User Guide

Sentral Loader Control

Deluxe SLC model

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Installation

Operation

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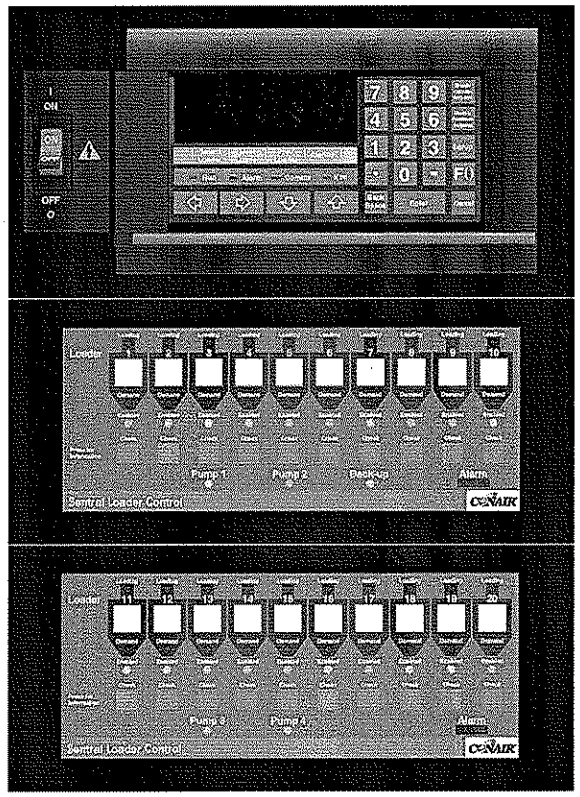

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1.0 INTRODUCTION

1.1 CONTROL SYSTEM OVERVIEW

The Deluxe Sentral Loader Control is designed to control up to 40 loading stations. Controls are built in 10, 20, 30, and 40 station configurations. 10, 20, and 30 station controls can be expanded up to 40 stations in 10 station increments.

Loader pump assignments are completely flexible. Individual loaders can be designated to any one of eight loading systems, and each loading system can be designated to any one vacuum pump. Two pump outputs are supplied for each set of 10 loading stations, and one pump output is provided for a backup pump on all loading systems.

An interface panel is provided to modify loader parameters and monitor loader and pump status, and can be mounted up to 4000 feet from the main control. An audible and visual alarm is provided to alert the operator of problems with material loading.

Individual loaders can be configured for 4 different options. A loader full option is provided as standard on all controls, and can be used with an optional fill sensor mounted in the body of the loader. Ratio, air discharge, and purge options can be added for any loader, by installing the correct output card and correctly configuring the loader.

1.2 CONTROL SYSTEM DESCRIPTION

A 10 or 20 station Deluxe Sentral Loader Control consists of the following components:

- Allen Bradley PLC with SLC 5/01 processor in a 10 slot backplane with IB16 24VDC sinking input modules and OW16 relay contact output modules. The number of input and output modules will vary with the number of loaders and loader options.
- Nematron interface display and LED loader status panel.
- 10 ft communication cable

A 30 or 40 station Deluxe Sentral Loader Control will also include:

- Second Allen Bradley PLC with SLC 5/01 processor in a 10 slot backplane with IB16 24VDC sinking input modules and OW16 relay contact output modules. Number of input and output modules will vary with number of loaders and loader options.
- Second 10 ft communication cable

2.0 INSTALLATION

Installation of the Deluxe Sentral Loader Control consists of:

1. Mounting Allen Bradley I/O station(s) and Nematron Interface panel.
2. Connect loader control wiring to I/O station(s).
3. Connect pump control wiring to I/O station(s).
4. Connect purge valve control wiring to I/O station(s). (OPTIONAL)
5. Connect power cord for Nematron interface and I/O stations to 115 VAC power source.

2.1 MOUNTING COMPONENTS

Find a secure location to mount the Nematron interface and I/O station(s). The Nematron interface and I/O station(s) do not need to be located together. The standard length of the communication cable, used to connect the Nematron interface and each I/O station is 10ft, but additional lengths up to 4000ft can be ordered (CPN#107-435-07 and state desired length). When planning cable routes, follow these guidelines to help protect the communication cable from electrical interference:

- Keep the communication cable at least 5 ft (1.52m) from any electric motors, transformers, rectifiers, generators, arc welders, induction furnaces, or sources of microwave radiation.

- If you must run the cable across power feed lines, run the cable at right angles to the lines.

- If you do not run the cable through a contiguous metallic wireway or conduit, keep the communication cable at least:
  - 6 inches (0.15m) from AC power lines of less than 20A
  - 1 foot (0.30m) from lines greater than 20A, but only up to 100kVA
  - and 2 feet (0.60m) from lines of 100 kVA or more.

The Nematron interface should be located in a position that is convenient for operators to see and access. The I/O stations should be in a central location that is as close as possible to the loaders they will control. Keeping the I/O stations close to the loaders will minimize the amount of wire needed to connect the loaders.

2.2 LOADER CONTROL WIRING

Each loader will need to have at least seven wires run between its pigtail and the I/O station. If any of the following options are also to be used, loader full, ratio, or air discharge, then an additional wire will need to be run for each option. Also if a three wire sensor is being used for either demand or loader full, then an additional wire will need to be run. The color coding for the loader pigtails is as follows:

Sensor power	-	Orange
Sensor common	-	Pink
Demand sensor input	-	Yellow
Fill sensor input	-	Red/Black
AC power	-	Red
AC power neutral	-	White
Ground	-	Green
Load solenoid	-	Black
Ratio solenoid	-	Brown
Air discharge solenoid	-	Red/Yellow
Purge solenoid	-	Red/Green

Follow all local electrical guidelines when installing and connecting wires. Shielded cable is a must when not running wires in metal conduit. Static electricity is very harmful to electronic components and failure to use a metal shield can cause damage to the controls. When using shielded cable it is important to make sure the shield is grounded inside the I/O stations only. It is also important when running wire to keep away from material lines, especially material hoses.
Material lines and hoses produce large amounts of static electricity when material is conveyed.

Refer to the electrical prints included with this manual for all electrical connections to the loader control. All loader outputs are 24 VAC and all demand and fill sensor inputs are 24 VDC. A general list of loader electrical connections are as follows:

Sensor power	-	Ldrs 1-20	Terminal #9	
		Ldrs 21-40	Terminal #9	2nd I/O station
Sensor common	-	Ldrs 1-20	Terminal #10	
		Ldrs 21-40	Terminal #10	2nd I/O station
Demand sensor input	-	Ldrs 1-10	slot 1, inputs 0-9	
		Ldrs 11-14	slot 2, inputs 4-7	
		Ldrs 15-20	slot 3, inputs 0-5	
		Ldrs 21-30	slot 1, inputs 0-9	2nd I/O station
		Ldrs 31-34	slot 2, inputs 4-7	2nd I/O station
		Ldrs 35-40	slot 3, inputs 0-5	2nd I/O station
Fill sensor input	-	Ldrs 1-6	slot 1, inputs 10-15	
		Ldrs 7-10	slot 2, inputs 0-3	
		Ldrs 11-20	slot 3, inputs 6-15	
		Ldrs 21-26	slot 1, inputs 10-15	2nd I/O station
		Ldrs 27-30	slot 2, inputs 0-3	2nd I/O station
		Ldrs 31-40	slot 3, inputs 6-15	2nd I/O station
24 VAC power	-	Ldrs 1-20	Terminal #7	
		Ldrs 21-40	Terminal #7	2nd I/O station
24 VAC power neutral	-	Ldrs 1-20	Terminal #8	
		Ldrs 21-40	Terminal #8	2nd I/O station
Ground	-	Ldrs 1-20	Ground terminal	
		Ldrs 21-40	Ground terminal	2nd I/O station
Load solenoid	-	Ldrs 1-16	slot 4, outputs 0-15	
		Ldrs 17-20	slot 5, outputs 0-3	
		Ldrs 21-36	slot 4, outputs 0-15	2nd I/O station
		Ldrs 37-40	slot 5, outputs 0-3	2nd I/O station
Ratio solenoid	-	Ldrs 1-16	slot 6, outputs 0-15	
		Ldrs 17-20	slot 7, outputs 0-3	
		Ldrs 21-36	slot 6, outputs 0-15	2nd I/O station
		Ldrs 37-40	slot 7, outputs 0-3	2nd I/O station
Air discharge solenoid	-	Ldrs 1-10	slot 7, outputs 6-15	
		Ldrs 11-20	slot 8, outputs 0-9	
		Ldrs 21-30	slot 7, outputs 6-15	2nd I/O station
		Ldrs 31-40	slot 8, outputs 0-9	2nd I/O station

2.3 PUMP CONTROL WIRING

The Deluxe Sentral Loader Control is capable of running 8 vacuum pumps and one backup pump. There are two pump outputs for each 10 loaders. All backup pump outputs are 115 VAC and all overload inputs are 24 VDC. Pump electrical connections to the SLC control are as follows:

