OP-9001

Communications Master

Manual Number OP-9001-M

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Manual Revisions

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

Title: OP-9001 Communications Master
Manual Number: OP-9001-M

Issue	Date	Effective Pages	Description of Changes
Original	2/96	Cover/Copyright Contents Manual Revisions 1 — 23 Index	Original Issue
Rev A	6/98		Downsize format Made minor corrections before reprinting

EU Information

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 **PLC***Direct* or its agents should be used. A listing of international affiliates is available at our Web site http://www.plcdirect.com

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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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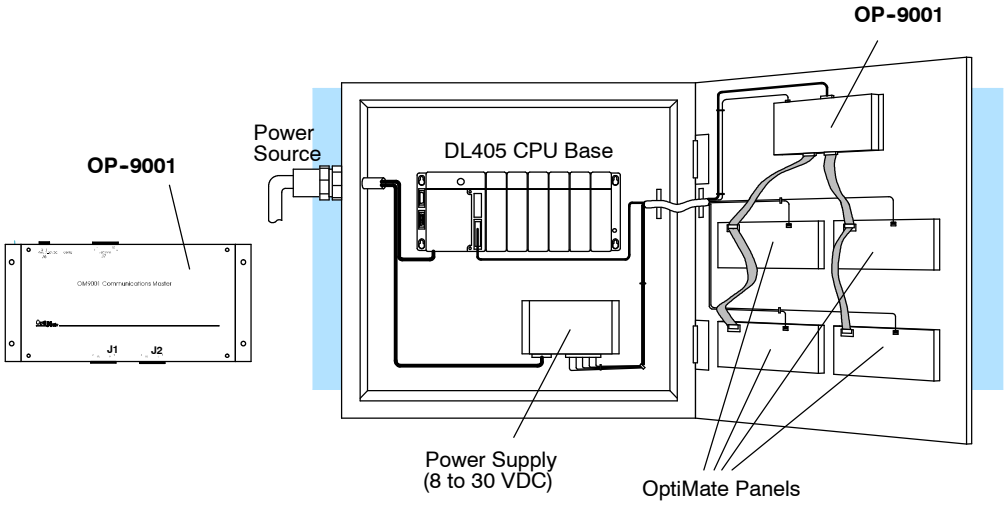
Sections This table provides an overall description of the topics covered within this manual.

1	**Introduction**	Introduces the physical and functional characteristics. Also provides introduction to planning your system.
2	**Memory Mapping**	Explains memory mapping in a multi-panel configuration.
3	**Installation and Specifications**	Shows how to prepare for system installation, including specifications and mounting instructions. Includes connecting cables part numbers and specifications.
4	**Configuring Your Panels**	Shows how to configure the panel. The OP-WINEDIT for windows contains Help windows which will assist with configuring the panels.
5	**Trouble Shooting**	Shows you how to diagnose and correct common problems.

Introduction

Is this Manual Right for You?

The OP-9001 Communications Master provides an intelligent interface between your programmable controller (PLC) and two or more OptiMate™ panels. This manual shows you how to install, configure and operate your OP-9001 Communications Master. It includes wiring diagrams and power requirements, as well as the information you need for selecting the proper connecting cables.



Additional Manuals

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

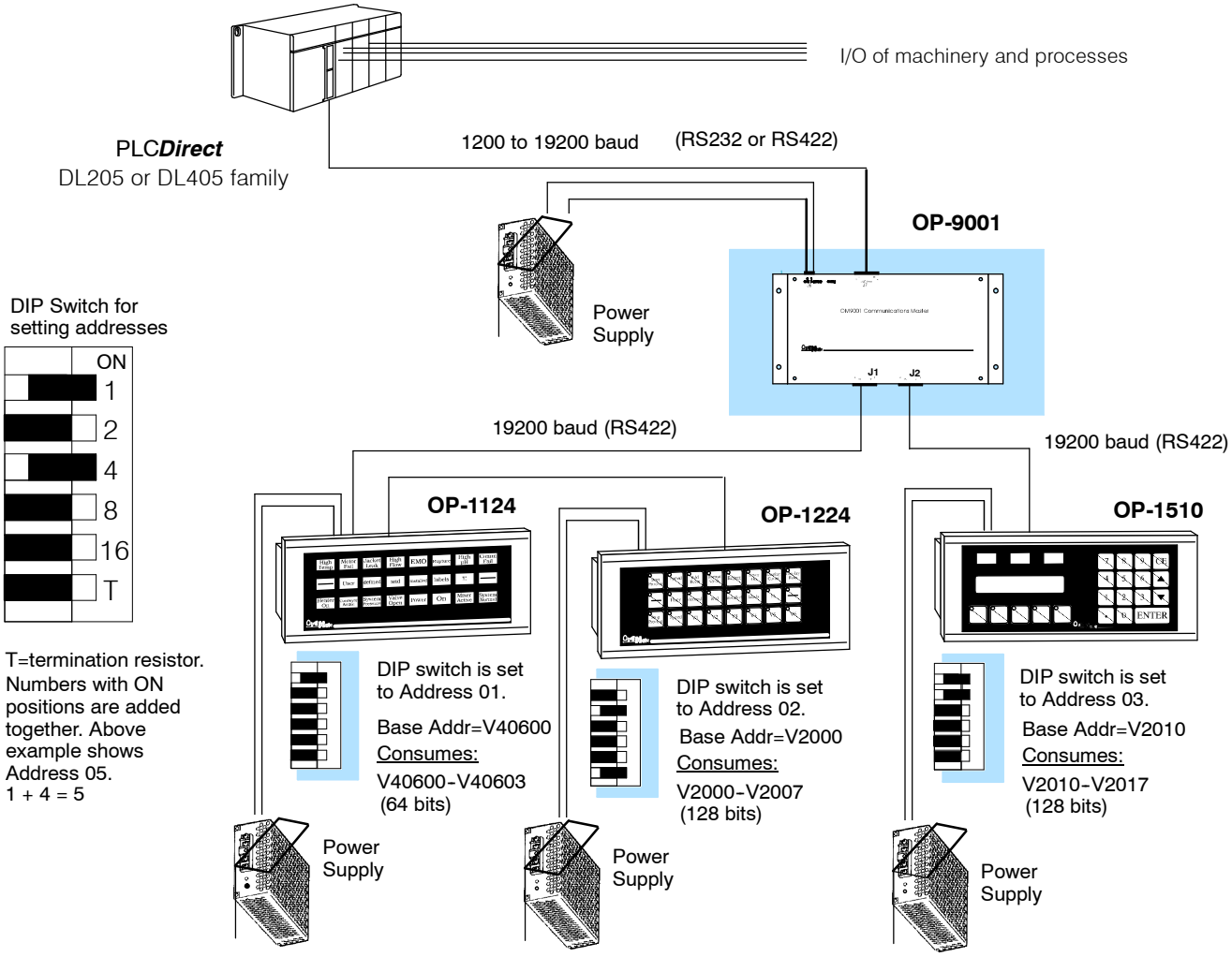
- Respective PLC User Manuals–Shows you the memory conventions, programming instruction sets, data or file types, communications protocol, etc.
- Respective OptiMate operator panel User Manuals–Shows you the memory mapping requirements, modes of operation, ladder logic needed for operation of the respective panel, initial setup requirements, and much more.

How the OP-9001 Communicates

The OP-9001 communicates with your OptiMate panels via two RS422 ports at a baud rate of 19200. It communicates with your PLC at the rate you indicate during configuration. Depending on brand and model of PLC, this will be some rate between 1200 and 19200 baud. Later on in this manual, we will show you how to select the communcation baud rate between your OP-9001 and PLC. This is done with the same OPEditor software that you use to configure the individual OptiMate panels.

The OP-9001 knows which OptiMate panel is sending information to it, because each OP panel has a unique address assigned via its respective DIP switch. You can have up to 31 panels connected to a single OP-9001. Addresses 0 thru 30 are available for this purpose. See the diagram below for more about DIP switch settings.

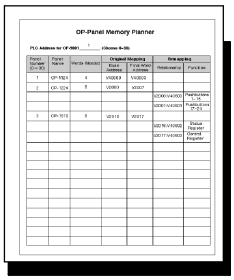
Shown below is a sample configuration using a PLC***Direct*** programmable controller, a pushbutton panel (OP-1224), a lamp annunciator panel (OP-1124) and a menu-driven operator panel (OP-1510). Notice that each panel has a unique address, and that each panel has been assigned specific memory inside the PLC for the purpose of "mapping" your configurations.



