5

Programming Examples

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Examples Using PLC*Direct* PLCs

Register Usage

The OP–WINEDIT configuration software allows you to configure a panel to use a block of registers at a starting value that you define. For a DL105, DL205, D3–350 or DL405 CPU the recommended memory to use is the general purpose data words starting at V2000. For the 305 family (except the D3–350) the recommended memory is the registers beginning at R400. Any block of registers within the data word range can be used.

The first six PLC registers in the block used by the OP–420 panel are used for numeric information, and this makes them ideally suited for the general purpose data registers. The seventh register uses individual bits for pushbutton status, making it better suited for the control relay register range of memory. The solution to this minor conflict is to define the base register address in general purpose data register memory and place a rung in your PLC program to copy the last register to a control relay register (we show you how to do this later).

The following table lists the control relay register addresses for CPUs.

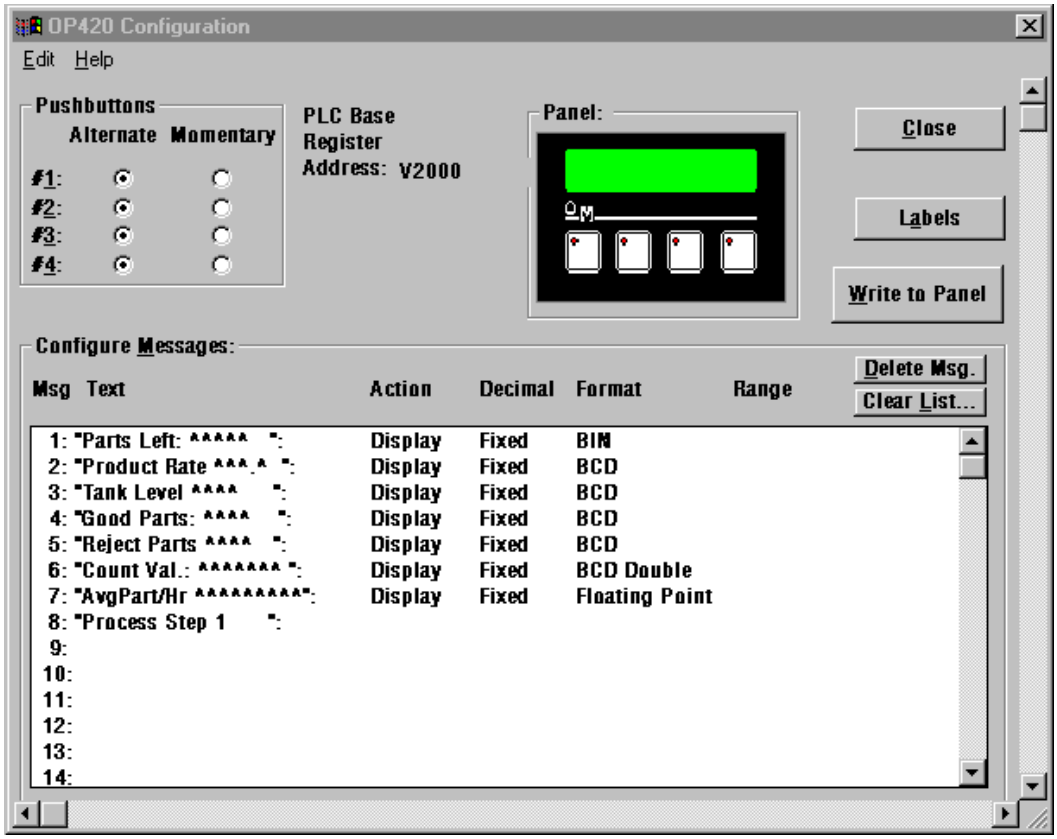
Control Relay Registers for *Direct*LOGIC™ PLCs		
Family	**CPU**	**Control Relay Registers**
*Direct*LOGIC™ DL105	F1–130	V40600–V40617
*Direct*LOGIC™ DL205	D2–230	V40600–V40617
	D2–240	V40600–V40617
	D2–250	V40600–V40677
*Direct*LOGIC™ DL305	D3–330/D3–330P	not applicable to OP–420
	D3–340	R016–R037 and R100–R106
	D3–350	V40600–V40677
*Direct*LOGIC™ DL405	D4–430	V40600–V40635
	D4–440	V40600–V40677
	D4–450	V40600–V40777

Examples Using DL105, DL205, D3–350 and DL405

Defining the Status Register

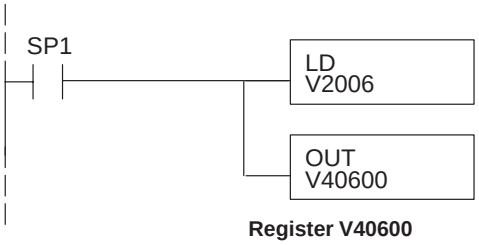
The following examples assume that the OP–420 is configured for a base address of V2000. When configuring the panel, use the configuration data and messages shown in the following figure.