115 VAC neutral	-	Pumps 1-4	Terminal #2	
	-	Backup pump	Terminal #2	
	-	Pumps 5-8	Terminal #2	2nd I/O station
Pump/Dust collector outputs	-	Pump 1	slot 5, output 8	
		Pump 2	slot 5, output 9	
		Pump 3	slot 5, output 11	
		Pump 4	slot 5, output 12	
		Backup pump	slot 5, output 10	
		Pump 5	slot 5, output 8	2nd I/O station
		Pump 6	slot 5, output 9	2nd I/O station
		Pump 7	slot 5, output 11	2nd I/O station
		Pump 8	slot 5, output 12	2nd I/O station
Pump Overload power	-	Pump 1-4	Terminal #9	
		Backup pump	Terminal #9	
		Pump 5-8	Terminal #9	2nd I/O station
Pump Overload input	-	Pump 1	slot 2, input 11	
		Pump 2	slot 2, input 12	
		Pump 3	slot 2, input 14	
		Pump 4	slot 2, input 15	
		Backup pump	slot 2, input 13	
		Pump 5	slot 2, input 11	2nd I/O station
		Pump 6	slot 2, input 12	2nd I/O station
		Pump 7	slot 2, input 14	2nd I/O station
		Pump 8	slot 2, input 15	2nd I/O station

The connections for the wires at the pump and dust collectors will be the same for all pumps. A list of connections on the motor contactor at the pump are as follows:

Pump output/Dust Collector solenoid	-	Terminal A1
115 VAC Neutral/Dust Collector solenoid neutral	-	Terminal 96
Pump overload power	-	Terminal 97
Pump overload input	-	Terminal 98

There also should be supplied, a jumper wire connecting the normally closed contact on the overload (Terminal 95) to the motor contactor coil (Terminal A2). If this jumper wire is missing it will need to be installed.

2.4 PURGE VALVE CONTROL WIRING (OPTIONAL)

The Deluxe Sentral Loader Control is capable of operating up to 40 purge or material valves, used to purge material lines. Since purge/material valves are located at the material source instead of at the loader, and that many loaders can use the same purge/material valve, separate special connections will be required to properly operate the valves.

For each purge/material valve in use, three wires will be needed to operate the valve. A list of connections are as follows:

24 VAC neutral	-	Ldrs 1-20	Terminal #8	
		Ldrs 21-40	Terminal #8	2nd I/O station
Ground	-	Ldrs 1-20	Ground terminal	
		Ldrs 21-40	Ground terminal	2nd I/O station
Purge solenoid*	-	Ldrs 1-16	slot 9, outputs 0-15	
		Ldrs 17-20	slot 8, outputs 12-15	
		Ldrs 21-36	slot 9, outputs 0-15	2nd I/O station
		Ldrs 37-40	slot 8, outputs 12-15	2nd I/O station

*For any loaders that are using a common purge valve, the purge solenoid will need to be connected to all of the purge outputs for the loaders on that valve.

2.5 CONTROL POWER WIRING

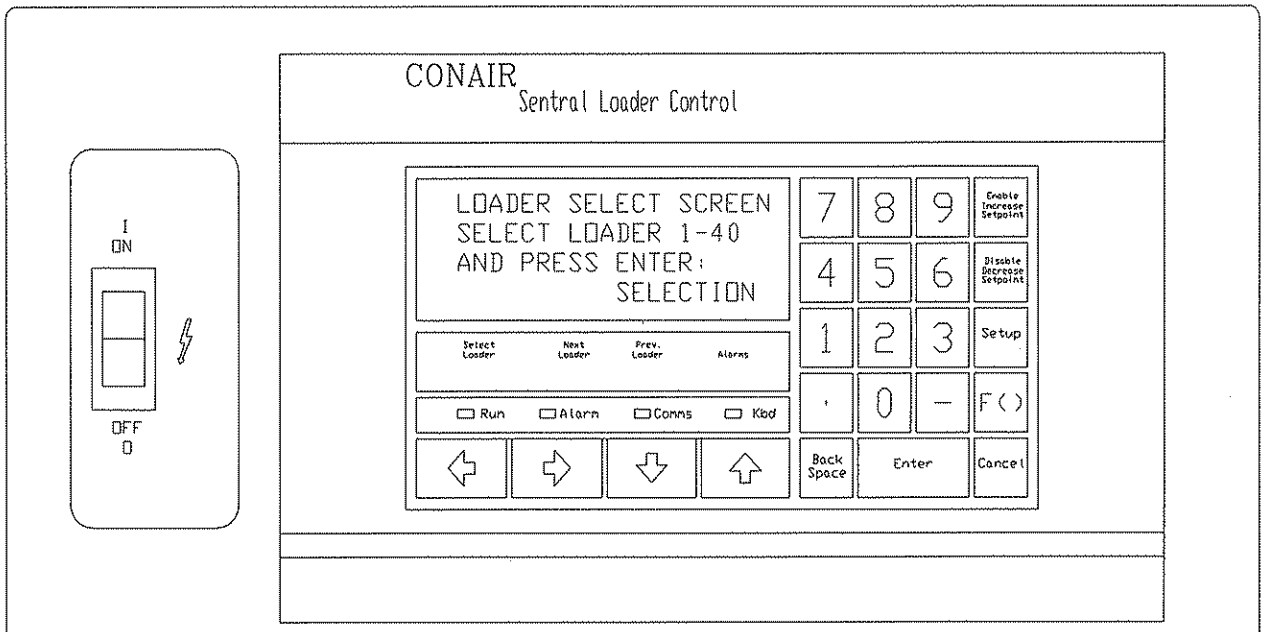
Power for both the I/O stations and Nematron interface is 115 VAC. A three prong power cord is included with each I/O station and the Nematron interface. Each power cord can be plugged into a standard 115 VAC outlet rated for at least 15 Amp service. All outlets must be grounded. Failure to provide proper grounding to the control can cause control malfunctions and could result in electrical shock and possible injury.

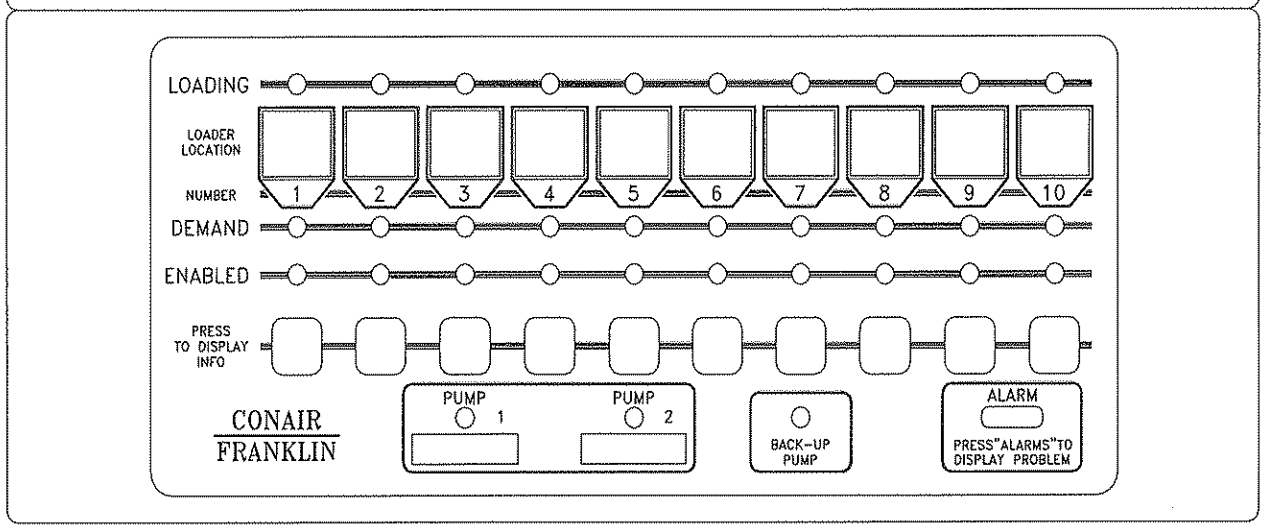
3.0 OPERATOR FUNCTIONS

3.1 NEMATRON INTERFACE AND LED STATUS PANEL

All operator entry for the system is accomplished via the Nematron IWS-127 operator interface shown in Figure 1. This 4-Line vacuum fluorescent display with keypad is used to access and change all data stored in the PLC. A simple menu system allows changes to be made to any loader with just a few keystrokes.

The LED status panel, also shown in Figure 1, contains demand, loading, and loader enable LED's for each loader. LED's are also included to represent pump and alarm status. All LED's are on continuously when it's corresponding functions are energized. There is one LED panel for each 10 loading stations.





The functions of each LED is as follows:

Demand LED - when lit, indicates loader needs material or has demand.
Loading LED - when lit, indicates loader is currently loading.
Enable LED - when lit, indicates loader is enabled and will load if it has demand.
when flashing, indicates loader has a "No Material Alarm".

Also on the LED panel, there is one "Press to Display Info" button for each loader. Pressing a loader's "Press to Display Info" button will bring that loader's loading information on screen, where changes can be made to its settings.

