

Numa-Logic control

Numa-Logic 300 Series Solid State Controls . . . "The controls with the built-in machine trouble-shooter". . . are the only solid state controls designed specifically to help the plant electrician locate machine troubles quickly and efficiently.

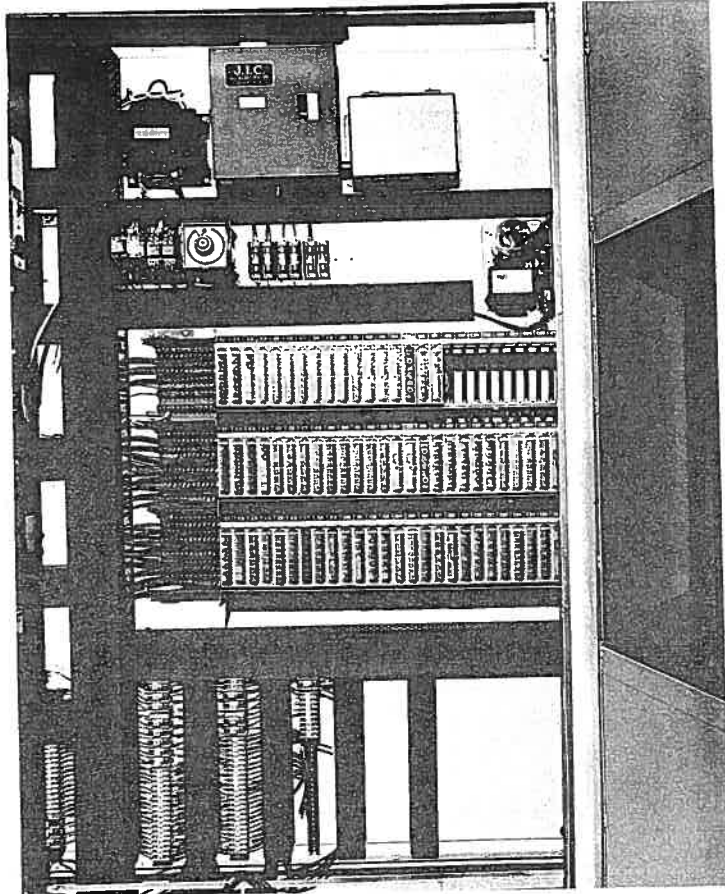


Figure 1-1: Typical Numa-Logic panel.

Numa-Logic 300 Series Solid State hard-wired Control Systems operate similarly to electro-mechanical relays in controlling machine and process line functions. The actual 300 Series controls are simply printed circuit boards (called modules) containing solid state components that perform the functions of electro-mechanical relays. These modules fit into pre-wired mounting racks to complete the circuitry.

A typical Numa-Logic 300 Series installation consists of a series of input and output power modules, and sufficient logic modules to control the machine or process function. A mounting rack and separate power supply are required to complete the installation.

Control sequences are designed in English logic symbology, using independent AND and OR gates rather than traditional relay ladder diagram symbols.

Because of the solid state reliability and many exclusive features of the Numa-Logic 300 Series, it is ideal for a number of applications, particularly in the textile, wood, paper, canning, plastic, mining, petro-chemical, and food processing industries.

Distinctive 300 Series System Features

Optimum reliability

1. All 300 Series modules utilize integrated circuits, which are accepted industry-wide as having the highest order of reliability. See Figure 1-2.

2. All built-in indicating lights are light-emitting diodes (LEDs). These LEDs offer the same type of long life reliability that is consistent with the other solid state components used. See Figure 1-2.

3. The 300 Series system of noise immunity requires no external suppression of possible noise transients when the control is used in common systems.

4. Most 300 Series modules are designed for 85°C (185°F) operation at full loading capacity. This exceeds the temperatures found in common control environments.

5. Most 300 Series modules are subjected to a comprehensive burn-in procedure where the modules are operated under load at 85°C. This practice weeds out any solid state components that might fail prematurely when in use.