NOTE: The Example Worksheet in Appendix A also has the configuration data and messages needed for these examples. The example uses an F1–130 CPU, but enter the PLC parameters for your PLC. The example shows how you can use the worksheets to help plan your configurations.



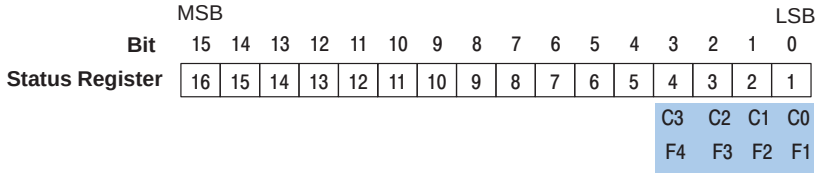
Enter the above messages to run the example programs.

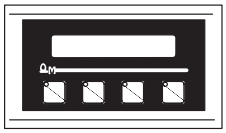
Place the following program rung in the program to copy the status register to memory location V40600.



This rung copies the status register to V40600.

Register V40600

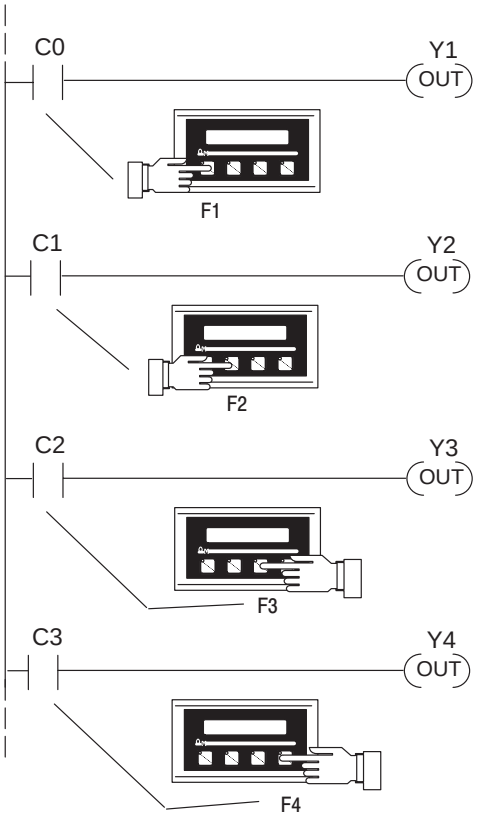




As you can see, control relays C0–C3 will be associated with pushbuttons F1–F4.

Using a Function Button

The four function buttons will appear as control relay coils in your program (assuming the register copy rung shown previously is in the program).



This rung turns on output Y1 when pushbutton F1 is active.

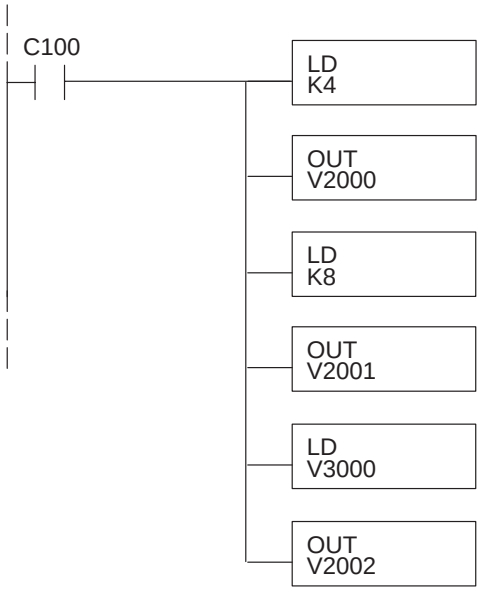
This rung turns on output Y2 when pushbutton F2 is active.

This rung turns on output Y3 when pushbutton F3 is active.

This rung turns on output Y4 when pushbutton F4 is active.

