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Rack assembly

Rack assembly

A wide range of mounting racks is available to meet most application requirements: standard drop racks, compact drop racks, swing racks, and adder racks. Numa-Logic 300 Series racks are available in 9, 18 and 27 positions with standard wiring duct.

Standard Drop Rack

Standard drop racks may be stacked a maximum of three high (Figure 4-1), although two drop rack stacks can be mounted separately, one on top of the other. A complete standard drop rack assembly can consist of:

- One Base Rack
  OR
- One Base Rack plus One Adder Rack
  OR
- One Base Rack plus Two Adder Racks

Space Saver Drop Rack

The Space Saver drop rack, which was designed for use with 8" deep panels, limits the number of stacked racks to two (Figure 4-2). A complete space saver assembly can consist of:

- One Base Rack
  OR
- One Base Rack plus One Adder Rack

Adder rack

The bottom edges of the adder rack end plates are offset so that they will overlap the top edges of the rack end plate below when the racks are stacked. Adjacent racks are held together at the lap joint by six 8-32 x 5/16 machine screws.

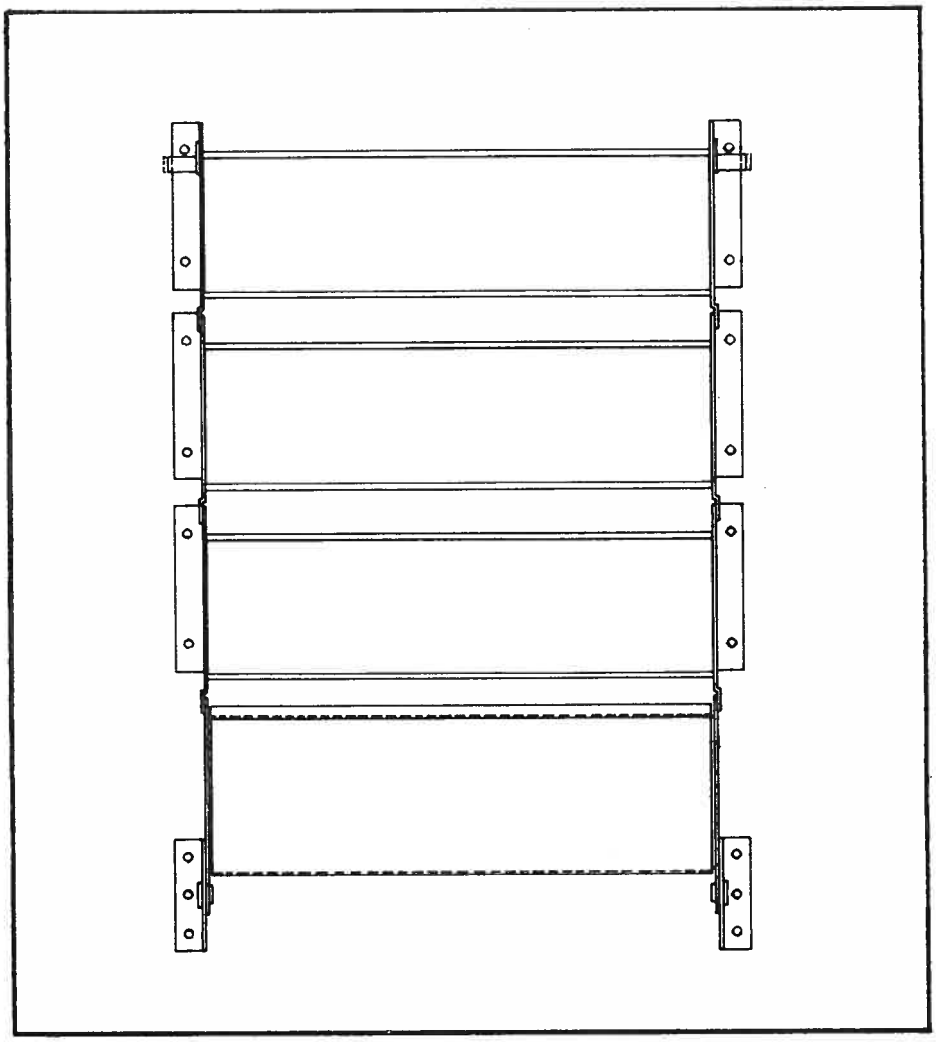


Figure 4-1: Method of stacking standard drop racks.

