Vorne Industries

87/712
Parallel Input Module
User's Manual

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Notice Of Disclaimer

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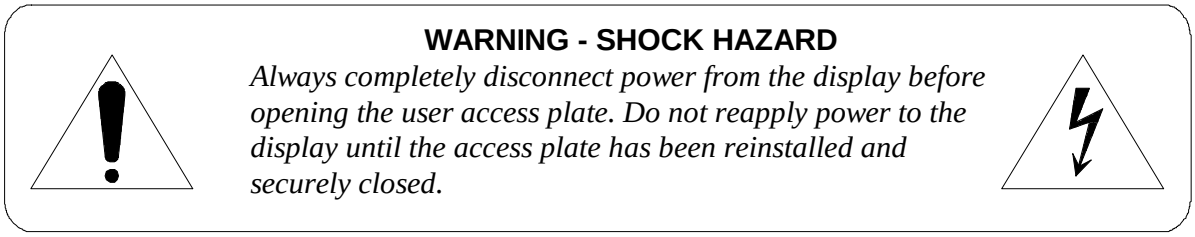
Chapter 1 Introduction

The 87/712 Parallel Module is a plug-in module for an 87/232 Series Display. The Parallel Module incorporates 16 Data Inputs, a Strobe input and a Return line. The unit accepts parallel or multiplexed BCD inputs and converts it to a digital display. The unit can be customized to your particular application using VDP4. VDP4 is a Windows™ based utility that allows customization of the 87 Series Display. VDP4 is available from Vorne at no charge.

1.1 Accessing Wiring Connections And Selection Switches

All external power and communication line connections to the display are made to printed circuit board mounted terminal strips. These terminal strips, as well as a 10 position DIP switch, and COM PORT selection switch, can be accessed by removing the back panel user access plate.



There are two 7/8" conduit openings on the back panel of the display, provided for bringing external wiring into the display enclosure. If these conduit openings will not be used for wiring, these openings can be filled with plastic plugs (Caplugs Part Number BP-7/8) which are provided with the display.

The left most conduit opening is provided for power wiring, the right most for signal wiring. **It is not recommended to run power wiring and signal wiring in the same conduit!**

1.2 Setting The DIP Switches For Your Application

Note: Changes to the DIP switches are only acknowledged at power up. Factory default settings are shown in gray.
Note: Installing the 87/712 module overrides the DIP switch settings of the 87/232 Logic board.

Run and Program Modes

1	Mode
ON	Program
OFF	Run

For normal operation the Run/Program switch should be set to Run (off). Setting the unit to Program mode allows the unit to be customized using VDP4 and to run one of two diagnostic routines. If DIP switch 2 is off, the display cycles thru the following display diagnostic.

a. Error status Should show E0. E1 or E2 indicates a memory error.
b. Unit Address Default value is 00.
c. Red segment test The unit will turn on 1 segment at a time A thru G and DP.
d. Green segment test. For a single color display a blank screen will be displayed.
e. All segments ON.
f. Unit type. 2 = 87/712
g. --. This is a separator between the Unit type and the Software version.
h. Software version. This number is displayed on two consecutive screens (Ex: 1.2.6).

If DIP switch 2 is on, the display runs a DIP switch diagnostic. This diagnostic displays the HEX value of DIP switches 3 thru 10 (switches 3 to 6 = MSD, switches 7 to 10 = LSD). If switches 3 thru 10 are all set to the ON position, the display turns on all LEDs.

DIP Switch Settings

For normal operation the Settings DIP switch should be set to DIP switch (on).
In program mode, Switch 2 selects between Display test (off) and DIP switch test (on).

