

# Communication Settings

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## Selecting the communication settings.

### What do I have to select?

There are a few things you need to select before you can set the communication switches for the network stations.

- Baud rate
- Parity
- Response delay
- Hexadecimal or ASCII data representation
- Station address

### Baud Rate

All devices on the network must use the same communication settings, but not all of the masters and slaves offer the same range of settings. This means your choice of equipment will help you determine the baud rate. For example, the DCM (Data Communication Module) interfaces can communicate at speeds of 38.4K baud, but the built-in PLC ports are limited to 19.2K baud (the DL340 can go up to 38.4K baud). Also, some computer communication cards are limited in the range of available baud rates. Check the documentation that came with your computer or operator interface to determine the available communication parameters.

*DirectNET* can support eight baud rate selections ranging from 300bps to 38.4Kbps. Usually, you should use the highest baud rate possible unless noise problems appear. If noise problems appear, try reducing the baud rates.

### Parity

You can choose between odd parity or no parity. Again, all the devices should be set the same. Odd parity uses eleven bits total (1 start bit, 8 data bits, 1 stop bit, and 1 parity bit.) Odd parity also provides slightly better error checking. Some devices require no parity, which uses only 10 bits (1 start bit, 8 data bits, and 1 stop bit.)

### Response Delay

This sets how long the station will wait before it responds to a communication request. If you're using all *DirectLOGIC™* equipment, a response delay is not required and you should set the time to 0. This is primarily included for those of you who need to use modems. For example, the DCM may respond too quickly for some devices, such as telephone or radio modems. If you encounter this problem just choose a delay from 0 to 500 mS. Your modem manual should suggest the proper settings.

### HEX or ASCII Data

If you want the fastest communication possible, use HEX mode. The difference is in the way the data is represented. The same data is twice as long in ASCII format, so it takes longer to transfer. If you have a device on the network that requires ASCII mode, then select ASCII mode for all the stations, otherwise, use HEX mode.

### Station Address

You can have up to 90 slave stations connected to the master. Each station, including the master, must have a unique network address. There are a few restrictions on how you can use the available addresses.

*Master stations:* the master station should be address 0. This insures compatibility with all slaves.

*Slave stations:* the slave stations can use addresses 1 – 90 and not address 0.

*Peer stations:* the peer stations can use addresses 1 – 90. There are only two stations in this configuration and either one can act as a master and initiate a request, however; each station is restricted from using address 0.

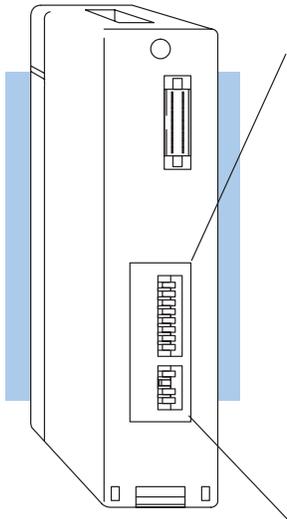
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## Setting the station parameters

**For all Masters and Slaves** You have to set the switches for all the stations on the network, masters and slaves. Set the switches so all the stations have the same communication parameters. The next several pages provide the switch settings for the **DirectLOGIC™** network components. You can quickly scan the pages to find the settings for your devices. Read the descriptions carefully because most network problems are caused by incorrect switch settings.

