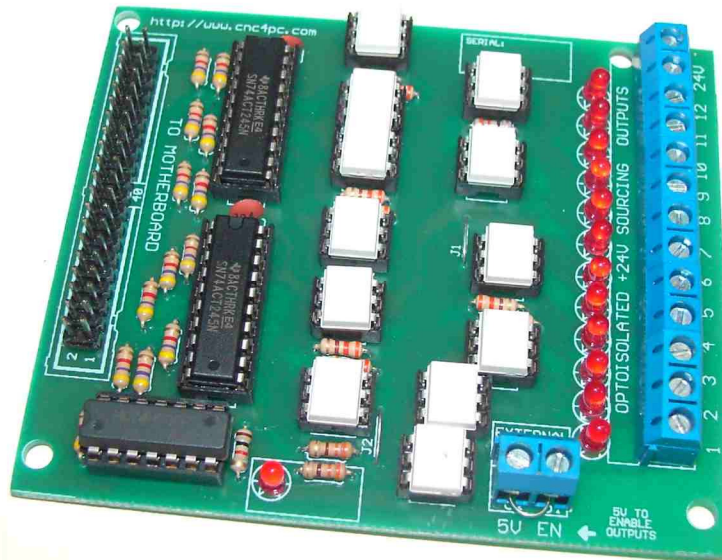


# M28- 12OD(24)O EXPANSION BOARD

## Rev. 1.1

### User manual Rev. 3



## 1. Overview

This board provides 12 optoisolated sourcing outputs for 24VDC signals.

## 2. Features

- **12 Optoisolated Sourcing 24V Outputs.**
- **Darlington Outputs**
- **24V Common Terminal.**
- **Screw-On connections for all terminals.** You only have to screw-on the wires to make all your connections.
- **Fully optoisolated.**
- **Support for up to 10 KHz optoisolation.**
- **Status LEDs on all output connections.** No more guessing. You can SEE all your signals.
- **External Enable Pin (EN).** The board has a pin that allows you to enable/disable all the outputs at once.
- **Status outputs LED.**

### 3. Specifications.

DIGITAL OUTPUT SPECIFICATIONS	
Maximum output voltage	28V
Typical output current	100mA
Maximum operation frequency	10KHz
Time of transition to high impedance state	12 nS*

\*Time passed since a low in the ENABLE input is detected and the outputs are disabled.

## 4. Pinout

M28 and M2R1.1 Pinout					
40 Pins Header (Pin # / Description)	Terminal/Function	Exp. Port 1 (Pokeys Pin #)	Exp. Port 2 (Pokeys Pin #)	Exp. Port 3 (Pokeys Pin #)	Exp. Port 4 (Pokeys Pin #)
1 / GND					
2 / GND					
3 / GND					
4 / GND					
5 / I/O	24V Sourcing Output 1	1	11	25	35
6 / I/O	24V Sourcing Output 2	2	12	28	36
7 / I/O	24V Sourcing Output 3	3	54	29	37
8 / I/O	24V Sourcing Output 4	4	14	30	38
9 / I/O	24V Sourcing Output 5	5	15	26	39
10 / I/O	24V Sourcing Output 6	6	16	32	40
11 / I/O	24V Sourcing Output 7	7	21	33	41
12 / I/O	24V Sourcing Output 8	8	22	34	42
13 / I/O	24V Sourcing Output 9	9	27	23	47
14 / I/O	24V Sourcing Output 10	10	31	24	48
15 / I/O	24V Sourcing Output 11	17	19	43	45
16 / I/O	24V Sourcing Output 12	18	20	44	46
17 / 3.3V					
18 / 5V					
19 / 5V					
20 / 5V					

<b>M28 and M2R3 Pinout</b>					
<b>40 Pins Header (Pin # / Description)</b>	<b>Terminal/Function</b>	<b>Exp. Port 1 (Pokeys Pin #)</b>	<b>Exp. Port 2 (Pokeys Pin #)</b>	<b>Exp. Port 3 (Pokeys Pin #)</b>	<b>Exp. Port 4 (Pokeys Pin #)</b>
1 / GND					
2 / GND					
3 / GND					
4 / GND					
5 / I/O	<b>24V Sourcing Output 1</b>	5	35	33	40
6 / I/O	<b>24V Sourcing Output 2</b>	6	36	28	41
7 / I/O	<b>24V Sourcing Output 3</b>	7	9	29	42
8 / I/O	<b>24V Sourcing Output 4</b>	8	38	30	50
9 / I/O	<b>24V Sourcing Output 5</b>	12	39	34	51
10 / I/O	<b>24V Sourcing Output 6</b>	14	37	22	52
11 / I/O	<b>24V Sourcing Output 7</b>	17	10	3	53
12 / I/O	<b>24V Sourcing Output 8</b>	18	11	4	54
13 / I/O	<b>24V Sourcing Output 9</b>	19	15	31	23
14 / I/O	<b>24V Sourcing Output 10</b>	26	16	32	24
15 / I/O	<b>24V Sourcing Output 11</b>	27	44	47	25
16 / I/O	<b>24V Sourcing Output 12</b>	20	45	21	46
17 / 3.3V					
18 / 5V					
19 / 5V					
20 / 5V					

