **m+5**. The bits not set do not affect the status of the Pushbuttons. You would set M2 to 1 while M1 and M3 are set to 0.

Mode 3 (M3)-forces OFF only those Pushbuttons matching the bits set in register **m+5**. The bits not set do not affect the status of the Pushbuttons. You would set M3 to 1 while M1 and M2 are set to 0.

Force Function Registers



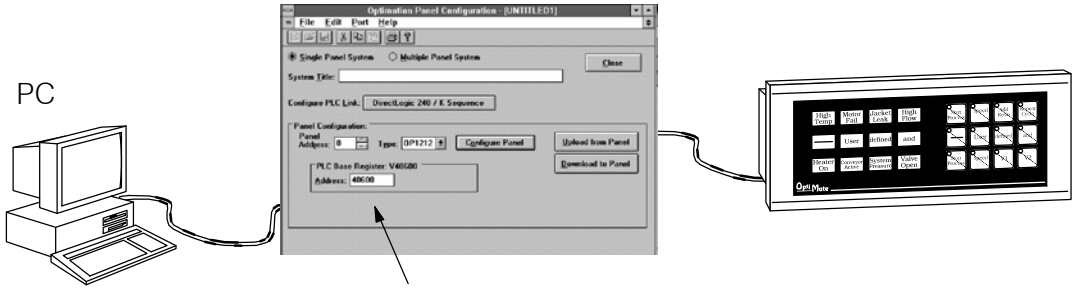
NOTE: Forcing is similar to a one-shot process. That is, once you have set the mode in m+5, the bit patterns in m+4 are changed (according to the mode selected), and then, all of the bits in m+5 are set to zero. What this means is that all pushbuttons return to normal manual operation after the forcing is completed.

Applying Ladder Logic

General Concepts

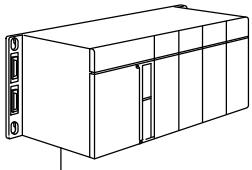
Memory Mapping

The OP-1212 uses memory mapping in order to link itself to a PLC. Memory mapping is a technique that maps the memory of the OP-1212 to the memory of the PLC. During initial configuration, the beginning address must be selected in the PLC memory where the mapping process will start. By knowing where the data of the specific panel is mapped, this data can be moved, changed or monitored using ladder logic.



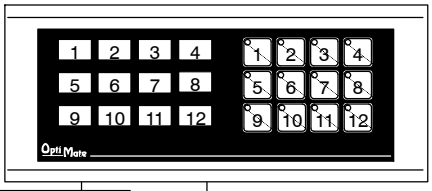
During configuration, you determine the starting address for the memory mapping process.

DirectLOGIC



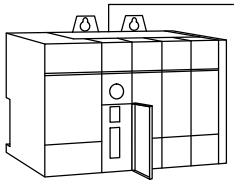
Mapping Assignments

Mapped Memory Location	Function
m+0 (such as V40600) C0-C17	Indicator Lamps ON/OFF
m+1 (such as V40601) C20-C37	Indicator Lamps Flash Control
m+2 (such as V40602) C40-C57	Button LEDs ON/OFF
m+3 (such as V40603) C60-C77	Button LEDs Flash Control
m+4 (such as V40604) C100-C117	Button ON/OFF Status
m+5 (such as V40605) C120-C137	Force Pushbuttons Data & Comnd



The pushbuttons and lamps are numbered left to right starting in the upper left corner of their respective area.

Allen-Bradley



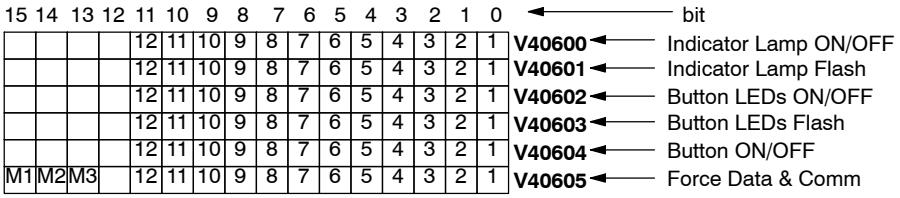
Mapped Memory Location	Function
m+0 (such as N7: 0/0–0/15)	Indicator Lamps ON/OFF
m+1 (such as N7: 1/0–1/15)	Indicator Lamps Flash Control
m+2 (such as N7: 2/0–2/15)	Button LEDs ON/OFF
m+3 (such as N7: 3/0–3/15)	Button LEDs Flash Control
m+4 (such as N7: 4/0–4/15)	Button ON/OFF Status
m+5 (such as N7: 5/0–5/15)	Force Pushbuttons Data & Comnd

Addressing Conventions

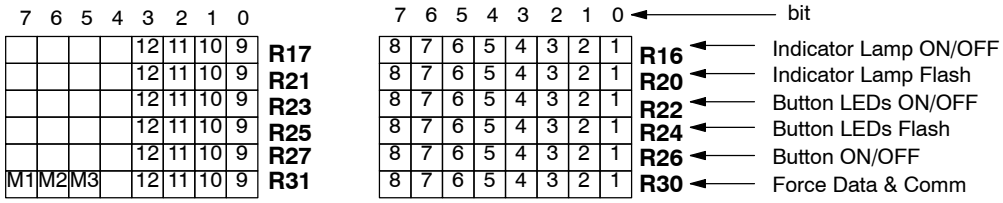
Before going into ladder logic programming, it is good to take a moment to review and compare the addressing conventions used by Automation***Direct*** and Allen-Bradley.

DirectLOGIC **Memory –** A typical address within a ***Direct***LOGIC PLC is Vxxxx, such as V40600 for ***Direct***LOGIC PLCs (DL05, DL06, DL105, DL205, DL350 and DL405 families) and Rxx, such as R16 for the DL305 family. The V-memory in the ***Direct***LOGIC PLCs is divided into 16-bit registers, and the R-memory in the DL305 is divided into 8-bit registers. Refer to your individual User Manuals for complete memory information. The two diagrams below shows how the OP-1212 could be mapped during configuration. In this example, V40600 and R16 have been chosen as starting registers to map the OP-1212 to the PLC, but it could actually be any available user or internal relay memory areas as long as they are consecutive:

DL05, DL06, DL105, DL205 or DL405



DL305



After the address has been selected and mapped, it will allow the ladder logic to treat pushbuttons as contacts and Lamps, and LEDs as coils. The following table is an example of the control relay correlation for ***Direct***LOGIC PLCs to the OP-1212 when the address is configured for V40600. Use the work sheet in **Appendix A** for your application.

Device	Lamp ON/OFF	Lamp Flash	Button LED ON/ OFF	Button LED Flash	Button Status	Force Function
1	C0	C20	C40	C60	C100	C120
2	C1	C21	C41	C61	C101	C121
3	C2	C22	C42	C62	C102	C122
4	C3	C23	C43	C63	C103	C123
5	C4	C24	C44	C64	C104	C124
6	C5	C25	C45	C65	C105	C125
7	C6	C26	C46	C66	C106	C126
8	C7	C27	C47	C67	C107	C127
9	C10	C30	C50	C70	C110	C130
10	C11	C31	C51	C71	C111	C131
11	C12	C32	C52	C72	C112	C132
12	C13	C33	C53	C73	C113	C133
M3						C135
M2						C136
M1						C137

Allen-Bradley Memory-A typical address for Allen-Bradley might be N7:0/0 or N27:0/0. The OP-1212 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, it must be defined in the Allen-Bradley memory map before configuring the panel.* Below diagrams show how 16-bit integer files could be used to map the pushbuttons to the Allen-Bradley PLC.