2	Settings
ON	DIP Switch
OFF	VDP4

Input Mode

This setting determines the Input Mode that the parallel module will use.
Mode 0 sets the unit to Parallel Input mode. In this mode the 16 parallel inputs are used to enter a BCD, HEX, or binary value (depending on the setting of DIP switches 9 and 10). This value is then converted to a digital display.
Mode 1 sets the unit to Multiplexed Input mode. This mode accepts a BCD, HEX, or binary value at Inputs D0 thru D3 (depending on the setting of DIP switches 9 and 10). This value is the character to be displayed. Inputs D8 thru D15 act as select lines and determine which display digit the data will be shown. D8 represents the LSD of the display. D15 represents the 8th character of the display. For units with less than 8 digits, the higher strobe lines need not be used. Repeat this process for all digits of the display.
Mode 2 sets the unit to Pilot Light mode. This mode displays the value of the active input. If more than one input is active at the same time, only the Input with the highest value is displayed. The Relay output turns on whenever there is an active input. See section 1.5 for more information regarding the Relay Output. It is recommended to set the Number Format DIP switch settings to switch 9 on and switch 10 off.
Mode 3 sets the unit to Round Robin mode. This mode displays the value of the active input. If more than one input is active at the same time, the unit cycles thru all of the active values. The display time for each active value can be set between 1 and 25 seconds using VDP4. The Relay output turns on whenever there is an active input. See section 1.5 for more information regarding the Relay Output. It is recommended to set the Number Format DIP switch settings to switch 9 on and switch 10 off.

3	4	Input Mode
OFF	OFF	Parallel Data
OFF	ON	Multiplexed
ON	OFF	Pilot Light
ON	ON	Round Robin

Data Active Level

This setting determines the Data Active Level the parallel module will use. This setting affects the parallel inputs D0 to D15. Use the table below to select the correct Data Active Level.

87/712 Return Connection	Input Logic Type Selected	PLC Output Voltage	Interpreted By 87/712 As
+V	Low	Open or +V	"0" (Inactive)
		GND	"1" (Active)
	High	Open or +V	"1" (Active)
		GND	"0" (Inactive)
GND	High	Open or GND	"0" (Inactive)
		+V	"1" (Active)
	Low	Open or GND	"1" (Active)
		+V	"0" (Inactive)

5	Data Active Level
ON	High
OFF	Low

Strobe Active Level

This setting determines the Strobe Active Level the parallel module will use. For units which have Strobe mode turned Off, (Switch 7 Off) this switch setting will be ignored. This setting does not affect the operation of the digit select inputs (D8 thru D15) when the unit is set to Multiplexed mode (Switch 3 Off Switch 4 On).

6	Strobe Active Level
ON	High
OFF	Low

Strobe Mode

This setting turns On or Off the operation of the Strobe Input (Terminal 3 of P4). This setting does not affect the operation of the digit select inputs (D8 thru D15) when the unit is set to Multiplexed mode (Switch 3 Off Switch 4 On).

7	Strobe Mode
ON	On
OFF	Off

Debounce Time

The Debounce time for Inputs D0 thru D15 and the Strobe input is field programmable to low or high speed by setting this DIP switch. When using a input device such as a switch or a relay contact, set the input rate to low speed. This will prevent false counts caused by contact bounce. For input devices such as PLC NPN (Sinking) or PNP (Sourcing) outputs, set the input rate to high speed. Shielded wire for the input is recommended when the unit is set to high speed but not required for low speed.

8	Debounce Time
ON	High
OFF	Low

Number Format

The Number Format selection determines how the parallel inputs will be interpreted. There are four different number format selections available.

BCD specifies that the parallel inputs will be interpreted as BCD inputs. Up to 4 digits of BCD data can be entered. In parallel mode, the right most digit consists of D0 to D3. The second digit from the right consists of D4 to D7. The third digit from the right consists of D8 to D11. The MSD consists of D12 to D15. A negative sign can be displayed at any digit position by placing a HEX A at the parallel inputs. See Appendix A for additional character representation. The range of values is from -999 to 9,999.

HEX specifies that the parallel inputs will be interpreted as HEX inputs. Up to 4 digits of HEX data can be entered. The range of values is from 0 to FFFF.

Signed Binary specifies that the parallel inputs will be interpreted as signed binary data. D0 to D14 will be interpreted as binary inputs. If D15 is active the binary value is interpreted as a negative number. Negative numbers are two's complement format. The range of values is from -32,768 to 32,767.

Binary specifies that the parallel inputs will be interpreted as binary data. D0 to D15 will be interpreted as binary inputs. The range of values is from 0 to 65,535.

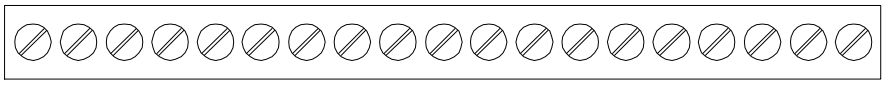
9	10	Number Formats
OFF	OFF	BCD
OFF	ON	HEX
ON	OFF	Signed Binary
ON	ON	Binary

1.3 Parallel Input Connectors

Parallel Inputs can be wired to the 87/712 through the 19 pins of the Parallel port terminal strip (marked P4). The Parallel Input terminal strip is shown below.

