

Designing the Slice I/O System

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Determine the System Layout

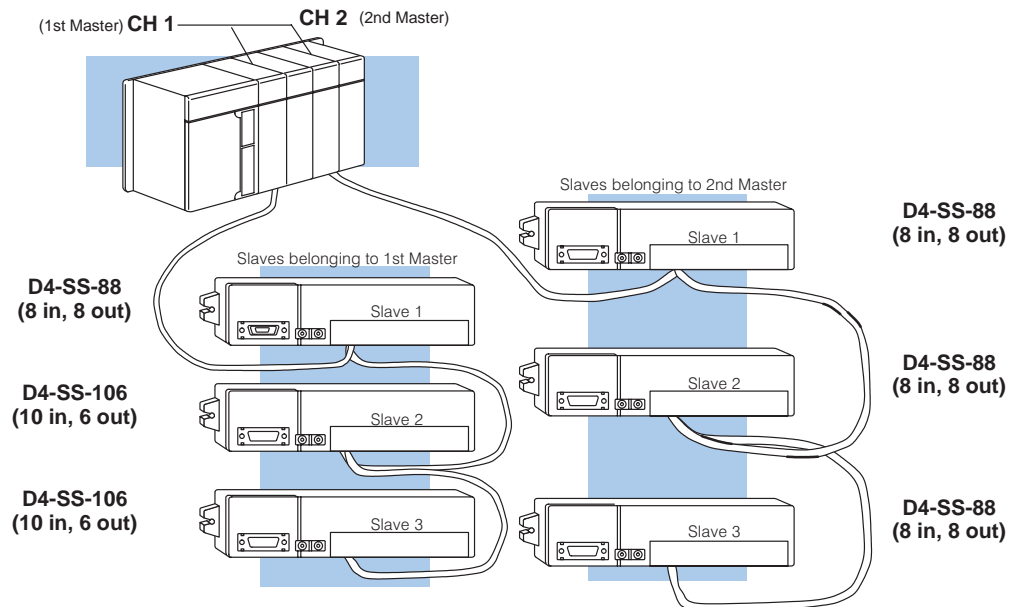
Determine I/O Needed and How Many Masters & Slaves

The first step in putting any system together is to at least establish a mental picture of the system components. You should determine the number of input and output points needed, which in turn will allow you to determine the number (and types) of slave units required. You may even want to draw a diagram.

An Example System

We'll use the following example system to help you understand these choices.

- Two channels to wire two different areas of some machine.
- Channel 1 uses 28 inputs and 20 outputs spread over three slave units
- Channel 2 uses 24 inputs and 24 outputs spread over three slave units



Choose the Addressing Mode

Once you have determined the number of I/O points, masters, and slave units required for your application, you have to choose the addressing mode. This allows you to assign the I/O points that will be used by each slave unit. You may recall that Chapter 1 provided a detailed description of the different modes. The following table provides a quick overview of each choice.

Addressing Mode	Ease of Programming	Slave Number Limitations	Special I/O Point Assignments	Number of Points Consumed	Availability
Automatic	Easiest	12 per master	Inputs start at X200 Outputs start at Y200	32 per slave (16 Input & 16 Output)	Can be used with 1 master only
Manual	Easy	15 per master	Any available addresses	32 per slave	Can be used with both masters
Discrete	Less Easy	7 per master	Any available addresses	Only the inputs and outputs needed per slave as long as it is in blocks of 8 pts. each	Can be used with both masters

32-Point I/O Consumption Rule

When you use either automatic or manual addressing, notice that a total of 32 I/O points are consumed for each slave (16 inputs and 16 outputs) regardless of how many I/O points are actually present on the slave. However, with the discrete addressing mode, the Slice slaves may not necessarily consume 32 I/O points. It depends on which Slice slave you're using. For example, with discrete addressing, the D4-SS-16N would only use 16 inputs and the D4-SS-16T would only use 16 outputs.