Integer File Type

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
				12	11	10	9	8	7	6	5	4	3	2	1	**N7: 0/0–0/15** ← Indicator Lamp ON/OFF
				12	11	10	9	8	7	6	5	4	3	2	1	**N7: 1/0–1/15** ← Indicator Lamp Flash
				12	11	10	9	8	7	6	5	4	3	2	1	**N7: 2/0–2/15** ← Button LEDs ON/OFF
				12	11	10	9	8	7	6	5	4	3	2	1	**N7: 3/0–3/15** ← Button LEDs Flash
				12	11	10	9	8	7	6	5	4	3	2	1	**N7: 4/0–4/15** ← Button ON/OFF
M1	M2	M3		12	11	10	9	8	7	6	5	4	3	2	1	**N7: 5/0–5/15** ← Force Data & Comm

bit

User-Defined Integer File Type

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
				12	11	10	9	8	7	6	5	4	3	2	1	**N27: 0/0–0/15** ← Indicator Lamp ON/OFF
				12	11	10	9	8	7	6	5	4	3	2	1	**N27: 1/0–1/15** ← Indicator Lamp Flash
				12	11	10	9	8	7	6	5	4	3	2	1	**N27: 2/0–2/15** ← Button LEDs ON/OFF
				12	11	10	9	8	7	6	5	4	3	2	1	**N27 :3/0–3/15** ← Button LEDs Flash
				12	11	10	9	8	7	6	5	4	3	2	1	**N27: 4/0–4/15** ← Button ON/OFF
M1	M2	M3		12	11	10	9	8	7	6	5	4	3	2	1	**N27: 5/0–5/15** ← Force Data & Comm

bit

After the address has been selected and mapped, it will allow the ladder logic to treat pushbuttons as contacts and Lamps, and LEDs as coils. The following table is an example of the control relay correlation for the SLC or Micrologix to the OP-1212 when the address is configured for N7:0. Use the work sheet in **Appendix A** for your application.

Device	Lamp ON/OFF	Lamp Flash	Button LED ON/ OFF	Button LED Flash	Button Status	Force Function
1	N7:0/0	N7:1/0	N72/0	N7:3/0	N7:4/0	N7:5/0
2	N7:0/1	N7:1/1	N7:2/1	N7:3/1	N7:4/1	N7:5/1
3	N7:0/2	N7:1/2	N7:2/2	N7:3/2	N7:4/2	N7:5/2
4	N7:0/3	N7:1/3	N7:2/3	N7:3/3	N7:4/3	N7:5/3
5	N7:0/4	N7:1/4	N7:2/4	N7:3/4	N7:4/4	N7:5/4
6	N7:0/5	N7:1/5	N7:2/5	N7:3/5	N7:4/5	N7:5/5
7	N7:0/6	N7:1/6	N7:2/6	N7:3/6	N7:4/6	N7:5/6
8	N7:0/7	N7:1/7	N7:2/7	N7:3/7	N7:4/7	N7:5/7
9	N7:0/8	N7:1/8	N7:2/8	N7:3/8	N7:4/8	N7:5/8
10	N7:0/9	N7:1/9	N7:2/9	N7:3/9	N7:4/9	N7:5/9
11	N7:0/10	N7:1/10	N7:2/10	N7:3/10	N7:4/10	N7:5/10
12	N7:0/11	N7:1/11	N7:2/11	N7:3/11	N7:4/11	N7:5/11
M3						N7:5/13
M2						N7:5/14
M1						N7:5/15

Three Different Ways to Use the Panel

Depending on the type of CPU and the number of OP-1212 functions selected, there are three different ways to interface your ladder logic with the panel.

Bit-of-Word

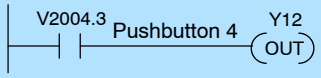
Internal Relays

User Memory Combined with Internal Relays

Which of these methods is best for you depends on the make and model of the PLC you are using.

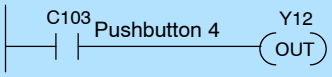
Method 1: Bit-of-Word *Direct*LOGIC and Allen-Bradley

The most direct way to address the individual bits with your ladder logic is to use "bit-of-word". This method is available in the DL05, DL06, DL250, DL350 and DL450 ***Direct***LOGIC PLCs and SLC 5/03 and 5/04 Allen-Bradley PLCs. Below is a rung of logic that shows how a ***Direct***LOGIC PLC might use the status of bit 3 to control a process connected to Y12. This function will be covered in more detail further on the next page for ***Direct***LOGIC PLCs. **Refer to page 31 for Allen-Bradley.**



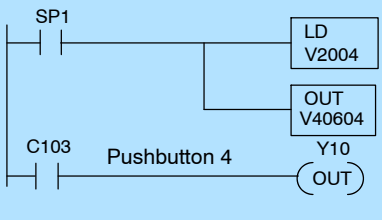
Method 2: Internal Relays (All Options Used)

This method is only available for Automation***Direct*** programmable controllers. If you are already familiar with ***Direct***LOGIC PLCs, then you know about internal relays. These relays, by PLC design, are mapped to certain bits in reserved memory areas. These relays can be mapped during configuration with OP-WINEDIT by mapping directly to the control relay reserved memory area. **Only use this method if *all of the functions are going to be used* in the panel; otherwise it will consume internal relays unnecessarily.** Using this method automatically consumes 96 internal relays. In the example below, one of the mapped pushbuttons is used to control the output Y12. **Refer to Pages 24-25.**



Method 3: Remapping (Selected Options)

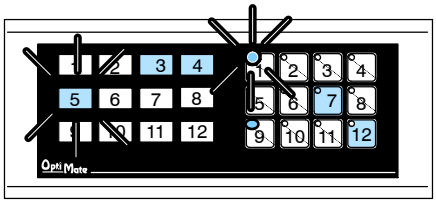
A better way to make use of internal relays when you are not using all of the OP-1212 functions is to use a process of "remapping". With this technique the panel is mapped to the user memory (such as V2000), then maps part of the user memory only to those relays actually needed to be used. The example below shows ladder logic necessary to use a pushbutton. It maps V2004 to V40604 and consumes only 16 relays. The point is-it uses only the relays necessary for the option you have selected. More examples will be in the following pages. **By convention, in this manual, syntax of the form V2000:V40600 is used to refer to memory locations that have been mapped together**. **Refer to Pages 26-30 for ladder logic examples.**



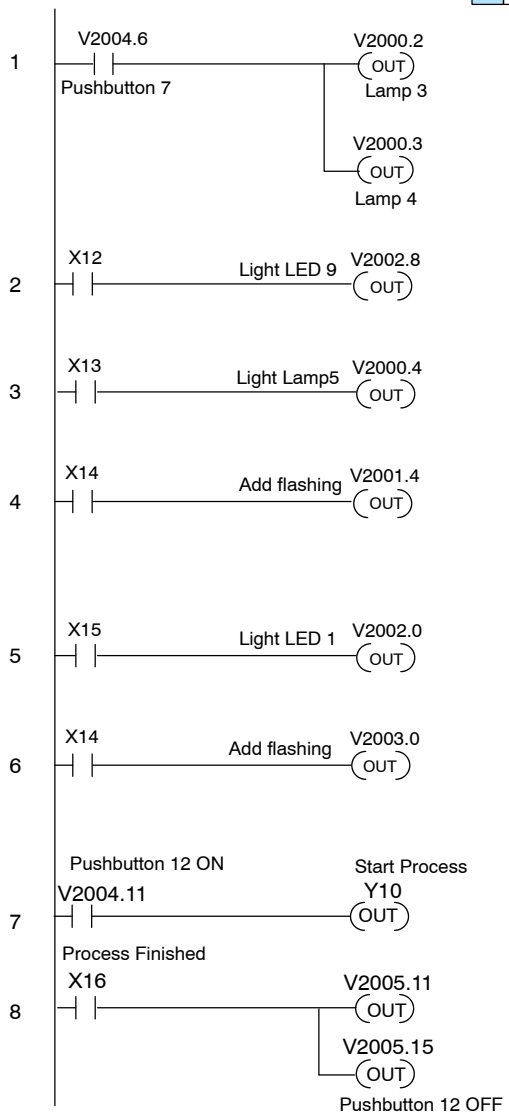
Using Bit-of-Word with the OP-1212

Using Ladder Logic

DiredtLOGIC PLCs (DL05, DL06, DL250, DL350 and DL450) all use the bit-of-word instructions. (Refer to your particular PLC user guide). The example program shown below uses a base register address of **V2000** to map the status of the pushbuttons, lamps, and LEDs. The ladder logic example provides a simple use for all of the panel features. If you are unfamiliar with any of the panel features, please refer to ***Understanding the OP-1212 Panel***. The table shows which bits the program sets.