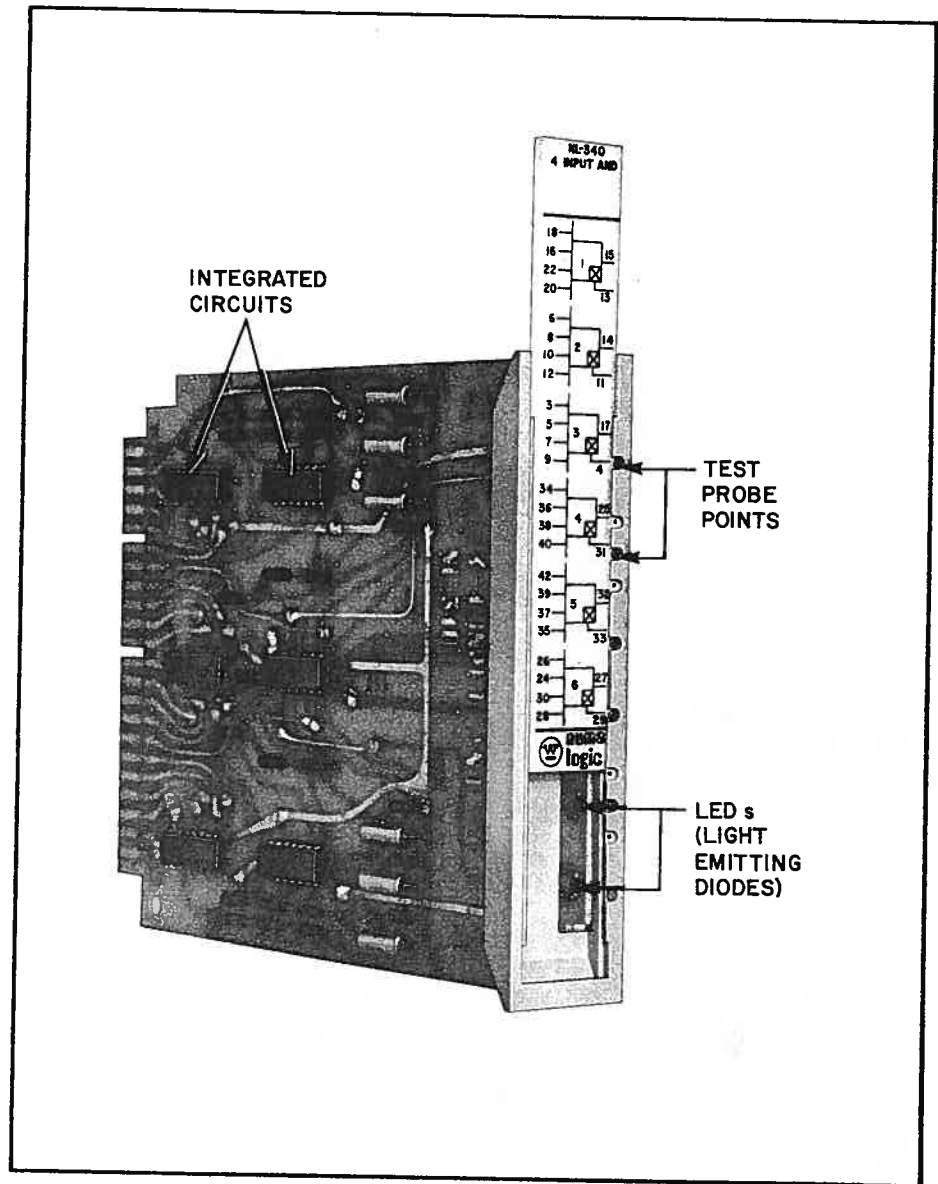


Figure 1-2: Typical 300 Series logic module showing ICs, LEDs and test points.

Improved personnel and equipment safety

1. Two mechanical interlocking features prevent 300 Series modules from being inserted in the wrong rack position or from being inserted in the rack upside down. As shown in Figure 1-3, the keyed slots assure the correct rack position and the stepped notch solves the inversion problem.

2. Electrical interlocking is provided by the exclusive short power pin shown in Figure 1-3. The connection to this pin can be wired in series by machine functions or to the complete machine in such manner that, when any one module is pulled out, it cancels power to all the modules, preventing any unwanted machine functions from occurring.

