

# D0–DCM Module Setup

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## In This Chapter. . . .

- Important Module Configuration Information
- Using *DirectSOFT5* to Configure DCM Ports
- DCM Port 1 and Port 2 Configuration Registers
- Using Ladder Logic to Configure DCM Ports (DL05)
- Using Ladder Logic to Configure DCM Ports (DL06)

# Important Module Configuration Information

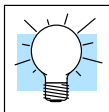
The D0-DCM's communications port parameters are configured using either the **DirectSOFT5** (or later) PLC>Setup>D0-DCM setup dialog box or ladder logic programming for **DirectSOFT32** users. If port 1 and/or port 2 default parameters are acceptable for your application, no setup is required. (*Tip:* If you intend to use port 2 as a network master, you must configure the port).

The “*DCM Port 1 and Port 2 Configuration Registers*” section beginning on page 3-9 lists port 1 and port 2 default parameters and V-memory configuration registers used by the DCM module(s).



**NOTE:** The DL05 CPU's communication feature for the D0-DCM requires **DirectSOFT32** Version 3.0c (or later) and firmware version 5.00 (or later). The DL06 requires **DirectSOFT32** version V4.0, build 16 (or later) and firmware version 1.90 (or later). See our web site for firmware information and downloads: [www.automationdirect.com](http://www.automationdirect.com)

## Tip for DirectSOFT5 Users (optional)

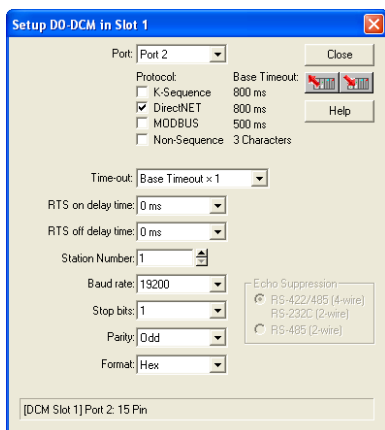


If you intend to use ladder logic in your program to configure the DCM ports, you can use the DCM setup dialog box and a Data View window to quickly determine the BCD/HEX values to use in your port setup ladder logic code. This method greatly simplifies the process. The procedure is summarized below and covered in this chapter.

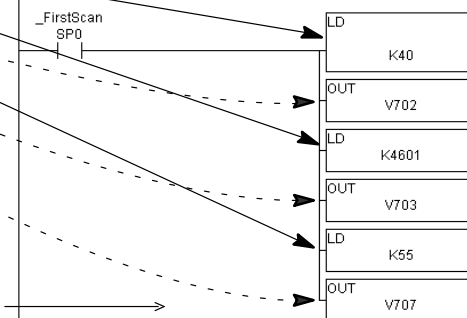
**Step 1:** Use the **DirectSOFT5** PLC>Setup>D0-DCM setup dialog box to configure the DCM port(s) as needed for your application. Save the port configuration to the CPU.

**Step 2:** In **DirectSOFT5**, open a Data View window and type in the special V-memory locations used for the DCM module based on the slot the module is occupying (see page 3-9). The BCD/HEX register values needed to support your specific port communications selections will be displayed in the Data View window.

**Step 3:** Create a ladder rung in your PLC program to write the values determined in the previous step to the special V-memory locations used for the module. Creating this rung ensures that your specified communications port parameters will be maintained after a power outage, power cycle, etc. without having to reconnect and reconfigure the port(s) using **DirectSOFT5** again. There are similar ladder logic examples provided at the end of this chapter.



Element	Status
V702	40
V703	4601
V707	55

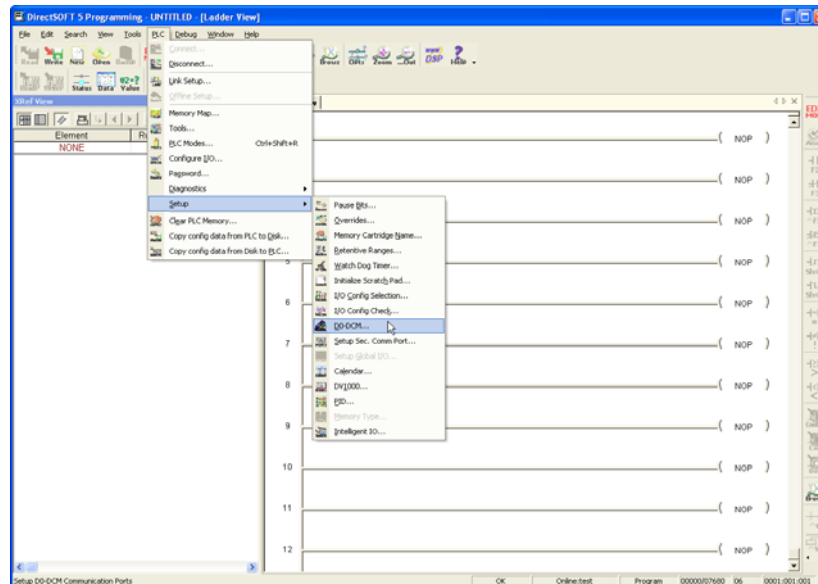


Setup Completion Flag: The CPU will write **00AA** Hex to the “Setup Complete” register after and if the port setup code executes successfully (see page 3-17).

# Using *DirectSOFT5* to Configure the DCM

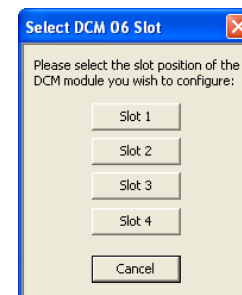
## *DirectSOFT5* PLC>Menu>Setup

Using the D0-DCM setup dialog box in *DirectSOFT5* is the easiest way to configure the D0-DCM communications port parameters. The DCM must be installed in an option slot and the PLC must be powered up and connected to a PC running *DirectSOFT5* or later. It is recommended to connect your PC to port 1 on the DL05/06 CPU to setup the DCM module, however, CPU port 2 or an ECOM Ethernet link will work. Once you're on-line with the PLC, click on PLC>Setup>D0-DCM.