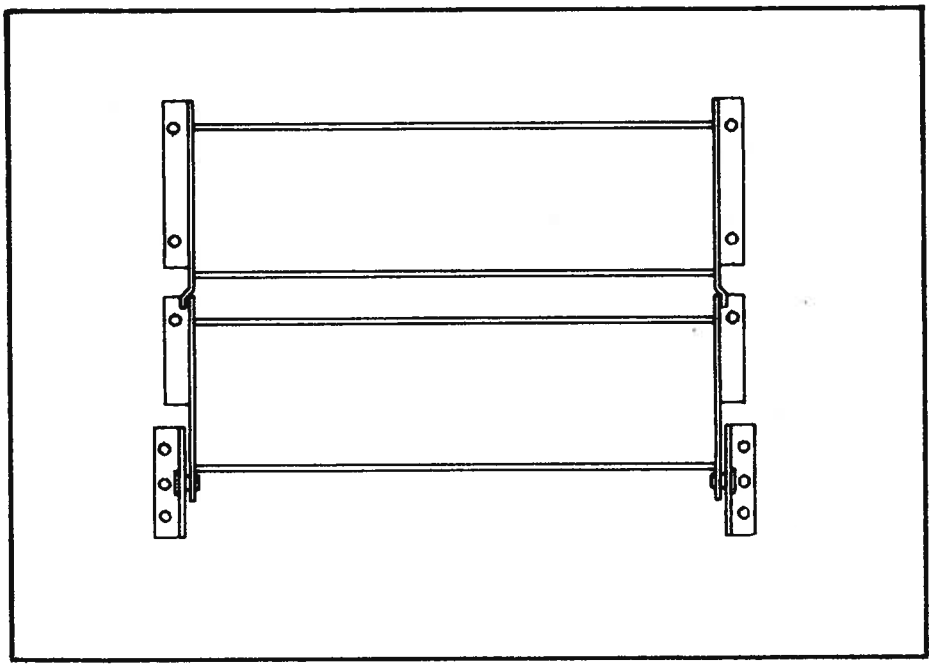


Figure 4-2: Method of stacking Space Saver drop racks.

Swing Rack
The number of racks in a swing rack stack is limited to seven. Figure 4-3 shows a two-rack stack.

With swing racks, one hinge bracket is common between two adjacent racks. To assemble, the pivot pin and its retaining ring are removed before the racks are stacked. The pivot pin is replaced so it projects through the one hinge bracket and both hinge plates. The retaining ring is located in the second groove of the pivot pin. Five 8-32 x 5/16 machine screws through the lap joints complete the assembly.