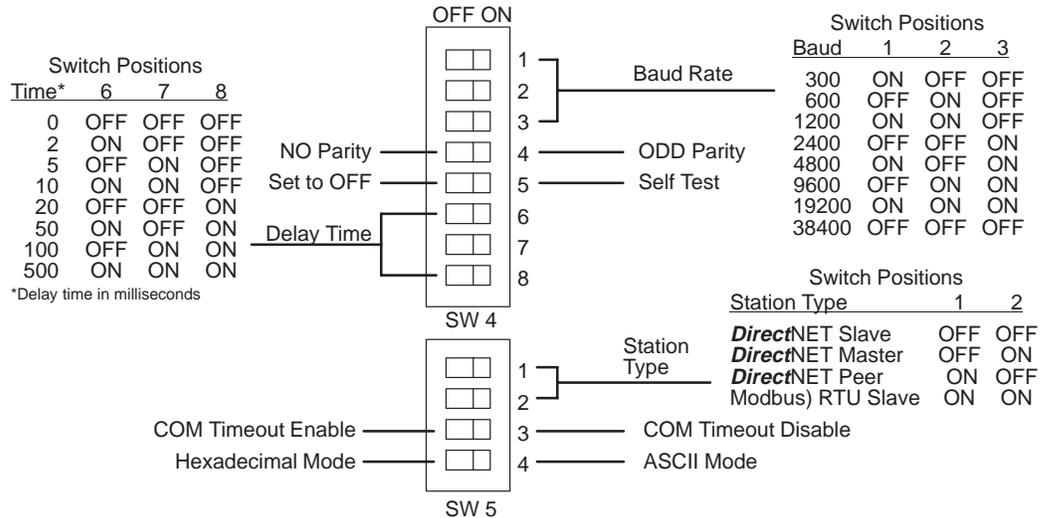
**Host as a Master** It seems there's a computer manufacturer on every corner these days, so it would be impossible for us to provide the communication settings for all of them. Just check the documentation that came with your computer to determine how to set the parameters.

## DL405 DCM Communication Switches



DCM Rear View

There are two banks of switches located on the rear of the DCM that are used to set the communications parameters.



**Baud Rate:** Positions 1 – 3 on SW4 are used to set the baud rate for the DCM. There are eight baud rate selections available from 300 baud to 38.4K baud.

**Parity:** Position 4 on SW4 selects between the two parity options, odd or none.

**Self-Test:** Position 5 on SW4 selects the factory self-test and should always be switched off. If the self-test is on, the module will not operate correctly.

**Response Delay Time:** Positions 6 – 8 on SW4 set the response delay time. This is primarily used when you're using modems and determines how long the DCM will wait before it responds to a communication request. If you're using all **DirectLOGIC™** equipment, a response delay is not required and you should set the time to 0. If you're using a modem, check the documentation to determine the proper delay time.

**Station Type:** Positions 1 and 2 on SW5 select the DCM protocol and the station type, master or slave. The DCM is very versatile and can actually support a second protocol Modbus®. Be sure you have selected the proper protocol for your network, either **DirectNET** or Modbus®.

*Host as Master:* If you're using a host as master, set the DCM as a **DirectNET** slave.

*PLC as Master:* If the DCM is in a master station, then set the DCM as a **DirectNET** master. If the DCM is in a slave station, then set the DCM as a **DirectNET** slave.

*Peer as Master:* If you're using a peer network, set both stations as **DirectNET** peers.

**Communication Timeout:** Position 3 on SW5 selects the communication timeout. Don't disable the timeout for normal use. 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 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.

**ASCII / HEX Mode:** Position 4 on SW5 selects between ASCII and HEX modes of data representation. Set the switch to match your network parameters.

**Online / Offline Switch**

In the Offline position, this switch logically disconnects the DCM from the network (just as if you pulled the cable from the connector.) Once this switch is moved to the Offline position, the DCM will not communicate with the network.