3. Each 300 Series module is equipped with an exclusive "broken wire protection" feature. With this feature, AC and DC logic and power outputs are inhibited when interconnecting wires are broken.

4. Each 300 Series power output module is protected with a built-in fuse that is coordinated to guard against improper wiring of the output or improper external fusing. See Figure 1-4.

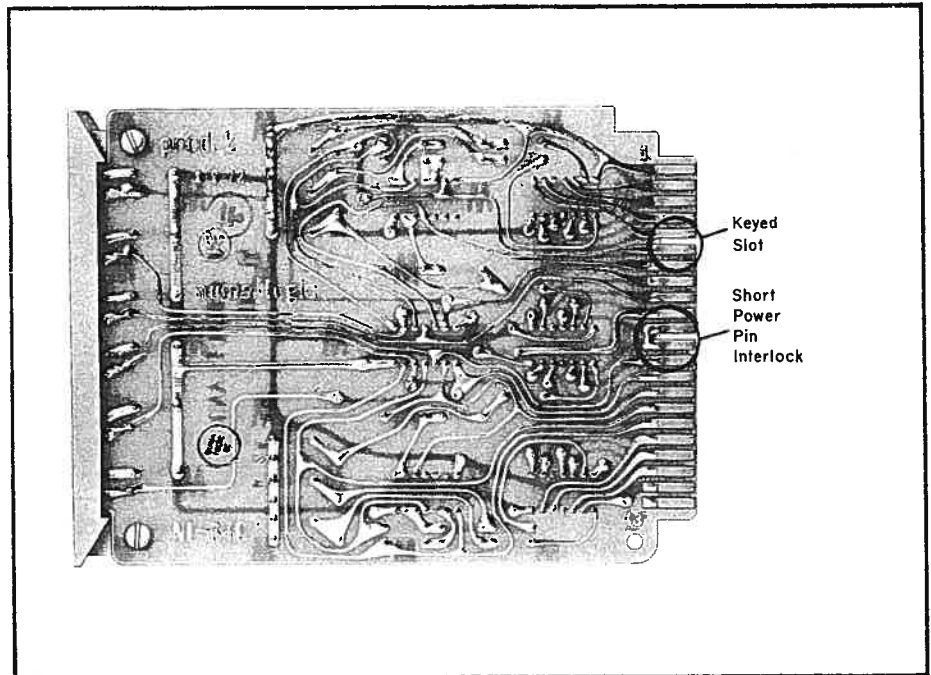


Figure 1-3: Mechanical and electrical interlock features.

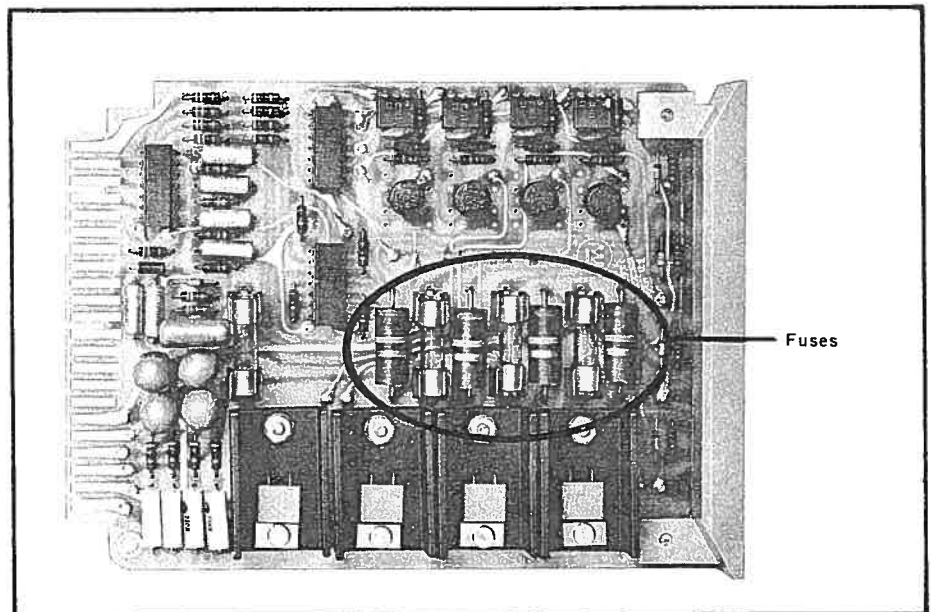


Figure 1-4: Built-in fuse protection on power output modules.