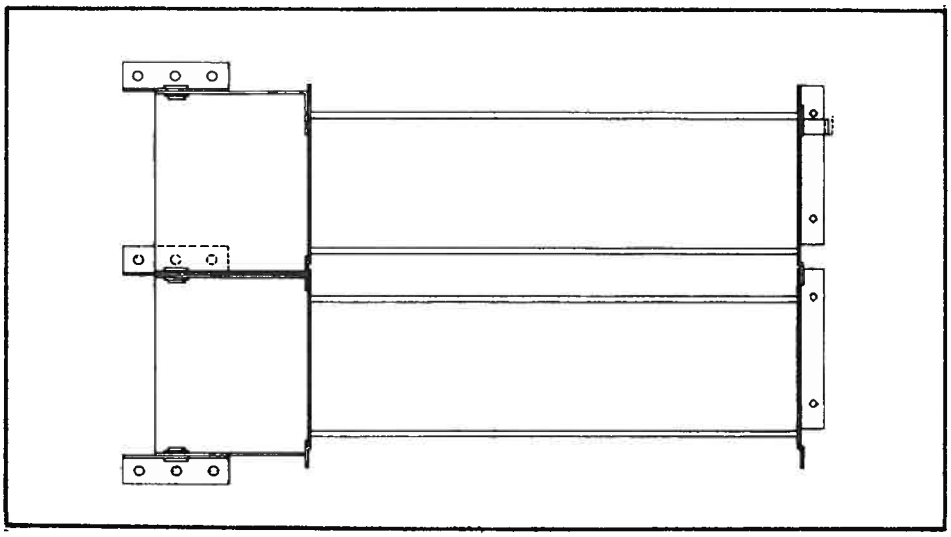


Figure 4-3: Method of stacking swing racks.

Terminal capacity
Terminal capacity varies with both size and type of rack. Swing racks have the terminal blocks located at the end of each rack. Drop racks, on the other hand, have the terminal blocks located below the bottom rack and one terminal block bank accommodates all the racks in the stack (up to three). See Figure 4-4.

Terminal blocks are provided in three sizes: 8 terminals per strip, 12 terminals per strip, and 22 terminals per strip.

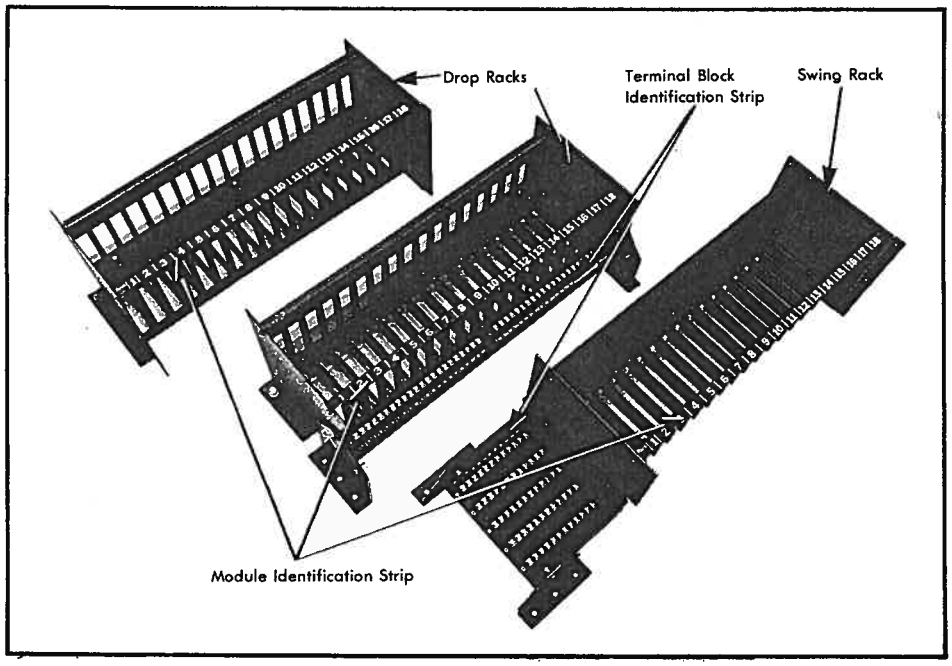


Figure 4-4: Module and terminal block identification strips.

Standard Drop Rack
8 terminals per strip
- 18-position rack — up to 14 terminal strips (112 terminals)
- 27-position rack — up to 21 terminal strips (168 terminals)

Space Saver Drop Rack
22 terminals per strip
- 9-position rack — M suffix —1 terminal strip (22 terminals)
- M1 suffix — 2 terminal strips (44 terminals).
- 18-position rack — M suffix — 2 terminal strips (44 terminals)
- M1 suffix — 4 terminal strips (88 terminals).
- 27-position rack — M suffix — 3 terminal strips (66 terminals)
- M1 suffix — 6 terminal strips (132 terminals).

Swing Rack
12 terminals per strip
- 9 & 18-position rack — 5 terminal strips (60 terminals).