## Select DCM Slot

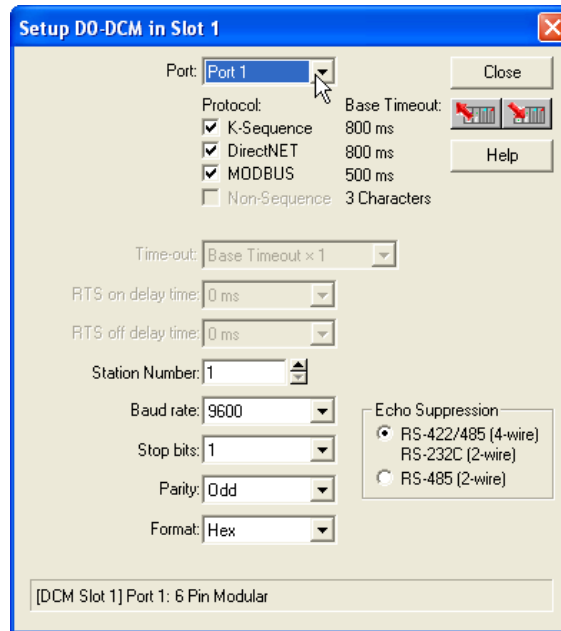
Select the option slot number that the target DCM is occupying. The DL06 PLC can support multiple DCM's, so be sure to click on the proper slot number 1-4. Once you click on a slot number, the D0-DCM port setup window will display as shown on the following pages.



### Port 1 Configuration (slave only)

The D0-DCM Setup window allows you to verify or make any necessary changes to the communications port parameters for your specific application.

- **Port:** From the port number list box, choose “Port 1”.
- **Protocol:** By default, all protocols are selected which results in “auto-detect” mode. The port will automatically determine which protocol is being used to communicate with it and operate accordingly. There is no advantage in deselecting unused protocols (selecting single protocols is for master mode use on port 2).



Read from module



Write to module



- **Station Number:** The allowable range for *DirectNET* slaves is from 1 to 90. The allowable range for Modbus RTU slaves is from 1 to 247. Each slave must have a unique, but do not need to be consecutive.
- **Baud Rate:** The available baud rates include 9.6K to 115.2K baud. Choose a higher baud rate initially, reverting to lower baud rates if you experience data errors or noise problems on the network. Important: You must configure the baud rates of all devices on the network to the same value.
- **Stop Bits:** Select 1 or 2 stop bits for use in the protocol.
- **Parity:** Select none, even, or odd parity for error checking.
- **Format:** Select hex or ASCII formats.
- **Echo Suppression:** Select port 1 wiring (applies to Modbus protocol only).

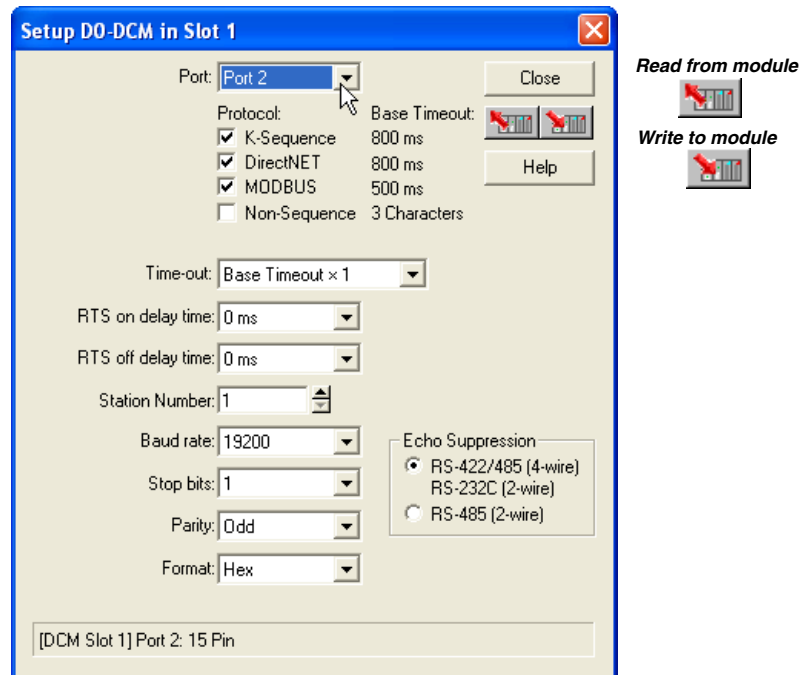


Then click the button indicated to send the Port configuration to the Module, and click Close.

## Port 2 Configuration (slave mode)

Click on “Port 2” to display its parameter settings. Make any changes as necessary for your application.

- **Port:** From the port number list box, choose “Port 2”.
- **Protocol:** By default, all protocols (except non-sequence) are selected which results in “auto-detect” mode. The port will automatically determine which protocol is being used to communicate with it and operate accordingly. There is no advantage in deselecting unused protocols (selecting a single protocol is for master mode use on port 2).



- **Timeout:** amount of time the port will wait after it sends a message to get a response before logging an error.
- **RTS On Delay Time:** The amount of time between raising the RTS line and sending the data.
- **RTS Off Delay Time:** The amount of time between resetting the RTS line after sending the data.
- **Station Number:** The allowable range for *DirectNET* slaves is from 1 to 90. The allowable range for Modbus RTU slaves is from 1 to 247. Each slave must have a unique, but do not need to be consecutive.
- **Baud Rate:** The available baud rates include 300 to 115.2K baud. Choose a higher baud rate initially, reverting to lower baud rates if you experience data errors or noise problems on the network. Important: You must configure the baud rates of all devices on the network to the same value.
- **Stop Bits:** Choose 1 or 2 stop bits for use in the protocol.
- **Parity:** Choose none, even, or odd parity for error checking.
- **Format:** Choose hex or ASCII formats.
- **Echo Suppression:** Select port 2 wiring (applies to Modbus protocol only)



Then click the button indicated to send the Port configuration to the Module, and click Close.

## Port 2 Configuration (DirectNET Master)

To configure Port 2 for **DirectNET** master operation:

- **Port:** From the port number list box, choose “Port 2”.
- **Protocol:** Click the check box to the left of “DirectNET”.

Read from module



Write to module



- **Timeout:** amount of time the port will wait after it sends a message to get a response before logging an error.
- **RTS On Delay Time:** The amount of time between raising the RTS line and sending the data.
- **RTS Off Delay Time:** The amount of time between resetting the RTS line after sending the data.
- **Station Number:** For making the DCM port a **DirectNET** master, choose “1”. The allowable range for **DirectNET** slaves is from 1 to 90 (each slave must have a unique number). At power up, the port is a slave, unless and until the CPU executes network read/write instructions which uses the DCM port as a master. Thereafter, the port reverts back to slave mode until network read/write instructions use the port again.
- **Baud Rate:** The available baud rates include 300 to 115.2K baud. Choose a higher baud rate initially, reverting to lower baud rates if you experience data errors or noise problems on the network. Important: You must configure the baud rates of all devices on the network to the same value.
- **Stop Bits:** Choose 1 or 2 stop bits for use in the protocol.
- **Parity:** Choose none, even, or odd parity for error checking.
- **Format:** Choose hex or ASCII formats.