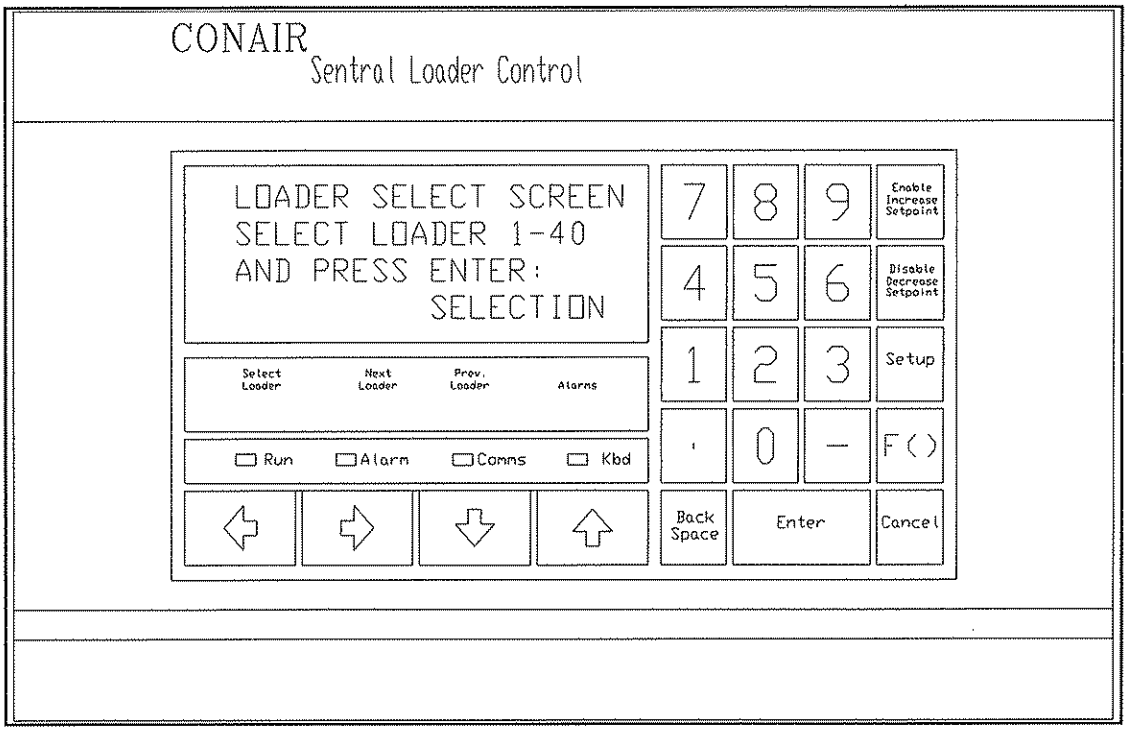
3.2 SELECTING LOADERS

To change loader settings, ie. load times, purge time, regrind percentage, or to enable or disable a loader, you will first need to select that loader. Selecting a loader can be done three ways:

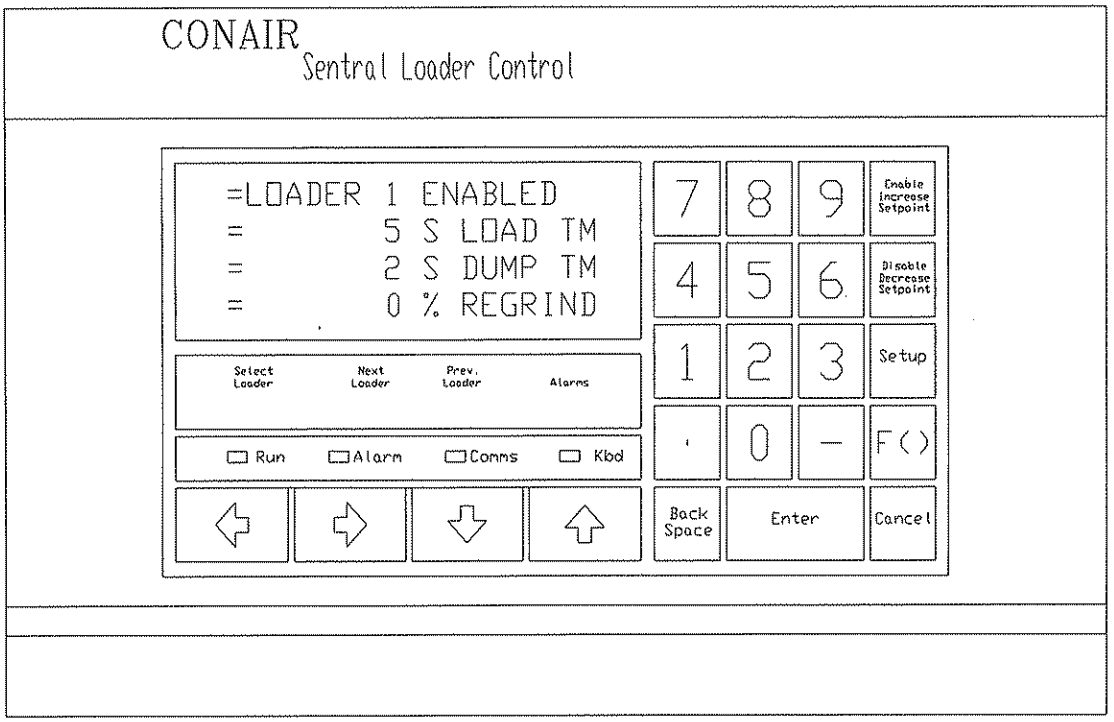
1. Pressing the "Select Loader" button. After the Select Loader Screen is displayed, enter the number of the loader to change and press "Enter" (See Figure 2).

2. Pressing the "Next Loader" or "Prev. Loader" button. After a loader has been selected, pressing these keys will display the next loader or previous loader's information.

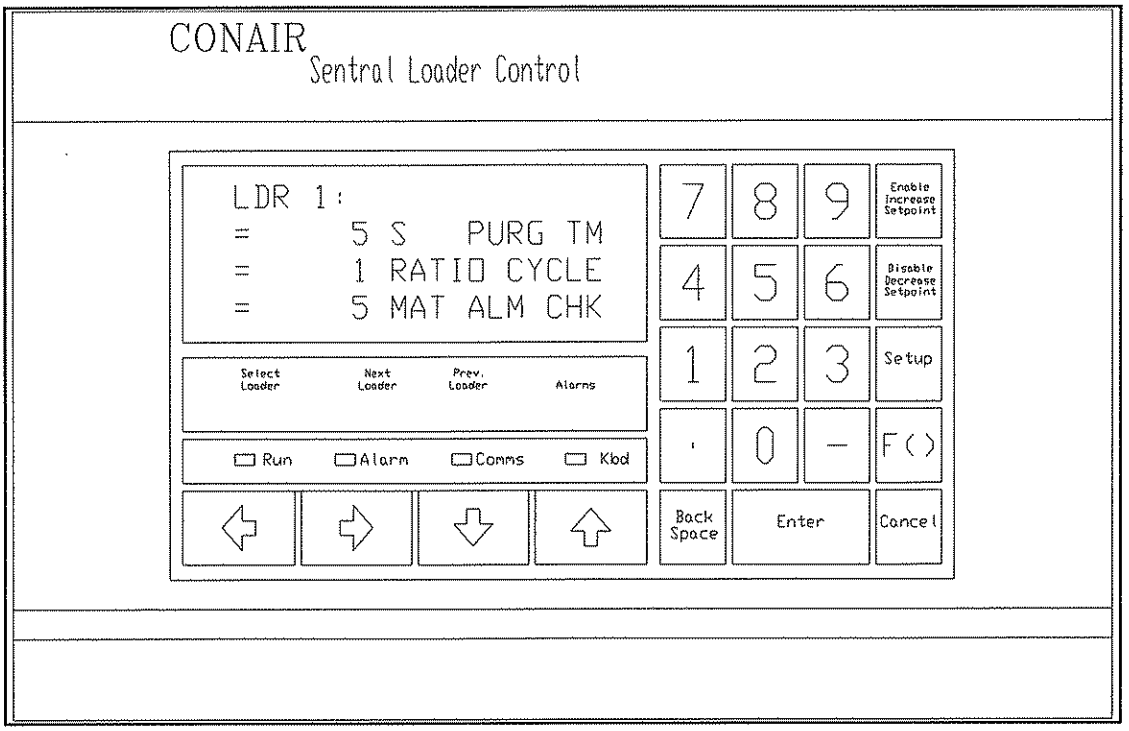
3. Pressing the "Press to Display Info" button on the LED status panel corresponding to loader you wish to change.