Using the Communications Master...5 Easy Steps

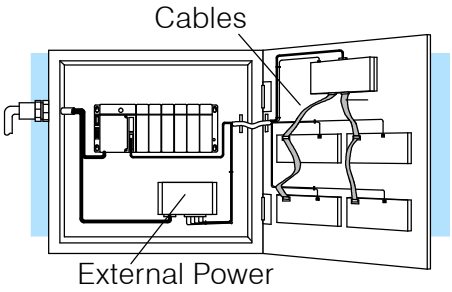
Step 1: Plan Your System of Panels (Pages 4-7)

In the next section, we provide you with a template for planning your multi-panel OptiMate system. It's main purpose is to have you plan in advance what base register addresses you want to use for each panel, and to make sure that the consecutive bits consumed by each panel during the mapping process do not overwrite each other. You need to know this information when you do the configuration in Step 3.



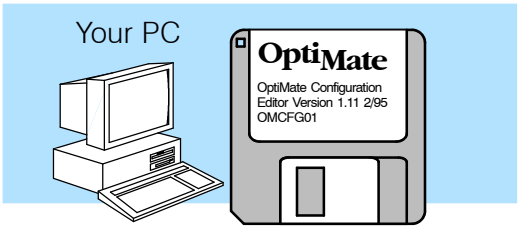
Step 2: Install the Panels and the OP-9001 (Pages 8-16)

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. This manual includes only the specifications for the OP-9001. Review the individual OptiMate User Manuals for each respecitive panel used.



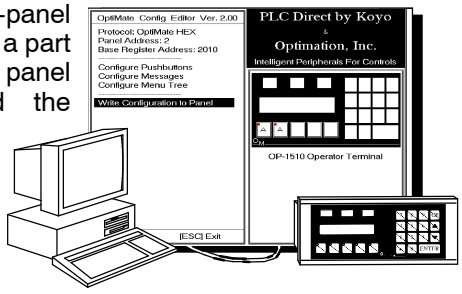
Step 3: Configure the System and the Individual Panels (Pages 17-22)

You need the OptiMate™ OPEditor software in order to configure the system and all the individual panels. 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 a PLC***Direct*** or Allen-Bradley product.



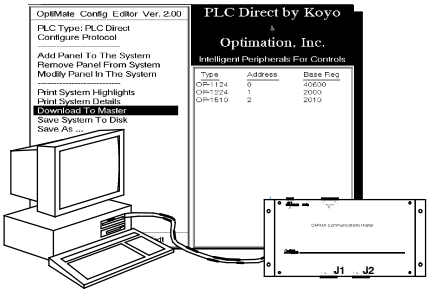
Step 4: Download the Configurations to Each Panel (Page 21)

As you configure the OP-9001 for a multi-panel system, you will be configuring each panel as a part of the overall configuration process. After each panel is configured, you will then download the configuration to the individual panel.



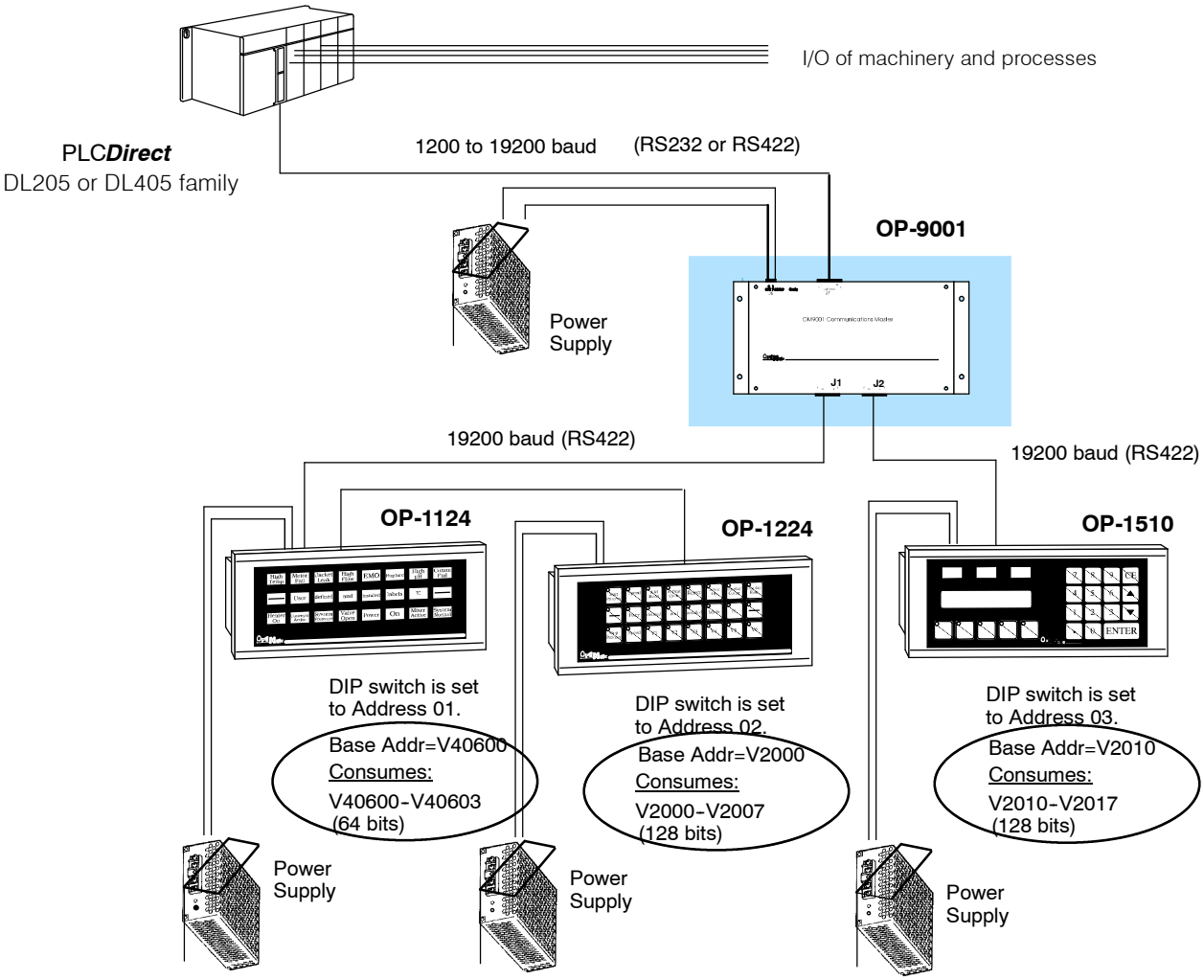
Step 5: Download the System to the OP-9001 Master (Page 22)

After all the panels have been downloaded with their respective configurations, you then download the overall scheme to the OP-9001 itself. This requires that you set a jumper on the OP-9001.



Planning Your Memory Mapping

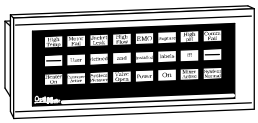
When using more than one OP-panel in a system, it is important that you plan ahead to make sure the memory mapping for one panel does not overwrite the memory mapping for another panel. Let's take a look again at a typical system. Notice that each panel shown consumes a fixed amount of memory for its mapping. For example, The OP-1124 needs 64 consecutive bits; the OP-1224 needs 128 consecutive bits; and the OP-1510 needs 128 consecutive bits. When you are planning your system, you have to make sure that your panels don't compete for the same memory space. To help you with this process, we have given you a memory assignment template on Page 7. We have also included a chart on Page 6 that shows you the memory requirements for each of the currently available OP-panels.



Memory Consumption for Mapping Process

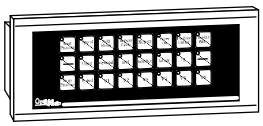
NOTE: For PLC*Direct* and compatibles, remember that the V-Memory and R-Memory addresses are numbered in octal-not decimal. For example, V2007 and V2010 are consecutive registers-V2008 and V2009 do not exist.