Increased machine up-time

1. The condition of all inputs and outputs of the machine (limit switches, pushbuttons, solenoids, motor starters and lamps) are pictorially displayed on the input/output module faceplates by means of light-emitting diodes (Figure 1-2). The LEDs help diagnose problems with these devices, thus reducing troubleshooting time.

2. Solid state reliability assures minimum problems within the control itself.

3. Test points are provided on the front of each 300 Series module, in addition to the LEDs (Figure 1-2). These points can be tested with a simple voltmeter or special test probe (Figure 1-5) to determine the status of every signal, thus eliminating the necessity of dropping or swinging out the rack for rear access.

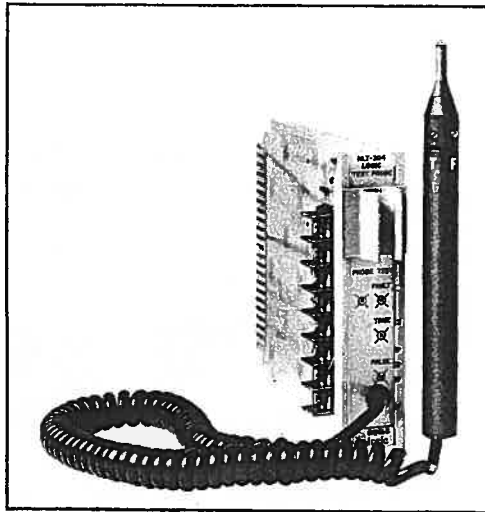


Figure 1-5: Special test probe used to troubleshoot Numa-Logic 300 Series panels.



Straightforward design with minimum ground rules

1. Control design is based on simple English logic (AND, OR, NOT). This system is the easiest to design and read (Figure 1-6). Each circuit reads just like the sequence of the machine's function. Compare this to NOR or negative logic where one's thinking must be turned upside down. Or relay logic where one has to trace from one line in a ladder diagram back to other lines to see which sequence is occurring between relays.

2. Numa-Logic 300 Series controls provide Power On reset circuits on all input, output, retentive, shift register, timer and memory modules to prevent unwanted machine motions during system power up. This eliminates the need for the control designer to concern himself with any conditions that might cause incorrect machine signals on initial start-up. Some competitive controls require separate modules or special circuit design to guard against this condition.

3. The input and logic modules have built-in NOT functions. This convenience eliminates the need for additional control modules when a NOT function is required.

4. All modules have the same fan-out to fan-in ratio of 10 to 1, eliminating loading considerations in the initial design.