<b>M28 and M2R4 Pinout</b>					
<b>40 Pins Header (Pin # / Description)</b>	<b>Terminal/Function</b>	<b>Exp. Port 1 (Pokeys Pin #)</b>	<b>Exp. Port 2 (Pokeys Pin #)</b>	<b>Exp. Port 3 (Pokeys Pin #)</b>	<b>Exp. Port 4 (Pokeys Pin #)</b>
1 / GND					
2 / GND					
3 / GND					
4 / GND					
5 / I/O	<b>24V Sourcing Output 1</b>	5	3	33	40
6 / I/O	<b>24V Sourcing Output 2</b>	6	4	28	41
7 / I/O	<b>24V Sourcing Output 3</b>	7	9	29	42
8 / I/O	<b>24V Sourcing Output 4</b>	8	38	30	50
9 / I/O	<b>24V Sourcing Output 5</b>	12	39	34	51
10 / I/O	<b>24V Sourcing Output 6</b>	14	43	22	52
11 / I/O	<b>24V Sourcing Output 7</b>	17	10	48	53
12 / I/O	<b>24V Sourcing Output 8</b>	18	11	49	54
13 / I/O	<b>24V Sourcing Output 9</b>	19	15	31	23
14 / I/O	<b>24V Sourcing Output 10</b>	26	16	32	24
15 / I/O	<b>24V Sourcing Output 11</b>	27	44	47	25
16 / I/O	<b>24V Sourcing Output 12</b>	20	45	21	46
17 / 3.3V					
18 / 5V					
19 / 5V					
20 / 5V					

## 5. Board description

### 5.1 Power Requirements

It requires a 24VDC @ 1.5 Amps external power supply to operate.

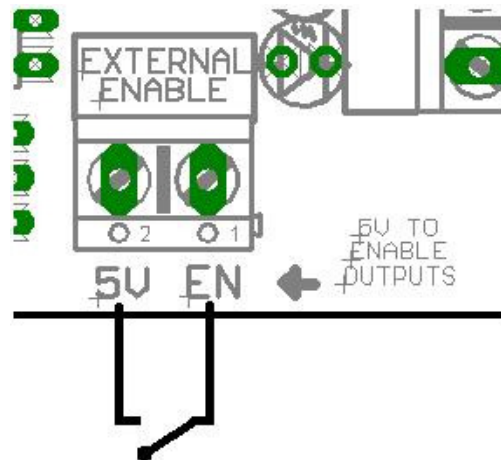


#### WARNING

Check the polarity and voltage of the external power source and connect the 24V. Overvoltage or reverse-polarity power applied to these terminals can cause damage to the board, and/or the power source.

### 5.2 Enable pin.

The card must be provided with a 5VDC signal to enable operation. This feature has been added to enable you to control externally the status of the outputs of the card. You can add an external switch to provide the enabling signal. Internally this pin has a 4.7kOhm pull-down resistor.