OP-1124



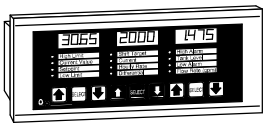
Consumes 64 consecutive bits:
4 sixteen bit registers (DL205/DL405 and A-B)
8 eight bit registers (DL305 only)

OP-1224



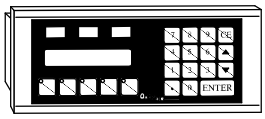
Consumes 128 consecutive bits:
8 sixteen bit registers (DL205/DL405 and A-B)
16 eight bit registers (DL305 only)

OP-1312



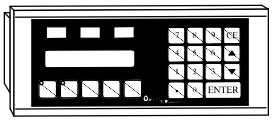
Consumes 224 consecutive bits:
14 sixteen bit registers (DL205/DL405 and A-B)
28 eight bit registers (DL305 only)

OP-1500



Consumes 128 consecutive bits:
8 sixteen bit registers (DL205/DL405 and A-B)
16 eight bit registers (DL305 only)

OP-1510



Data Registers

	DL205/DL405	DL305	A-B	Function
m	1	2	1	Lamps 1-16 ON/OFF
m+1	1	2	1	Lamps 17-24 ON/OFF
m+2	1	2	1	Lamps 1-16 flash
m+3	1	2	1	Lamps 17-24 flash

Data Registers

	DL205/DL405	DL305	A-B	Function
n	1	2	1	Pushbuttons 1-16 ON/OFF
n+1	1	2	1	Pushbuttons 17-24 ON/OFF
n+2	1	2	1	LEDs 1-16 flash
n+3	1	2	1	LEDs 17-24 flash
n+4	1	2	1	LEDs 1-16 ON/OFF
n+5	1	2	1	LEDs 17-24 ON/OFF
n+6	1	2	1	Force Function Data (1-16)
n+7	1	2	1	Force Function Mode/Data (17-24)

Data Registers

	DL205/DL405	DL305	A-B	Function
p	1	2	1	Location 1 data
p+1	1	2	1	Location 2 data
p+2	1	2	1	Location 3 data
p+3	1	2	1	Location 4 data
p+4	1	2	1	Location 5 data
p+5	1	2	1	Location 6 data
p+6	1	2	1	Location 7 data
p+7	1	2	1	Location 8 data
p+8	1	2	1	Location 9 data
p+9	1	2	1	Location 10 data
p+10	1	2	1	Location 11 data
p+11	1	2	1	Location 12 data
p+12	1	2	1	Force data flags
p+13	1	2	1	Data to be forced

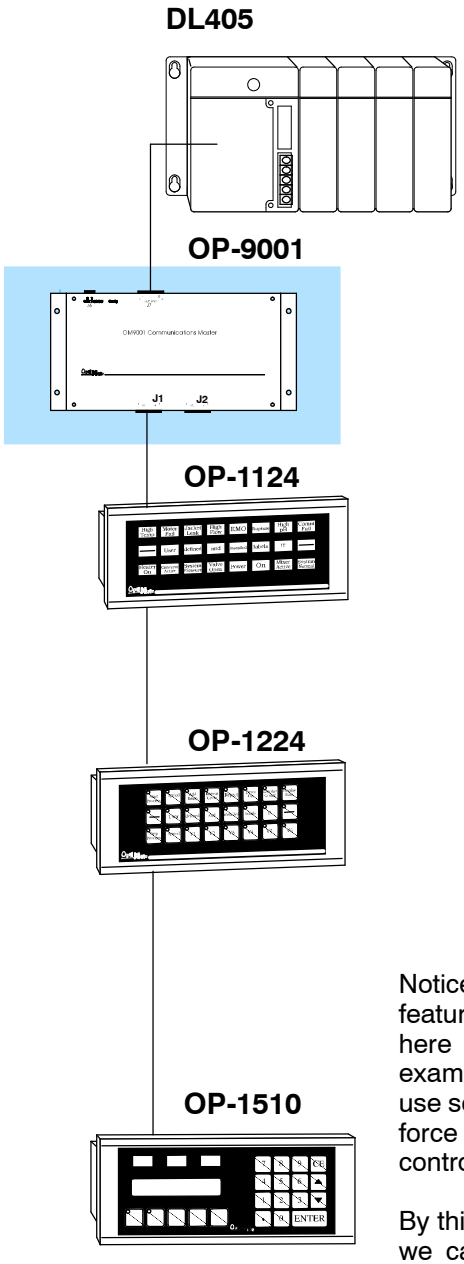
Data Registers

	DL205/DL405	DL305	A-B	Function
q	1	2	1	Top line message selection
q+1	1	2	1	Bottom line message selection
q+2	1	2	1	Top line data/menu function*
n+3	1	2	1	Decimal point, top line
q+4	1	2	1	Bottom line data
q+5	1	2	1	Decimal point, bottom line
q+6	1	2	1	Status register
q+7	1	2	1	Control register

*q+2 holds Function Number for the OP-1510 only. See OP-1510-M manual.

Using a Memory Planner

On Page 7, we have included a template for planning your memory mapping in a multi-panel configuration. The following example shows the memory requirements and assignments for three OP-panels connected to a DL405 programmable controller. Refer to the chart on Page 5 to find out how many registers of consecutive memory are required for each panel. Memory does not have to be consecutive between the various panels.



OP-Panel Memory Planner

PLC Address for OP-9001: 1

Panel Number (0 - 30)	Panel Name	Words Needed	Original Mapping		Remapping	
			Base Address	Final Word Address	Relationship	Function
1	OP-1124	4	V40600	V40603		
2	OP-1224	8	V2000	V2007		
					V2000 :V40600	Pushbuttons 1-16
					V2001 :V40601	Pushbuttons 17-24
3	OP-1510	8	V2010	V2017		
					V2016 :V40602	Status Register
					V2017 :V40603	Control Register

Notice that we have remapped some addresses to take advantage of select features that require individual bit manipulation.We have kept things simple here to make the example easy to understand. For the OP-1224, for example, we have only remapped the pushbuttons, and have elected not to use some other features that would require remapping, i.e. LED separation, force function, etc. On the other hand, we have remapped the status and control registers of the OP-1510.

By thinking out memory allocation for the original mapping and remapping, we can prevent possible memory overlap in either area. Refer to your respective OP-panel User Manuals to determine what features need to make use of remapping. Remapping is never an issue with the DL450 or Allen-Bradley PLCs because of bit-of-word capability. For these PLCs ignore this part of the template.

I.

OP-Panel Memory Planner

PLC Address for OP-9001___________

Panel Number (0 – 30)	Panel Name	Registers Needed	**Original Mapping**		**Remapping**	
			Base Address	Final Word Address	Relationship	Function

Installing the Panel

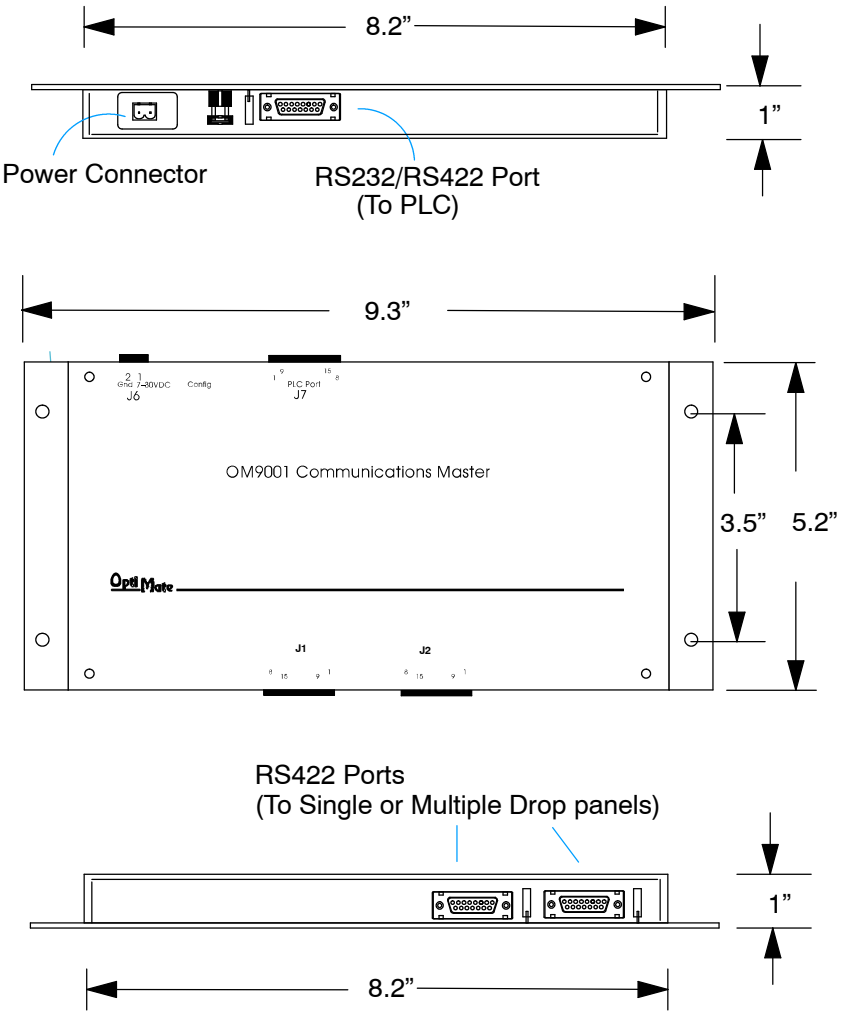
In this section, you will be given all of the information you need to install the panel. Before actually installing the OP-9001 panel, it may be helpful to examine the specifications and make sure that the requirements of your application are met.