Displaying Messages

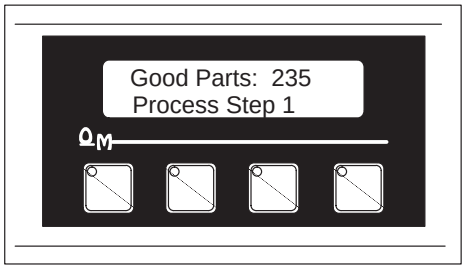
The following example shows two messages being displayed. The top line is displaying message #4 and the bottom line is displaying message #8.



This selects message #4 to be displayed in the top line

This selects message #8 to be displayed in the bottom line.

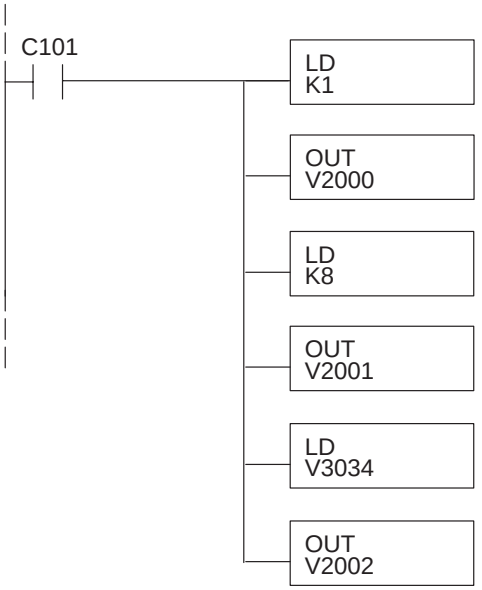
This puts data from V3000 (235 in this example) into the top line data field (^^^^).



V2000	Top line message selection
V2001	Bottom line message selection
V2002	Top line data
V2003	Top line data 2 (for long BCD & floating point)
V2004	Bottom line data
V2005	Bottom line data 2 (for long BCD & floating point)
V2006	Status register

Displaying Binary Numbers

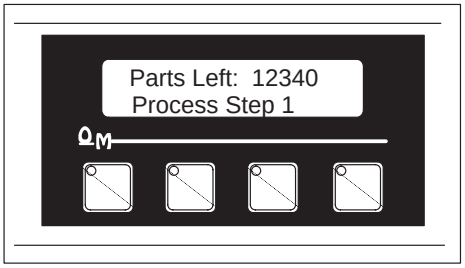
This example is similar to the previous example, except that it uses a binary number in the top display. The top line uses data display message #1, which has been configured as a binary display message. The data for the data field is a constant number 12340 (V3034). The data can also be moved to the data register from another register. The bottom line is text message #8.



This selects message #1 to be displayed in the top line.

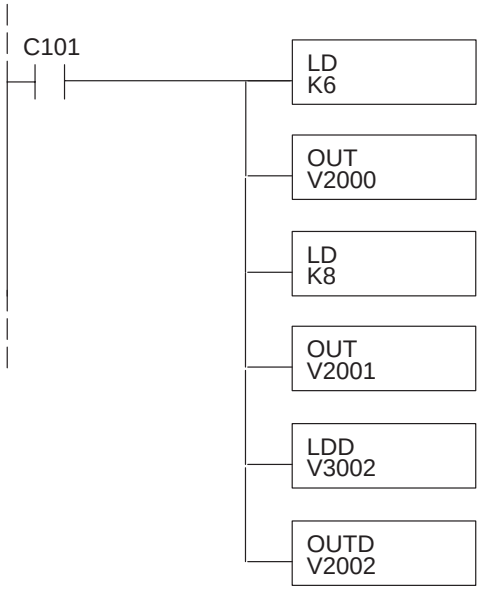
This selects message #8 to be displayed in the bottom line.

This puts binary value from V3034 (12340 in this example) into the top line data field (^^^^^).



Displaying BCD Double Numbers

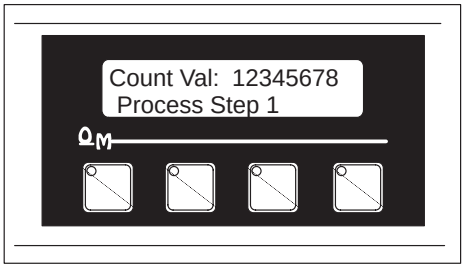
This example is similar to the previous example, except that it uses a BCD Double number in the top line display. The top line uses data display message #6, which has been configured as a BCD Double display message. The data for the data field is from V3002 and V3003. V3002 contains the four least significant digits while V3003 contains the four most significant digits. The bottom line is text message #8.