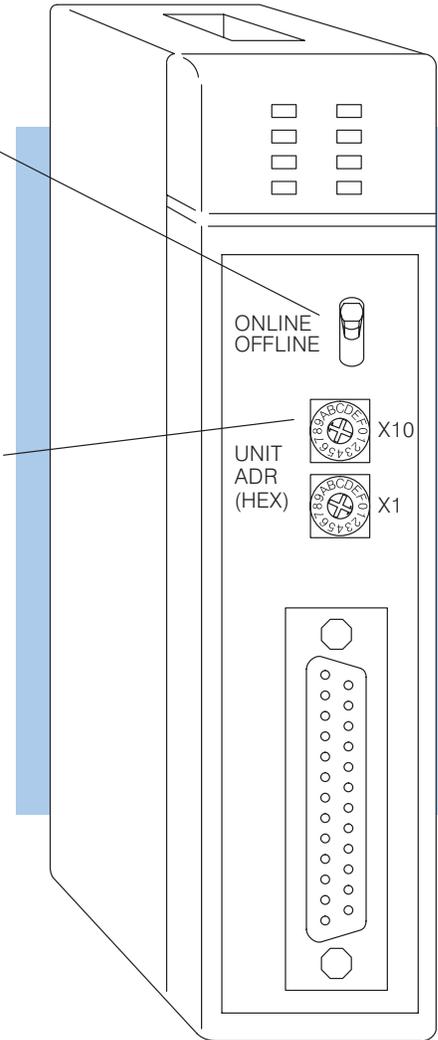
If you move the switch to the Online position, the DCM will communicate with the network, but not until the master sends another request for communication. This does not operate like the reset switch on many personal computers.

**Address Switch**

The DCM station address is set by the two rotary switches located on the front of the unit. Addresses are in hexadecimal format with valid addresses from 0 (only used for the master station) to hexadecimal 5A. The addresses do not have to be sequential, but each station must have a unique address.

The top rotary switch is used to set the most significant digit of the HEX address. The bottom switch is used to set the least significant digit the HEX address. For example, to set a DCM address of HEX 10 (decimal 16), set the top rotary switch to 1 and the bottom rotary switch to 0.

**NOTE:** The DCM address switch settings are only read at power up. If you've want to change the address and the DCM is already running, you'll have to cycle the system power for the base containing the DCM to initialize the change.



Even though the DCM address is set in hexadecimal, it's a good idea to remember the decimal equivalent. This is because the communications program and the **DirectSOFT** package use the decimal equivalent of the HEX address. It's easy to convert from HEX to decimal.

HEX Format

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
										10	11	12	13	14	15

HEX 3C

$$3 \times 16 = 48 \quad + \quad C = 12 \quad = 60 \text{ decimal}$$

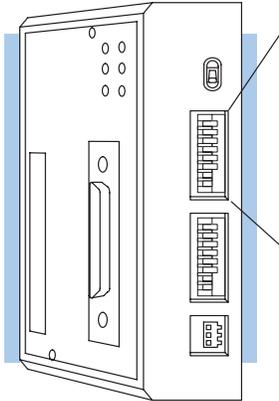
### DL305 DCU Communications Switches

First, make sure you have the correct model of DCU. There are two models.

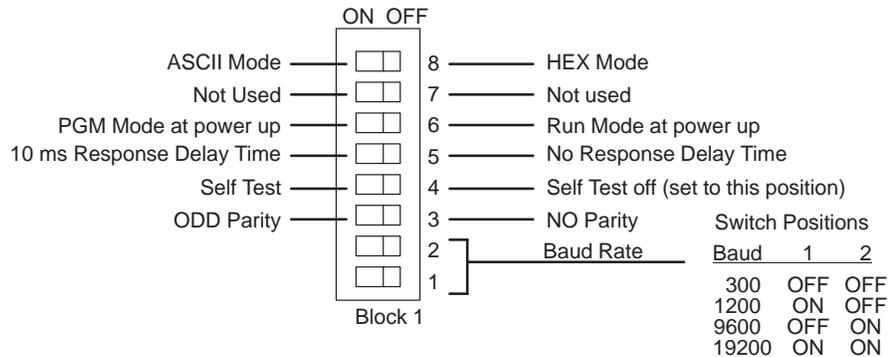
- D3-232-DCU (RS232C version)
- D3-422-DCU (RS422 version)

The DL305 DCU can only be used as a slave station interface. If you only have one master and one slave, you can use either version. If you have more than one slave you should probably use the the RS422 version. You can use the RS232C version, but you'll need an RS232C / RS422 converter for each one.

The communications parameters are set by the first switch block, which is located on the side of the unit.