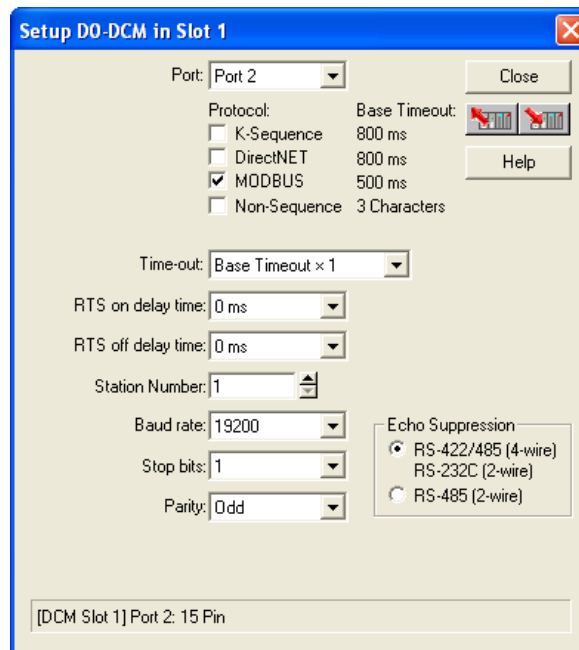


Then click the button indicated to send the Port configuration to the Module, and click Close.

## Port 2 Configuration (Modbus Master)

To configure Port 2 for Modbus® RTU master operation:

- **Port:** From the port number list box at the top, choose “Port 2”.
- **Protocol:** Click the check box to the left of “MODBUS”.



Read from module



Write to module



- **Timeout:** amount of time the port will wait after it sends a message to get a response before logging an error.
- **RTS On Delay Time:** The amount of time between raising the RTS line and sending the data.
- **RTS Off Delay Time:** The amount of time between resetting the RTS line after sending the data.
- **Station Number:** For making the DCM port a Modbus master, choose “1”. The possible range for Modbus slave numbers is from 1 to 247 when using the MRX/MWX network instructions (WX/RX network instructions limits slaves 1 to 90). Each slave must have a unique number. At power up, the port is a slave, unless and until the CPU executes network read/write instructions which uses the DCM port as a master. Thereafter, the port reverts back to slave mode until network read/write instructions use the port again.
- **Baud Rate:** The available baud rates include 300 to 115.2K baud. Choose a higher baud rate initially, reverting to lower baud rates if you experience data errors or noise problems on the network. Important: You must configure the baud rates of all devices on the network to the same value.
- **Stop Bits:** Choose 1 or 2 stop bits for use in the protocol.
- **Parity:** Choose none, even, or odd parity for error checking.
- **Echo Suppression:** Select port 2 wiring method.

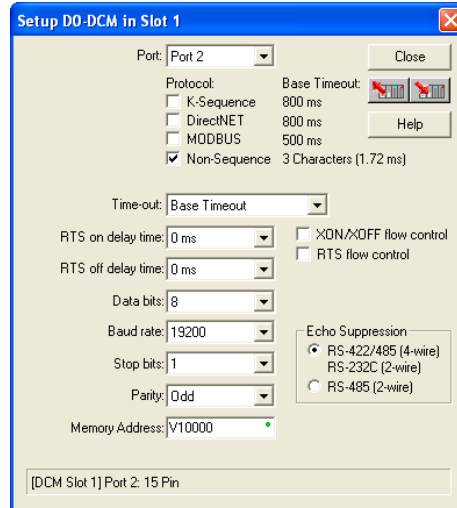


Then click the button indicated to send the Port configuration to the Module, and click Close.

## Port 2 Configuration (Non-Sequence)

Configuring port 2 on the DCM for Non-Sequence allows the CPU to use the DCM port to read/write raw ASCII strings using the DL05/06 ASCII instructions. Refer to Chapter 5 in the DL05/06 PLC User Manual for all available ASCII/Print instructions. In **DirectSOFT5**, select the PLC menu, then Setup, then “D0-DCM”.

- **Port:** From the port number list box at the top, choose “Port 2”.
- **Protocol:** Click the check box to the left of “Non-Sequence”.



Read from module



Write to module



- **Timeout:** amount of time the port will wait after it sends a message to get a response before logging an error.
- **RTS On Delay Time:** The amount of time between raising the RTS line and sending the data.
- **RTS Off Delay Time:** The amount of time between resetting the RTS line after sending the data.
- **Data Bits:** Select either 7-bits or 8-bits to match the number of data bits specified for the connected devices.
- **Baud Rate:** The available baud rates include 300 to 115.2K baud. Choose a higher baud rate initially, reverting to lower baud rates if you experience data errors or noise problems on the network. Important: You must configure the baud rates of all devices on the network to the same value.
- **Stop Bits:** Choose 1 or 2 stop bits to match the number of stop bits specified for the connected devices.
- **Parity:** Choose none, even, or odd parity for error checking. Be sure to match the parity specified for the connected devices.
- **Memory Address:** Choose a V-memory address to use as the starting location for the port setup parameters listed below.
- **Xon/Xoff Flow Control:** Choose this selection if you have port 2 wired for Hardware Flow Control (Xon/Xoff) with RTS and CTS signal connected between all devices.
- **RTS Flow Control:** Choose this selection if you have Port 2 RTS signal wired between all devcies.
- **Echo Suppression:** Select the appropriate radio button based on the wiring configuration used on port 2.



Then click the button indicated to send the Port configuration to the Module, and click Close.

# D0-DCM Port Configuration Registers

## Module Configuration Registers

The table below lists the special V-memory locations used by the DL05/DL06 PLCs for the D0-DCM module based on the slot the module is occupying. The registers, by slot, are used regardless of the method you use to configure the module (DS5 or ladder logic). The following pages define each register's function. DL05 and DL06 ladder logic examples are provided beginning on page 3-17.