19 Pin Parallel INPUT Terminal Strip (P4)

Pins 1 to 19 Parallel Input Terminal Strip



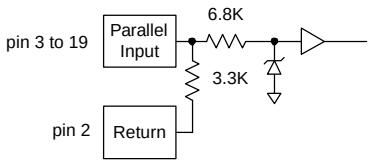
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Pin	Function
1	GND (Ground)
2	RET (Return)
3	STRB (Strobe)
4	D0
5	D1
6	D2
7	D3
8	D4
9	D5
10	D6
11	D7
12	D8
13	D9
14	D10
15	D11
16	D12
17	D13
18	D14
19	D15

Input characteristics

High Level	3.5 to 30 VDC
Low Level	0 to 1.5 VDC
Input loading	1.5mA to 10mA (5V-30V)
Leakage current accepted	450 uA
Low Speed	50 Hz (10 millisecond on/off time)
High Speed	4000 Hz (120 microsecond on/off time)

Parallel Input Circuitry

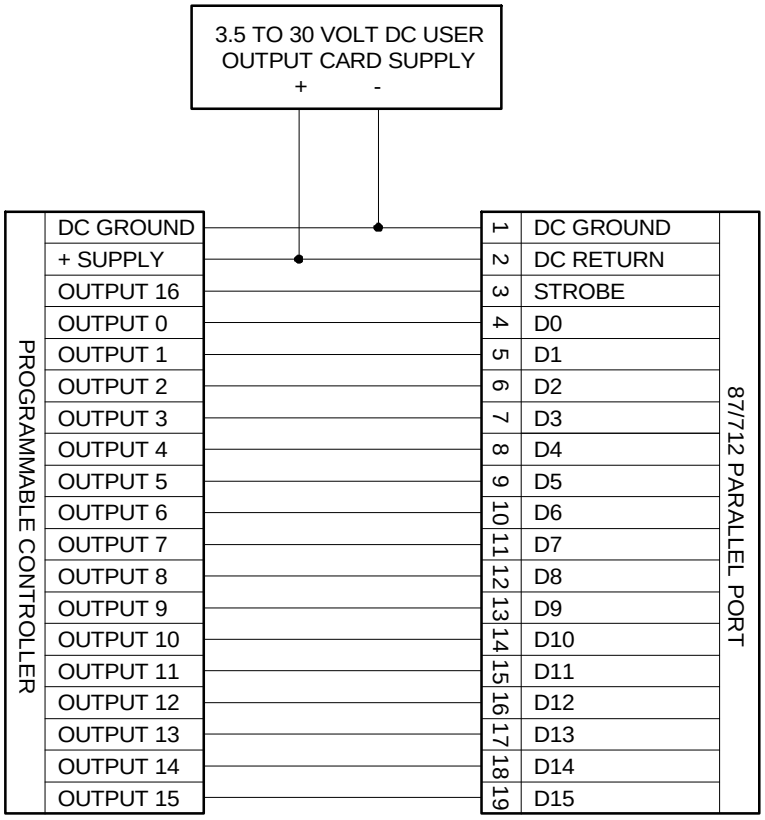


1.4 Wiring to the Parallel Port

Sinking Outputs

To operate the unit with sinking outputs, the DC Return line of the parallel port should be connected to a positive voltage (3.5 to 30 VDC). This will internally pull up all the inputs of the parallel port to this potential with a maximum current draw of 2.5 mA per input.