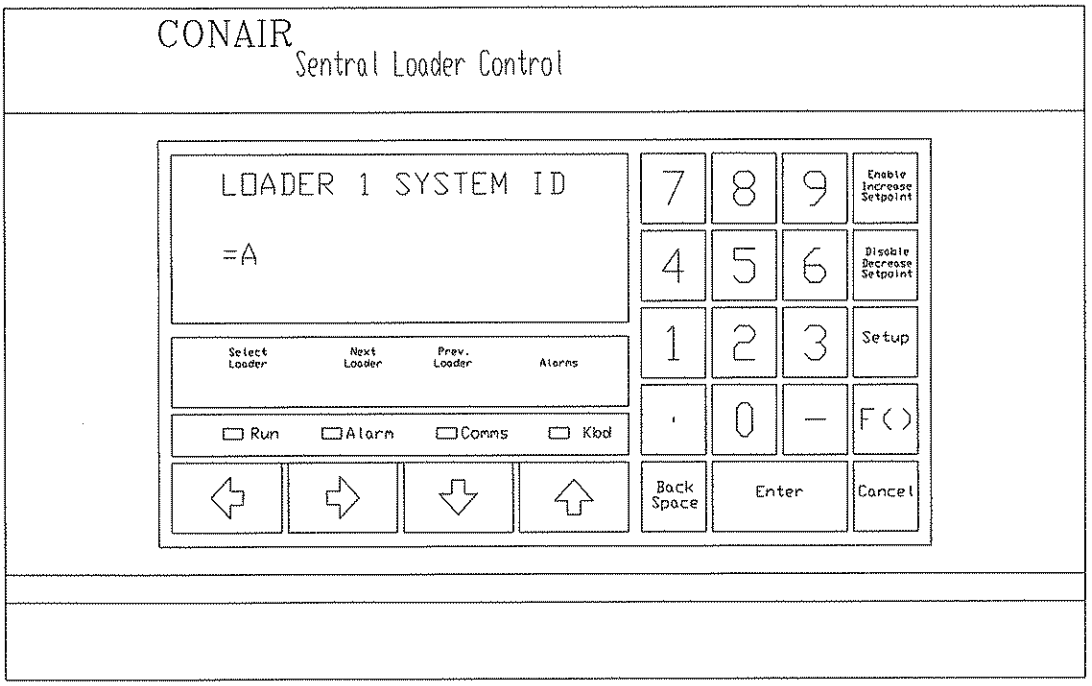


3.3 LOADER FUNCTIONS



Once a loader has been selected, its first loader information screen will be displayed, see Figure 3. For each loader there are three information screens. On the first loader information screen a loader can be enabled or disabled, or the load time, dump time, or regrind percentage can be changed. A flashing cursor will indicate which line of the display you are on and which function you can change.





The second loader information screen can be accessed by using the down arrow key and scrolling the cursor down past the regrind percentage setting, see Figure 4. The purge time, ratio cycles, and material alarm check are displayed on the second loader information screen. The third loader information screen can be accessed by again using the down arrow key and scrolling down past the material alarm check setting, see Figure 5. The third information screen displays the loading system the loader is designated to. This setting cannot be changed on this screen. Refer to section 4.4 for system ID changes.

The following is a description of the loader functions:

Load Time	The amount of time the loader will load material.
Dump Time	The amount of time the loader will dump material into vessel.
% Regrind	The percentage of regrind to load with virgin material. Calculations are done on a timed basis. Requires optional ratio valve on loader.
Purge Time	The amount of time the loader will purge material out of lines. With purge function enabled, total loading time is load time plus purge time. Requires optional purge valve.
Ratio Cycles	The number of cycles that the ratio valve will switch for virgin and regrind. This function is used to make layers of material in the loader when using large amounts of regrind.
Mat'l Alarm Check	The number of times the control will allow the loader to load and not satisfy its demand, before a "No Material" alarm is energized.

3.4 CHANGING LOADER SETTINGS

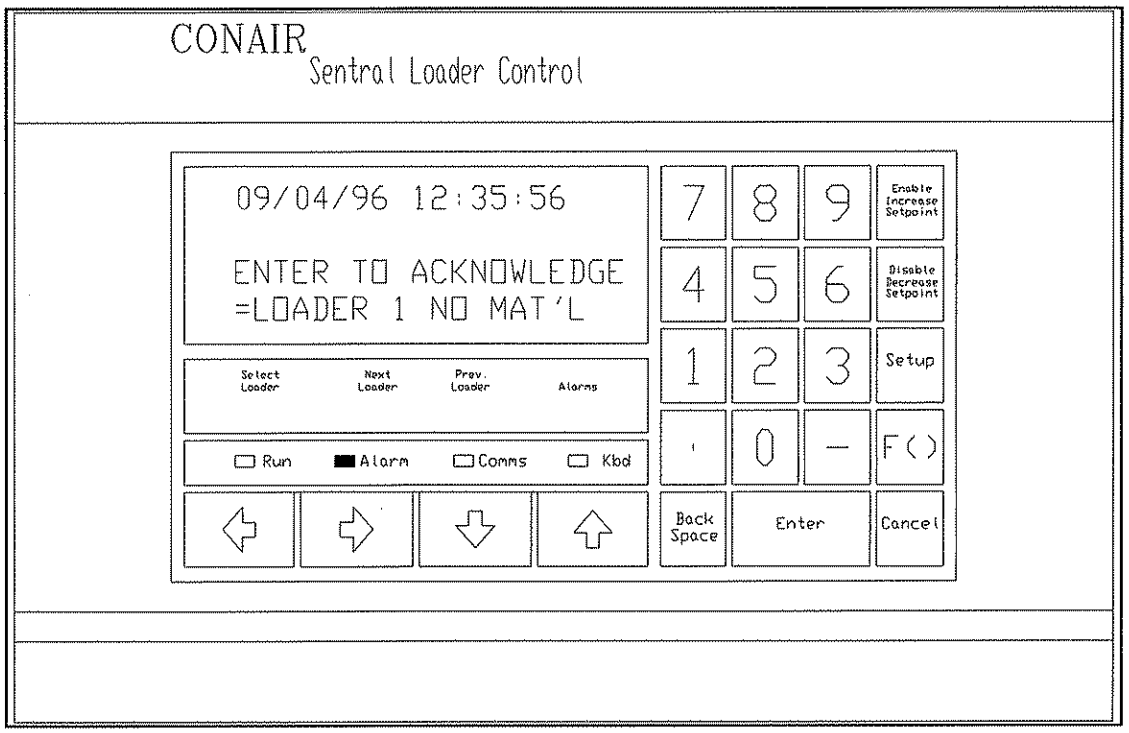
A flashing cursor will indicate which line of the display you are on, and there are four arrow keys, located on the bottom left hand corner of the Nematron, that are used to move the flashing cursor. To change a setting, you will need to move the cursor to the function you wish to change. Then use the numeric keypad to change the setting and press the "Enter" key to enter it. Also use "Increase Setpoint" or "Decrease Setpoint" keys to increase or decrease the setting by one.

3.5 ENABLE/DISABLE LOADERS

Enabling a loader will allow the loader to load when it has demand. To enable or disable a loader you will need to place the flashing cursor on the top line of the display of information screen 1 for the loader. The loader can then be enabled by pressing the "Enable" key located in the top right hand corner of the display. You will then see the green enable LED for that loader light. To disable the loader, press the "Disable" key located below the "Enable" key.

3.6 LOADER/PUMP ALARMS

The Sentral Loader Control, or SLC, control will monitor all loaders and pumps and notify the operator both audibly and visually when a loader does not receive material or a pump is in an overload condition. When an alarm occurs the SLC will energize the alarm horn on its control box and light the alarm LEDs on the LED status panel. If the alarm is for no material, then the enable LED will also flash for the loader with the alarm. Pressing the "Alarm" key will display the current alarm (See Figure 6). To acknowledge the alarm and silence the alarm horn, press the "Enter" key. All alarms are date and time stamped, and the last 100 alarms are stored and can be accessed by pressing the up arrow key.



There are two types of alarms and are described as follows:

LOADER NO MAT'L

This alarm will indicate a loader is not receiving material. Along with the alarm, the enable LED on the status panel will flash for the loader with this alarm. There are two ways to get a no material alarm:

1. Mat'l Load Count Check If a loader loads consecutive times and does not satisfy its demand the material alarm check will energize a no material alarm. The number of loads can be adjusted on Loader Information Screen 2 from 1 to 20 loads. Once a loader is enabled it will have to satisfy its demand once in order for this alarm to set. This is done to prevent the material alarm from activating when filling an empty bin.

2. Mat'l Fill Sensor Check A loader will need an optional fill sensor and have this option configured for the loader (See Section 4.3), for this alarm function to work. If the loader does not satisfy the fill sensor (or fill the loader) after one load, a no material alarm will energize.

PUMP OVERLOAD

This alarm will indicate a pump's overload has tripped. This alarm will also prevent the pump from being energized until the overload condition is corrected.