Panel Specifications:

Physical Specifications	Weight	22 ounces
	Panel Fasteners	Four holes to accept four 16x32 machine screws
	NEMA Rating	NEMA 1
CPUs Supported	CPUs	DL105, DL205, DL305, DL405, PLC***Direct*** Compatibles SLC 5/03, SLC5/04
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	3.75 VA @ 8 – 30 VDC 310 mA @ 12 VDC 155 mA @ 24 VDC
	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

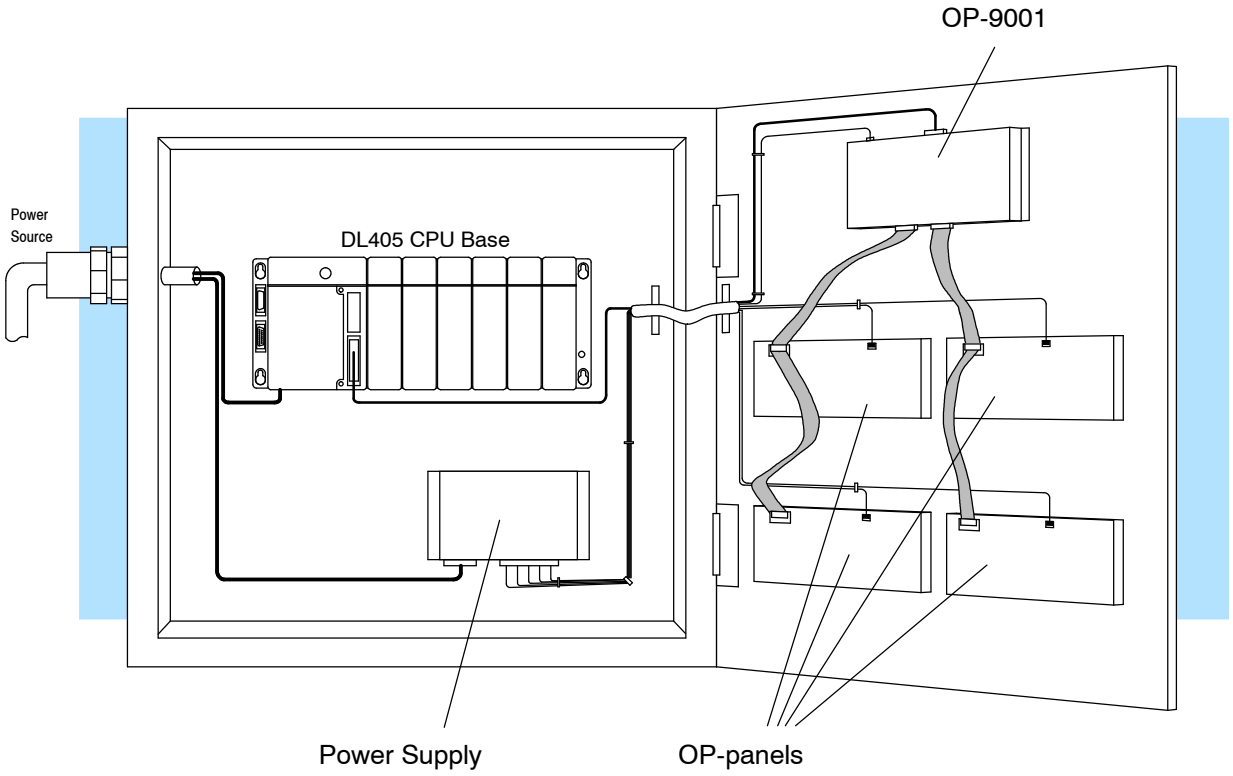
(All dimensions are given in inches)



Power and Cabling Requirements

What Are Your Application Needs?

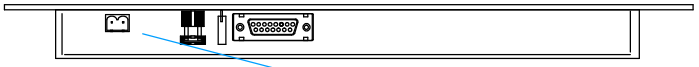
By using an OptiMate OP-9001 Communications Master, you can connect multiple Optimate units up to a single CPU. Up to 31 individual units can be connected in a daisy-chain fashion to the OP-9001. Communications are via RS422 between the OP-9001 and the operator interfaces. If you use a good quality shielded 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.



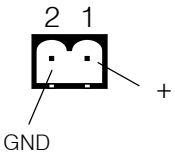
Connecting a Power Supply to the OP-9001

Power Supply Connections

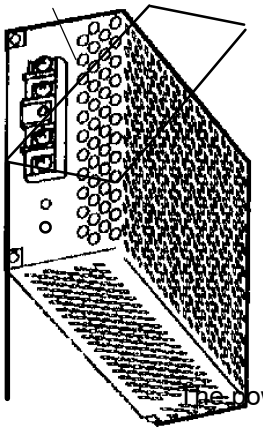
The OP-9001 panel can operate on DC voltages between 8 and 30 VDC rated at 3.75 watts. Connect the panel to a power supply (within the required voltage range and wattage) using the terminal block connector supplied. The connector is polarized to prevent reversing the connections. The male receptacle on the rear of the panel will only connect in one way with the female connector that is supplied with your OP-9001 panel. Pin 1 is the positive connection, while Pin 2 is the negative, or ground, connection.



You must use an external power supply that can deliver voltages in the 8 to 30 VDC range, and can supply 3.75 watts of power.



A two-prong male connector is on the side of the unit. Your OP-panel is shipped with the female connector.



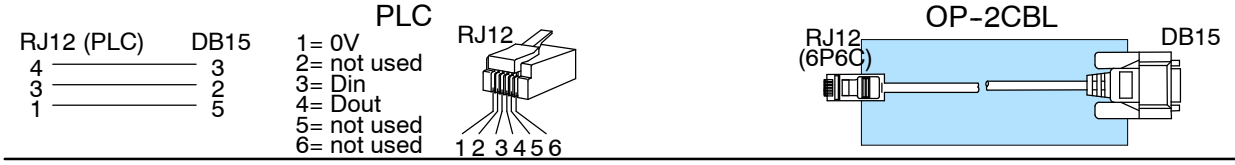
Install the connector to a cable for attachment to your power supply.

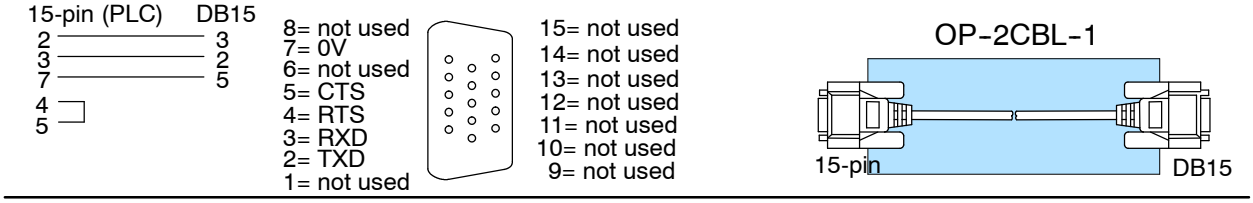
The power supply is not sold by PLC***Direct***.

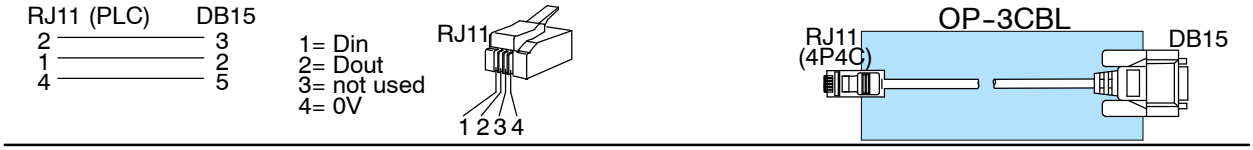
Model	Current Consumed at 12VDC	Current Consumed at 24VDC
OP-9001	0.31A	0.16A

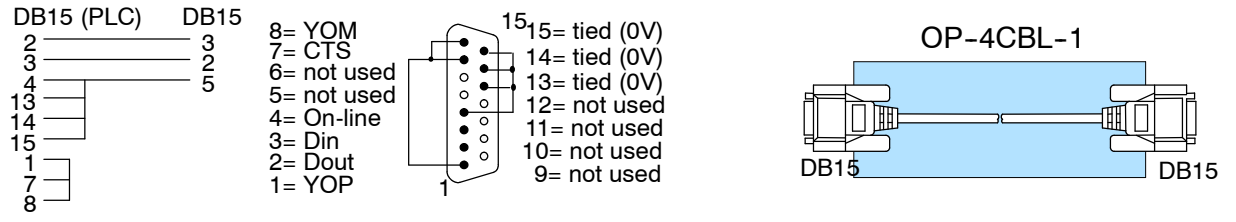
Pinout Diagrams for Cabling

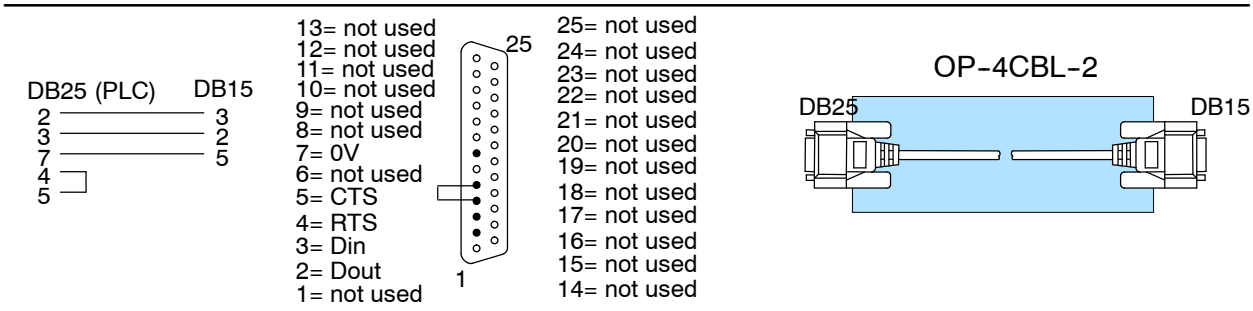
Connecting Cable The connecting cable may vary depending on the CPU used. Refer to the following page to confirm the proper cable is chosen for connecting your PLC.