DCU Side View



**Baud Rate:** The first two switches on block 1 are used to set the baud rate for the DCU. There are four baud rate selections available ranging from 300bps to 19.2Kbps.

**Parity:** Switch 3 on block 1 selects between the two parity options, odd or none.

**Self-Test:** Switch 4 on block 1 selects the factory self-test and should always be switched off. If the self-test is on, the DCU will not operate correctly.

**Response Delay Time:** Switch 5 on block 1 sets the response delay time. This sets how long the DCU will wait before it responds to each component of a **DirectNET** communication request. If you're using all **DirectLOGIC™** equipment, a response delay is not required and you should turn off the switch.

The DCU is not recommended for use with modems since it may respond too quickly for some devices. If you encounter this problem, you can turn on the delay switch to provide a 10 ms delay. If this still does not work, check your device manual to see if the device requires more than a 10 ms delay. The DL340 CPU built-in ports provide more extensive delay timing than can be achieved with a DCU.

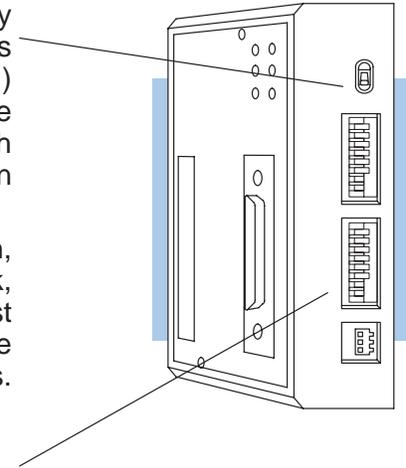
**Mode at Power-up:** Switch 6 on block 1 allows you to select the CPU operating mode when system power is supplied. If the switch is turned on, the CPU automatically enters Program mode when power is supplied. If the switch is off, the CPU automatically enters Run mode when power is supplied.

**ASCII / HEX Mode:** Switch 8 on block 1 selects between ASCII and HEX modes of data representation.

**Online / Offline Switch**

In the Offline position, this switch logically disconnects the DCU from the network (just as if you pulled the cable from the connector.) Once this switch is moved to the Offline position, the DCU will not communicate with the network. (The switch is set to Offline when you're using a handheld programmer.)

If you move the switch to the Online position, the DCU will communicate with the network, but not until the master sends another request for communication. This does not operate like the reset switch on many personal computers.

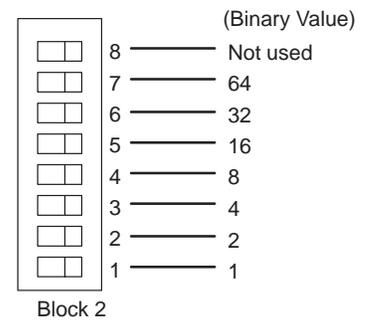


**Address Switch**

The DCU station address is set by the second switch block, which is located on the side of the unit. Unlike the DL405 DCM, the DCU uses decimal addresses. The decimal address is set in BCD (Binary Coded Decimal) format with valid addresses from 1 to 90 decimal. For example, to set an address of 10, you should turn on switches 4 and 2.

The addresses do not have to be sequential, but each station must have a unique address.

**NOTE:** The DCM address switch settings are only read at power up. If you've want to change the address and the DCM is already running, you'll have to cycle the system power for the base containing the DCM to initialize the change.