	12	11	10	9	8	7	6	5	4	3	2	1	← device number
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	← bit
V2000 Indicator Lamp ON/OFF	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	
V2001 Indicator Lamp Flash	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
V2002 Button LEDs ON/OFF	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	
V2003 Button LEDs Flash	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
V2004 Button ON/OFF	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
V2005 Force Data & Comm	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0



Rung 1 - Pushbuttons and Lamps
When pushbutton 7 is activated Lamps 3 and 4 turn ON.

Rung 2 - LEDs
When contact X12 is ON, LED 9 turns ON
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 3 and 4 -Flashing Lamps
To flash a Lamp, it must first be turned ON. When contact X13 is activated Lamp 5 will turn ON and when contact X14 is activated the Lamp will flash.

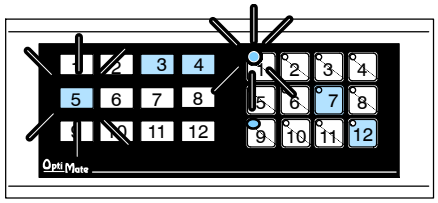
Rungs 5 and 6 - Flashing LEDs
To flash an LED, it must first be turned ON. When contact X15 is activated, LED 1 will turn ON and when contact X14 is activated the LED will flash.
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 7 and 8 - Force Function
When pushbutton 12 is pressed, process Y10 is started.When the process is completed it activates contact X16 which forces pushbutton 12 OFF.
NOTE: The pushbuttons must be configured as maintained (alternate) and the panels "Force Function" feature must be enabled.

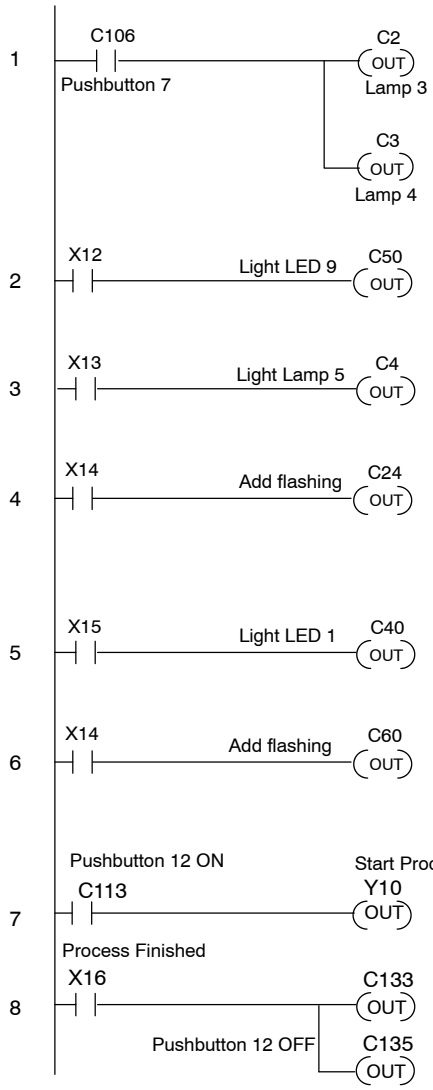
Using All Functions with *Direct*LOGIC PLCs

Using Ladder Logic

When configuring the OP-1212, a base address must be selected in the CPU. This address can be a *direct* mapping to the reserved memory locations that are tied to internal relays. The internal relays of ***Direct***LOGIC PLCs (DL05, DL06, DL105, DL205, DL350 and DL405) start at **V40600**. Using this method, the total mapping consumes 96 internal relays, which 75 are assigned to operator functions. This method is only used when all of the OP-1212 functions are utilized. In the examples below, **V40600** has been chosen as the starting address for ***Direct***LOGIC PLCs. *Notice that the internal control relays are numbered in octal and not decimal.*



	12	11	10	9	8	7	6	5	4	3	2	1	← device number
17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0	← Internal Relay
0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	**V40600** Indicator Lamp ON/OFF
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**V40601** Indicator Lamp Flash
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	**V40602** Button LEDs ON/OFF
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**V40603** Button LEDs Flash
0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	**V40604** Button ON/OFF
0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	**V40605** Force Data & Comm



Rung 1 – Pushbuttons and Lamps
When pushbutton 7 is activated Lamps 3 and 4 turn ON.

Rung 2 – LEDs
When contact X12 is ON, LED 9 turns ON
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 3 and 4 –Flashing Lamps
To flash a Lamp, it must first be turned ON When contact X13 is activated Lamp 5 will turn ON and when contact X14 is activated the Lamp will flash.

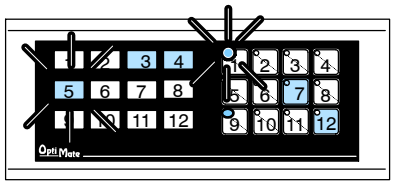
Rungs 5 and 6 – Flashing LEDs
To flash an LED, it must first be turned ON. When contact X15 is activated, LED 1 will turn ON and when contact X14 is activated the LED will flash.
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 7 and 8 – Force Function
When pushbutton 12 is pressed, process Y10 is started.When the process is completed, it activates contact X16 which forces pushbutton 12 OFF.
NOTE: The pushbuttons must be configured as maintained (alternate) and the panels ”Force Function” feature must be enabled.

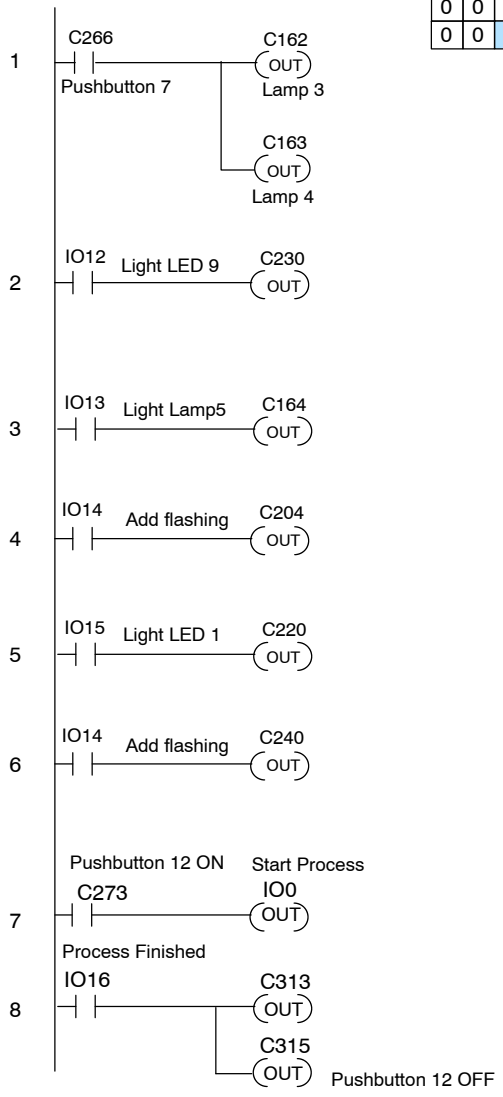
Using All Functions with the DL305 PLCs

Using Ladder Logic

When configuring the OP-1212, a base address must be selected in the CPU. This address can be a *direct* mapping to the reserved memory locations that are tied to internal relays. The internal relays of the DL305 family start at **R16**. Using this method, the total mapping consumes 96 internal relays, of which 75 are assigned to operator functions. This method should only be used when all of the OP-1212 functions are utilized. In the examples below, **R16** has been chosen as the starting address for the DL305. *Notice that the internal control relays are numbered in octal and not decimal.*



