

Developing a bill of material

Once a schematic diagram of a solid state control system has been completed, such as shown in Figure 2-24, a bill of material can be prepared. With Numa-Logic 300 Series controls, the suggested procedure incorporates a continuation of the circle method described under schematic conversion.

Solid state modules

In using the circle method, a circle is drawn around each group of circuits that will make up one module. To do this, one must be familiar with the content of the standard Numa-Logic 300 Series modules. An examination of Descriptive Bulletin 16-350 reveals the following circuit groupings:

Inputs

AC — 6 circuits per module (typically).

Outputs

AC — 2 or 4 circuits per module (typically).

Logic

2-input AND — 8 gates per module

4-input AND — 6 gates per module

2-input OR — 8 gates per module

4-input OR — 6 gates per module

DELAY TIMER — 1, 2 or 4 circuits per module

Table 2-1 lists the data on the modules required for this example.

NOTE: All catalog numbers ending in "L" indicate modules having light-emitting diodes.

Using this data, the module circles as shown in Figure 2-37 can be drawn.

Table 2-1: List of modules required for example.

Function	Module Cat. No.	No. of Circuits Req.	Circuits Avail. per Mod.	No. of Mods. Req.	Spare Circuits	Input/Output Terminals	
						Used	Spare
Ac Input	NL-302L	8	6	2	4	8	4
Ac Output	NL-320L	4	4	1	0	4	0
4 Input AND	NL-340	3	6	1	3	N/A	..
2 Input OR	NL-341	4	8	1	4	N/A	..
2 Input AND	NL-342	4	8	1	4	N/A	..
Timer	NL-346	1	1	1	0	N/A	..
Totals	7	15	4