This selects message #6 to be displayed in the top line.

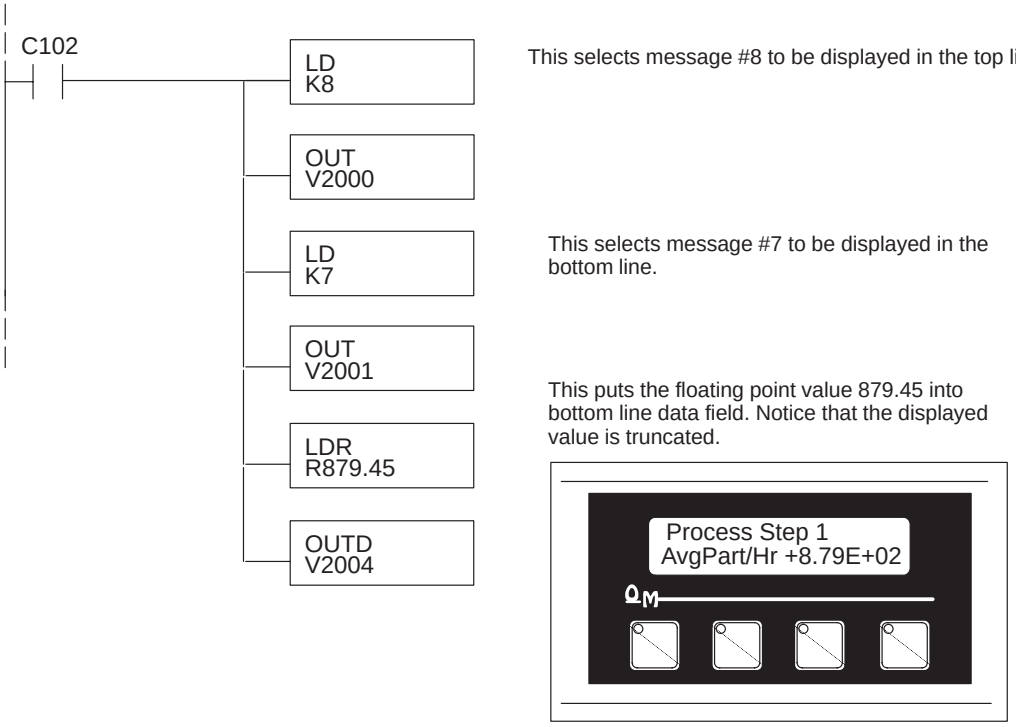
This selects message #8 to be displayed in the bottom line.

This puts BCD Double number from V3002 (12345678 in this example) into the top line data field.



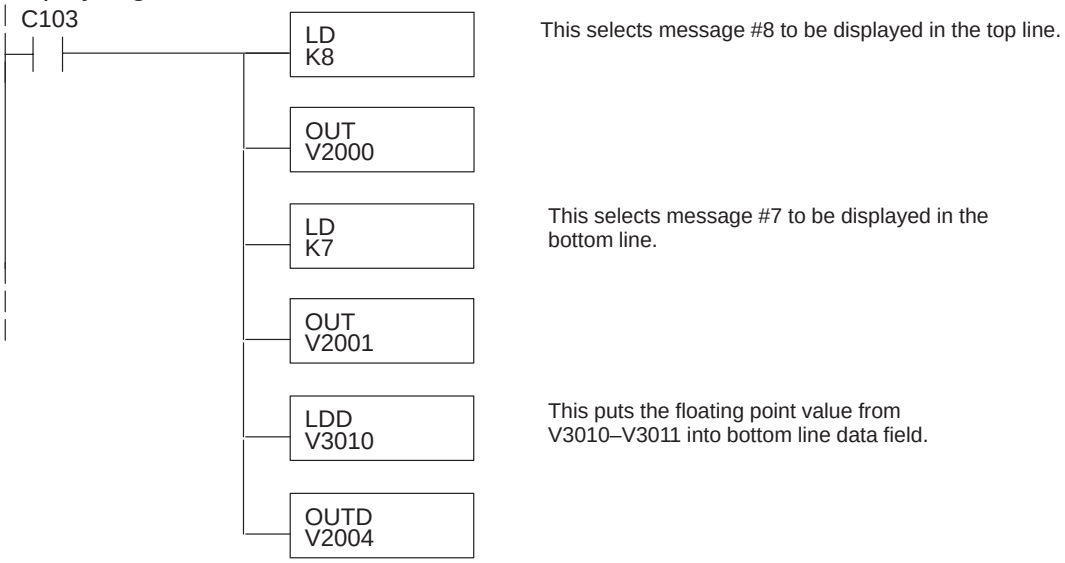
Displaying Floating Point Numbers Example 1

This example uses a floating point number in the bottom line display. The bottom line uses data display message #7, which has been configured as a floating point display message. Since the data is a floating point number, it uses two 16-bit registers. The two registers have to be looked at together, not individually, for the data to be understandable. In this example, the data is a constant number (879.56) which is loaded into the bottom line data display registers using an LDR (load real number) instruction. The top line is text message #8.