Module Configuration Parameters		DL05 and DL06 Option Slot					
		Word Offset	DL05	DL06 Slot 1	DL06 Slot 2	DL06 Slot 3	DL06 Slot 4
<b>A</b>	<b>Port 1</b> –Transmit Mode (ASCII/Hex), Protocol	+0000	V7700	V700	V710	V720	V730
<b>B</b>	<b>Port 1</b> –Station Address, Baud Rate , Parity	+0001	V7701	V701	V711	V721	V731
<b>C</b>	<b>Port 2</b> –RTS On/Off Delay, Transmit Mode (ASCII/Hex), Protocol, Comm Time-out, RS-485 Mode Select	+0002	V7702	V702	V712	V722	V732
<b>D</b>	<b>Port 2</b> –Station Address, Baud Rate, Data Bit , Stop Bit , Parity	+0003	V7703	V703	V713	V723	V733
<b>E</b>	<b>Port 2</b> –Character Time-out	+0006	V7706	V706	V716	V726	V736
<b>F</b>	<b>Port1/Port 2</b> – Setup Completion Code	+0007	V7707	V707	V717	V727	V737
<b>G</b>	<b>Port 1/Port 2</b> –Reset Time-out		V7730	V7730	V7731	V7732	V7733

## Default Communications Parameters

On power up, the DCM will write the necessary data to the V-memory configuration registers to result with the following default port communications parameters. If you need to change any of the default settings or configure the module for network master operation, you must use either the **DirectSOFT5** (or later) PLC>Setup>D0-DCM setup dialog box or ladder logic programming for **DirectSOFT32** users.

Port Default Settings		
Parameter	Port 1	Port 2
Mode	Slave	
Baud Rate	9600bps	19200bps
Parity	Odd	
Protocol	K-Sequence/DirectNet/Modbus (auto-detect)	
Station Address	1	
Data Bits	8 (fixed)	8
Stop Bits	1 (fixed)	1

**Parameter Descriptions**

**Protocol Selection:** Slave mode (ports 1 and 2) – The default protocol setting for ports 1 and 2 is referred to as “auto-detect” mode (all protocols are selected except non-sequence for port 2). With this selection, the port will automatically determine which protocol is being used to communicate to it and operate accordingly. This selection is fine if you intend to program/monitor the CPU through the D0-DCM using *DirectSOFT*, or connect it to an operator interface, etc. You can select a single protocol if desired.

Master mode (port 2 only) – The DCM can serve as a *DirectNet* or Modbus<sup>®</sup> master. When using port 2 as a master, you must select the single appropriate protocol for the master port to use when communicating to the slave device(s) and set the station address to “1”. At power up, the port is a slave, unless and until the CPU executes network read/write instructions which uses the DCM port as a master. Thereafter, the port reverts back to slave mode until network read/write instructions use the port again.

**Communication Timeout:** Communication Timeout Disable is normally used *only* if you’re developing your own *DirectNET* programs. By disabling the timeout, you can send one *DirectNET* component without any communication timeout problems. If you have this timeout disabled and a communication error does occur, you must restart communications by sending a retry or an End of Transmission (EOT) command. If you want to know more, see the *DirectNET* manual for details.

**Transmit Mode:** Select between ASCII and HEX modes of data representation. If you want the fastest communication possible, use HEX mode, which is the default. The difference is in the way the data is represented. The same data is twice as long in ASCII format, so if there’s more data, it takes longer to transfer. If you have a device on the network that requires ASCII mode, then configure the DCM for ASCII mode, otherwise, use HEX mode.

**Baud Rate:** There are several baud rate selections available ranging from 300bps to 115.2Kbps. All stations must have the same baud rate setting before the communications will operate correctly. Usually, you should use the highest baud rate possible unless noise problems appear. If noise problems appear, then try reducing the baud rates.

**Parity:** Choose between none, even and odd parity for error checking.

**RTS Delay Times:** On Delay – The delay time specifies the amount of time the D0-DCM waits to send the data after it has raised the RTS signal line. This is normally set to 0, and is typically only adjusted if you are using the D0-DCM with a radio modem. If you are using the D0-DCM with a radio modem, check your modem documentation to help you choose the proper setting.

RTS Off Delay – the delay time specifies the amount of time the D0-DCM will wait to reset the RTS line after sending the data.

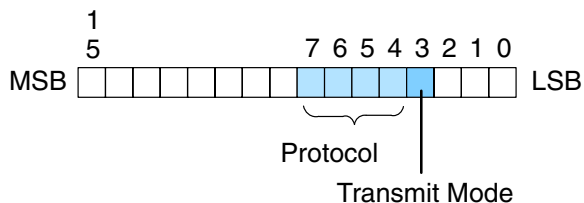
**Station Address:** The decimal addresses do not have to be consecutive, but each station must have a unique number. See protocol description above for port 2 master operation.

**A: Port 1 –  
Transmit Mode,  
Protocol**

Use word +0000 to set Port 1:

- K-Sequence slave, **DirectNET** slave or MODBUS RTU slave protocol (or auto-detect for all three protocols)
- HEX or ASCII transmit mode

**word +0000**



Set all unused bits to zero.

Port 1: Transmit Mode	
Mode	Bit 3
HEX Mode	0
ASCII Mode	1

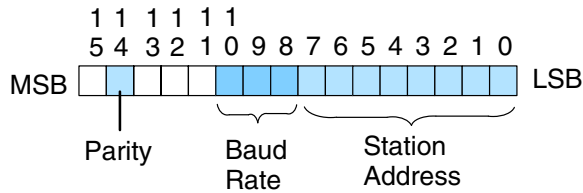
Port 1: Protocol					
Protocol	Bit 7-4 (Hex)	Bit 7	Bit 6	Bit 5	Bit 4
K-Sequence	8	1	0	0	0
DirectNet	4	0	1	0	0
MODBUS RTU	2	0	0	1	0
K-Seq / D-Net /MODBUS RTU	E	1	1	1	0

### B: Port 1 – Station Address, Baud Rate, Parity

Use word +0001 to set Port 1:

- Station address ranges from 0–247 (00–F7 Hex)
- Baud rates ranging from 9.6K to 115.2K bps
- Odd or No parity

#### word +0001



Set all unused bits to zero.