Rack and panel wiring

Rack wiring methods

Point-to-point wiring on Numa-Logic 300 Series racks usually is performed by either wire-wrap or "Termi-Point"™ methods. Both solderless methods provide equally reliable connections, the choice being up to the user.

With the wire-wrap method, the bared end of the connecting wire is wrapped tightly around the terminal post by means of a special wire-wrap tool. Wrapping tools are available in electric powered and manually operated models. Cutting, skinning and unwrapping tools and accessories are also available.

With the Termi-Point™ method, the bared end of the connecting wire is held tightly to the terminal post by means of a special clip as shown in Figure 4-5.

A complete range of special tools is available for both the wire-wrapping and Termi-Point™ wiring methods. Complete operating instructions are from the manufactures.

When using the wire-wrap method, it is recommended that 7/8" of insulation be stripped from the end of the wire (Figure 4-6). This provides for three complete turns of bare wire on the terminal post. One turn of insulated wire is made first, followed by three turns of bare wire.

Bussing connections, by either bussing strip or wire, should be soldered. This includes connections to both connector pins and terminal block pins. On each module, this includes pins 1, 2, 43 and 44. The details of how to make these connections are covered later in this section.

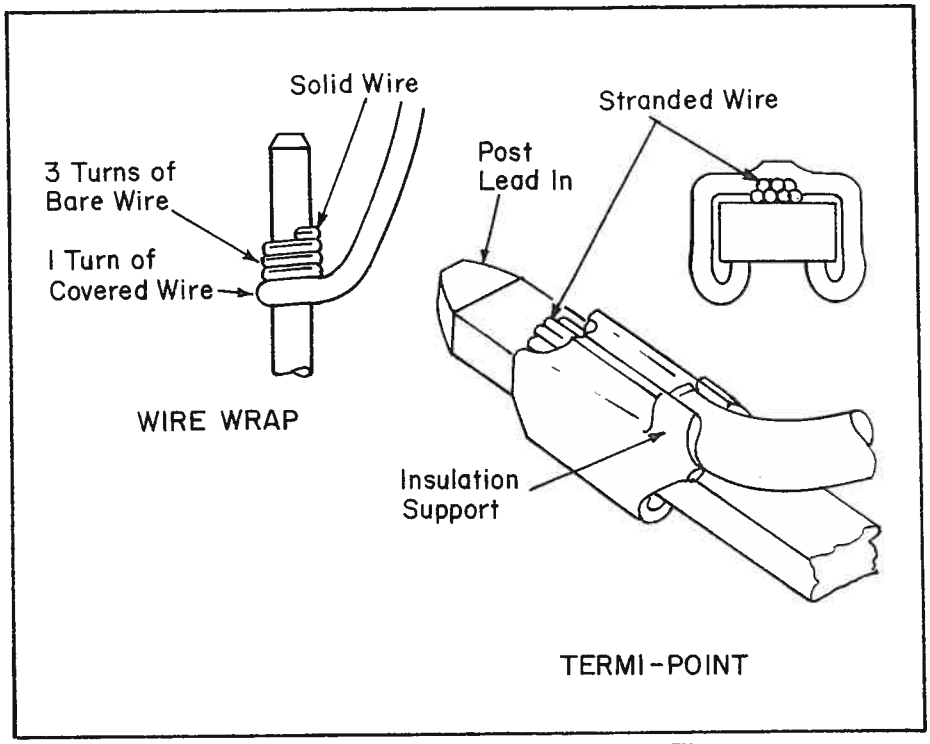


Figure 4-5: Principles of wire-wrap and Termi-Point™ methods.

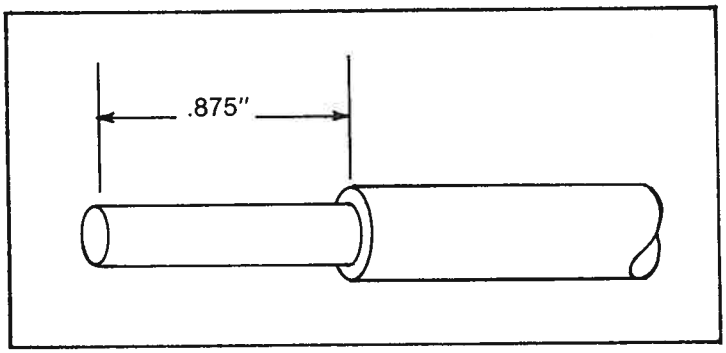


Figure 4-6: Stripping length for wire-wrap connection.