	12	11	10	9	8	7	6	5	4	3	2	1	← device number	
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	← internal relay	
R17	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	**R16**	Indicator Lamp ON/OFF
R21	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**R20**	Indicator Lamp Flash
R23	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	**R22**	Button LEDs ON/OFF
R25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**R24**	Button LEDs Flash
R27	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	**R26**	Button ON/OFF
R31	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	**R30**	Force Data & Comm



Rung 1 - Pushbuttons and Lamps
When pushbutton 7 is activated, Lamps 3 and 4 turn ON.

Rung 2 - LEDs
When contact IO12 is ON, LED 9 turns ON.
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 3 and 4 -Flashing Lamps
To flash a Lamp, it must first be turned ON When contact IO13 is activated Lamp 5 will turn ON and when contact IO14 is activated the Lamp will flash.

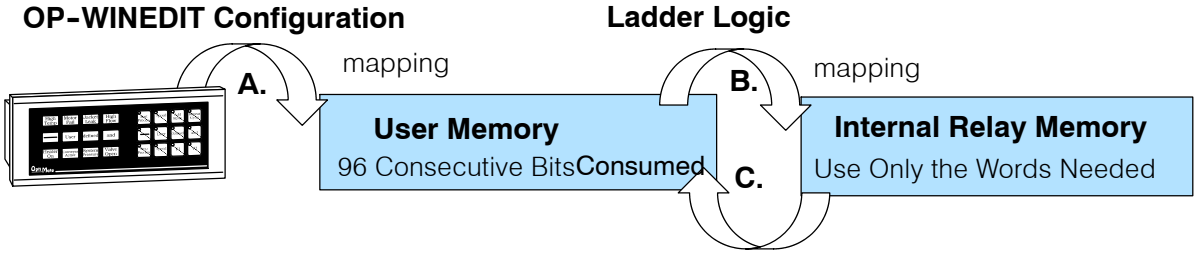
Rungs 5 and 6 - Flashing LEDs
To flash an LED, it must first be turned ON. When contact IO15 is activated, LED 1 will turn ON and when contact IO14 is activated the LED will flash.
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 7 and 8 - Force Function
When pushbutton 12 is pressed, process IO0 is started.When the process is completed, it activates contact IO16 which forces pushbutton 12 OFF.
NOTE: The pushbuttons must be configured as maintained (alternate) and the panels "Force Function" feature must be enabled.

Using Selected Functions with *Direct*LOGIC PLCs (not DL305 PLCs)

Using the Remapping Process

The "remapping" process has been briefly discussed as a method that allows you to easily manipulate individual bits to take advantage of the panels several functions. All the functions are bit-controlled. By using this method, the number of relays actually needed for the selected functions are consumed.



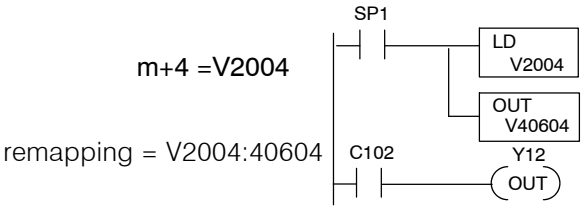
Using the remapping method, the panel configuration will automatically consume 96 consecutive memory bits in PLC User Memory (this occurs when the base register address is configured with OP-WINEDIT). This is indicated by the arrow A. But since User Memory doesn't provide bit control, the User Memory will need to be remapped with Internal Relay Memory. By remapping between User Memory and Internal Relay Memory, the Relay Memory needed will be consumed. There are two directions in which the ladder logic can be programmed to do the remapping between User Memory and Internal Relay Memory:

For using the Pushbutton Status to control outputs, write ladder logic to map User Memory to Internal Relay Memory (arrow B). This affects the User Memory in the **m+4** location.

For controlling all other functions of the panel, write the ladder logic to map Internal Relay Memory to User Memory (arrow C). This affects the User Memory in locations **m+0** through **m+3** and **m+5**.

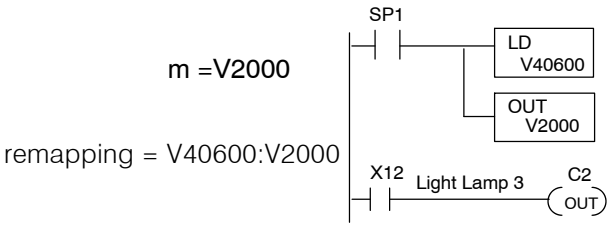
The two relay ladder examples of remapping below demonstrate the two types of remapping that can be used with this technique. Assume that V2000 was used as the base register address:

Example of User Memory being mapped to Internal Relay Memory



Here we are using SP1 to map V2004 to V40604. This consumes 16 relay bits, 12 of which are tied to the 12 pushbuttons of the panel. By pressing Pushbutton 3, you affect the status of the third relay in V40604 which is C102. In turn, C102 will control output Y12.

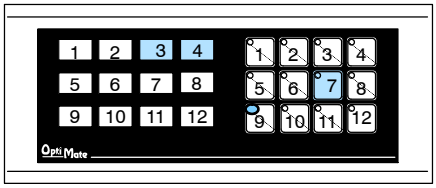
Example of Internal Relay Memory being mapped to User Memory

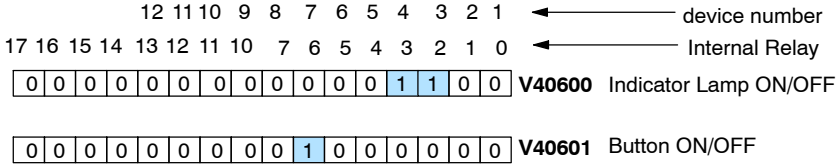


Here we are using SP1 to map V40600 to V2000. This consumes 16 relay bits, 12 of which are tied to the 12 Lamps of the panel. When a relay is ON, its corresponding Lamp is ON. By turning ON X12 with our ladder logic, we can thus turn on the Lamp corresponding to C2. C2 is bit 2 of the V40600 word and is tied to Lamp 3 through the mapping process. See your PLC User Manual for relay number assignments

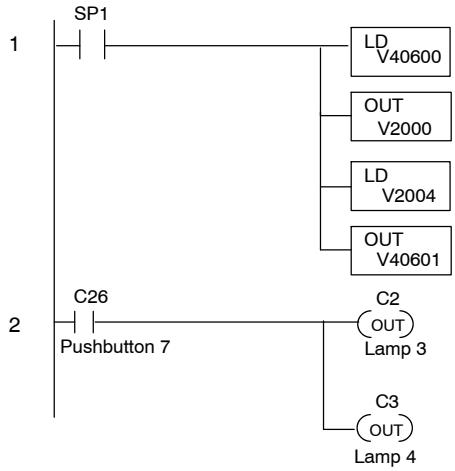
Using Ladder Logic with *Direct*LOGIC PLCs

In the following examples, user memory will be remapped to internal relay memory. The internal relays of ***Direct***LOGIC PLCs (DL05, DL06, DL105, DL205, DL350 and DL405) start at V40600. In the examples below, **V2000** has been used as the base address for a ***Direct***LOGIC PLC, then **SP1** (always ON relay) is used in the ladder logic to perform the remapping. When using **SP1**, the remapping is performed on each scan, otherwise **m+0** and **m+1** would not be updated.