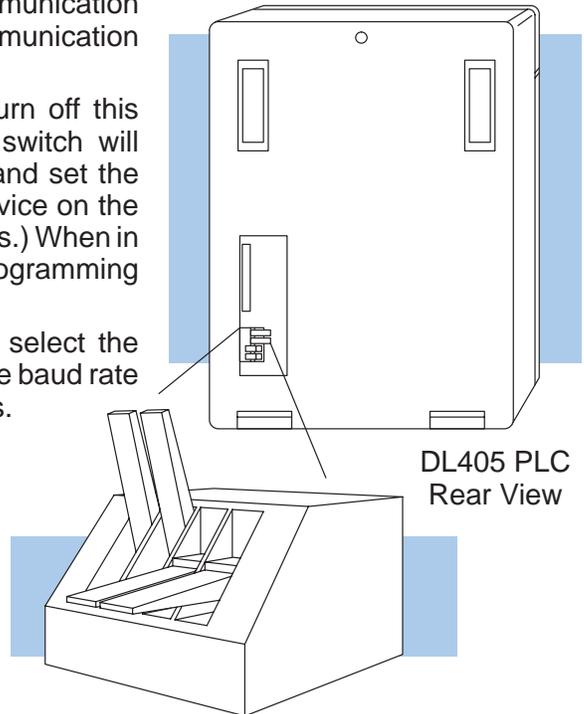
### DL430 and DL440 PLC Communication Switches

If you look at the back of the DL440 CPU you will notice a small bank of switches. Switches 2, 3, and 4 are used to set the communication parameters for the bottom communication port.

**Switch 2** — It's usually best to turn off this switch. If in the on position this switch will override the CPU slave address, and set the address to 1. (Remember each device on the network must have a unique address.) When in the off position you can use a programming device to set the address.

**Switch 3 & 4** — These switches select the baud rate for the bottom port. Set the baud rate to match the other network stations.

Baud	3	4
300	OFF	OFF
1200	OFF	ON
9600	ON	OFF
19200	ON	ON

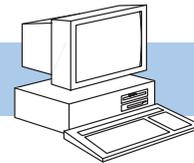


DL405 PLC  
Rear View

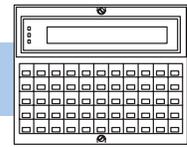
**DL430 and DL440 Station Addresses**

With **DirectSOFT**, use AUX 56 from the Auxiliary functions menu to set the port parameters.

With the DL405 Handheld Programmer, use AUX 56 to set the port parameters. The following example shows how to use the handheld programmer to set the address.