Port 1: Station Address								
Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
00	0	0	0	0	0	0	0	0
01	0	0	0	0	0	0	0	1
02	0	0	0	0	0	0	1	0
-----								
F6	1	1	1	1	0	1	1	0
F7	1	1	1	1	0	1	1	1

Port 1: Baud Rate			
Baud Rate	Bit 10	Bit 9	Bit 8
9.6 K bps	0	0	0
19.K bps	0	0	1
38.4K bps	0	1	0
57.6K bps	0	1	1
115.2K bps	1	0	0

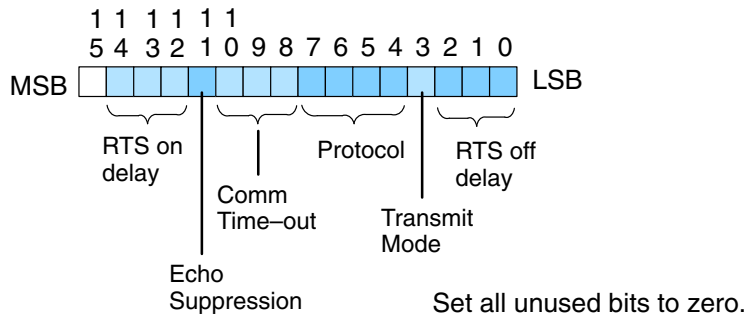
Port 1: Parity	
Parity	Bit 14
No Parity	0
Odd Parity	1

**C: Port 2 –  
RTS On/Off delay,  
Transmit Mode,  
Protocol,  
Comm Time-out,  
RS-485 Mode**

Use word +0002 to set Port 2:

- K-Sequence slave, **Direct**NET slave or MODBUS RTU slave protocol (or auto-detect for all three protocols)
- HEX or ASCII transmit mode
- RTS On and Off delay times
- Communication Time-out
- Echo Suppression

**word +0002**



Port 2: RTS Off Delay			
Time (ms)	Bit 2	Bit 1	Bit 0
0	0	0	0
2	0	0	1
5	0	1	0
10	0	1	1
20	1	0	0
50	1	0	1
100	1	1	0
500	1	1	1

Base Time-out for K-Seq/D-Net = 800ms

Base Time-out for MODBUS = 500ms

Port 2: Transmit Mode	
Mode	Bit 3
HEX Mode	0
ASCII Mode	1

Port 2: Protocol					
Protocol	Bit 7-4 (Hex)	Bit 7	Bit 6	Bit 5	Bit 4
K-Sequence	8	1	0	0	0
DirectNet	4	0	1	0	0
MODBUS RTU	2	0	0	1	0
Non-Sequence	1	0	0	0	1
K-Seq / D-Net /MODBUS RTU	E	1	1	1	0

Port 2: Communication Time-out (ms)				
K-Seq, D-Net, MODBUS RTU	Non-Sequence Protocol	Bit 10	Bit 9	Bit 8
Base Time x 1	0	0	0	0
Base Time x 1.2	2	0	0	1
Base Time x 1.5	5	0	1	0
Base Time x 2	10	0	1	1
Base Time x 5	20	1	0	0
Base Time x 10	50	1	0	1
Base Time x 20	100	1	1	0
Base Time x 50	500	1	1	1

Port 2: Echo Suppression	
Mode	Bit 11
RS-422/485: 4-wire RS-232	0
RS-485: 2-wire	1

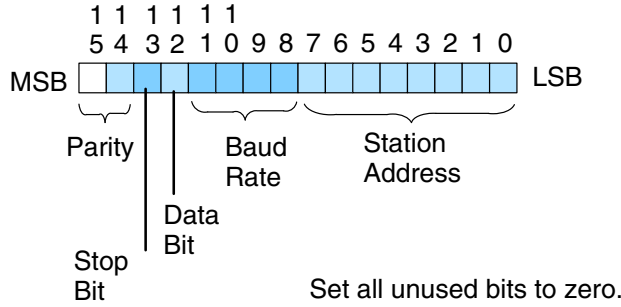
Port 2: RTS On Delay			
Time (ms)	Bit 14	Bit 13	Bit 12
0	0	0	0
2	0	0	1
5	0	1	0
10	0	1	1
20	1	0	0
50	1	0	1
100	1	1	0
500	1	1	1

**D: Port 2 – Station Address, Baud Rate, Data Bit, Stop Bit, Parity**

Use word +0003 to set Port 2:

- Station address ranges from 0–247 (00–F7 Hex)
- Baud rates ranging from 9.6K to 115.2K bps
- Data Bit Length (7 or 8 bits)
- Stop Bit Length (1 or 2 bits)
- Odd, Even or No Parity

word +0003



Port 2: Station Address								
Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
00	0	0	0	0	0	0	0	0
01	0	0	0	0	0	0	0	1
02	0	0	0	0	0	0	1	0
—								
F6	1	1	1	1	0	1	1	0
F7	1	1	1	1	0	1	1	1

Port 2: Baud Rate				
Baud Rate	Bit 11	Bit 10	Bit 9	Bit 8
300 bps	0	0	0	0
600 bps	0	0	0	1
1200 bps	0	0	1	0
2400 bps	0	0	1	1
4800 bps	0	1	0	0
9600 bps	0	1	0	1
19.K bps	0	1	1	0
38.4K bps	0	1	1	1
57.6K bps	1	0	0	0
115.2K bps	1	0	0	1

Port 2: Data Bit	
Length	Bit 12
8 Bit	0
7 Bit	1

Port 2: Stop Bit	
Length	Bit 13
1 Bit	0
2 Bit	1

Port 2: Parity		
Parity	Bit 15	Bit 14
No Parity	0	0
Odd Parity	0	1
Even Parity	1	0

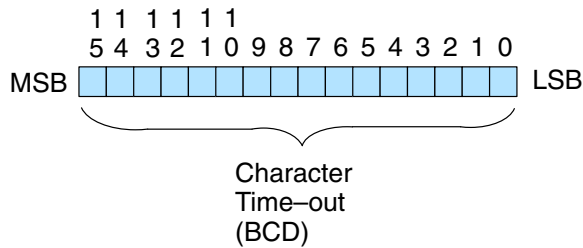
**E: Port 2 – Character Time-out**

Use word +0006 to set Port 2:

- Character Time-out (BCD)

This parameter is used when the DCM is used as a MODBUS RTU master.