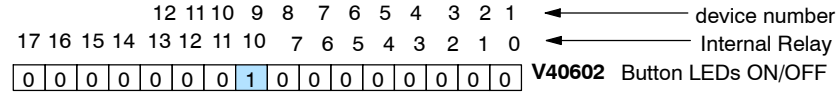
MAPPING PUSHBUTTONS AND LAMPS

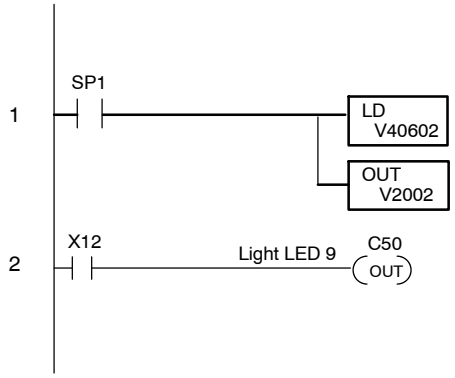


Rung 1 – Mapping User Memory to Internal Relays
The first steps remap the Internal Relay Memory to User Memory for the lamps to function. The second step remaps the User Memory to the Internal Relay Memory for the operation of the pushbuttons.

Rung 2 – Pushbuttons and Lamps
When pushbutton 7 is activated Lamps 3 and 4 turn ON.

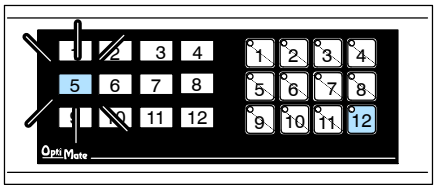
MAPPING LEDS





Rung 1 – Mapping Internal Relays to User Memory
This step remaps the Internal Relay Memory to User Memory for the LEDs to function.

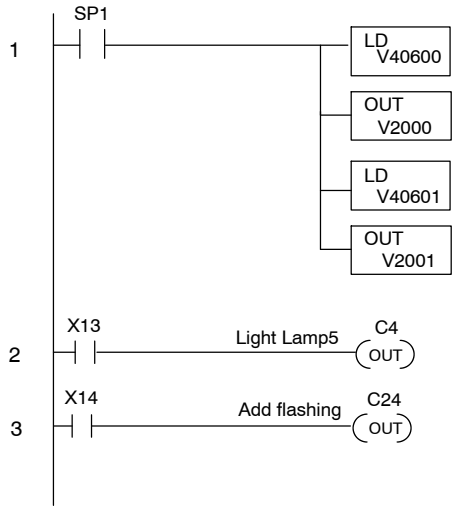
Rung 2 – LEDs
When contact X12 is ON, LED 9 turns ON
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.



	12	11	10	9	8	7	6	5	4	3	2	1	
	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0	
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**V40600** Indicator Lamp ON/OFF
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**V40601** Indicator Lamp Flash

device number
Internal Relay

MAPPING LAMPS AND FLASH FEATURE



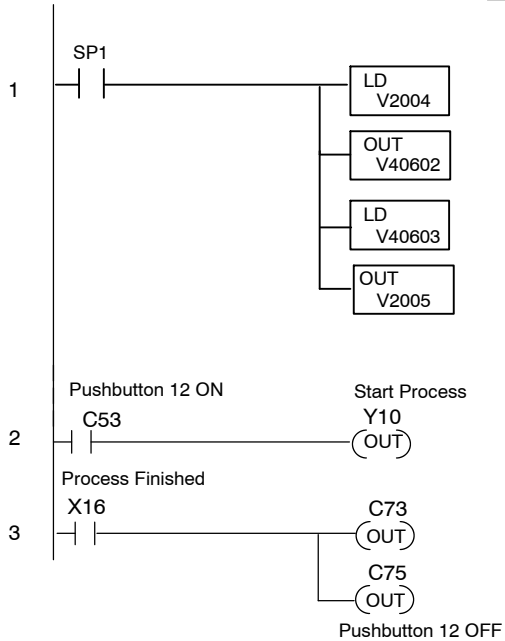
Rung 1 - Mapping Internal Relays to User Memory
This step remaps the Internal Relay Memory to User Memory for the Lamps and their flashing feature. These steps will be the same except for the address location for the LED flash option.

Rungs 2 and 3 -Flashing Lamps and LEDs
To flash a Lamp or LED, it must first be turned ON When contact X13 is activated, Lamp 5 will turn ON and when contact X14 is activated the Lamp will flash. These steps are the same for the LED flash option with the exception of the internal relay number.
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

MAPPING PUSHBUTTONS AND FORCE FUNCTION FEATURE

	12	11	10	9	8	7	6	5	4	3	2	1	
	17	16	15	14	13	12	11	10	7	6	5	4	3	2	1	0	
	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**V40602** Button ON/OFF
	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	**V40603** Force Data & Comm

device number
Internal Relay

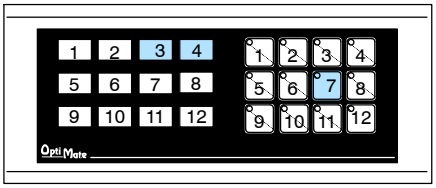


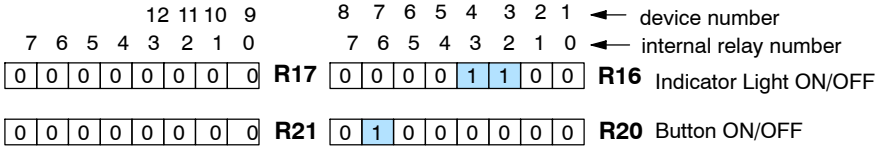
Rung 1 - Mapping User Memory to Internal Relays
These steps remap the User Memory to Internal Relay Memory for the Force Function feature. The first step maps the pushbutton control and the second step maps the Force Function feature.

Rungs 2 and 3 - Force Function
When pushbutton 12 is pressed, process Y10 is started.When the process is completed it activates contact X16 which forces pushbutton 12 OFF.
NOTE: The pushbuttons must be configured as maintained (alternate) and the panels "Force Function" feature must be enabled.

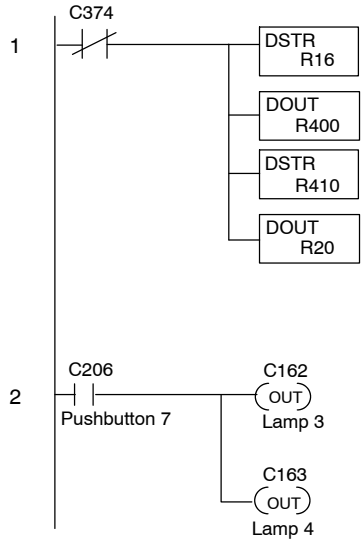
Using Ladder Logic with the DL305

In the following examples, user memory will be remapped to internal relay memory in order to use the pushbutton status to control outputs. The internal relays of the DL305 family start at R16. In the examples below, **R400** has been chosen as the base address for the DL305, then used normally closed **C374** in the ladder logic to map it to **R16**. Using **normally closed C374,** the remapping is performed on each scan, otherwise **m+0** and **m+1** would not be updated.