Displaying Floating Point Numbers Example 2

This example is similar to the one above, except that it gets its value from two PLC registers instead of a constant value. The bottom line uses data display message #7, which has been configured as a floating point display message. Remember, floating point numbers require two 16-bit registers. In this example, the data is loaded from V3010 and V3011 using an LDD (load double number) instruction to the bottom line display registers V2004 and V2005.

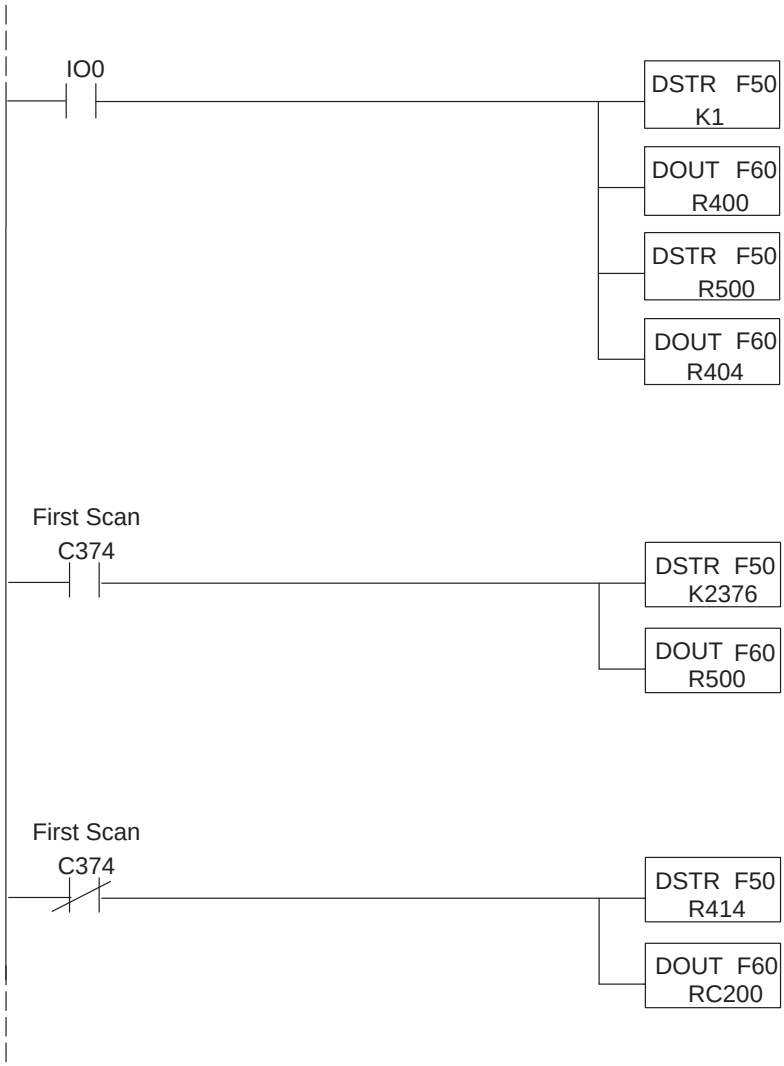


Example Using D3–340

Defining the Status Register

The following example assumes that the OP–420 is configured for a base address of R400/R401. When configuring the panel, enter the messages shown in the previous section for the DL105, DL205, D3–350 and DL405 examples.

DirectSOFT



Displaying Messages

This rung displays message #1 and R500 value in the top display line.

This rung loads an arbitrary value (2376) to be displayed.

Pushbuttom Status

This rung remaps the status register (R414/R415) to control relays C200–C217.

Examples Using Allen-Bradley SLC 5/03, 5/04 and Micrologix

Interfacing to A-B Memory

OptiMate panels interface to Allen-Bradley SLC 5/03, SLC 5/04 and Micrologix PLCs via integer file type N. The 5/03 and 5/04 have file type N7 as standard. Other "N" type files can be created. The Micrologix has a fixed file type N7. Please see A-B documentation for information on setting up and using "N" type files.