Types of wire
Although other wire sizes can be used, in general practice 22 gauge wire is used for module interconnections and 18 gauge wire is used for connecting the

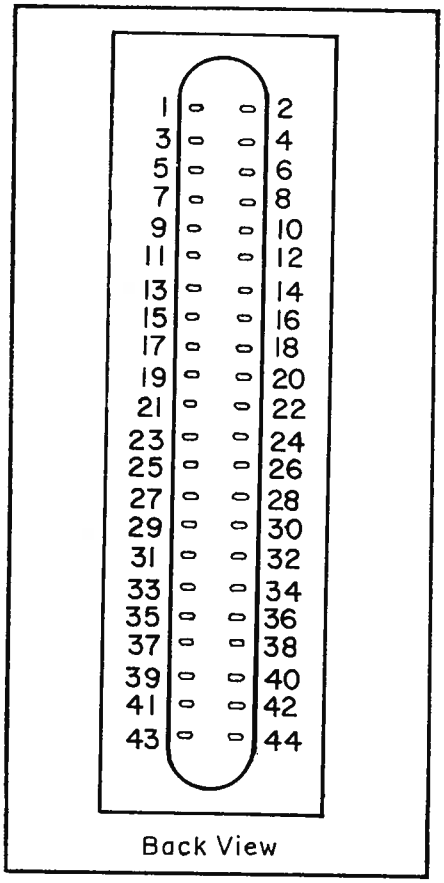


Figure 4-7: Module connector pin identification.

power busses to the terminal strips. See Figure 4-8.

Wire color coding is flexible. One method that simplifies troubleshooting is to use red for 120 VAC signals and blue for DC logic level signals.

Terminal identification
Module connector pins are numbered 1 thru 44, starting at the top left of the connector. Figure 4-7 shows the pin numbering system from the back view of the connector.

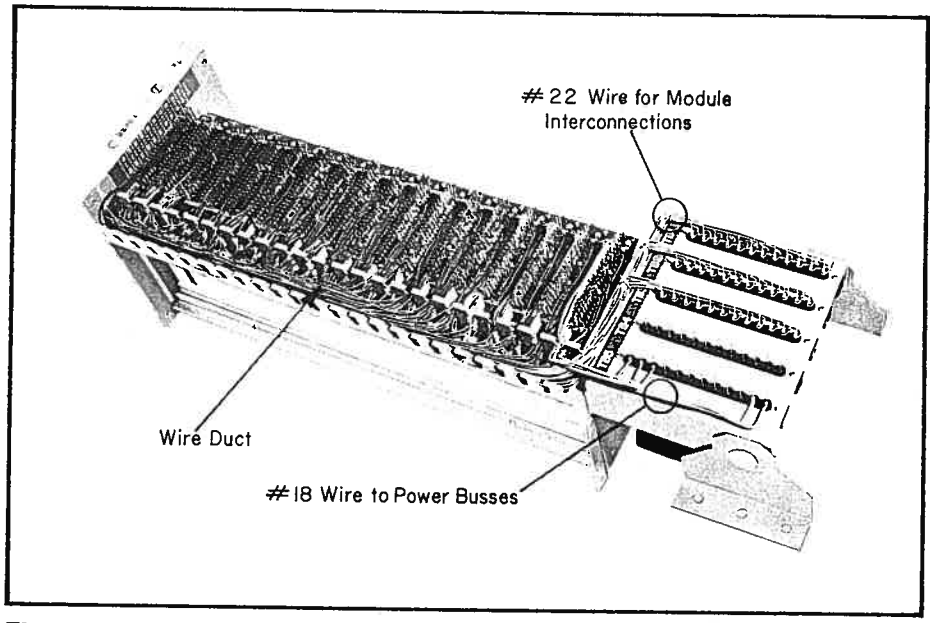


Figure 4-8: Individual rack wire duct.