## 6. Schematics

### 5.1 Discrete 24V sourcing Outputs

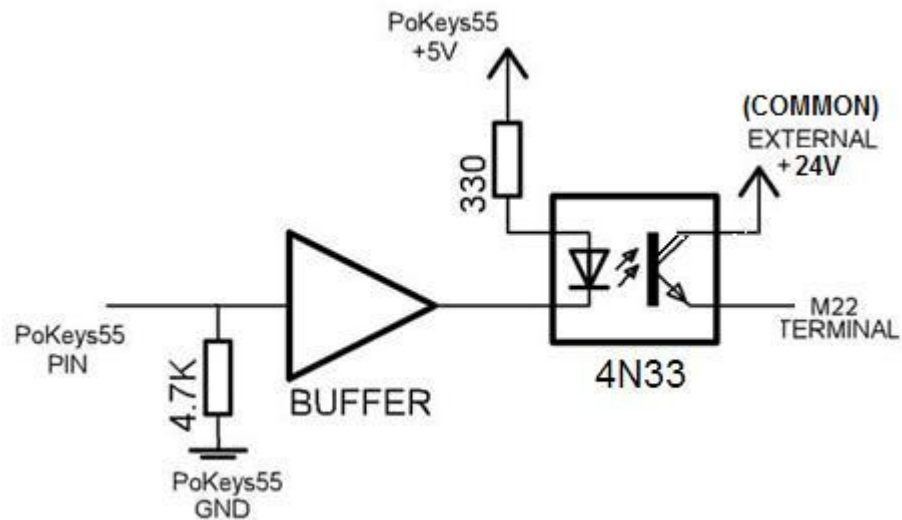


Fig. 1 Outputs schematic

## 7. Wiring Diagrams

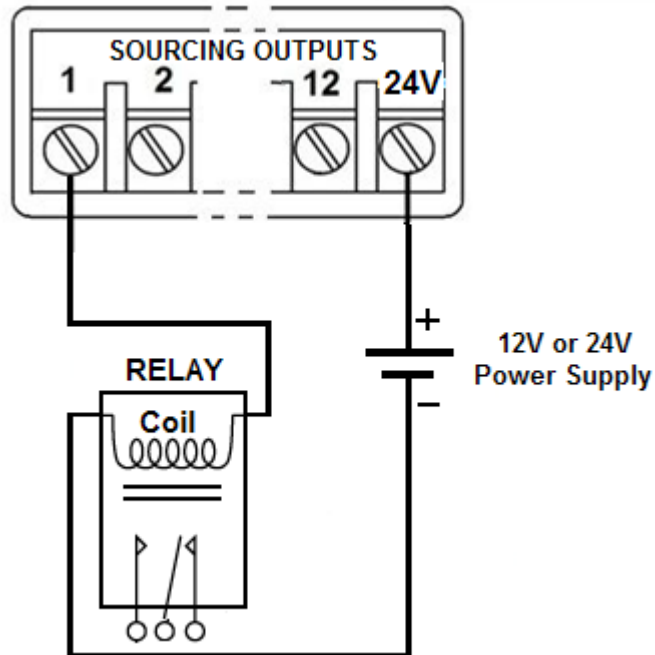


Fig. 2 Wiring diagram to connect electromechanical relays.



## 8. Troubleshooting.

### SYMPTOM 1: THE BOARD DOES NOT REACT TO THE SIGNAL.

POSSIBLE CAUSE	POSSIBLE SOLUTIONS
<ul style="list-style-type: none"> <li>- <b>Pin conflict or mach3 configuration.</b> It is possible that the port address used for the pin is not right, or that there is a pin conflict. That is that you are using that same pin twice. (it could be assigned to a different function).</li> </ul>	<ul style="list-style-type: none"> <li>- Check that the pin you are using is not been used anywhere else in your setup. Got to motor output and output signals, and check all the entries.</li> </ul>
<ul style="list-style-type: none"> <li>- <b>The board does not like the waveform it is getting.</b> Changing the active low status of the pin used also inverts the waveform.</li> </ul>	<ul style="list-style-type: none"> <li>- Play with the active low status of the pin used for the frequency.</li> </ul>
<ul style="list-style-type: none"> <li>- <b>The signal or frequencies are not getting to the board.</b></li> </ul>	<ul style="list-style-type: none"> <li>- Try a different cable.</li> <li>- Test the pins in the cable (before they reach the expansion board) with a multimeter.</li> </ul>
<ul style="list-style-type: none"> <li>- <b>Problems with Mach3 Pulse Generation.</b> Mach3 could have installation problems (you did not restart immediately after installation), or there could be something creating a conflict. Some dongle devices might cause this, other software, like QuickTime or drivers for touch screen.</li> </ul>	<ul style="list-style-type: none"> <li>- Test this in a different PC.</li> <li>- Follow Art's suggestions for optimizing up WinXP:  <a href="http://www.machsupport.com/downloads/XP_Optimization.txt">http://www.machsupport.com/downloads/XP_Optimization.txt</a>.</li> </ul>

### SYMPTOM 2: THE OUTPUTS DO NOT GET ENABLED / NO SIGNALS ARE COMING OUT.

POSSIBLE CAUSE	POSSIBLE SOLUTIONS
<ul style="list-style-type: none"> <li>- <b>The EN terminal (Enable Outputs) is not enabled.</b> The board requires to be externally enabled.</li> </ul>	<ul style="list-style-type: none"> <li>- Make sure you are providing +5vdc to the EN terminal. This +5vdc can be taken from the terminal next to it.</li> </ul>