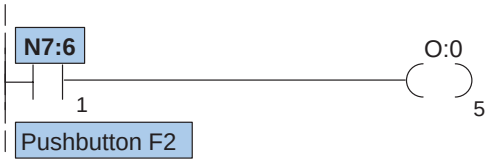
NOTE: When using an OP–420 with an Allen-Bradley PLC, always be sure that at least seven words of memory are allocated to allow proper communications.

All of the examples shown assume the OP–420 has been configured (using OP–WINEDIT) for a file number N7 and base register address 0. With this configuration, the status register will be at N7:6. This table relates status register bits to their N7 locations.

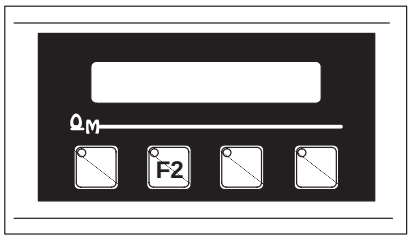
Status Register	
Bit	**Location**
F1	N7:6/0
F2	N7:6/1
F3	N7:6/2
F4	N7:6/3

Using a Function Button

The four function buttons will appear as control relay coils in your program.



This rung turns on output O:0/5 when pushbutton F2 is active.

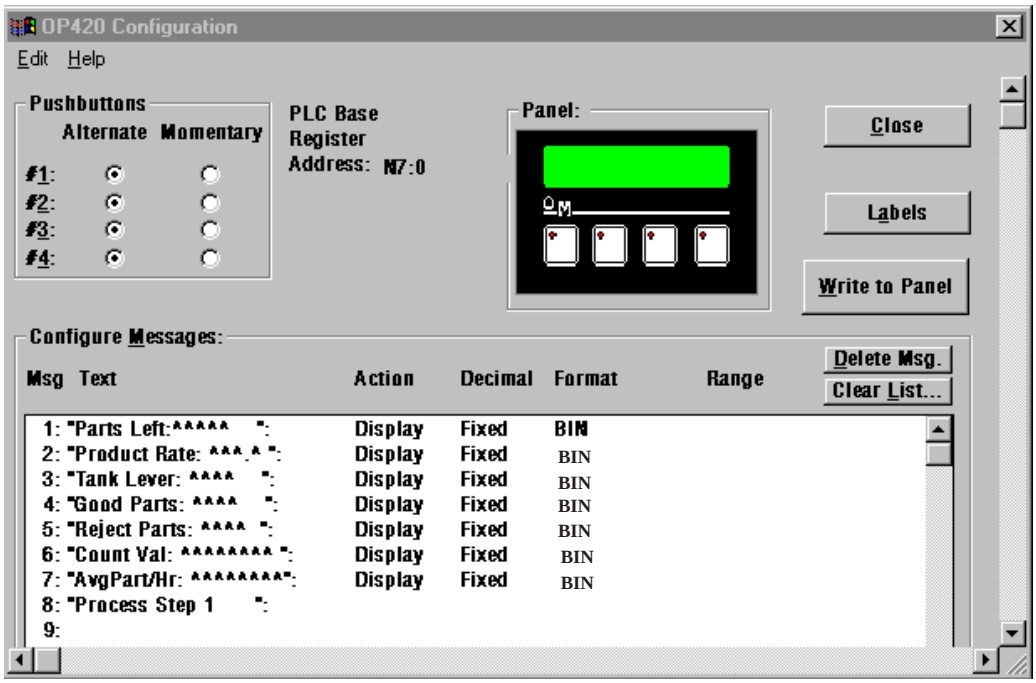


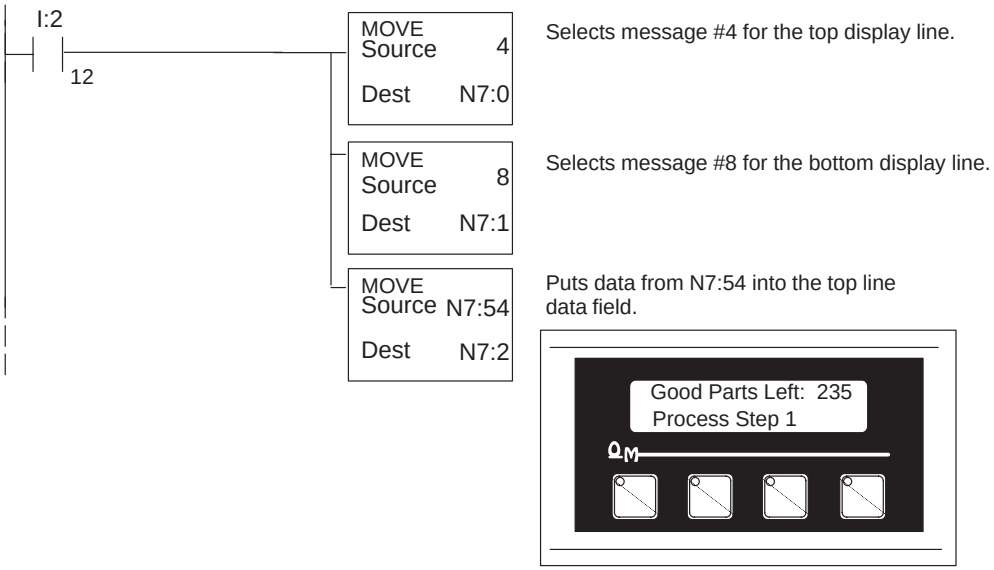
Example Address		Function
N7:0	M+0	Top line message selection (#1 to #160)
N7:1	M+1	Bottom line message selection (#1 to #160)
N7:2	M+2	Top line data
N7:3	M+3	Top line data 2 (long BCD, floating point)
N7:4	M+4	Bottom line data
N7:5	M+5	Bottom line data 2 (long BCD, floating point)
N7:6	**M+6**	F4 F3 **F2** F1

Status register

Displaying Messages