Parallel Port Wiring - Sinking Outputs

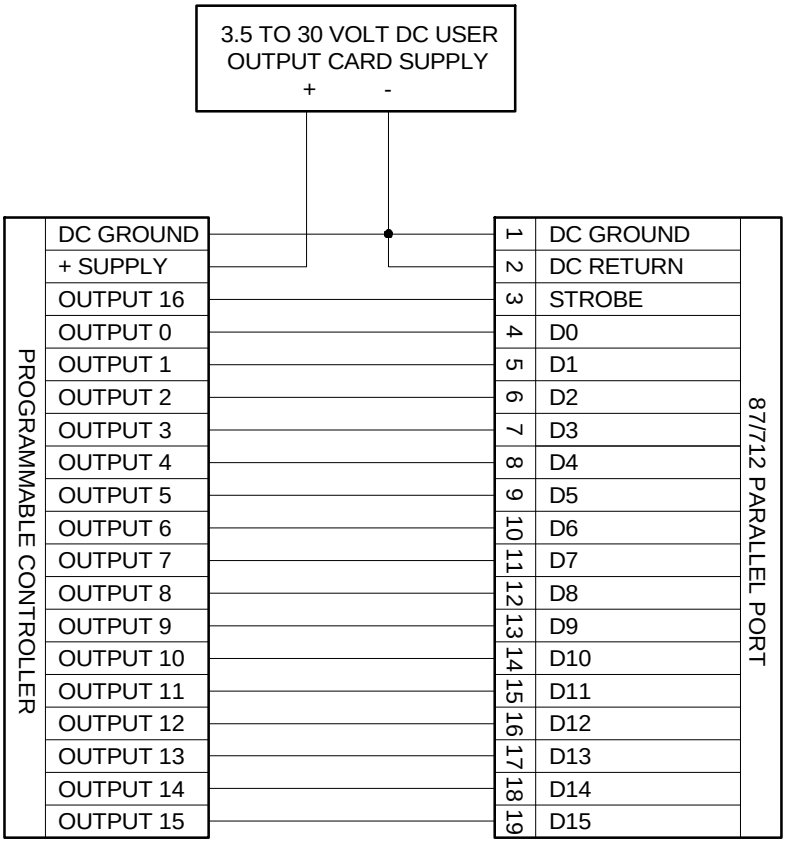


In all cases, make sure that DC ground (Terminal 1) is wired to the DC ground of the output card supply.

Sourcing Outputs

To operate the unit with sourcing outputs, the DC Return line on the parallel port should be connected to DC ground. This will internally pull down all the inputs of the parallel port to DC ground with a maximum current draw of 2.5 mA per input.

Parallel Port Wiring - Sourcing Outputs



In all cases, make sure that DC ground (Terminal 1) is wired to the DC ground of the output card supply.

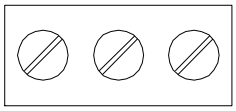
1.5 Relay Output

WARNING

Use the relay for annunciator applications only. Do not use it for control.

Relay Connectors

A SPDT Relay is available through the three pins of the relay port terminal strip (marked P5). The relay terminal strip is shown below. The relay is a single pole double throw (SPDT), rated 120VAC @ 1A.

3 Pin Relay Terminal Strip (P5)	Pin	Function
 A B C	A	Normally Closed (NC)
	B	Common
	C	Normally Open (NO)

Activate Relay

A 87 series display can be programmed to activate the relay when a trigger point is reached. The relay can also be activated serially by using the **Relay** command. The Relay command string begins with the ASCII character **R** (52 hex/82 decimal). Note that the **R** must be upper case, and must be followed by one character (which determines what relay action will occur). The available actions are:

Action	**ASCII Character**	**Hex/Decimal Representation**
Turn relay on	1	31 hex/49 decimal
Turn relay off	0	30 hex/48 decimal
Sequence A	A	41 hex/65 decimal

Relay Sequence A is user definable as either a Delay On Relay or Cycle Relay. VDP4 is required to change this parameter. The Delay On Relay selection allows adjustment of the delay and duration time. These settings are adjustable from .1 to 25.5 seconds. The Cycle Relay selection allows specifying the ON time (.1 to 25.5 seconds), OFF time (.1 to 25.5 seconds), and number of cycles to perform (adjustable from 1 to 255 times).

The following examples assume that addressing and checksums are not being used, and that Terminator has been selected as **<CR>**. Also note that the header of the packet **<SOH>s:** has

the effect of broadcasting to all displays, overriding any group or individual address a display might be set to.

To....	Transmit
Turn the relay on	<SOH>s:R1<CR>
Turn the relay off	<SOH>s:R0<CR>
Trigger Sequence A	<SOH>s:RA<CR>

Appendix A Character Representation

D3	D2	D1	D0	BCD Mode representation	HEX Mode representation
0	0	0	0	0	0
0	0	0	1	1	1
0	0	1	0	2	2
0	0	1	1	3	3
0	1	0	0	4	4
0	1	0	1	5	5
0	1	1	0	6	6
0	1	1	1	7	7
1	0	0	0	8	8
1	0	0	1	9	9
1	0	1	0	-	A
1	0	1	1	E	B
1	1	0	0	H	C
1	1	0	1	L	D
1	1	1	0	P	E
1	1	1	1	{blank}	F