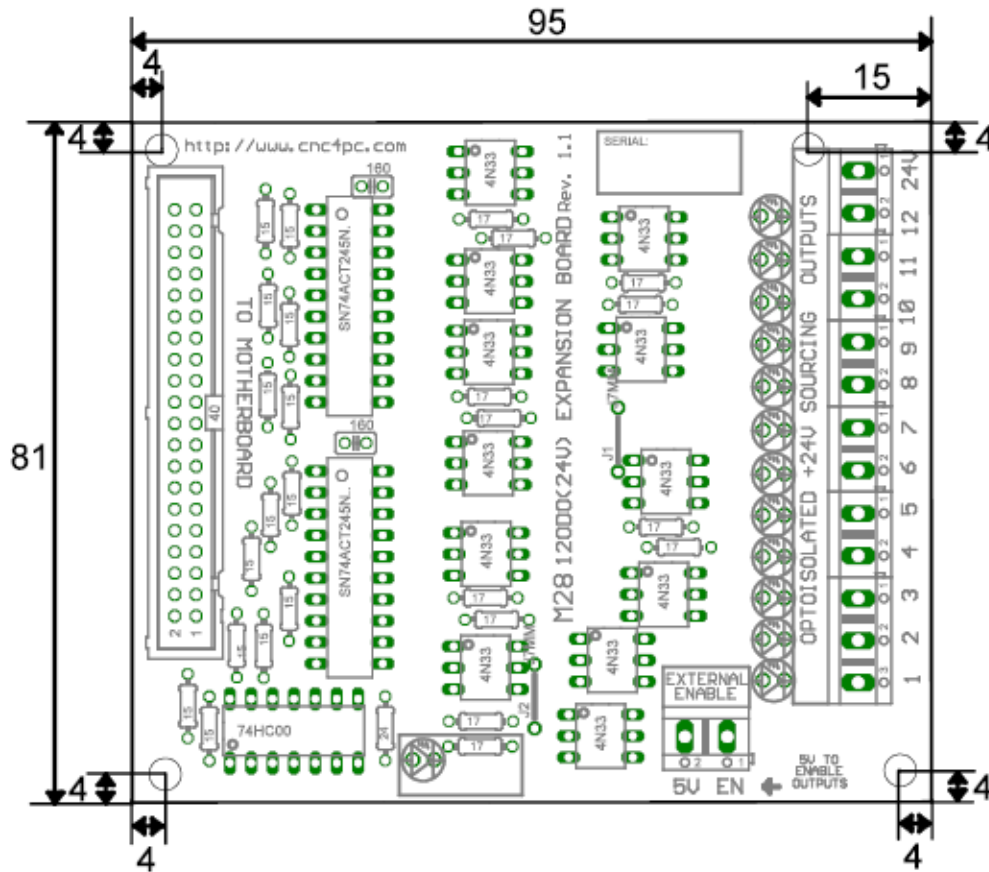
**SYMPTOM 3: THERE IS NOISE IN THE SYSTEM.**

POSSIBLE CAUSE	POSSIBLE SOLUTIONS
- <b>The board could be underpowered.</b>	- Make sure that main board can supply +5vdc@300mA to this board.
- <b>There could be a short that could be draining the power to the board.</b>	- Check that there are no hot spots in the board or it's connections. - Measure the board's power consumption, it should be less than 300mA (depending on the features used).

**SYMPTOM 4: AN OUTPUT PIN MIGHT NOT BE WORKING.**

POSSIBLE CAUSE	POSSIBLE SOLUTIONS
- <b>A chip may have gone bad.</b> These buffers could act as fuses for the signals, and they can go bad because of noise spikes or even strong static.	- These chips are inexpensive and readily available. You can order them here: <a href="http://www.cnc4pc.com/Store/osc/index.php?cPath=38_43">http://www.cnc4pc.com/Store/osc/index.php?cPath=38_43</a> . - Carefully moving chips around and checking if the problem moves around could be a way of figuring out if this is the case.
- <b>There could be a problem with the cable.</b>	- Test this with a different ribbon cable

## 9. Dimensions



All dimensions are dimensions are in Millimeter.

### Disclaimer:

Use caution. CNC machines could be dangerous machines. DUNCAN USA, LLC or Arturo Duncan are not liable for any accidents resulting from the improper use of these devices. The M28 is not fail-safe device, and it should not be used in life support systems or in other devices where its failure or possible erratic operation could cause property damage, bodily injury or loss of life.