The following example uses the configuration shown below, and shows two messages being displayed. The top line is displaying message #4. The data for the data field is from location N7:54. The bottom line is displaying message #8.

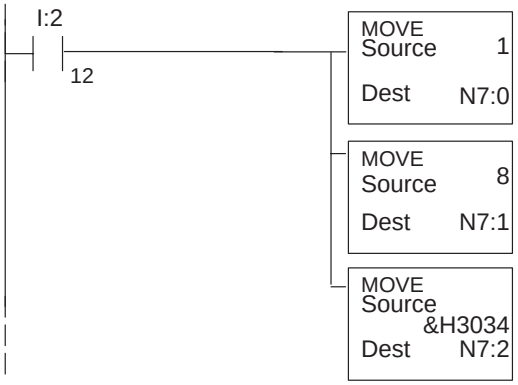




Example Address		Function
N7:0	**M+0**	Top line message selection (#1 to #160)
N7:1	**M+1**	Bottom line message selection (#1 to #160)
N7:2	**M+2**	Top line data
N7:3	M+3	Top line data 2 (long BCD, floating point)
N7:4	M+4	Bottom line data
N7:5	M+5	Bottom line data 2 (long BCD, floating point)
N7:6	M+6	F4 F3 F2 F1

Displaying Binary Numbers

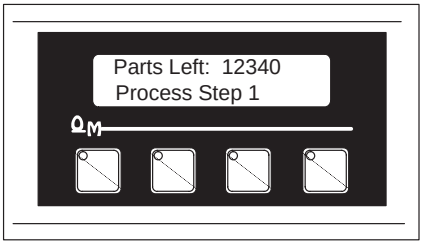
This example is similar to the previous example, except that it uses a binary number in the top display. The top line uses data display message #1, which has been configured as a binary display message. The data for the data field is a constant number 12340 (3034 Hexadecimal). The data can also be moved to the data register from another register. The bottom line is text message #8.



Selects message #1 for the top display line.

Selects message #8 for the bottom display line.

Puts binary data “12340” into the top line data field.