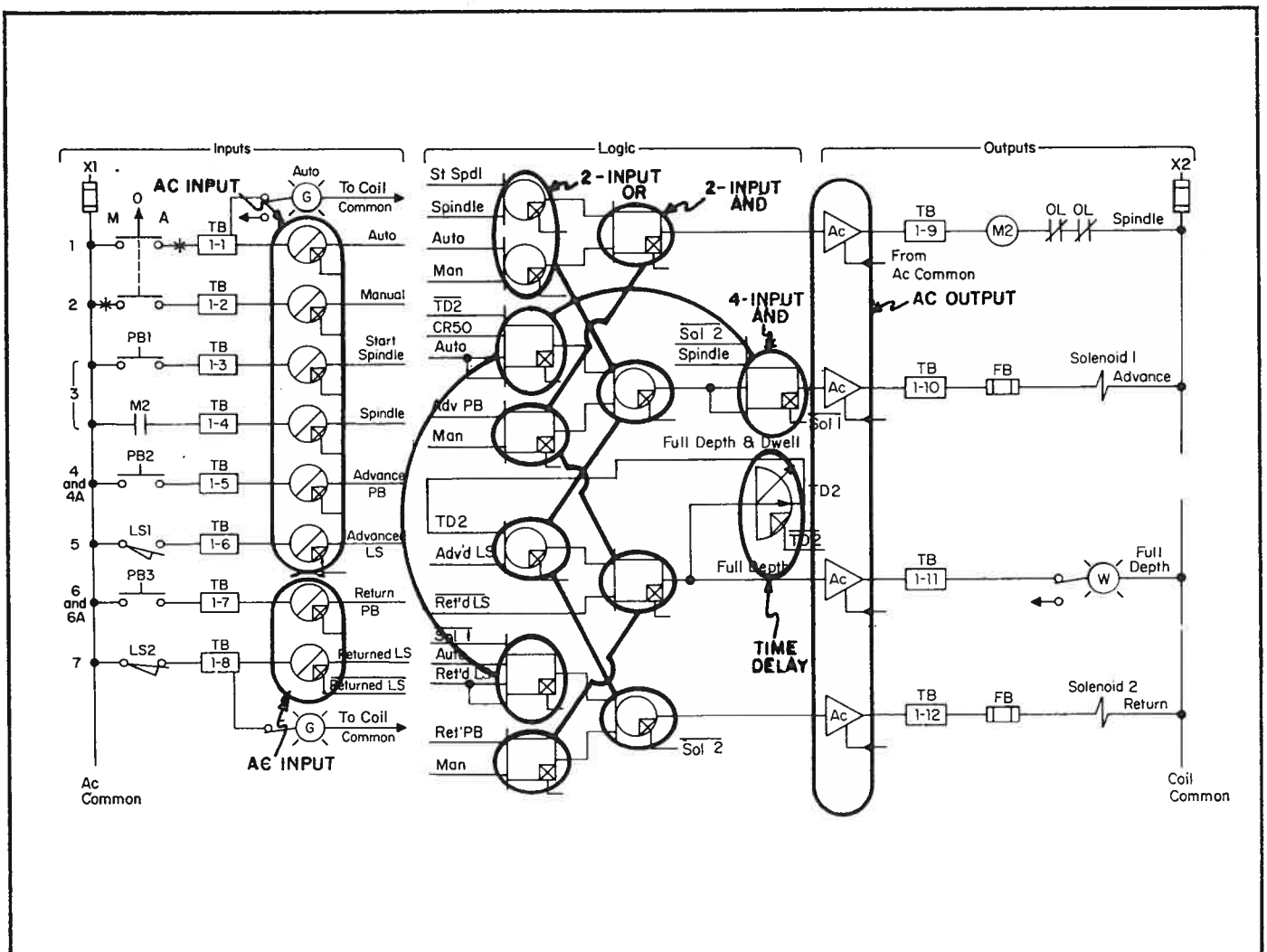


Figure 2-37: Grouping of gates into modules.

Mounting racks

The next step is to select the rack (or racks) needed to mount the modules. As indicated in DB 16-350, racks are available in three different module capacities: 9, 18 and 27. In the example, seven modules are used, so a 9-position rack will suffice.

Also to be determined is whether there are a sufficient number of input-output terminals available. An I/O terminal is needed for each input and output circuit. Thus, adding up the terminals produces the following results:

2 input modules
x 6 inputs each =12 Terminals
1 output module
x 4 outputs each =4 Terminals
16 Terminals
including
4 spares

Since only two circuits of the second hex input module are being used, four of the terminals will not be needed and can act as spares.

The Descriptive Bulletin 16-350 shows that 9-position swing racks and 9-position drop racks (for single stacking) both have 60 terminals, thus either will be adequate. For purpose of discussion, the swing rack will be used. The catalog number is NLRS309.

Power supply

The third step in establishing a bill of materials is to select the power supply. To determine an approximate power requirement, allow 0.125 amps of power per module. Be sure to refer to the power requirements for each module in the Component Data section to perform an accurate calculation of the power needed.

Since seven modules are used in this example, the power supply

requirements should be approximated as follows:
 $7 \times 0.125 = .875$ amps

The NLPS-315, 1.5 amp power supply (which operates at + 5.7 VAC) will fulfill the power supply requirements for this example.

Hardware and accessories

Now that the basic components of modules, racks and power supply have been selected, the only remaining details are to select any accessories or hardware needed, and specify the type of faceplate lenses desired.

Refer to Descriptive Bulletin 16-350, to determine accessory equipment, such as wire wrap, rack components, test equipment or drawing aids needed.

The faceplate lenses are available as either blank, standard symbols (as shown in Specification Sheets Section 6) or customized for the machine and job. Customize faceplate lenses, which aid greatly in troubleshooting, are available from Westinghouse on special order. Or, they can be made using blank faceplate lenses and standard blueprinting procedures as described in Section 3.

Pricing a Numa-Logic system

The table below lists the Numa-Logic 300 Series components that comprise the bill of material for the control system depicted in Figure 2-26. Consult Westinghouse Descriptive Bulletin 16-350 and Discount Schedule C10-S22 for current prices and user discounts, respectively.

Quantity	Catalog Number	Description
2	NL-302L	AC Input Module
1	NL-320L	AC Output Module
1	NL-342	2-Input AND Module
1	NL-340	4-Input AND Module
1	NL-341	2-Input OR Module
1	NL-346L	Delay Timer Module
1	NLRS-309	Swing Rack
1	NLPS-315	Power Supply