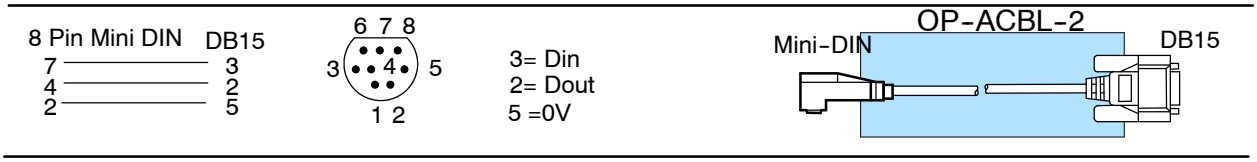






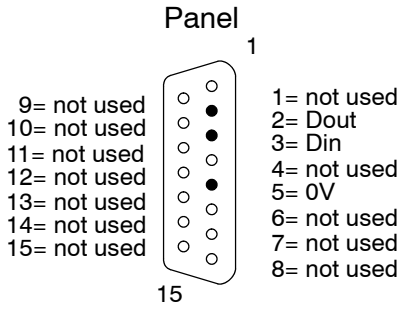






RS-422 Pinout

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



Choosing Your Connecting Cables

Depending on which PLC you are using, you may require as many as two cables. Here are the requirements:

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

OptiMate Cables			
Family	**CPU (or other device)**	**Port**	**Cable**
DirectLOGIC™ DL105	DL130	Only port	OP-2CBL
DirectLOGIC™ DL205	DL230	Only port	OP-2CBL
	DL240	Top port	OP-2CBL
		Bottom port	OP-2CBL
	DL250	Top port	OP-2CBL
		Bottom port	OP-2CBL-1
	D2-DCM (module)	Only port	OP-4CBL-2
DirectLOGIC™ DL305	DL330	Requires DCU*	OP-4CBL-2
	DL330P	Requires DCU*	OP-4CBL-2
	DL340	Top port	OP-3CBL
		Bottom port	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	OP-4CBL-1
		Bottom port	OP-4CBL-2
	DL450	Phone Jack	OP-2CBL
		Top port (15-pin)	OP-4CBL-1
		Bottom port (25-pin)	OP-4CBL-2
	D4-DCM (module)	Only port	OP-4CBL-2
	Slice I/O panels	Only port	OP-4CBL-1
GE® Series 1	IC610CPU105/106	Requires DCU*	OP-4CBL-2
GE® Series™ 90/30	All Models (311-351)	RS232, RS422 Serial Port	OP-GCBL-1
GE® Fanuc™ Series 90 Micro	All Models	RS232, RS422 Serial Port	OP-GCBL-1
MODICON	ModBus	RJ45 port	OP-MCBL-1
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	OP-3CBL
		If DCU is used*	OP-4CBL-2
TI405™ / SIMATIC® TI405™	425-CPU, PPX:425-CPU **	Only port	OP-4CBL-1
	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	Only port	OP-4CBL-1
A-B SLC 500	5/03, 5/04	Bottom port	OP-ACBL-1
A-B	MicroLogix	Only port	OP-ACBL-2

* — requires RS232 Data Communications Unit (D3-232-DCU)

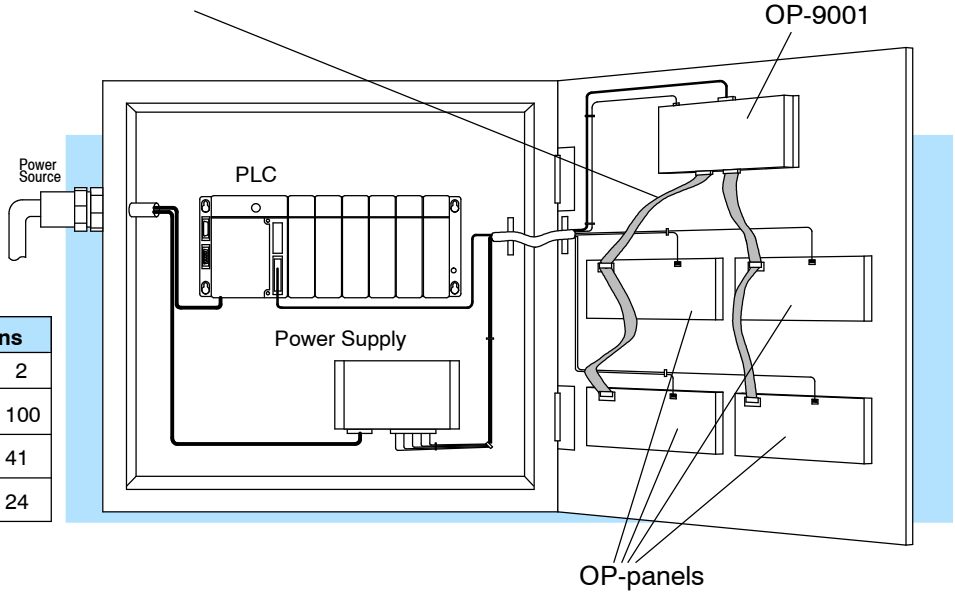
** - also DC versions

Custom Cables for Connecting Panels to the OP-9001

You must build your own cables for connecting the multiple panels to your OP-9001. Since the proper cable choice really depends on your application, we offer the following 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 the chart below for more details concerning the Belden cable.

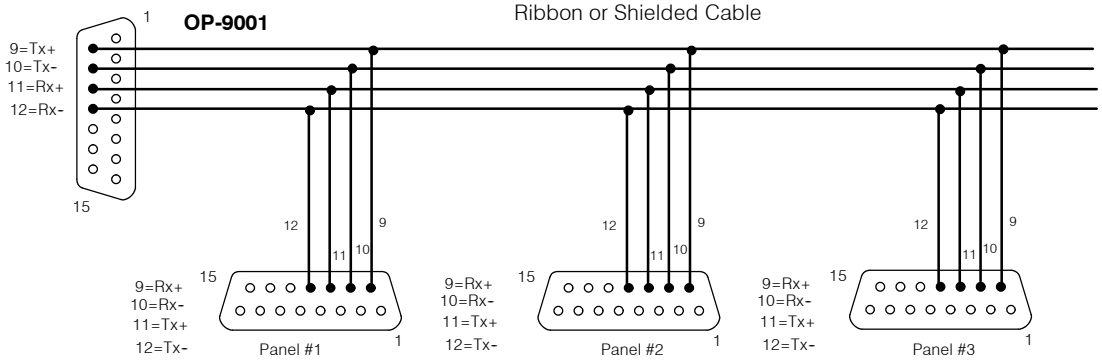
- **OP-CMCON-1** — pack of 4 ribbon cable connectors.
- **OP-CMCON-2** — pack of 4 solder-type connectors.

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.



Belden 9729 Specifications	
No. twisted pairs	2
Nom. Impedance (ohms)	100
Nom. Capacitance (pF/m)	41
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. **Notice in the diagram below that the receive and transmit lines are wired straight through for each of the panels connected to the OP-9001. For example, pin 9 of the OP-9001 is the Tx+ line and pin 9 of the panel is the Rx+ line. This keeps you from having to twist cable wires. The matchup between Tx and Rx is handled internally by the OP-9001.**

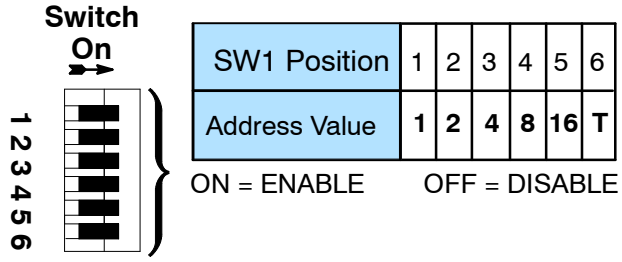


Setting the Panel DIP Switches and OP-9001 Jumper

Assigning Addresses to the Panels Connected to the OP-9001

A 6-position DIP switch on the rear of each individual panel 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 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 or upload your panel configurations to each individual panel.