5. Terminals are standard on all racks (Figure 1-7), eliminating the need for separate terminal assemblies.

6. All modules can be mixed in any fashion in any rack, eliminating the need for different racks for different modules.

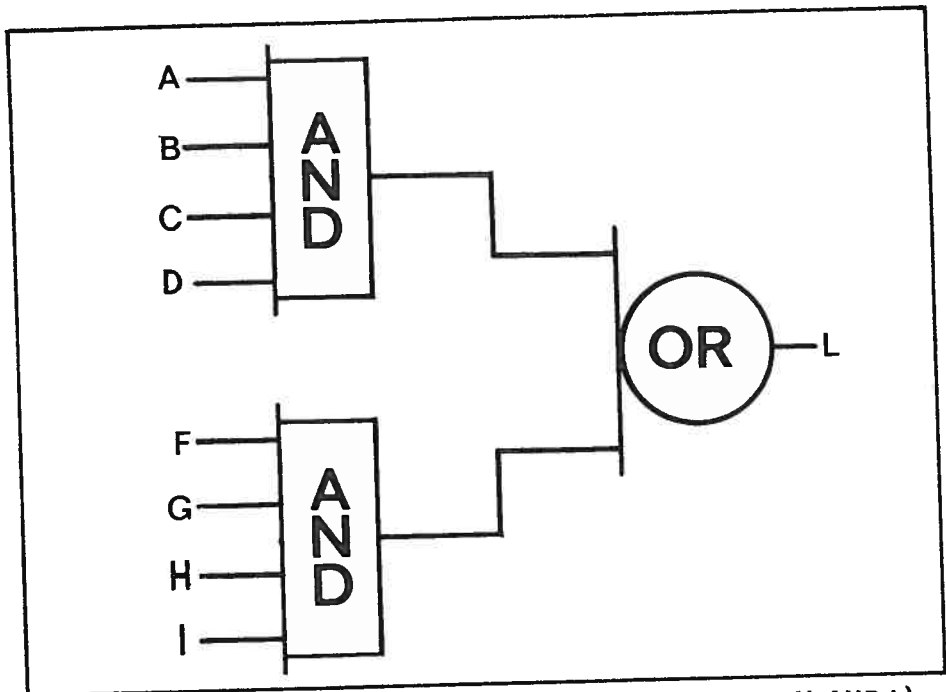


Figure 1-6: Inputs (A AND B AND C AND D) OR (F AND G AND H AND I) must be on in order to get an output at L.

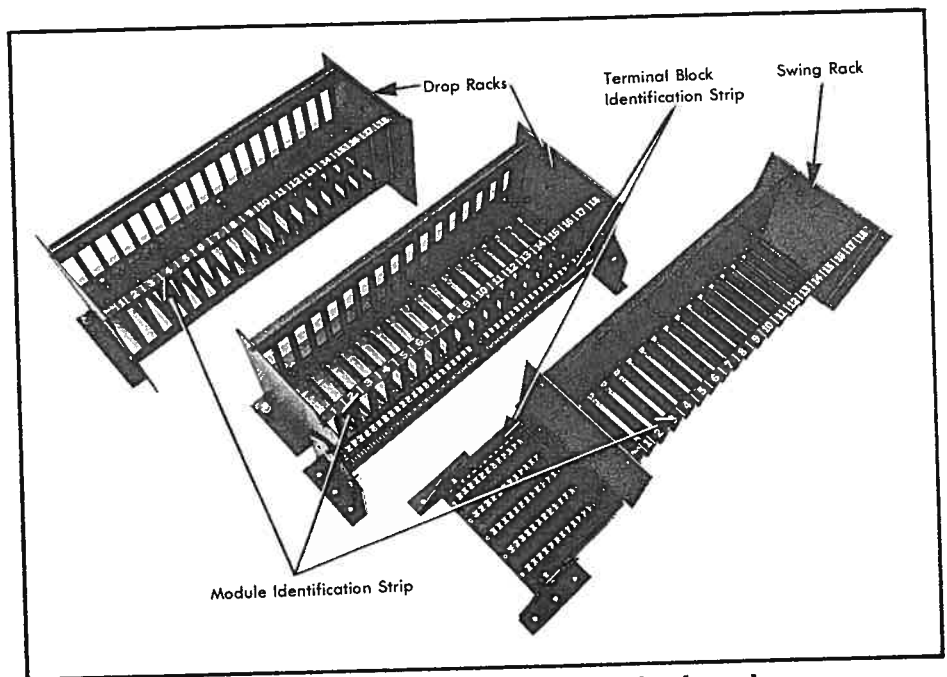


Figure 1-7: Terminals are an integral part of Numa-Logic racks.

7. The power and logic wiring for most 300 Series modules need not be segregated because of Numa-Logic's unique noise immunity design. This simplifies

initial layout, location of different types of cards, physical wiring of the racks, and field modifications.



A complete panel

A complete Numa-Logic 300 Series panel consists of:

1. Input, logic and output modules, which are available as a complete family, including the specialty logic functions.
2. One or more racks, which are available in a variety of configurations.
3. A power supply, available in a number of sizes.

This manual covers in detail how to select, design, assemble and maintain a complete Numa-Logic panel.