16-point Boundary Rule

With manual or discrete addressing you can specify the starting address and the data type (X, Y, C, etc.). *These addresses must be on a 16-point boundary.* For example, let's say you have a system that has consumed local base input points up through X27. Now let's say you want your first Slice slave to be a D4-SS-16N and you want to continue to use the X input data type for these points. You may think that your first address for this slave will be X30, which is the next input address following X27. However, X30 does not start on a 16pt. boundary. The next available input point for the Slice slave will be X40 in this example. (Remember, the DL405 uses octal addressing for the I/O points.)

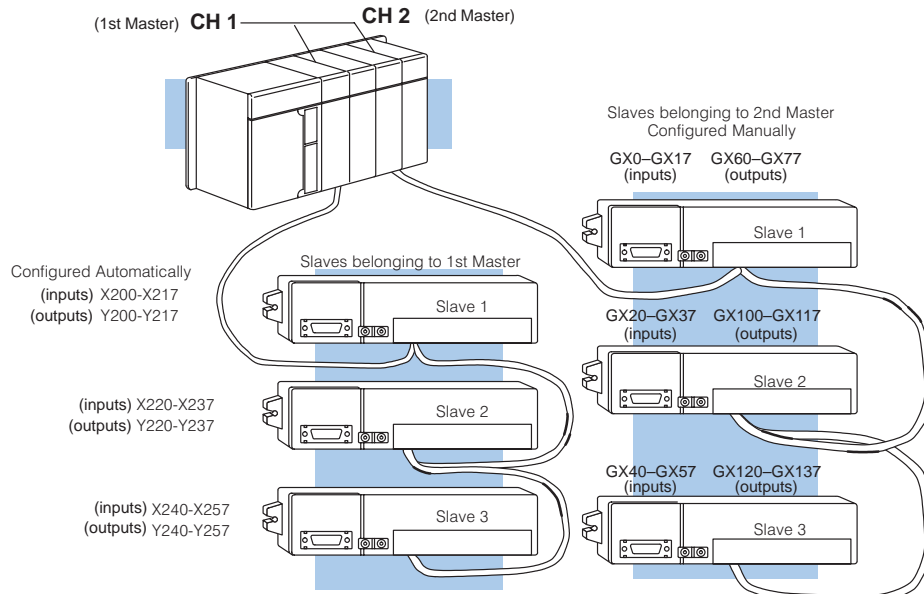
The setup routines described later actually help make sure this happens. You may recall that the CPU requires you to load an address into the pointer locations that setup the Slice I/O. These V-memory addresses automatically start on 16-point boundaries, so you cannot actually start the numbering incorrectly. This is just important when you're trying to determine your starting address.

Example System Addressing

In our example system, we have only used 3 slaves per master. This is well within the limit for each addressing mode, so we can choose from any of the options shown in the previous table. However, we decided to choose:

- Automatic addressing for Channel 1 (1st Master)
- Manual addressing for Channel 2 (2nd Master)

With these choices, our addressing assignments would be as shown in this diagram.



Note: From a point of consistency, you might prefer to manually configure the Slice I/O for both Masters. This example is for illustration only.

Remember, automatic addressing can only be used with one of the two possible masters in the CPU base. We could not, for example, have used automatic addressing in CH2 because we have already used it for CH1. You do not have to use automatic addressing at all if you prefer not to do so. For example, both of these channels could have been configured using manual addressing.

Other Examples

Here are a few more examples that may help you understand addressing choices.

Example 1: *You need a system with 12 slaves and you plan to use only one master. The rest of your system does not use any points assigned to either X200 (or above) or Y200 or above. You are not cramped for I/O points in your total system.*

Solution: Choose automatic mode. It takes just a few lines of ladder logic, and it allows up to 12 slaves per master. Although it can only be used with one master, you only have one master—so it's not an issue. You'll consume 32 points per slave, but you have plenty of I/O for your other needs.

Example 2: *You need 28 slaves in your system. What mode should you choose?*

Solution: You will have to use two masters and have manual addressing for both of them. It's the only way you can address more than 27 slaves.