SW1 Position	1	2	3	4	5	6
Address Value	**1**	**2**	**4**	**8**	**16**	**T**

ON = ENABLE OFF = DISABLE

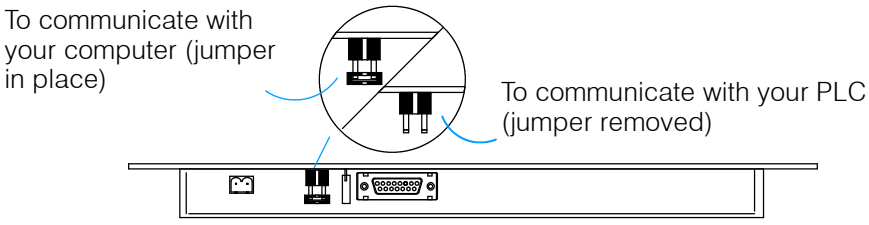
How to Set the Operator Panel Addresses

To set the address on any of the individual panels so that they can communicate with the OP-9001, 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). **Remember that you must use address 31 only when communicating with a computer for uploading or downloading.** The letter **T** in position 6 stands for "terminal resistor". **The final panel in a multi-drop panel configuration should have this position turned ON**.

NOTE: Each time you change the DIP switch setting, you must power cycle the panel.

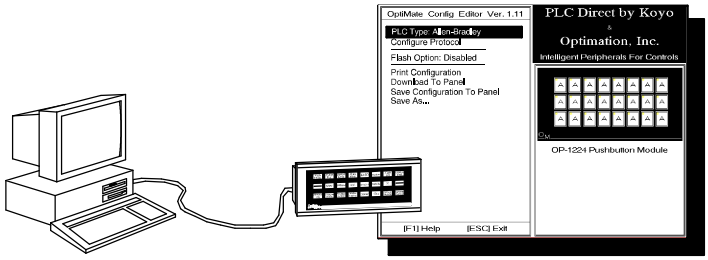
Setting the Jumper of the OP-9001

There is a jumper terminal on the edge of the OP-9001 (located between the cable connector and the power supply connector). This jumper must be in place in order for the OP-9001 to communicate with your computer for downloading or uploading configurations. You must remove this jumper when you want the OP-9001 to communicate with your PLC.



Configuring Multiple Panels with the OPEditor

You configure multiple panels by loading the OPEditor software on a personal computer and selecting the appropriate options. The setup options for your system configuration such as type of PLC being used, communications protocol, and the type of panel being used are handled through an on-screen dialogue.



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, execute the INSTALL.EXE file. For example, if the disk is in drive A, and you are logged onto your hard drive, type the following:

   . . . . . **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!

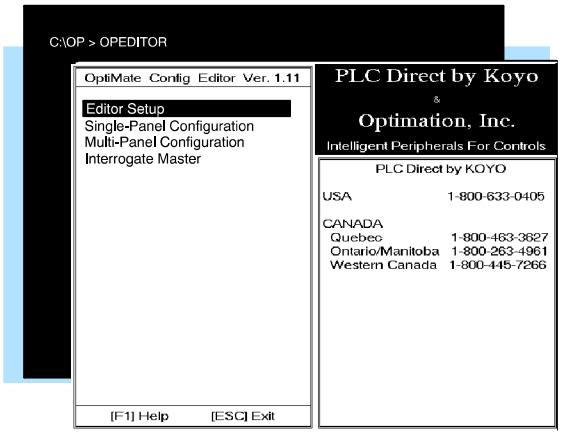
Step-by-Step Procedure

NOTE: You do not need to connect the OP-9001 or any of the OP-panels to your computer until you are ready to download configuration information. Remember that the panels must have their DIP switch set to 31 and that the OP-9001 must have a jumper in place before the configuration can be successfully written. You will remove the jumper on the OP-9001, and reset the DIP switch settings on the panels, when you connect your configured system to the PLC for actual operation.

Step 1
Load the OPEditor and Complete the Editor Setup

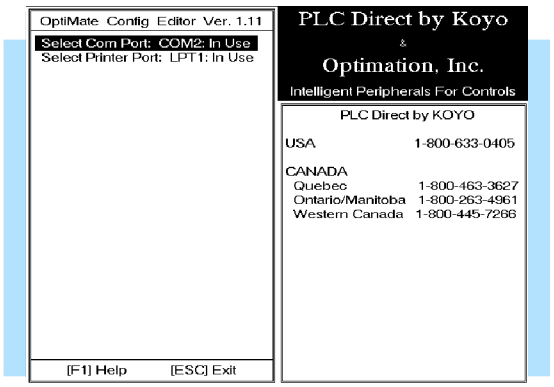
You can operate the OPEditor as a DOS program out of DOS only. Do not attempt to operate the program out of Windows. If you are in Windows, close Windows completely, change to the directory in which you have stored the OPEditor executable file (default is C:\OP), and then type the file name (OPEDITOR)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

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



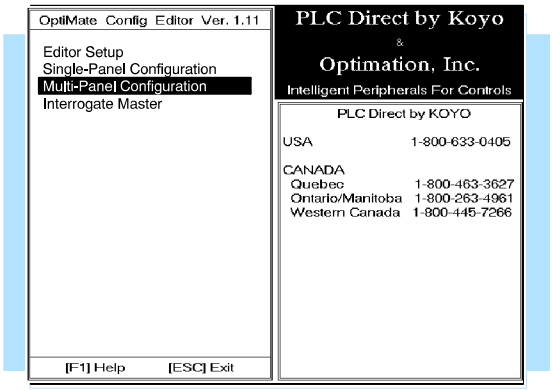
Step 2
Select the LPT and COM ports

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
Select Multi-Panel Configuration

Next, you must press <**ESC**> to return to the first screen again. Here you will need to select **Multi-Panel Configuration**. Even though you will be configuring each individual panel, as well as the OP-9001, it is all done through this Multi-Panel Configuration path. You do not use the Single-Panel Configuration for any reason when you are configuring a multi-panel system.



Step 4
Select the Source for your Configuration

When you select **Multi-Panel Configuration**, another menu appears that allows you to choose from the following actions:

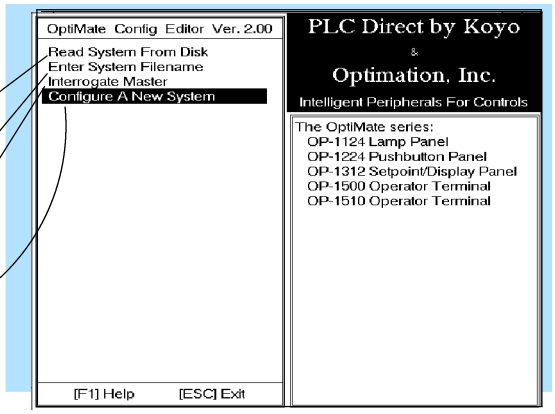
Browse the OP Directory for an existing system configuration.

Enter a path and filename of an existing system configuration.

Upload a system configuration already in the OP-9001 panel.

Configure a new system.

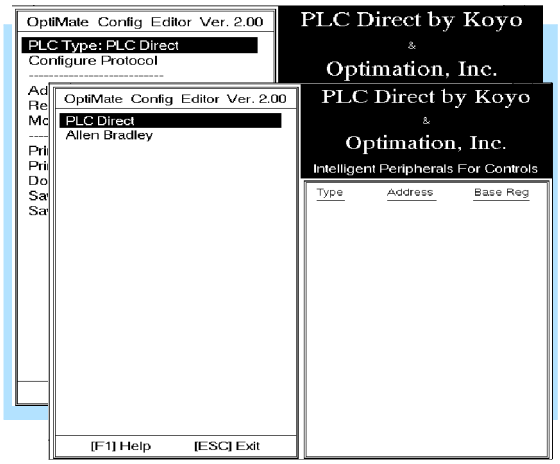
You will want to select **Configure a New System**, since you are creating a configuration file for the first time.



Step 5
Enter the Correct PLC Brand and Type

As soon as you make the above selection and press the <**Enter**> key, you will go to a screen that allows you to choose from either **PLCDirect** or **Allen-Bradley**.

After making your selection, press the **<Enter>** key to return to previous screen.