4.0 CONTROL SYSTEM SETUP

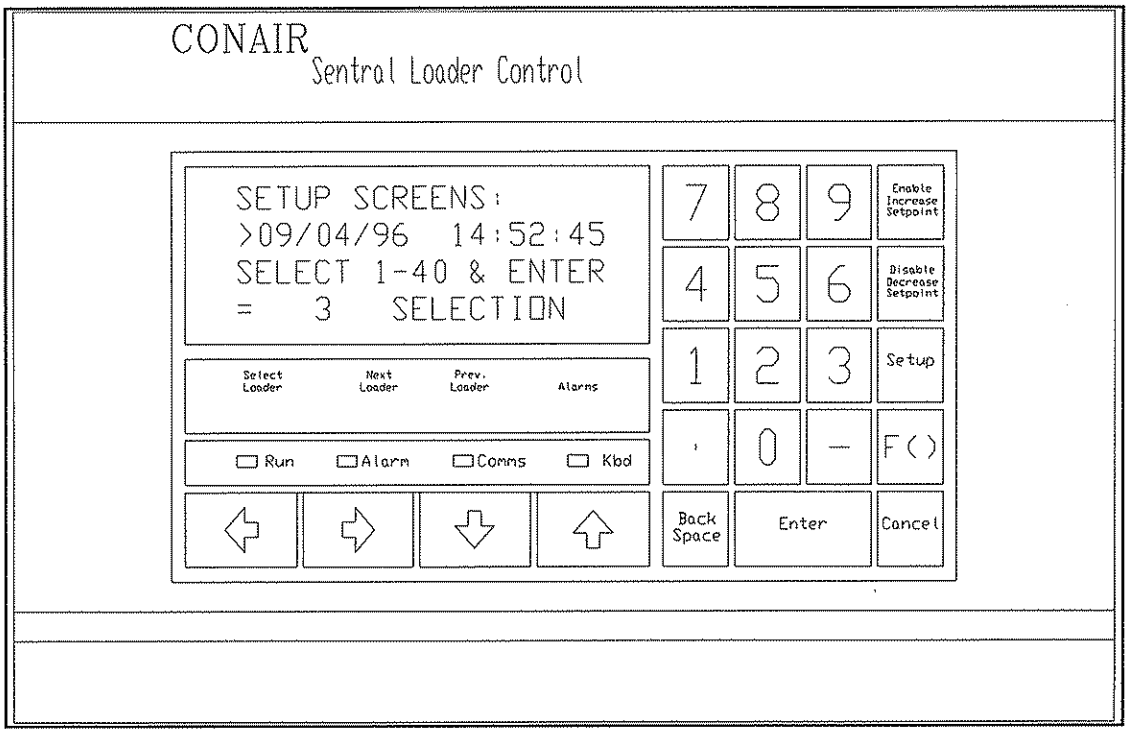
WARNING: CHANGING CONTROL SYSTEM SETUP PARAMETERS CAN DRAMATICALLY ALTER SYSTEM PERFORMANCE. ENABLING LOADER OPTIONS WITHOUT THE PROPER I/O MODULES ON THE CONTROL CAN RESULT IN CONTROL SHUTDOWN AND PROCESSOR ERROR. AUTHORIZED PERSONNEL ONLY!

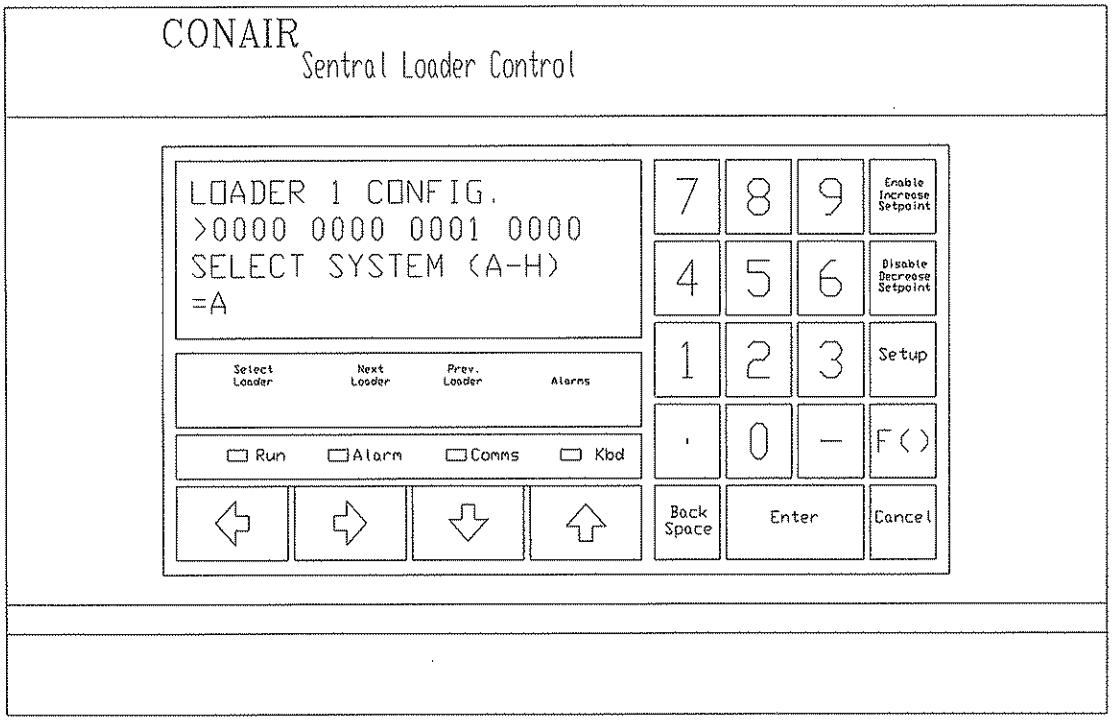
4.1 SYSTEM CONFIGURATION SELECTION

The SLC control was designed to be easily adapted to handle different loader and pump configurations. After the SLC controls have been installed you will need to configure loader options as well as setup loader/pump system configurations. To change system setup parameters press the "Setup" key. The setup menus are password protected, so you will need to enter a password of "9999" and press "Enter". The loader configuration select screen will then be displayed (See Figure7). From this screen you can change the date/time settings, select a loader configuration, or go to the pump configuration screen. To exit this screen and return to the loader select screen, press the "Cancel" button.

4.2 DATE AND TIME SETTINGS

On the loader configuration select screen you can set the date and time used for time stamping the alarms. The first set of numbers is the current date (Month/Day/Year). The second set of numbers is the time in military format (Hour:Minute:Second). To change the date or time setting, use the arrow keys to place the cursor on the number, and use the numeric keypad to change. Press the "Enter" key when the date and time are set properly.

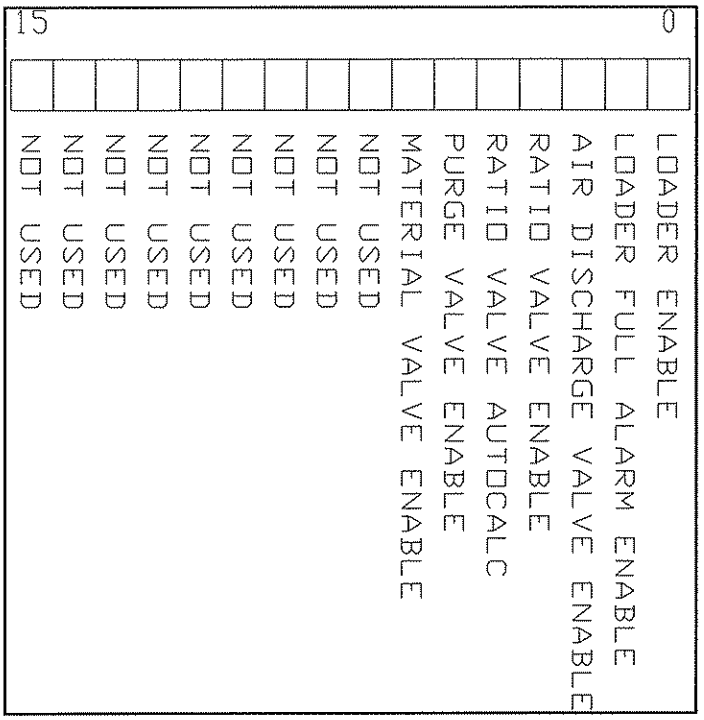




4.3 LOADER CONFIGURATION

Individual loaders can be configured for four different options, ratio, purge, air operated discharge, and loader full alarm. To add or remove these loader functions you will need to change the loader's configuration. To display a loader's configuration, select the loader you wish to change. To select a loader, either enter the number of the loader on the last line of the loader configuration select screen and hit "Enter", or press the "Press to Display Info" button for the loader. Once the loader has been selected the loader configuration screen will be displayed (See Figure 8). To move up or down one loader you can then press either the "Next Loader" or "Prev. Loader" button.

On the loader configuration screen, there are sixteen numbers located on the second line. The individual positions represent a loader function which can be enabled with a 1 or disabled with a 0. Figure 9 shows the loader function assignment for each position.



The following is a description of the loader configuration settings:

LOADER ENABLE (Bit 0)

Entering a 1 in this position will enable the loader. Entering a 0 in this position will disable the loader. This is the same as enabling and disabling the loader on its loader information screen.

LOADER FULL ALARM ENABLE (Bit 1)

Entering a 1 in this position will enable the loader full alarm. If a loader does not fill before the load time is reached, a no material alarm will be activated. Requires optional fill sensor.

AIR DISCHARGE VALVE ENABLE (Bit 2)*

Entering a 1 in this position will enable the output for an air operated discharge on the loader. After a loader loads the air discharge output will be energized for the dump time set.