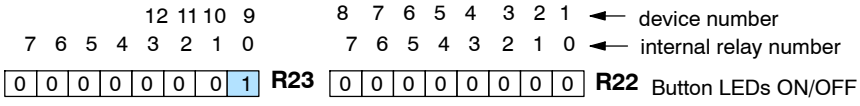
MAPPING PUSHBUTTONS AND LAMPS

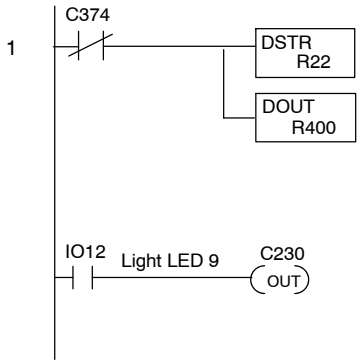


Rung 1 - Mapping User Memory to Internal Relays
The first steps remap the Internal Relay Memory to User Memory for the lamps to function. The second step remaps the User Memory to the Internal Relay Memory for the operation of the pushbuttons.

Rung 2 - Pushbuttons and Lamps
When pushbutton 7 is activated Lamps 3 and 4 turn ON.

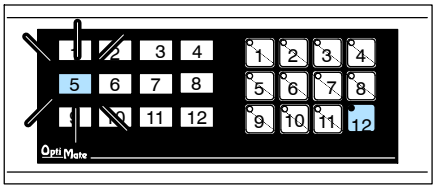
MAPPING LEDS





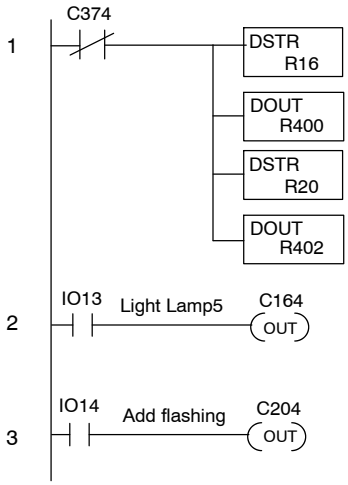
Rung 1 - Mapping Internal Relays to User Memory
This step remaps the Internal Relay Memory to User Memory for the LEDs to function.

Rung 2 - LEDs
When contact IO12 is ON, LED 9 turns ON
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.



	12	11	10	9	7	6	5	4	3	2	1	0		8	7	6	5	4	3	2	1	0		
													← device number										← device number	
													← internal relay number										← internal relay number	
R17	0	0	0	0	0	0	0	0						0	0	0	1	0	0	0	0		R16	Indicator Lamp ON/OFF
R21	0	0	0	0	0	0	0	0						0	0	0	1	0	0	0	0		R20	Indicator Lamp Flash

MAPPING LAMPS AND FLASH FEATURE

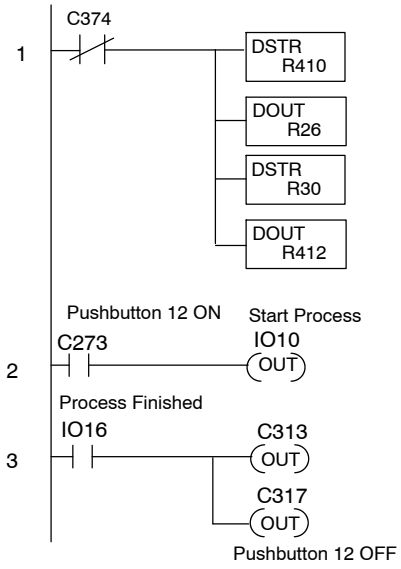


Rung 1 - Mapping Internal Relays to User Memory
This step remaps the Internal Relay Memory to User Memory for the Lamps and their flashing feature. These steps will be the same except for the address location for the LED flash option.

Rungs 2 and 3 -Flashing Lamps and LEDs
To flash a Lamp or LED, it must be first turned ON. When contact IO13 is activated Lamp 5 will turn ON and when contact IO14 is activated the Lamp will flash. These steps are the same for the LED flash option with the exception of the internal relay number.
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

MAPPING PUSHBUTTONS AND FORCE FUNCTION FEATURE

	12	11	10	9	7	6	5	4	3	2	1	0		8	7	6	5	4	3	2	1	0		
													← device number										← device number	
													← internal relay										← internal relay	
R27	0	0	0	0	1	0	0	0						0	0	0	0	0	0	0	0		R26	Button ON/OFF
R31	1	0	0	0	1	0	0	0						0	0	0	0	0	0	0	0		R30	Force Data & Comm



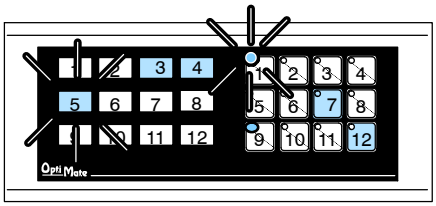
Rung 1 - Mapping User Memory to Internal Relays
The first step remaps the User Memory to the Internal Relay Memory for the pushbuttons. The second step remaps the User Memory to the Internal Relay Memory for the operation of the Force Function feature.

Rungs 2 and 3 - Force Function
When pushbutton 12 is pressed, process IO10 is started.When the process is completed it activates contact IO16 which forces pushbutton 12 OFF.
NOTE: The pushbuttons must be configured as maintained (alternate) and the panels "Force Function" feature must be enabled.

Using the OP-1212 with an Allen-Bradley PLC

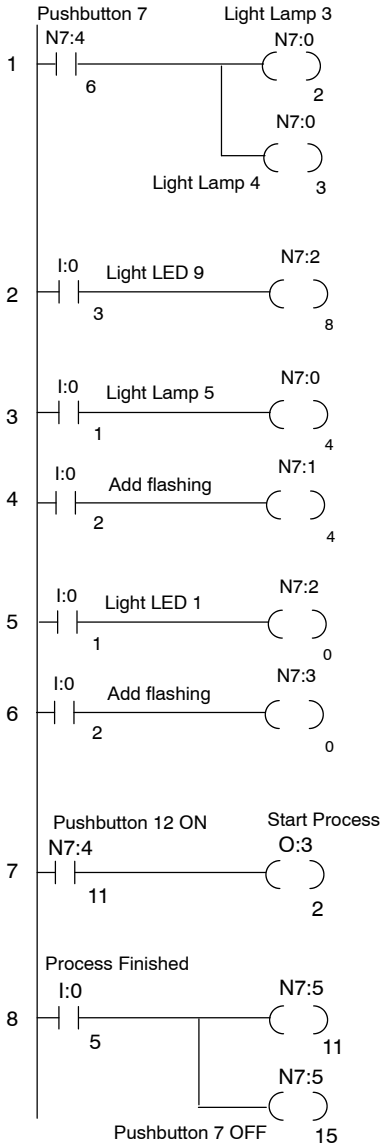
Using Ladder Logic with Allen-Bradley PLC

Integer type of files can be mapped for the Allen-Bradley PLC when being used with the OP-1212. In the examples below, integer file registers starting at base address **N7:0** have been mapped. If you need more information on any of the features of the panel, refer to ***Understanding the OP-1212 Panel*** in this manual.