Module connectors are numbered the same as the corresponding modules, starting with 1 at the left of each rack from the front view of the rack. From the back view of the rack, 1 is at the extreme right. Modules are identified by a nameplate strip at the front of each rack as shown in Figure 4-4.

Terminal blocks for drop racks are numbered from left to right at the front of the rack, starting with TB1. Terminals within each terminal block are numbered from top to bottom, starting with 1.

Terminal blocks for swing racks are numbered from top to bottom, viewing the front of the racks. Terminals within each terminal block are numbered from right to left.

Care must be exercised to remember that the order of any of the above mentioned identification is the reverse when viewing the back of the rack rather than the front of the rack. An additional reversal takes place when the rack is dropped down or swung out.

When more than one swing rack is stacked in a panel, the racks are identified as shown in Figure 4-9. A similar scheme can be used for drop racks. For large multiple door panels, the rack and terminal strip identification is repeated for each panel door. The drawing set then is organized and labeled by panel doors.

Wire duct

A wire duct is provided at the back of each rack (Figure 4-8) to accommodate the back plane wiring of the rack. Similar ducts for interpanel wiring must be provided by the user.

Bussing strips

The bussing connections for connector pins 1 and 2 (DC common) are made with a bussing strip. The strip is installed at the factory.

These connections should be soldered. Further, the connections from the buss strip to the terminal strip should be made with 18 gauge wire and soldered at both ends. See Figure 4-10.

Interlocks

The Numa-Logic 300 Series has both electrical and mechanical interlock features.

To utilize the electrical interlock, connect the modules in series with the AC or DC power through connector pins 21 and 23 as shown in the schematics (Figures 3-12, 3-13 and 3-14). The hook-up procedure detailed in Figure 4-10 is wired as follows:

1. Bring one side of the AC or DC power line to pin 21 of module 1.
2. Interconnect pin 23 of module 1 with pin 21 of module 2.
3. Repeat this interconnection from module 2 to module 3, etc.
4. Bring the opposite side of the AC or DC power line to pin 23 of the last module.

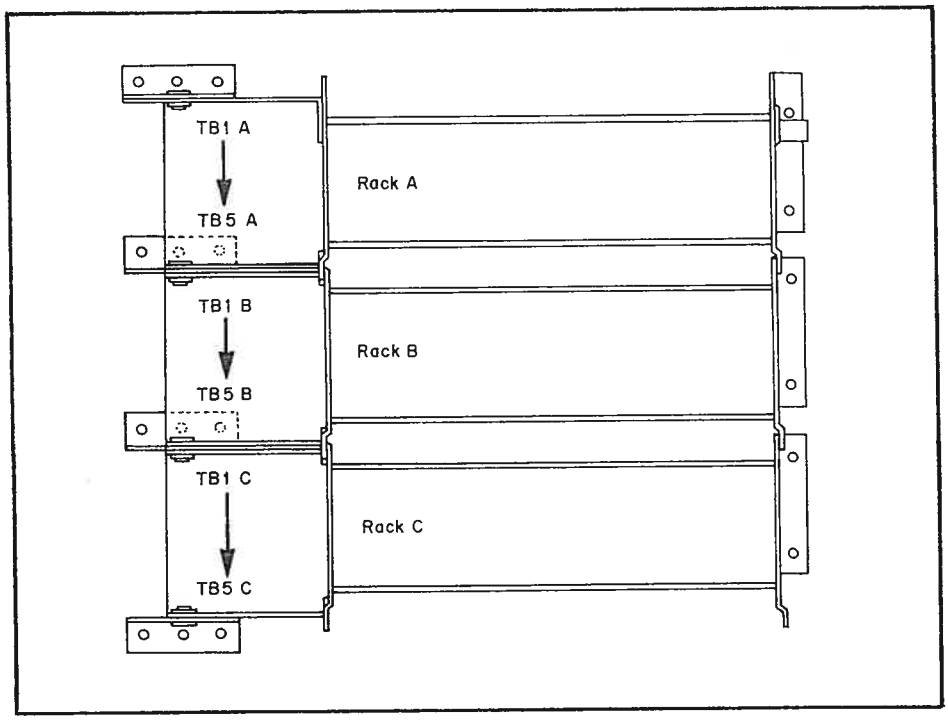


Figure 4-9: Identification of stacked Swing Racks.