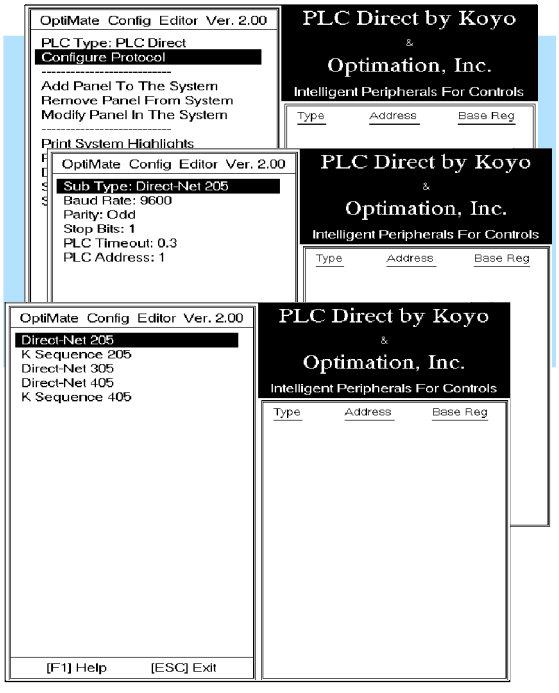
Step 6A
Select Configure Protocol and the PLC Subtype

Select **Configure Protocol**. Here we are selecting the communications protocol that will be used between the PLC and the OP-9001.

This will take you to another screen that gives you a selection of **PLC Subtype**. The default subtype (for PLC***Direct***) is indicated. In this example shown, the default is **Direct-Net 205**. 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 PLC***Direct*** models, one port is K-sequence and another may be ***Direct***Net. On others, you may only have one protocol available.



Step 6B
Set the Baud Rate, Parity and Stop Bits

If you are using a PLC***Direct*** or compatible programmable controller with your OP-9001, you can use the chart shown on the right to help you select the proper baud rate, parity and stop bits.

If you are using an Allen-Bradley SLC 5/03 or 5/04, you must select either 4800 or 9600 baud. Your Allen-Bradley configuration software shows a default baud rate of 1200; so you must change this. You must also be connecting through Channel 0 (the bottom serial port) and be set to DF1 full duplex.

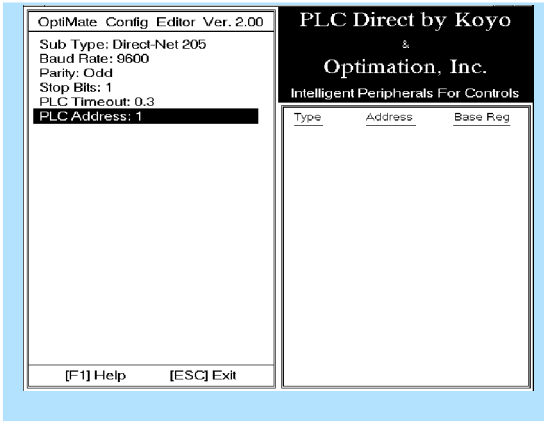
PLC Model	Port/Baud Rates	Parity	Stop Bit
DL230/240	Top 9600	Odd	1
	Bottom (DL240 only) 1200/9600/19.2k	Odd/None	
DL330	DCU 1200/9600/19.2k	Odd/None	1
DL340	Top 1200/4800/9600/19.2k	None	1
	Bottom 1200/4800/9600/19.2k	None	
DL430/440	Top 9600	Odd	1
	Bottom 1200/9600/19.2k	Odd/None	
DL450	DB15 9600	Odd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

Step 6C
Set the Timeout

When the OP-9001 sends a message to the PLC, and either does not receive a response or does not understand the response, it will wait the timeout period before resending the message. The default timeout period is 0.3 seconds. You can change this, if you like. The range is from 0.2 seconds to 25.5 seconds.

Step 6D
Set the PLC Address for the Port Used

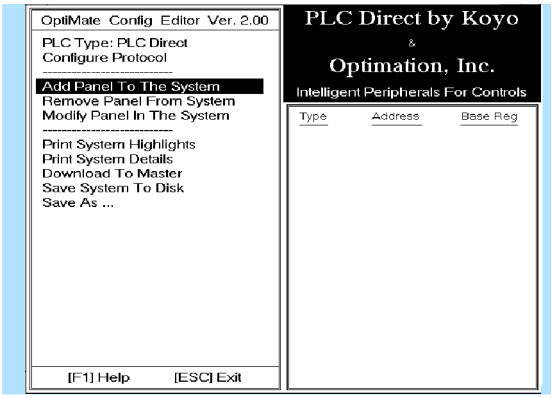
Each PLC**Direct** or compatible has addresses associated with its communications ports. Some port addresses are fixed and some are configurable. Check your respective PLC User Manual for the address available for the port connected to your OP-9001. Make sure your OPEditor setting matches the number assigned to the port.



For Allen-Bradley SLC 5/03 or 5/04, you must connect to Channel 0 (the bottom serial port) set for DF1 full duplex. You can set the PLC address to any number in the range of 0 through 255 using the A-B software. Make sure the OPEditor setting matches the A-B configuration. The default is PLC Address 1.

Step 7
Add the Panel to the System

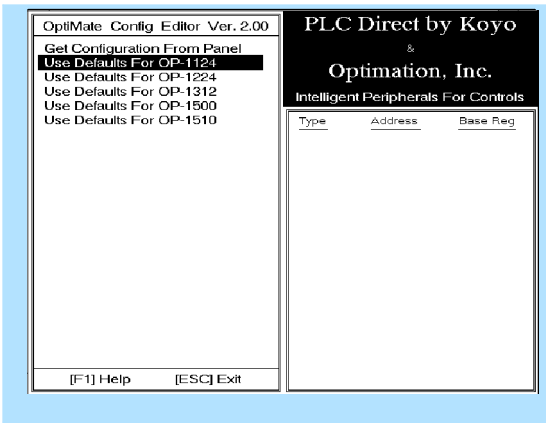
Since this is the first time that you are configuring a multi-panel system, select **Add Panel to the System**. Then press the **<Enter>** key.



Step 8
Select the Panel to be Configured or Upload an Existing Panel Configuration

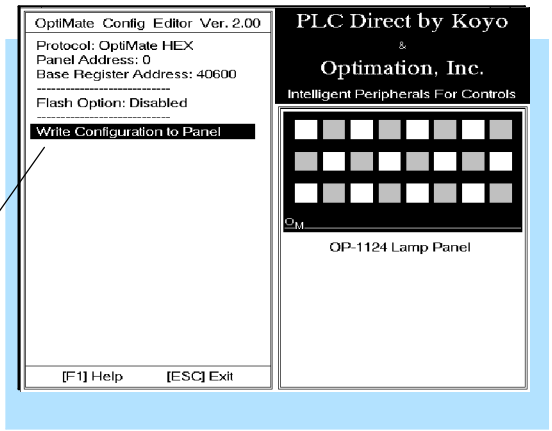
If you have previously configured an OP-panel (as a single panel), and now you are including it in a multi-panel system, select **Get Configuration from Panel**.

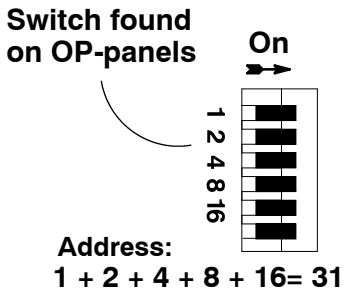
If you have no existing configuration, and you are now adding a panel that must be configured, move the selector bar to the appropriate model name. Then, press the **<Enter>** key.



Step 9
Download the Configuration to the Respective Panel

Each panel has to store its own configuration. Consequently, each time you finish a configuration, connect the respective panel, then set its DIP switch to address 31 for downloading. All the slide switches (representing weighted decimal digits) are turned to the ON position in order to indicate address 31.

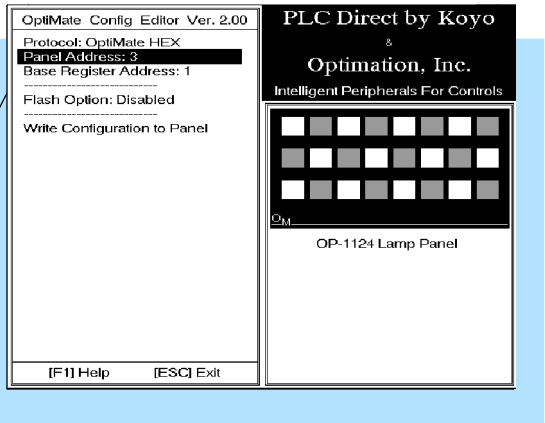


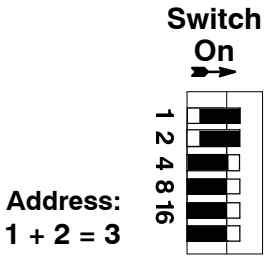


NOTE: Remember that you must have the DIP switch on the rear of the OP-panel set to address 31 in order for the downloading of your configuration to take place.