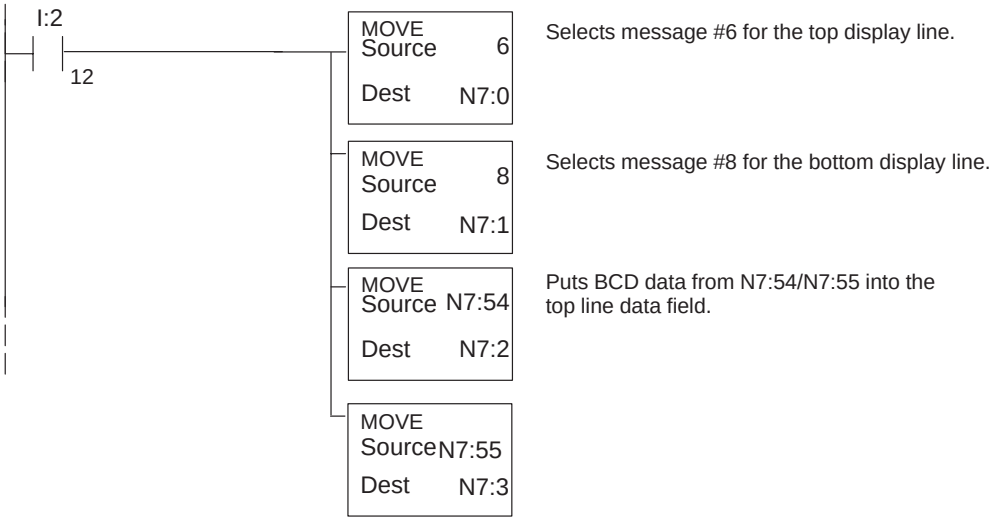


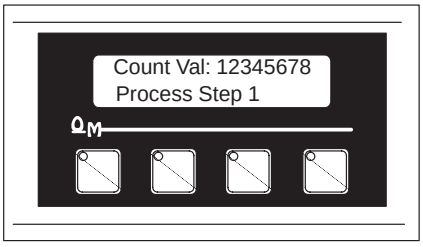
Example Address		Function
N7:0	**M+0**	Top line message selection (#1 to #160)
N7:1	**M+1**	Bottom line message selection (#1 to #160)
N7:2	**M+2**	Top line data
N7:3	M+3	Top line data 2 (long BCD, floating point)
N7:4	M+4	Bottom line data
N7:5	M+5	Bottom line data 2 (long BCD, floating point)
N7:6	M+6	F4 F3 F2 F1

Displaying BCD Double Numbers

Allen-Bradley PLCs do not have an easy way of handling long BCD numbers, so this feature of the OP–420 will not be commonly used.

In this example register N7:54 and N7:55 contain an eight digit BCD number, with the most significant four digits in register N7:55. The data is moved into the top display registers using a MOVE instruction. BCD long data can also be displayed on the bottom line by simply moving the data to the bottom line data registers. The bottom line is text message #8.





Example Address		Function
N7:0	**M+0**	Top line message selection (#1 to #160)
N7:1	**M+1**	Bottom line message selection (#1 to #160)
N7:2	**M+2**	Top line data
N7:3	**M+3**	Top line data 2 (long BCD, floating point)
N7:4	M+4	Bottom line data
N7:5	M+5	Bottom line data 2 (long BCD, floating point)
N7:6	M+6	F4 F3 F2 F1

Displaying Floating Point Numbers

Allen-Bradley SLC PLCs do not have a means of handling floating point numbers.

Troubleshooting the OP-420 Panels

Troubleshooting

In this section, we explain how to isolate potential problems which may occur while using the OP–420. Because these panels have only a power supply connection and a communications connection, no DIP switches or controls to set, and cannot be used in multiple panel arrangements, troubleshooting is a very straightforward operation.

Power Supply Problems

If the panel LED display, the pushbutton indicators, and the RX and TX LEDs on the back of the panel do not illuminate, the panel is most likely not receiving input power. Carefully check your connections to make sure they are tight. If this does not help, see Chapter 2 and review the input power requirements.

Remember, all PLC's require that you use the OP–PS400 5V plug-in power supply (or equivalent) for configuration. Some PLC's also require that you use this power supply for operation. Make sure that the 120 VAC receptacle you plug the power supply into has power. Also, if you are using another 5V power supply, make sure that it has a center negative connector.

If using a PLC that supplies 5V for operation through the communications cable, check to make sure sure that pin 5 on the lead going into the panel has a 5V signal.

Configuration Problems

Make sure that you are using the proper configuration cable (OP–CCBL) and that it is securely connected. Check your configuration program and make sure the proper communications port is selected, such as COM1 or COM2. Review your configuration settings to make sure they are correct. Remember, the OP–WINEDIT Help screens provide a lot of valuable information.

Communication Problems

Observe the RX and TX LEDs on the rear panel. They should be steady flashing or glow (depending on the baud rate). If not, make sure that you are using the proper communications cable and that it is securely connected. Review your configuratiion settings and make sure that the communications information for your PLC, address number, baud rate, protocol type, etc. is correct. Check the user manual for your PLC for the proper settings.

Getting Help

See "Technical Support" in Chapter 1 for additional information.