DirectSOFT



DL405 HP

**NOTE:** The PLC port address is set in decimal, not hexadecimal.

**Select AUX 56**

CLR CLR AUX 5 6 ENT ENT

AUX 5\* CPU CFG  
AUX 56 CPU N/W ADDRESS

**Enter the Address (in decimal)**

X X ENT

AUX 56 CPU N/W ADDRESS  
N/W # 01

**Select HEX or ASCII**

To change the mode press ... →  
then press enter. ENT

AUX 56 CPU N/W ADDRESS  
HEX / ASCII

**Select the Parity Option**

To change the parity press ... →  
then press enter. ENT

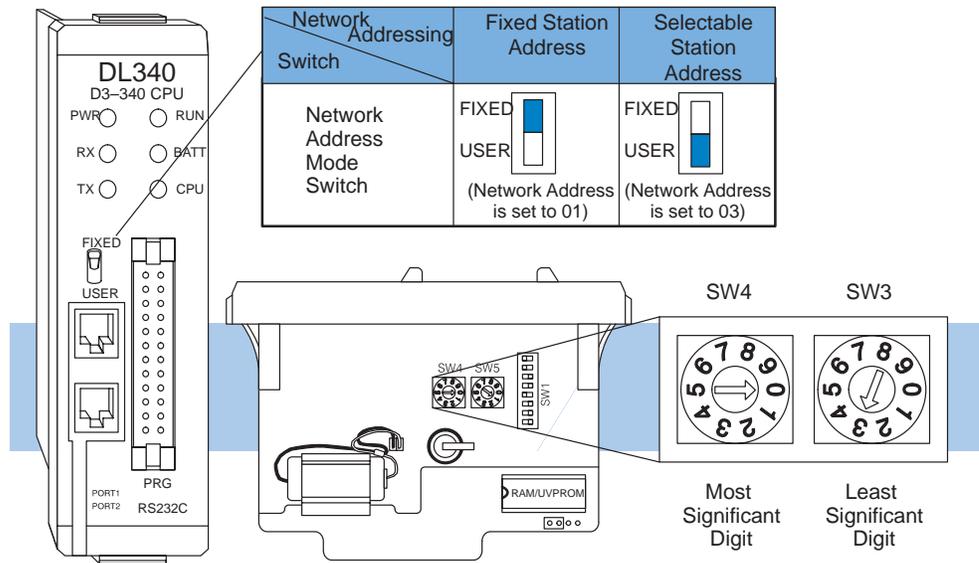
AUX 56 CPU N/W ADDRESS  
NONE / ODD

**Clear the Display**

To clear the display press.... CLR

OK

### DL340 Network Address Selection for Ports 1 and 2



**Port 1 (RS232C):** Network address selection is accomplished with the Network Address Mode Switch and the two rotary switches 3 and 4.

Network Address Mode Switch sets fixed or selectable network address. Rotary Switch 3 sets the least significant decimal digit of the network address. Rotary Switch 4 sets the most significant decimal digit of the network address.

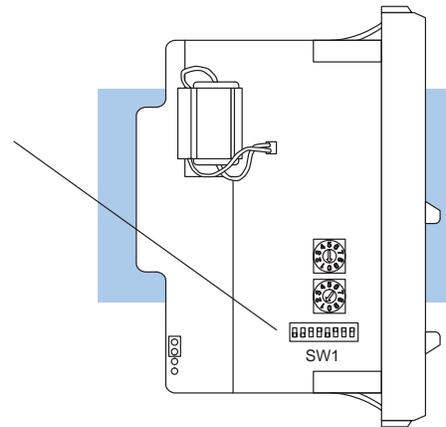
In the example above, when the Network mode switch is set to FIXED the network address will default to 01, when the Network mode switch is set to USER the network address (set with the rotary switches) is 03. Note, if the rotary switches are set to 00, the network address will default to 01.

**Port 2 (RS232C):** Network address selection is set by using a programming device to enter the value for the most significant digit and least significant digit in addresses R771 and R772 respectively.

### DL340 Station Type Selection and Address Ranges

The station type for Port 1 is fixed as a Slave and cannot be changed. The station type for Port 2 can be selected by setting the appropriate switch positions (6 and 7) on the SW1 switch bank.

Port	Bit 6	Bit 7	Address Protocol	Range
1	N/A	N/A	Slave	1 – 90
2	Off	Off	Slave	1 – 90
	Off	On	Master	1 – 90
	On	Off	Peer	1 – 90
	On	On	Modbus®/RTU	1 – 247



**DL340 Baud Rate Selection**

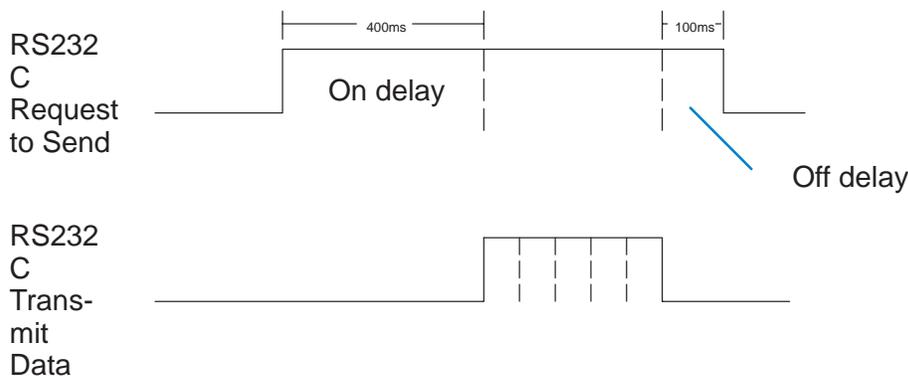
The following chart shows how to configure the baud rate for Port 1 (RS232C) of the DL340 using dipswitch SW1, switches 3, 4 and 5. Port 2 baud rate is set by using a programming device to enter the baud rate in address R773 (in BCD or HEX).