RATIO VALVE ENABLE load (Bit 3)*

Entering a 1 in this position will enable the output for the ratio valve on the loader. The output will be energized based on the time, %regrind, and ratio cycle settings.

RATIO VALVE AUTOCALC (Bit 4)

Entering a 1 in this position will enable the "Autocalc" feature for the ratio cycle setting. The ratio cycles are calculated as follows:

Load Time	Ratio Cycles
0-20 Seconds	1
21-30 Seconds	2
31-100 Seconds	3

PURGE VALVE ENABLE valve (Bit 5)*

Entering a 1 in this position will enable the output for a purge on the material line. After a loader has finished loading, the loader will continue to run for the purge time setting. The total run time for the loader will be load time plus purge time. This output will be energized either during the load time or during the purge time depending on the MATERIAL VALVE ENABLE setting. Entering a 0 in this position will disable the purge function.

MATERIAL VALVE ENABLE (Bit 6)

Entering a 1 in this position, and entering a 1 in the PURGE VALVE ENABLE will change the purge valve into a material valve. With a 1 in this position, the purge output will be energized during the load time and off during the purge time (Total run time will still be load time plus purge time). With a 0 in this position, the purge output will be energized only during the purge time.

***If these bits are set to 1 and the I/O module for this option is not installed in the SLC, then the SLC processor will fault causing the loader control to stop. If you are unsure if your control has these options, please contact CONAIR for assistance before changing these parameters.**

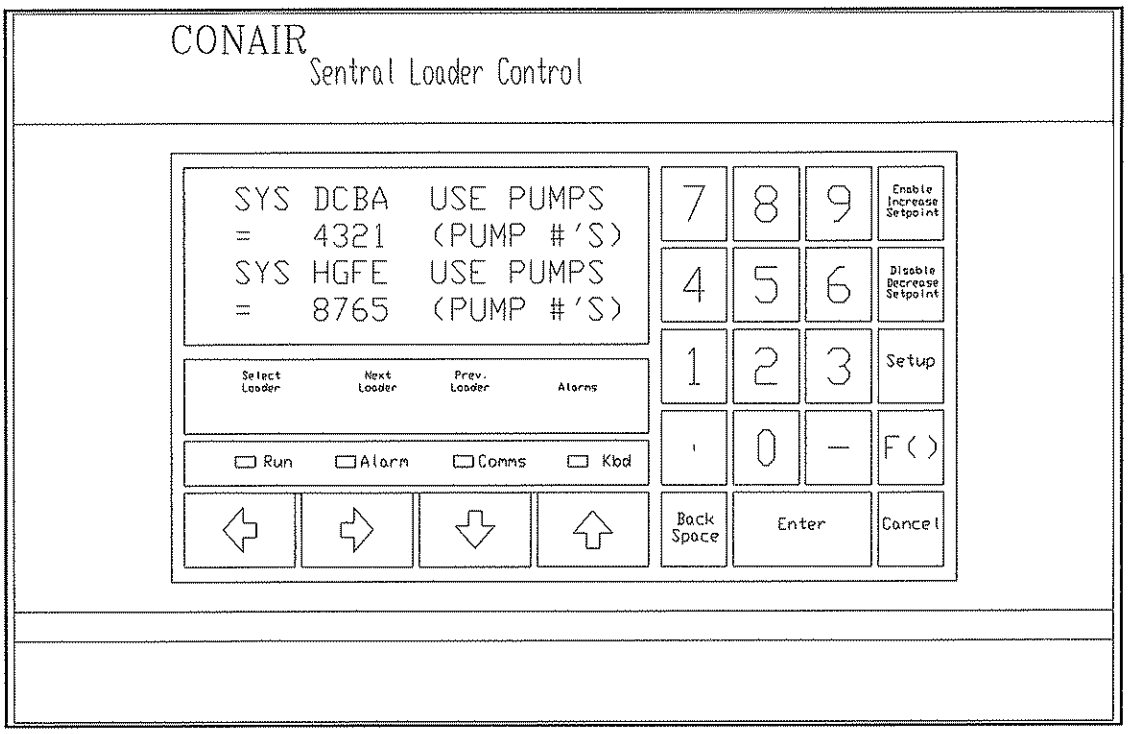
Also on the loader configuration screen is the loader's system ID. Because all loading systems are different, ie. different loaders on different pumps, you will need to configure the loaders and pumps to match your system. On the SLC Deluxe control there are eight available loading systems, one for each pump, labeled A through H. You will need to configure your loaders so that all loaders using a common pump are assigned to a common system.

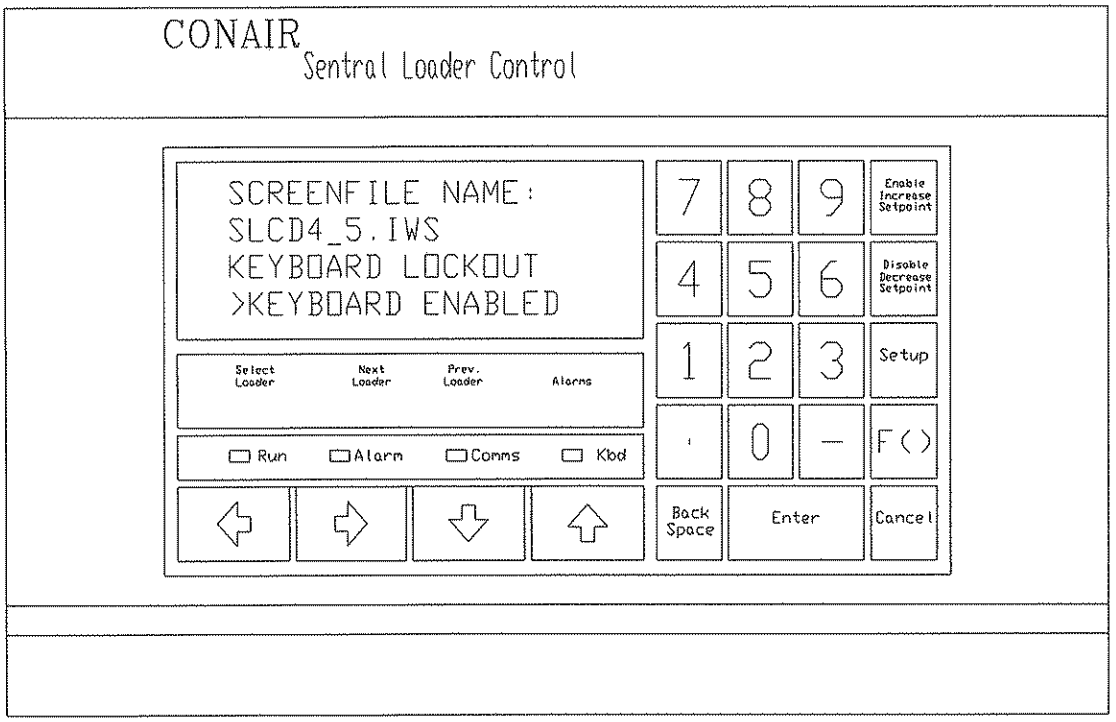
The bottom line on the loader configuration screen shows the loading system that the loader is currently designated to. To change the loading system, place the cursor on the loading system id and use the right or left arrow to scroll through the different systems, and then press "Enter" to enter it. Once all loaders have been configured to the proper systems you can press "Cancel" to return to the loader configuration select screen.

4.4 SYSTEM PUMP ASSIGNMENTS

The SLC control is setup as standard so that system A is assigned to pump 1 down through system H being designated to pump 8. To configure your pumps, you will need to first get to the loader configuration select screen (Refer to Section 4.1). On the loader configuration select screen, press the "Setup" key to display the pump configuration screen (See Figure 10).