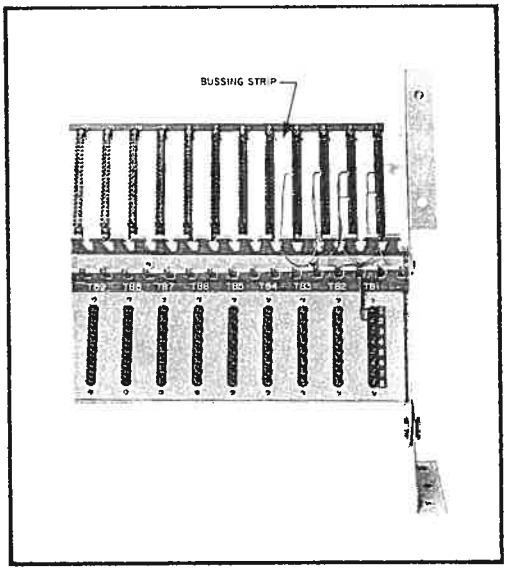


Figure 4-10: Electrical interlock hookup.

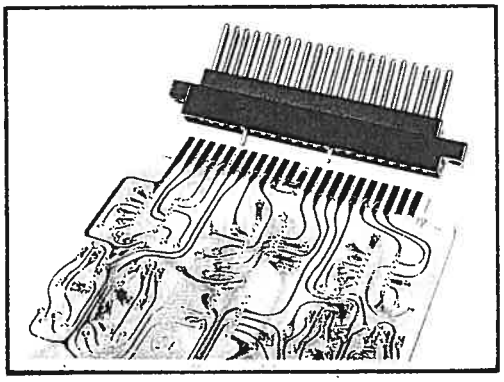


Figure 4-11: Mechanical interlock feature.

The electrical interlock may be wired using either wire-wrap or Termi-Point ™ methods.

Through the mechanical interlock feature, the keyed slots on each type of module prevent modules from being placed in incorrect module positions. As shown in Figure 4-11, each module has two slots at the back end, and the slot locations for each type of module are different. Two glass epoxy (G10) keys are located in the corresponding connectors and positioned the same as the module slots. Therefore, if the correct module is inserted, the slots and keys mate. If the wrong module is inserted, the keys intercept the unslotted section of the module and prevent the module from being properly seated.

To make the mechanical interlock feature operational, position the removable plastic keys correctly in each connector. For each module, this involves checking the slot locations in the module (or referring to the mechanical keying on the Component Data sheet) and then inserting the plastic keys in the corresponding positions in the connector, making sure that they are secure.

Plus DC input
Module pin 19 is the +5.7 VDC power connection. It can be wire-wrapped between modules. No more than 27 modules should be wired in series. Each rack must have a return wire (#16 or #18) soldered from pin 19 of the last module in the rack back to the +5.7 VDC terminal point as shown in Figure 3-11.

DC common input
It is not recommended to tie DC common of the power supply to the panel or earth ground. Let the power supply float with respect to the panel and earth ground.

L2 (neutral) input
This is the right vertical line on the schematic. Connect module pin 41 to this line on the coil side. Pin 41 can be wire-wrapped between modules.

Panel Assembly

Panel size
In general, standard stock panels can be used with 300 Series systems. The procedure for selecting panel height and width is the same as for magnetic relay control. Standard subplates can be used. If more than two racks are mounted on a subplate, consider strengthening the subplate by some type of support on the back.