Step 10
Assign a Unique Panel Address

So that the OP-9001 can distinquish one panel from the next, you must assign a unique address (in the range of 0 through 30) to each panel via its address dip switch. Make sure that the **Panel Numbe**r setting matches the dip switch setting.





Step 11
Repeat Steps 8-10 for each OP-panel

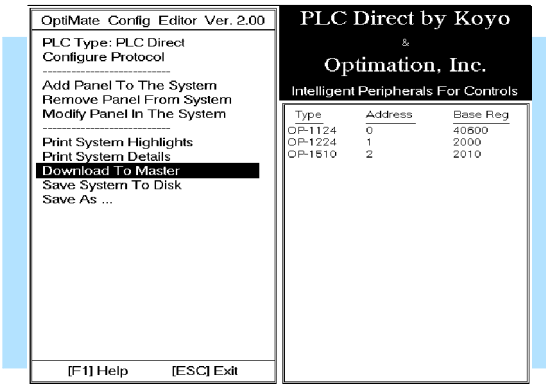
Each panel has to be individually configured for all of its features. You will have to repeat Steps 8 thru 10 for each panel you add to your system. Notice that as you add panels to your configuration they are shown on the righthand side of your screen along with the panel address and the base register address.

Each panel requires certain blocks of consecutive memory for its mapping process and you must be careful in assigning the base register addresses. In our Memory Planning section of this manual, we presented you with a table that shows the consecutive memory requirements for each panel and PLC combination. Assign a base register address that will not conflict with the other panels by overwriting their configuration.

Keep in mind (as you refer back to the individual User Manuals for each OptiMate panel) the configuration examples were based on single-panel systems that had to communicate directly with the PLC. For this reason they are setup in a single-panel scheme using the communications protocol of the PLC. For example, you use K-sequence or ***Direct***NET for the PLC***Direct*** and compatibles. The communications protocol for multi-panel systems will always be set for **OptiMate HEX** except for the OP-9001 communications master. The panels do not talk to the PLC directly–they talk instead to the OP-9001 communications master.

Step 12
Download the System Configuration to the OP-9001

When you have completely finished configuring every individual panel belonging to your system, you are then ready to download the overall system to your OP-9001 panel. Don't forget to place the downloading jumper on the OP-9001. You access this through the edge of the panel. When you are finished downloading, you need to remove the jumper before the OP-9001 can communicate with the PLC. Make sure also that you have reset the DIP switch on the OP-panels to match the unique address you gave them during configuration.



Do not leave the panels set to address 31 or otherwise the OP-9001 will not be able to communicate with them.

If you want to download your system to a disk or save it as a file, you will notice the last two options on the above dialogue allow you to do just that. It is a good idea to always store your configuration on your hard drive or a floppy, as well as download it to the OP-9001.

NOTE: Remember that you must have the "download" jumper in place in order to download the system from the computer to the OP-9001. The jumper is located between the DB15 connector and the power supply connector on the open edge of the panel

If you later want to **add, remove or modify a panel configuration**, you can do so by merely selecting any of these options from the above menu. You can also **print** the system highlights or the detailed version of your configuration, by clicking on these menu options.

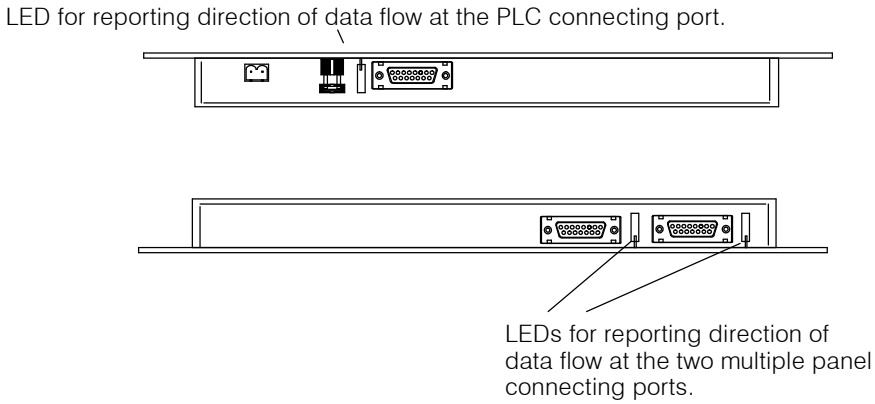
By using **Save System To Disk**, or **Save As..** options of the menu, you can also make sure you have a backup copy of your configurations (panel or system) stored somewhere besides in a panel or the OP-9001.

Troubleshooting

Observing the LEDs on the OP-9001

The steps shown below explain how to use the built-in communication LEDs to make sure the communications of your configuration are working properly:

1. Make sure you have downloaded your system configuration to the OP-9001, and that you have downloaded the panel configurations to each respective panel.
2. Remove the jumper from the OP-9001 and make sure all of the dip switch settings on your individual panels are set to unique addresses. These addresses, of course, must be the same panel addresses you assigned during configuration.
3. Attach the cable from the PLC to the OP-9001. Attach the cabling between the OP-9001 and the multiple panels.
4. Apply power to the PLC, the OP-9001, and all of the respective panels.
5. Make sure anytime you remove or replace the OP-9001 jumper that you also power cycle the OP-9001. Power cycle means to turn the power OFF, then ON.
6. With power applied, visually inspect the LEDs located beside each connecting port of the OP-9001.
    - The LED located beside the port for the cable leading to the PLC should blink **green** when the OP-9001 is **sending** requests for data to the PLC.
    - The LED should blink **red** when the OP-9001 is **receiving** data from the PLC.
    - If the baud rate is such that the request and transfer of data are very fast (changing rapidly between the red and green states), it will appear that the LED glows **amber**.



Requesting Data from PLC But No Response

If the LED (on the top edge of the OP-9001) remains green and never makes the transition to red or amber, then you are probably experiencing a lack of response by the PLC. When your PLC and the OP-9001 are communicating correctly, the LEDs should flicker constantly (or appear to glow amber at high baud rates), with only a few pauses. If it doesn't, here's what you do to isolate and solve the problem:

1. Check your baud rate setting between the PLC and OP-9001. Make sure they are set at a rate that matches your PLC specs and configuration.
2. If the baud rate appears to be OK, check your panel configurations to make sure you have specified the correct memory allocations, and that you have not specified memory that does not exist for your PLC.

3. If you are using a PLC***Direct*** or compatible PLC, make sure the PLC port is set to HEX. If you don't have the port set to HEX, the LED may indicate that everything is OK, but in fact, no communication between the OP-9001 and the PLC is taking place.
4. If the baud rate and memory allocation seem to be OK, perhaps your cable is bad. If you built your own cable, check the pinout specifications on Page 12.

OP-9001 Not Communicating Properly with the Panels

The LEDs on the bottom edge of the OP-9001 are used to troubleshoot communication between the OP-9001 and the panels. The OP-9001 should be sending requests (green) to the connected panels and receiving responses (red). When the OP-9001 and the panels are communicating correctly, the LED indicators on the OP-9001 should flicker constantly (or appear to glow amber), and the LEDs on the panels should barely flicker. The amount of flicker will depend upon how may panels you have connected to the OP-9001. Fewer panels mean less flicker. If the OP-9001 is not communicating properly, here are some things to check and correct if necessary:

1. Check the LEDs on the back of each panel. These LEDs should glow **red** when receiving requests and glow **green** when sending data to the OP-9001. If any one of the panels is not communicating, check the DIP switch on the back of the panel and make sure its setting matches the setting you indicated in your configuration. Remember also that no two panels can have the same setting.
2. If Step 2 checks out OK, then make sure the panel is set for Optimate HEX protocol.
3. If Step 3 is OK, then check your cabling.
4. Make sure that any DIP switch setting changes have been followed by a power cycle of the panel. You must turn the power OFF then ON for the new setting to take place.

Trouble Communicating with Computer During Configuration

Here are some common causes of this problem:

1. The OPEditor is a DOS program, you cannot shell out of Windows or try to run the OPEditor from Windows. Make sure you have completely exited Windows before trying to do your configuration.
2. In some rare cases, you may have a TSR or a device driver that is conflicting with the OPEditor communications. To check this, if you are using MS-DOS 6.0 or above, press the **F8** key when you see the message **"Starting MS-DOS..."** on the screen. This allows you to decide line-by-line for your CONFIG.SYS and AUTOEXEC.BAT files whether or not you want certain drivers or TSRs to be loaded. We suggest that you only load HIMEM.SYS in your CONFIG.SYS file, and you not run the AUTOEXEC.BAT file at all. After your system loads HIMEM.SYS and then you are asked if you want to run your AUTOEXEC.BAT, say "NO". You will then be given a DOS prompt. Change to your OPEditor subdirectory by typing: **CD C:\OP** or whatever alternative path and subdirectory is applicable. Once you are in your OPEditor subdirectory, type: **OPEDITOR**.

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