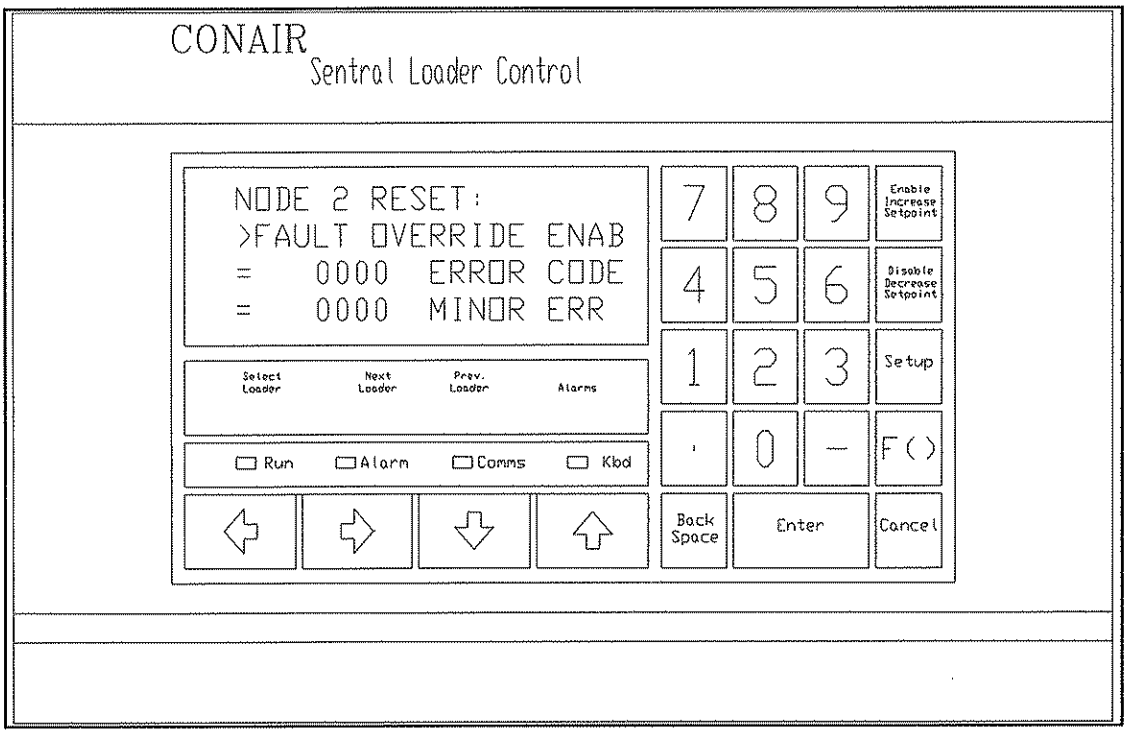
On the pump configuration screen the first line shows systems A-D with the corresponding pumps assigned below on line 2. The third line shows systems E-H and the corresponding pumps are below on line 4. To assign a pump to a particular system, first cursor to the pump number located below the system. Enter the number of the pump you wish to assign using the numeric keypad. Once all pumps have been assigned press "Enter" to enter it. To assign the backup pump to a system, enter a "0" for the pump number. To exit the pump configuration screen, press the "Cancel" button.





4.5 KEYBOARD ENABLE/DISABLE

The keyboard on the SLC control can be locked out to prevent unwanted changing of data values. Disabling the keyboard will not prevent the operators from displaying the loader data but will only prevent them from changing values. To disable or enable the keyboard on the SLC you will first need to press the "F()" key. Pressing this key will prompt you for a password. Enter a password of "0000" and press "Enter" and the keyboard enable screen will be displayed (See Figure 11). On the keyboard enable screen, you will see the screen file name used for the Nematron and whether the keyboard is enabled or disabled. To either enable or disable the keyboard, press the left or right arrow key and press "Enter" when you are done. To get back to the main screen, press the "Cancel" key.



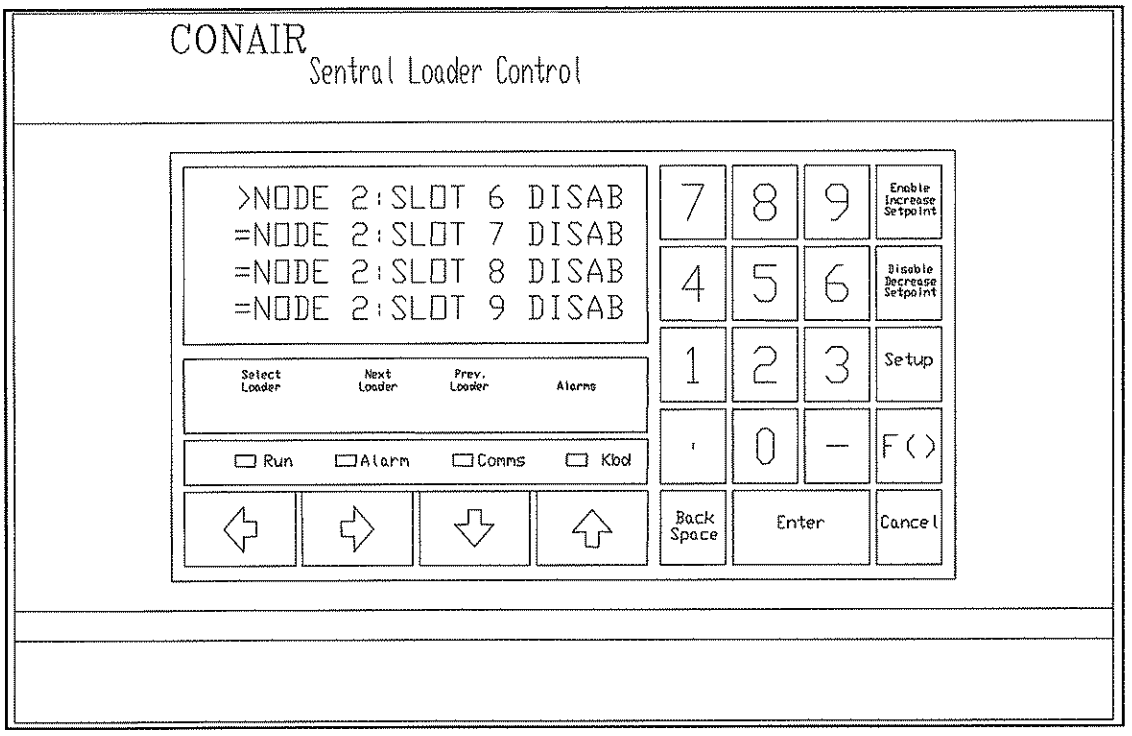
4.6 CPU FAULTS

The Allen Bradley processor used on the SLC Deluxe Control has a set of 4 LEDs to indicate its status. Refer to the appendix for a list of the LED indications. If the processor finds an error that will prevent the control from running, the processor will light its "CPU FAULT" LED. When this occurs it is very important to determine what the actual fault is before trying to troubleshoot.

To determine the CPU fault error code, you will first need to get to the keyboard enable screen (Refer to Section 4.5). Once there, use the down arrow key to scroll down to the node 2 reset screen (See Figure 12). If the processor that faulted is for loaders 21-40, you will need to cursor down two more screens down to the node 3 reset screen. On the third line of the display, the error code will be displayed. Refer to the appendix for a description of the CPU fault codes.

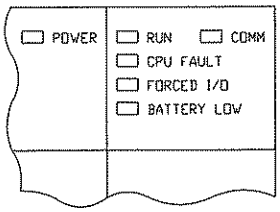
To clear a CPU fault you will first need to correct the problem that caused the fault as outlined by the Allen Bradley literature. Once the problem is corrected, cursor down to the error code, line 3, key in "0000", and press "Enter". Then finally cycle the power off and then on for the processor to clear the fault and run again.

Below the node 2 and node 3 reset screens, are the node 2 and node 3 slot enable/disable screens respectively. These screens are used to disable the slots to the three options. To get to these screens, scroll down past the reset screens using the down arrow key. To disable a slot, press the left or right arrow key and press "Enter".

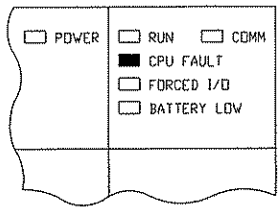


5.0 APPENDIX

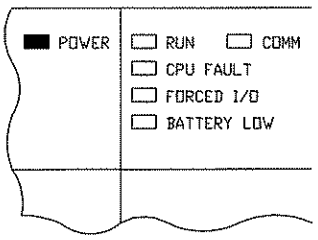
5.1 IDENTIFYING SLC 5/01 PROCESSOR ERRORS



The following Error Exists	Probable Cause	Recommended Action
Inadequate System Power	No Line Power	1. Verify proper line voltage and connections on the power terminals. 2. Verify proper 120/240V power supply jumper selection.
	Power Supply Fuse Blown	1. Check the incoming power fuse, check for proper incoming power connections. Replace fuse. 2. If fuse blows again, replace the power supply.
	Power Supply Overloaded	1. Remove line power to power supply. Remove several output modules from the chassis. Wait five minutes. Reapply power. 2. If condition reoccurs, re-calculate module configuration power required and verify proper power supply selection. This problem can occur intermittently if power supply is slightly overloaded when output loading and temperature varies.
	Defective Power Supply	1. Recheck other probable causes. 2. Monitor the line power to chassis power supply for possible transient or shorting. 3. Replace the power supply.



The Following Error Exists	Probable Cause	Recommended Action
Inadequate System Power	Improper line power voltage selection	Verify proper 120/240V power supply jumper selection.



The following error exists	Probable Cause	Recommended Action
Processor Not in Run Mode	Either Improper Mode Selected or User Program Logic Error	1. Verify selected processor mode. 2. If in program/test modes attempt Run mode entry. 3. If in suspend mode, check user program logic for suspend instructions.
	Line Power Out of Operating Range	1. Check proper 120/240V power supply jumper selection and incoming power connections. 2. Monitor for proper line voltage at the incoming power connections.
	Improper Seating of Power Supply, and/or Processor in the Chassis	1. Remove power and inspect the power supply chassis connections and the processor chassis connections. 2. Re-install the devices and re-apply power. IMPORTANT: The processor only operates in slot 0 of chassis #1.
	Defective Processor, Power Supply, or Chassis	1. Attempt Run mode selections of Processor in existing chassis. 2. Place processor in another chassis not in the existing system. Apply power, reconfigure and attempt Run mode selection. If unsuccessful, replace processor. 3. Try existing power supply in test chassis. If unsuccessful, replace power supply. If entry into the Run mode is allowed, replace the existing chassis.