Panel depth must be at least 8 or 10 inches (depending on rack selected) to clear racks mounted on a subplate located on the back panel wall. The size of panel door selected may dictate use of a panel of greater depth.

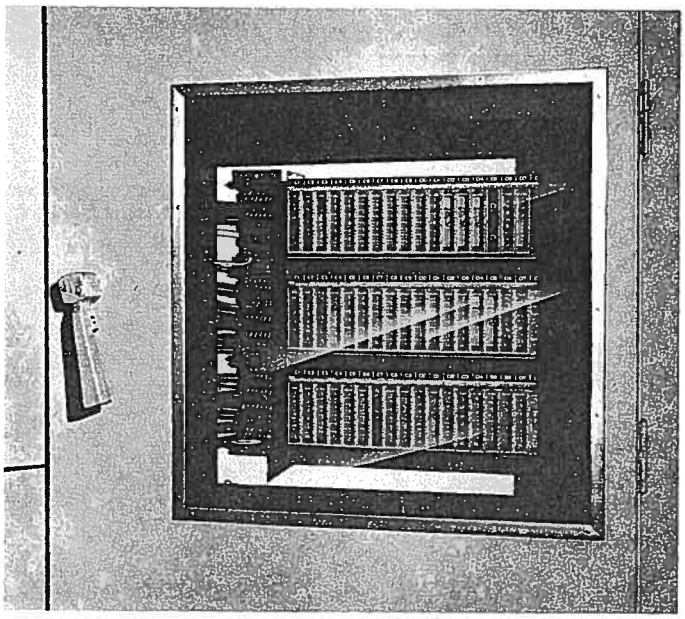
Door size
The main requirement for panel door size is it must be large enough to permit the racks to be dropped down or swung out for servicing. Door size varies with type of rack, number of racks in the stack, size of rack and panel depth.

With drop racks, the door opening must be at least slightly wider than the total rack width and in line with the stack. The minimum door heights for the various stacking configurations are shown in Section 6.

With swing racks, the door opening must be slightly higher than the overall stack height and in line with the stack. The minimum door width and placement will vary as shown in Section 6.

Panel window
One of the main features of Numa-Logic 300 Series control is that the initial phase of any troubleshooting can be performed by visual inspection of the module faceplates — often by the machine operator. Therefore, it is desirable to have a viewing window in the panel door. See Figure 4-12.

There are no hard and fast rules for the size and location of the window. The main objective is to be sure that all the faceplates can be seen easily without opening the door.



Location of components
Racks should be located as close as possible to eye level so the operator can view the faceplates without difficulty. Rack drilling plans are given in Section 6.

Horizontal in-panel wire ducts should be located with a minimum of 1 inch between the bottom of the rack stack and the top of the duct (See Section 6). There are no restrictions on the location of vertical in-panel wire ducts.

The power supply should be mounted as close to the racks as possible.

All other components such as motor starters, circuit breakers and the like are mounted in the same manner used for conventional control.

Rack support
Swing racks are mounted at one end by the flanged hinges. If the other end is left unsupported, the rack will tend to sag. Mounting flanges are provided at the other end of the rack, with holes to accept standard fasteners. Some users prefer to use a separate support bracket as shown in Figure 4-13.

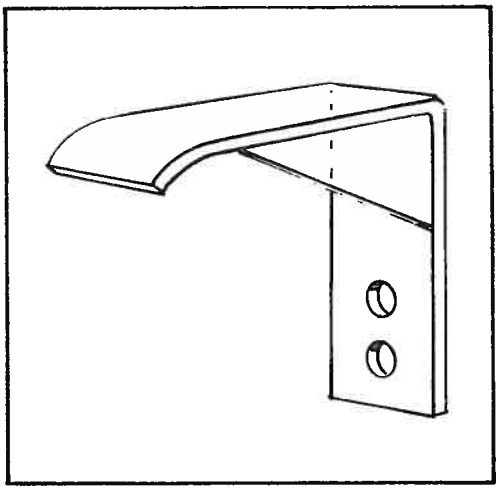


Figure 4-13: Typical swing rack support bracket.