Example 3: *You want to add a Slice I/O system that requires nothing but inputs at each slave station. You decide to use the D4-SS-16N for each slave location. You are going to need as many I/O points as possible for all of your local I/O.*

Solution: Use discrete addressing. This allows you to only consume 16 points at each slave station, instead of the usual 32 required for the other modes. You can have up to 7 slave stations per master, depending on needs and I/O address availability.

Complete the Programming Worksheets

Once you've determined the addressing mode and the address assignments, it is helpful to complete a programming worksheet to simplify the creation of the RLL setup program. In Appendix A of this manual you will find a blank Slice Slave Worksheet. We suggest that you photocopy this sheet and use it to map out the details of your system. Assuming this will be your procedure, this chapter will walk you through the worksheet by using the previous example system. You can use the details from these worksheets when you set the switches on your hardware and when you write any necessary setup logic.

Filling Out the Slice Slave Worksheet for the 1st Master

The following Slice Slave worksheet has been filled in for the 1st master module of the example system shown on the previous page.

Master Module No. 1

Slice Slave Worksheet

Unit Address	Model Name	INPUT		OUTPUT	
		Input Address	No. Inputs	Output Address	No. Outputs
1	D4-SS-88	X200	16 (only 8 used)	Y200	16 (only 8 used)
2	D4-SS-106	X220	16 (only 10 used)	Y220	16 (only 6 used)
3	D4-SS-106	X240	16 (only 10 used)	Y240	16 (only 6 used)
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Input Bit Start Address: X200 **V-Memory Address:V** N/A (automatic)

Total Input Points Consumed 48 **Input Points Used** 28

Output Bit Start Address: Y200 **V-Memory Address:V** N/A (automatic)

Total Output Points Consumed 48 **Output Points Used** 20

For the 1st master, we have decided to use **automatic addressing** for its slaves. This means that inputs (X's) and outputs (Y's) will be assigned starting at X200 and Y200 respectively. With automatic addressing we do not have to worry about looking up the V-memory addresses for the master module's internal memory and the slave I/O points, because the information is automatically mapped to the CPU's memory image area. Unlike manual or discrete addressing, you do not have to write ladder logic to setup the mapping process. This is why we have written "N/A" in the V-memory area of the form. Now let's complete go to the next page and fill out a worksheet for the 2nd master.

Filling Out the Slice Slave Worksheet for the 2nd Master

The following Slice Slave worksheet has been filled in for the 2nd master of the example system.

Master Module No. 2

Slice Slave Worksheet

Unit Address	Model Name	INPUT		OUTPUT	
		Input Address	No. Inputs	Output Address	No. Outputs
1	D4-SS-88	GX00	16 (only 8 used)	GX60	16 (only 8 used)
2	D4-SS-88	GX20	16 (only 8 used)	GX100	16 (only 8 used)
3	D4-SS-88	GX40	16 (only 8 used)	GX120	16 (only 8 used)
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Input Bit Start Address: GX0 V-Memory Address:V 40000 ← See Appendix B

Total Input Points Consumed 48 Input Points Used 24

Output Bit Start Address: GX60 V-Memory Address:V 40003 ← See Appendix B

Total Output Points Consumed 48 Output Points Used 24

For the 2nd master, we have decided to use **manual addressing** for its slaves. This means you must use the tables in Appendix B of this manual to determine the master module's internal V-memory locations for mapping against the corresponding CPU's V-memory. In Chapter 4, we will show you how to write the ladder logic to setup the mapping process. Right now, you need only look at the table to find the master module's V-memory locations corresponding to points GX0 and GX60—the starting points for the inputs and outputs of our example.

We have used **global data types** here because of simplicity. If we had manually used X's and Y's, we would have had to be concerned with what X's and Y's were already being used by the modules in the local and/or expansion bases. With global assignments, you do not need this information. This is a particularly good characteristic when you think that the configuration of the other I/O in the base may be changed in the future, i.e. new modules added, removed, etc.

Now that the amount of I/O has been decided upon and you have determined how many masters and which slaves you will be using, you are now ready to do the installation and wiring. Chapter 3 will cover this in detail. Then, later, in Chapter 4, you will learn how to write the setup logic to actually tell the CPU how to assign these addressing choices.