5.2 CPU FAULT CODES

Power up Errors

Error Code (Hex)	Description	Probable Cause	Recommended Action
0001	NVRAM error.	- Noise - Lightning - Improper grounding - Lack of surge suppression on inductive loads - Poor power source - Loss of battery or capacitor backup	Correct the problem, reload the program, and run. You can use the autoload feature with a memory module to automatically reload the program and enter the run mode.
0002	Unexpected hardware watchdog timeout.	- Noise - Lightning - Improper grounding - Lack of surge suppression on inductive loads - Poor power source	Correct the problem, reload the program, and run. You can use the autoload feature with a memory module to automatically reload the program and enter the run mode.
0003	Memory module memory error.	Memory module memory is corrupted	Re-program the memory module. If the error persists, replace the memory module.
0004	Memory error occurred during the run mode.	- Noise - Lightning - Improper grounding - Lack of surge suppression on inductive loads - Poor power source	Correct the problem, reload the program, and run. You can use the autoload feature with a memory module to automatically reload the program and enter the run mode.

Going to Run Errors

Error Code (Hex)	Description	Probable Cause	Recommended Action
0010	The processor does not meet the required revision level.	The revision level of the processor is not compatible with the revision level for which the program was developed.	Consult Conair Franklin.
0011	The executable program file number 2 is absent.	Incompatible or corrupt program is present.	Reload the program or reprogram with APS software.
0012	The ladder program has a memory error.	- Noise - Lightning - Improper grounding - Lack of surge suppression on inductive loads - Poor power source	Correct the problem, reload the program, and run. If the error persists, be sure to use the approved APS software to load program.
0014	Internal file error.	- Noise - Lightning - Improper grounding - Lack of surge suppression on inductive loads - Poor power source	Correct the problem, reload the program, and run. If the error persists, be sure to use the approved APS software to load program.
0015	Configuration file error.	- Noise - Lightning - Improper grounding - Lack of surge suppression on inductive loads - Poor power source	Correct the problem, reload the program, and run. If the error persists, be sure to use the approved APS software to load program.

Runtime Errors

Error Code (Hex)	Description	Probable Cause	Recommended Action
0020	A minor error bit is set at the end of the scan.	-A math or FRD instruction overflow has occurred. - Sequencer or shift register instruction error was detected. - A major error was detected while executing a user fault routine. - M0-M1 file addresses were referenced in the user program for a disabled slot.	Correct the programming problem, reload the program and enter the run mode.
0021	A remote power failure of an expansion I/O rack has occurred. Note: A modular system that encounters an over-voltage or over-current condition in an of its power supplies can produce any of the I/O error codes listed on pages xx to xx (instead of code 0021). The over-voltage or over-current condition is indicated by the power supply LED being off.	Fixed and FRN 1 to 4 5/01 processors: Power was removed of the power dipped below specification for an expansion rack. 5/02 processors and FRN 5 5/01 processors: This error code is present only while power is not applied to an expansion rack. This is the only self-clearing error code. When power is re-applied to the expansion rack, the fault will be cleared.	Fixed and FRN 1 to 4 5/01 processors: Cycle power on the local rack. 5/02 processors and FRN 5 5/01 processors: Re-apply power to the expansion rack.

I/O Errors

Error Codes: The characters xx in the following codes represent the slot number, in hex. The characters xx become 1F if the exact slot cannot be determined.

Slot	xx	Slot	xx	Slot	xx	Slot	xx	Slot	xx
0	00	7	07	14	0E	21	15	28	1C
1	01	8	08	15	0F	22	16	29	1D
2	02	9	09	16	10	23	17	30	1E
3	03	10	0A	17	11	24	18		
4	04	11	0B	18	12	25	19		
5	05	12	0C	19	13	26	1A		
6	06	13	0D	20	14	27	1B		

Error Code (Hex)	Description	Probable Cause	Recommended Action
xx50	A rack data error is detected	- Noise - Lightning - Improper grounding - Lack of surge suppression on inductive loads -Poor power source	Correct the problem, clear the fault, and re-enter run mode.
xx51	A "stuck" runtime error is detected on an I/O module.	If this is a discrete I/O module, this is a noise problem. If this is a specialty I/O module, refer to the applicable user manual for the probable cause.	Cycle power to the system. If this does not correct the problem, replace the module.
xx52	A module required for the user program is detected as missing or removed.	An I/O module configured for a particular slot is missing or has been removed.	- Disable the slot - Insert the required module in the slot.
xx53	At going-to-run, a user program declares a slot as unused, and that slot is detected as having an I/O module inserted. This code can also mean that an I/O module has reset itself.	- The I/O slot is not configured for a module, but a module is present. - The I/O module has reset itself.	-Disable the slot - Remove the module, clear the fault and run. - Modify the I/O configuration to include the module, then reload the program and run. - If you suspect that the module has reset itself, clear the major fault and run.
xx54	A module required for the user program is detected as being the wrong type.	An I/O module in a particular slot is a different type than was configured for that slot by the user.	-Replace the module with the correct module, clear the fault, and run. -Change the I/O configuration for the slot, reload the program and run.

I/O Errors (continued)

Error Code (Hex)	Description	Probable Cause	Recommended Action
xx55	A discrete I/O module required for the user program is detected as having the wrong I/O count. This code can also mean that a specialty card driver is incorrect.	- If this is a discrete I/O module, the I/O count is different from that selected in the I/O configuration. - If this is a specialty I/O module, the card driver is incorrect.	-If this is a discrete I/O module, replace it with a module having the I/O count selected in the I/O configuration. Then clear the fault and run. - If this is a specialty I/O module, refer to the user manual for that module.
xx56	The rack configuration is incorrect	The rack configuration specified by the user does not match the hardware.	Correct the rack configuration, reload the program and run.
xx57	A specialty I/O module has not responded to a Lock Shared Memory command within the required time limit.	The specialty I/O module is not responding to the processor in the time allowed.	Cycle rack power. If this does not correct the problem, refer to the user manual for the specialty I/O module. You may have to replace the module.
xx58	A specialty I/O module has generated a generic fault. The card fault bit is set (1) in the module's status byte.	Refer to the user manual for the specialty I/O module.	Cycle rack power. If this does not correct the problem, refer to the user manual for the specialty I/O module. You may have to replace the module.
xx59	A specialty I/O module has not responded to a command as being completed within the time required.	A specialty I/O module did not complete a command from the processor in the time allowed.	Refer to the user manual for the specialty I/O module. You may have to replace the module.
xx5A	Hardware interrupt problem	If this is a discrete I/O module, this is a noise problem. If this is a specialty I/O module, refer to the user manual for the module.	Cycle rack power. Check for a noise problem and be sure proper grounding practices are used. If this is a specialty I/O module, refer to the user manual for the module. You may have to replace the module.
xx5E	Processor I/O driver (software) error.	Corrupt processor I/O driver software.	Reload program.

I/O Errors (continued)

Error Code (Hex)	Description	Probable Cause	Recommended Action
xx60 through xx6F	Identifies an I/O module specific recoverable major error. Refer to the user manual for the specialty module for further details.		
xx70 through xx7F	Identifies an I/O module specific recoverable major error. Refer to the user manual for the specialty module for further details.		
xx90	Interrupt problem on a disabled slot.	A specialty I/O module requested service while a slot was disabled.	Refer to the user manual for the specialty I/O module. You may have to replace the module.
xx91	A disabled slot has faulted.	A specialty I/O module in a disabled slot has faulted.	Cycle rack power. If this does not correct the problem, refer to the user manual for the specialty I/O module. You may have to replace the module.
xx92	Invalid or non-existent module interrupt subroutine (ISR) file.	The I/O configuration/ISR file information for a specialty I/O module is incorrect.	Correct the I/O configuration/ISR file information for the specialty I/O module. Refer to the user manual for the module for the correct ISR file information. The reload the program and run.
xx93	Unsupported I/O module specific major error.	The processor does not recognize the error code from a specialty I/O module.	Refer to the user manual for the specialty I/O module.
xx94	A module has been detected as being inserted under power in the run or test mode. This code also can mean that an I/O module has reset itself.	The module has been inserted in the rack under power, or the module has reset itself.	No module should ever be inserted in a rack under power. If this occurs and the module is not damaged: - Remove the module, clear the fault and run - Add the module to the I/O configuration, reference the module in the user program where required, reload the program and run.

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- ❒ Make sure power is supplied to the equipment.
- ❒ Make sure that all connectors and wires within and between control systems and related components have been installed correctly.
- ❒ Check the troubleshooting guide of this manual for a solution.
- ❒ Thoroughly examine the instruction manual(s) for associated equipment, especially controls. Each manual may have its own troubleshooting guide to help you.
- ❒ Check that the equipment has been operated as described in this manual.
- ❒ Check accompanying schematic drawings for information on special considerations.

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