**word +0006**



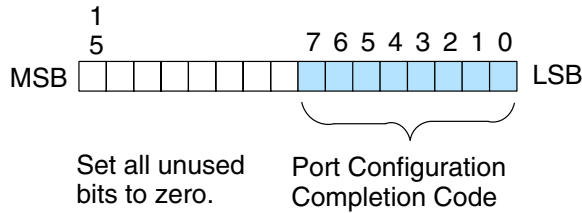
Port 2: Character Time-out	
Bit 15-0	time
0	3.5 characters
1-9999 (BCD)	time-out (ms)

**F: Port 1 and 2 Setup and Completion Code**

Word +0007 is used for Port 1 and Port 2 to :

- request that the DCM recognizes changes in the port(s) communication parameters from default or previous settings
- confirm that Port 1 and Port 2 configuration is complete

**word +0007**



Loading a K0055 (BCD) into word +0007 will request that the DCM recognizes (looks for) new or desired port communication parameters that are written to the DCM port configuration registers. If the requested changes are valid, a 00AA (hex) will then be written to word +0007. If the desired or new communications are invalid or out of range, an error code 00E\* (Hex) will be written to word +0007. The last digits indicate the address that has an error. For example, error code 00E2 means that word +0002 has an error.

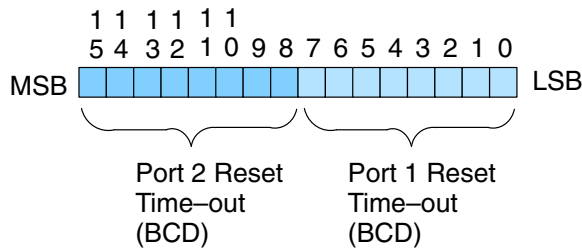
**G: Port 1 and 2 Reset Time-out**

Use word +0024 to set Port 1 and Port 2:

- Reset Time-out in seconds

The communication port will reset after the specified time after the port goes from the BUSY state to the IDLE state.

**word +0024**

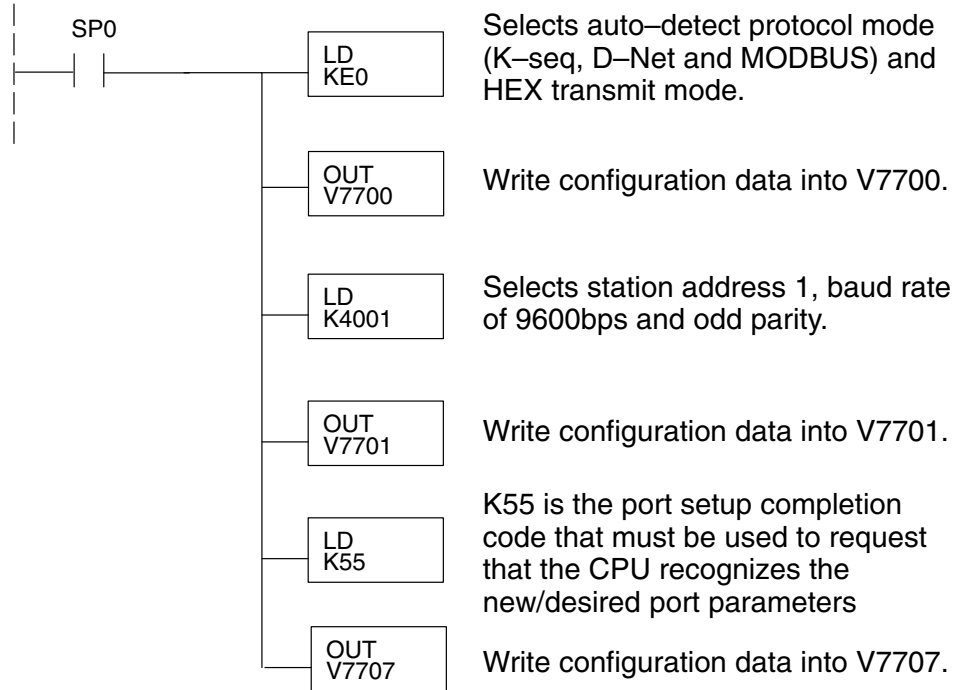


Reset Time-out		
Port	Time(s)	Function
Port 1: Bit 0-7	0	Disable
Port 2: Bit 15-8	1-99	Enable

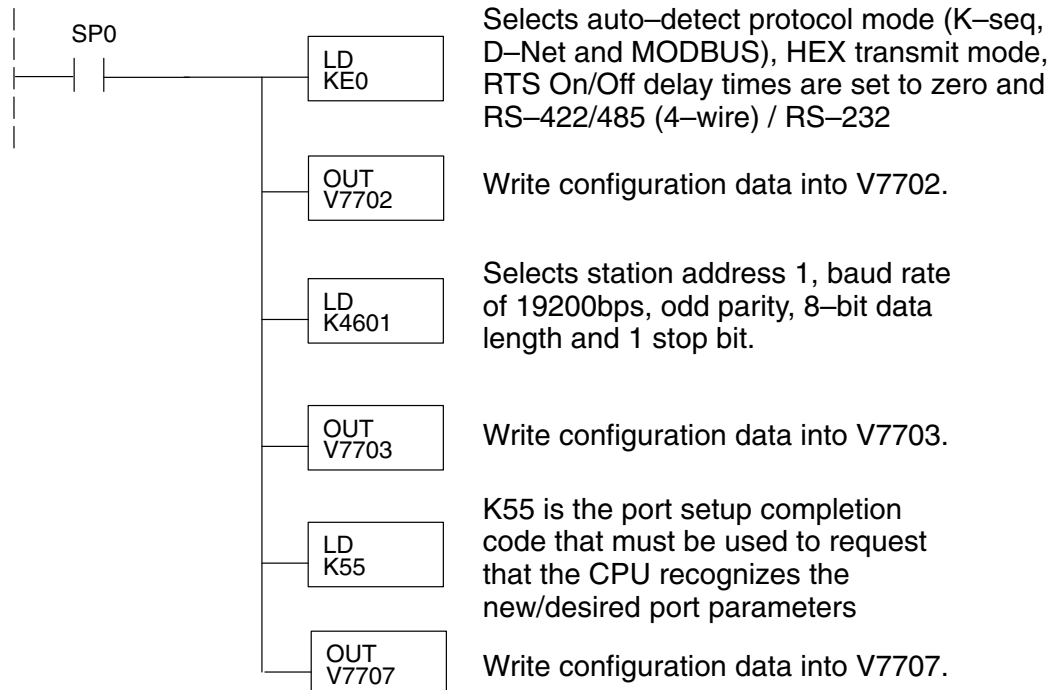
# Using Ladder Logic to Setup the D0-DCM (DL05)

The following tested ladder logic examples are provided by our technical support department for assistance only. We do not guarantee that the data is suitable for your particular application, nor do we assume any responsibility for them in your application.