Port 1		Port 2	
Baud	R773	Baud	R773
300	1	300	1
600	2	600	2
1200	3	1200	3
2400	4	2400	4
4800	5	4800	5
9600	6	9600	6
19200	7	19200	7
38400	8	38400	8
		9600	0, 9 to FF

**DL340 Selecting the Response Delay Time**

You can use the Handheld Programmer of *DirectSOFT* to select an on and off response delay time of up to 1980 ms. The time delay is calculated based on a preset number that is loaded into two memory locations. These presets indicate the number of 20 ms intervals that will be used as the delay. For example, an entry of 2 would result in a 40 ms response delay time.

Port	On Delay	Off Delay
Port 1	R776	R777
Port 2	R774	R775



R776 = 20, 20 x 20ms intervals = 400ms on delay  
 R777 = 5, 5 x 20ms intervals = 100ms off delay

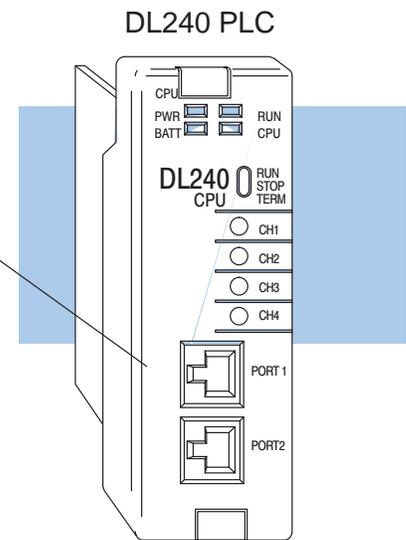
**DL340 Selecting Data Format (ASCII/HEX)**

A special propose relay is used to select between ASCII and HEX transmission modes. When this relay is off, HEX mode is used. When this relay is turned on, ASCII mode is used. Off is the default state.

- Port 1 SP1077
- Port 2 SP1076

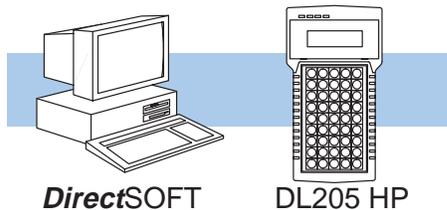
### DL240 Communication Settings

The DL240 CPU is set similarly to the DL405 CPUs, except that all parameters can be set with AUX 56 from *DirectSOFT* or the Handheld Programmer.



The following example shows you can set the port parameters with the DL205 Handheld Programmer.

NOTE: The PLC port address is set in decimal, not hexadecimal.



**Select AUX 56**

CLR CLR AUX F 5 G 6 ENT

AUX 5\* CPU CFG  
AUX 56 CPU N/W ADDRE

**Enter the Address (in decimal)**

X X ENT

AUX 56 CPU N/W ADDRE  
N/W # 01

**Select Hex or ASCII**

To change the mode press .... then press enter.

→

AUX 56 CPU N/W ADDRE  
HEX / ASCII

**Select the Parity Option**

To change the parity press .... then press enter.

→

AUX 56 CPU N/W ADDRE  
NONE / ODD

**Select the baud rate**

To change the baud rate press .... then press enter.

→

AUX 56 CPU N/W ADDRE  
300/1200/9600/19.2K

**To clear the display and show the current address (instructions)**

CLR

AND X7  
OR X10

## Communications Settings Checklist

### You can avoid problems

The majority of problems are caused by incorrect switch settings. Make sure you have set the switches for each station. Have you...

1. Checked your computer documentation to obtain host master switch settings? (if applicable)
2. Set the communications switches for all stations?
3. Set the network addresses for all stations?

Now, you're ready to create the communications programs.

## What part of the manual should you use next?

### Do you have a PLC as a master or a Peer as a Master network?

If you have a PLC as a master or a Peer as a master network, use Chapter 5, Creating RLL Communications Programs. This chapter describes the RLL instructions used to initiate network communication requests.

### Do you have a Host as a master network?

If you have a Host as a master network, use Chapter 6, Creating **DirectNET** Communications Programs. This chapter explains the **DirectNET** protocol in detail.