	12	11	10	9	8	7	6	5	4	3	2	1		
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0		
0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	**N7:0**	Indicator Lamp ON/OFF
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	**N7:1**	Indicator Lamp Flash
0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	**N7:2**	Button LEDs ON/OFF
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**N7:3**	Button LEDs Flash
0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	**N7:4**	Button ON/OFF
1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**N7:5**	Force Data & Comm

device number
bit



Rung 1 - Pushbuttons and Lamps
When pushbutton 7 is activated Lamps 3 and 4 turn ON.
Also, the LED in pushbutton 7 will turn ON if LED Separation is disabled and the pushbutton is configured as maintained.

Rung 2 - LEDs
When contact I:0/3 is ON, LED 9 turns ON
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 3 and 4 -Flashing Lamps
To flash a Lamp, it must be first turned ON When contact I:0/1 is activated Lamp 5 will turn ON and when contact I:0/2 is activated the Lamp will flash.

Rungs 5 and 6 - Flashing LEDs
To flash a LED, it must be first turned ON When contact I:0/1 is activated LED 1 will turn ON and when contact I:0/2 is activated the LED will flash.
NOTE: Panel must be in LED Separation mode and pushbutton configured as momentary.

Rungs 7 and 8 - Force Function
When pushbutton 12 is pressed, process O:3/2 is started.When the process is completed it activates contact I:0/5 which forces pushbutton 12 OFF.
NOTE: The pushbuttons must be configured as maintained (alternate) and the panels "Force Function" feature must be enabled.

Troubleshooting the OP-1212 Panel

Troubleshooting

This section is intended to help you through some typical situations that might occur while using the OP-1212. It is difficult to diagnose or solve all probable situations that may arise, therefore this section will discuss some of the more common trouble areas.

To help isolate the problem area, these problems have been divided into three sections:

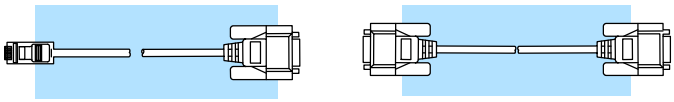
- Panel Configuration
- Panel to PLC Communications
- Panel Operation

If you continue to have a problem after applying this section, please contact our Technical Support team. Someone will be available between 9:00 am and 6:00 pm (EST) Monday through Friday. Phone **1-800-633-0405**.

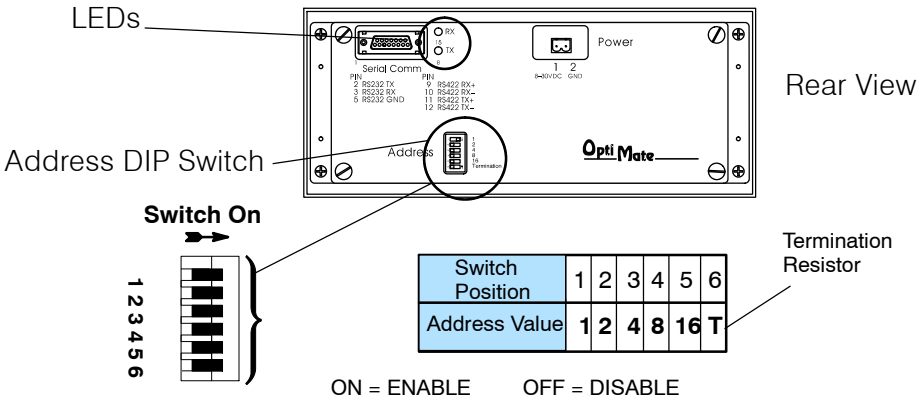
Panel Configuration

When I try to download the configuration, the message "could not communicate with panel" appears.

- Examine the two LEDs on the rear of the panel that show the state of the communication link. If the RX LED blinks but the TX LED does not, verify that you are using the appropriate cables.



- If the RX LED does not blink, the communication cable is plugged into the wrong serial port of the PC, the cable is faulty, or the panel is faulty.
- If the TX LED and/or the RX LED is blinking very slowly while you are attempting to download and all of the Lamps and LEDs are blinking, verify that the panel address is set to 31 (all positions ON) and power cycle the panel.

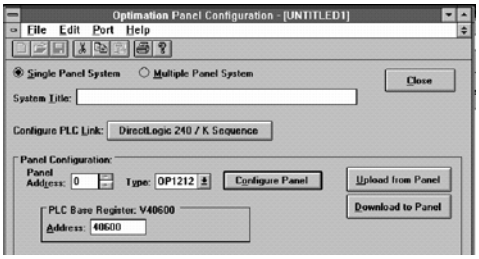


- If all of these corrective actions do not help, you may have a faulty panel.

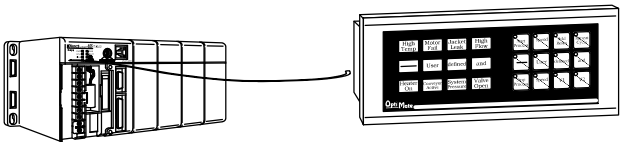
Panel to PLC Communications

I have configured the panel and connected it to my PLC. All of the lights are flashing and nothing seems to work. What do I do?

- Observe the TX and RX LEDs on the rear of the panel. If the TX LED flashes but the RX does not, check all cables and connections and try again.
- Examine the configuration and verify the Link and Comm. information match the PLC type and family that you are using (i.e. baud rate, parity, stop bit, address).



- If you are using the secondary comm port on a ***Direct***LOGIC PLC and both TX and RX LEDs are flashing verify the mode of that port is set to HEX and not ASCII.
- If you are using a Allen-Bradley PLC, verify that the baud rate for channel 0 is set to 4800 or 9600 and the memory map has been expanded to include the full range of registers (i.e., N7:0 through N7:7).

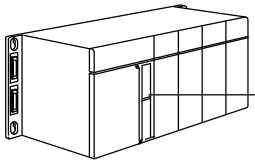


Panel Operation

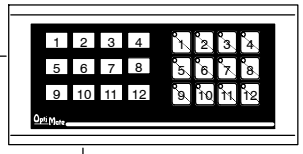
When I press a pushbutton nothing happens.

- Verify that the control relays that you are using in your ladder logic match the ones associated with the memory location that you mapped to the panel.

DirectLOGIC

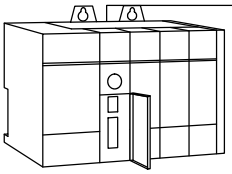


Mapped Memory Location	Function
m (such as V40600) C0-C17	Indicator Lamps ON/OFF
m+1 (such as V40601) C20-C37	Indicator Lamps Flash Control
m+2 (such as V40602) C40-C57	Button LEDs ON/OFF
m+3 (such as V40603) C60-C77	Button LEDs Flash Control
m+4 (such as V40604) C100-C117	Button ON/OFF Status
m+5 (such as V40605) C120-C137	Force Pushbuttons Data & Comnd



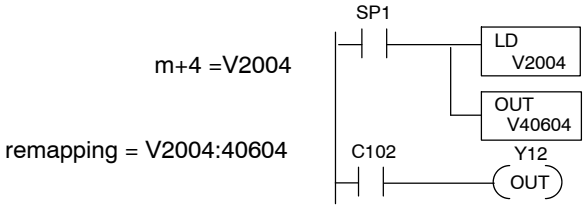
Mapping Assignments

Allen-Bradley



Mapped Memory Location	Function
m (such as N7: 0/0-0/15)	Indicator Lamps ON/OFF
m+1 (such as N7: 1/0-1/15)	Indicator Lamps Flash Control
m+2 (such as N7: 2/0-2/15)	Button LEDs ON/OFF
m+3 (such as N7: 3/0-3/15)	Button LEDs Flash Control
m+4 (such as N7: 4/0-4/15)	Button ON/OFF Status
m+5 (such as N7: 5/0-5/15)	Force Pushbuttons Data & Comnd

- If you are remapping, make sure that you are remapping in the proper direction and that you are using a contact that is always ON as the input to the remapping logic. Remapping must be performed every scan to function properly.