**Port 1 Example:  
(This port is a  
slave only)**

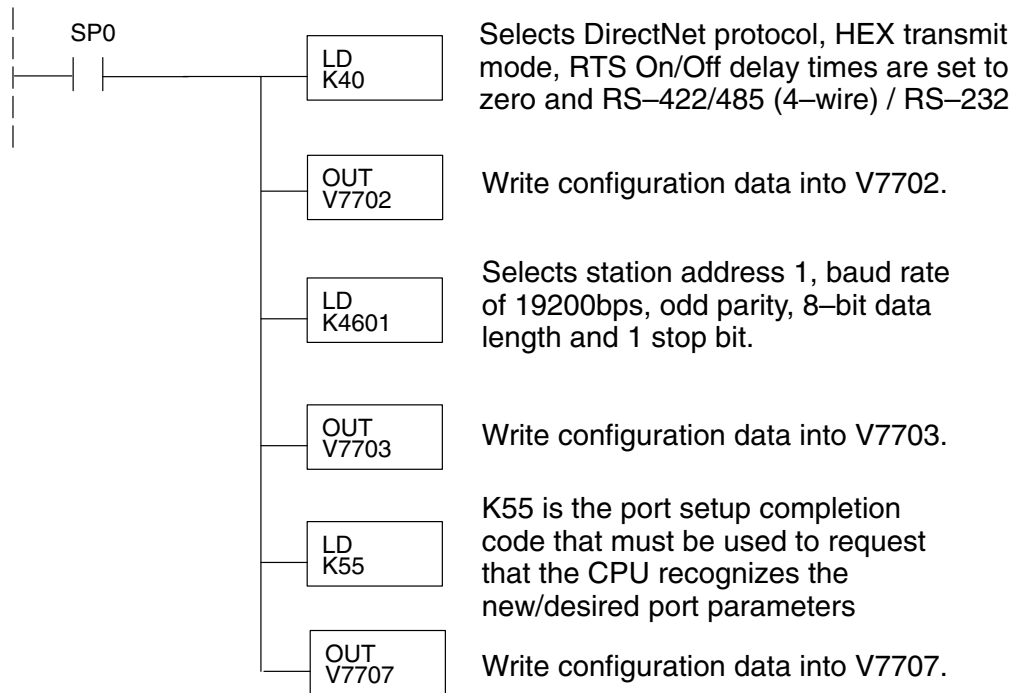


**Port 2 Example:  
Slave Mode**

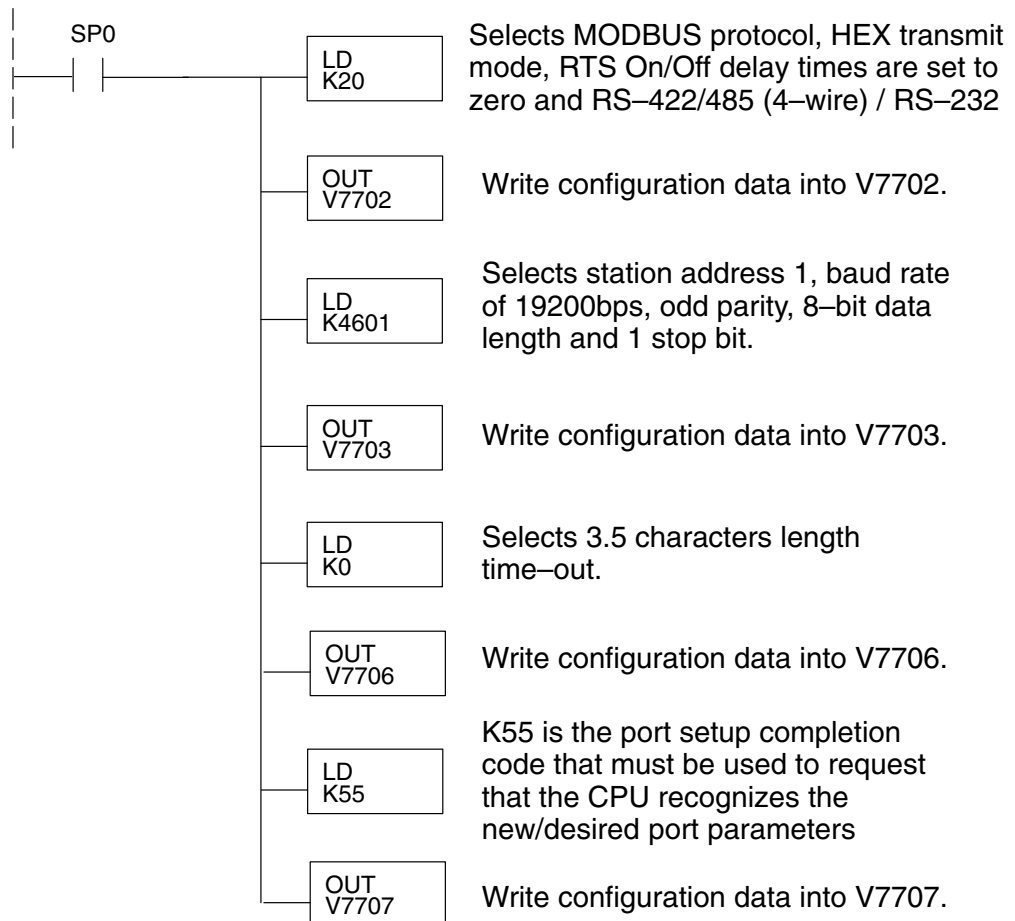


DCM Port Configuration

**Port 2 Example:  
DirectNet Master**



**Port 2 Example:  
MODBUS RTU  
Master**

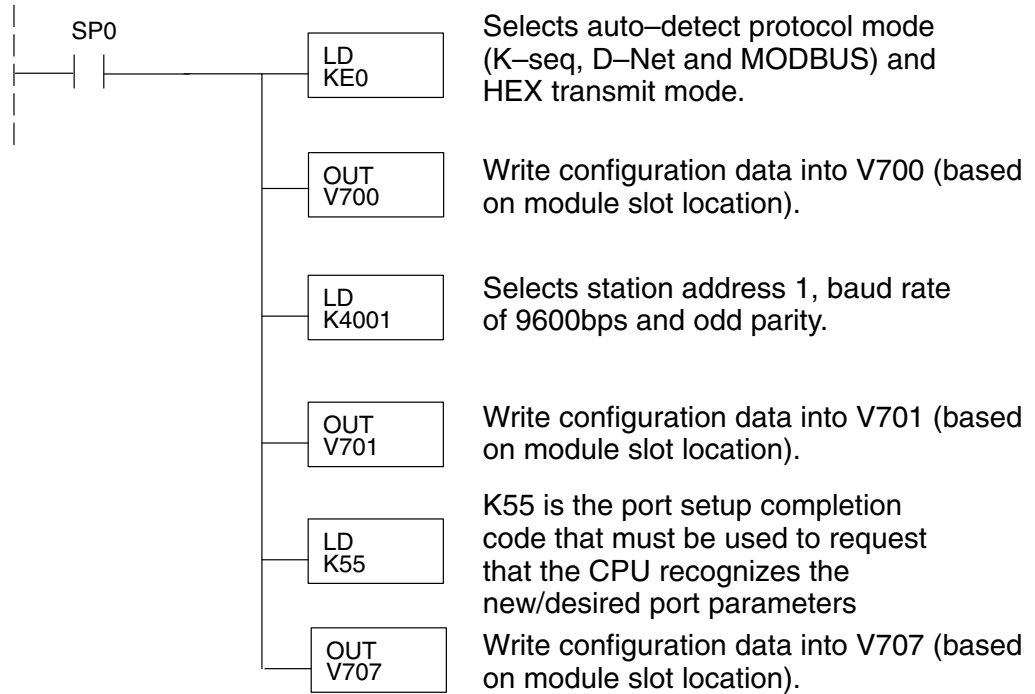


# Using ladder Logic to Setup the D0-DCM (DL06)

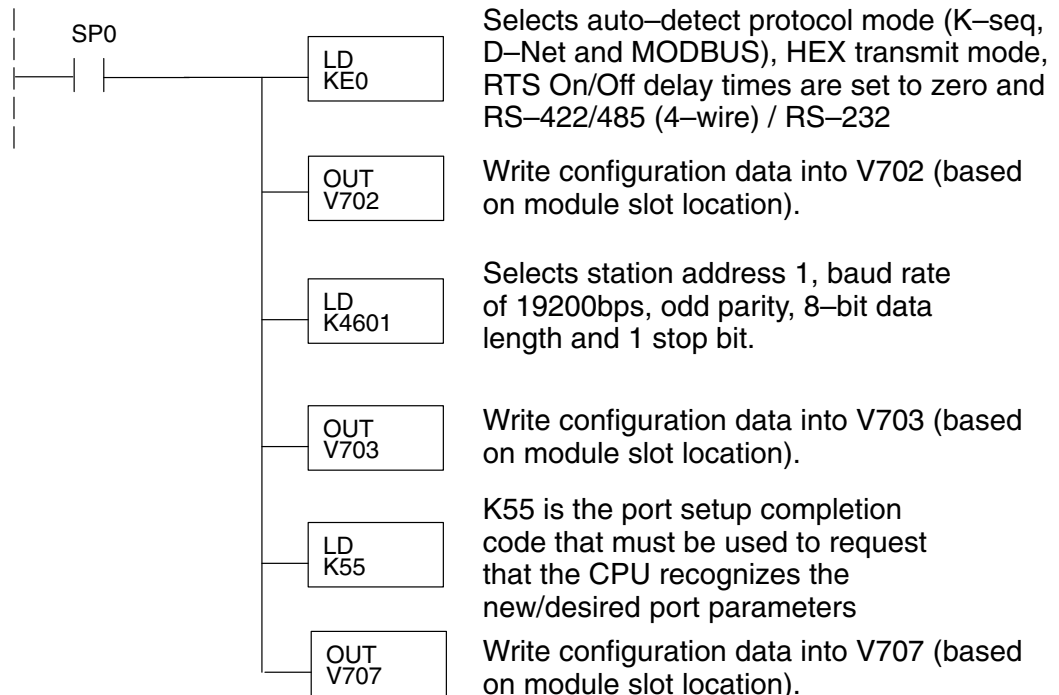
The following tested ladder logic examples are provided by our technical support department for assistance only . We do not guarantee that the data is suitable for your particular application, nor do we assume any responsibility for them in your application.

The following examples assumes the D0-DCM is installed in slot 1.

## Port 1 Example: Slave Mode Only

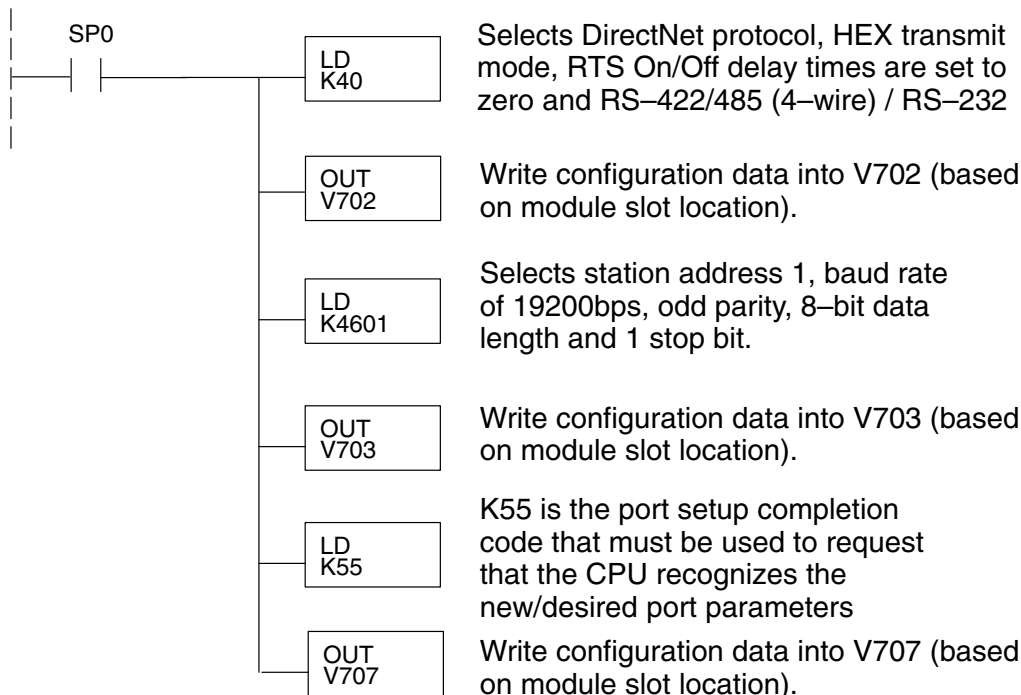


## Port 2 Example: Slave Mode



DCM Port Configuration

**Port 2 Example:  
DirectNet Master**



**Port 2 Example:  
MODBUS RTU  
Master**