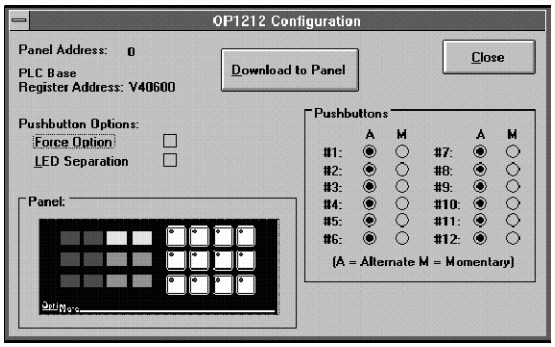
Here we are using SP1 to map V2004 to V40604. This consumes 16 relay bits, 12 of which are tied to the 12 pushbuttons of the panel. By pressing Pushbutton 3, you affect the status of the third relay in V40604 which is C102. In turn, C102 will control output Y12.

When I activate a bit to light a pushbutton LED, it does not light.

- Verify that you are using the correct address. The base address you chose during panel configuration determines the proper addresses to use.
- If you are remapping, make sure that you are remapping in the proper direction and that you are using a contact that is always ON as the input to the remapping logic. Remapping must be performed every scan to function properly.
- Verify that **LED Separation Mode** was **enabled** during panel configuration.

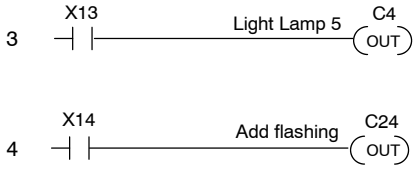
When I press a pushbutton the associated LED does not turn ON.

- If the LED Separation Mode was enabled, the LED will work independently of the pushbutton. In this case the LED will be turned ON by the ladder logic program.
- The pushbutton may be configured as momentary. In this case the LED will be ON only as long as the pushbutton is being pressed.



I can not make the lamp flash. What could I be doing wrong?

- Remember that to flash a lamp, it must be turned ON first. Verify that you are turning the Lamp ON before you activated the flashing option.



Rungs 3 and 4 -Flashing Lamps
To flash a Lamp, it must be first turned ON. When contact X13 is activated Lamp 5 will turn ON and when contact X14 is activated the Lamp will flash.

European Union Directives

This product is manufactured in compliance with European Union (EU) Directives and carries the CE mark. The following information is provided to comply with EU documentation requirements.

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 AutomationDirect or its agents should be used. A listing of international affiliates is available at our website **http://www.automationdirect.com**.

Technical Support

If you need technical assistance, please call the technical support group at AutomationDirect, Inc. *(3505 Hutchinson Rd., Cumming, GA 30040, U.S.A.)* at 800-633-0405. Support is available Monday through Friday from 9:00 A.M. to 6:00 P.M. Eastern Standard Time. Our website address is **http://www.automationdirect.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.

Worksheets

A

The following table is a example of the control relay correlation for the DL05, DL06, DL105, DL205, DL350 or DL405 to the OP-1212 when the address is configured for V40600. Use the work sheet provided below for the starting address for your application.

Address	**40600 m**	**40601 m+1**	**40602 m+2**	**40603 m+3**	**40604 m+4**	**40605 m+5**
Device	**Lamp ON/ OFF**	**Lamp Flash**	**Button LED ON/ OFF**	**Button LED Flash**	**Button Status**	**Force Function**
1	C0	C20	C40	C60	C100	C120
2	C1	C21	C41	C61	C101	C121
3	C2	C22	C42	C62	C102	C122
4	C3	C23	C43	C63	C103	C123
5	C4	C24	C44	C64	C104	C124
6	C5	C25	C45	C65	C105	C125
7	C6	C26	C46	C66	C106	C126
8	C7	C27	C47	C67	C107	C127
9	C10	C30	C50	C70	C110	C130
10	C11	C31	C51	C71	C111	C131
11	C12	C32	C52	C72	C112	C132
12	C13	C33	C53	C73	C113	C133
M3						C135
M2						C136
M1						C137

Address						
Device	**Lamp ON/ OFF**	**Lamp Flash**	**Button LED ON/ OFF**	**Button LED Flash**	**Button Status**	**Force Function**
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
M3						
M2						
M1						

The following table is a example of the control relay correlation for the SLC or Micrologix to the OP-1212 when the address is configured for N7:0. Use the work sheet provided below for your application.

Device	Lamp ON/ OFF	Lamp Flash	Button LED ON/ OFF	Button LED Flash	Button Status	Force Function
1	N7:0/0	N7:1/0	N72/0	N7:3/0	N7:4/0	N7:5/0
2	N7:0/1	N7:1/1	N7:2/1	N7:3/1	N7:4/1	N7:5/1
3	N7:0/2	N7:1/2	N7:2/2	N7:3/2	N7:4/2	N7:5/2
4	N7:0/3	N7:1/3	N7:2/3	N7:3/3	N7:4/3	N7:5/3
5	N7:0/4	N7:1/4	N7:2/4	N7:3/4	N7:4/4	N7:5/4
6	N7:0/5	N7:1/5	N7:2/5	N7:3/5	N7:4/5	N7:5/5
7	N7:0/6	N7:1/6	N7:2/6	N7:3/6	N7:4/6	N7:5/6
8	N7:0/7	N7:1/7	N7:2/7	N7:3/7	N7:4/7	N7:5/7
9	N7:0/8	N7:1/8	N7:2/8	N7:3/8	N7:4/8	N7:5/8
10	N7:0/9	N7:1/9	N7:2/9	N7:3/9	N7:4/9	N7:5/9
11	N7:0/10	N7:1/10	N7:2/10	N7:3/10	N7:4/10	N7:5/10
12	N7:0/11	N7:1/11	N7:2/11	N7:3/11	N7:4/11	N7:5/11
M3						N7:5/13
M2						N7:5/14
M1						N7:5/15

Device	Lamp ON/ OFF	Lamp Flash	Button LED ON/ OFF	Button LED Flash	Button Status	Force Function
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
M3						
M2						
M1						

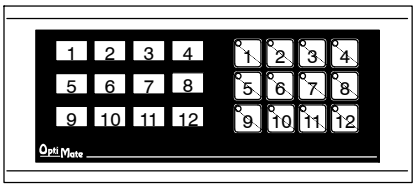
Use the following template and worksheets to keep track of how you configured the panel pushbuttons, Lamps and LEDs.

OP-1212 Configuration Worksheet

PLC Type:_____

Panel Address:_____

PLC Base Register Address:_____



Link Configuration:

Protocol _____

Baud Rate _____

Parity _____

Stop Bit _____

Force Option ☐

LED Separation ☐

Pushbutton Options

	A	M		A	M
#1	☐	☐	#7	☐	☐
#2	☐	☐	#8	☐	☐
#3	☐	☐	#9	☐	☐
#4	☐	☐	#10	☐	☐
#5	☐	☐	#11	☐	☐
#6	☐	☐	#12	☐	☐

(A = Alternate M = Momentary)

Lamp Descriptions

1._____ 7._____
2._____ 8._____
3._____ 9._____
4._____ 10._____
5._____ 11._____
6._____ 12._____

Pushbutton Descriptions

1._____ 7._____
2._____ 8._____
3._____ 9._____
4._____ 10._____
5._____ 11._____
6._____ 12._____

LED Descriptions

1._____ 7._____
2._____ 8._____
3._____ 9._____
4._____ 10._____
5._____ 11._____
6._____ 12._____

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