

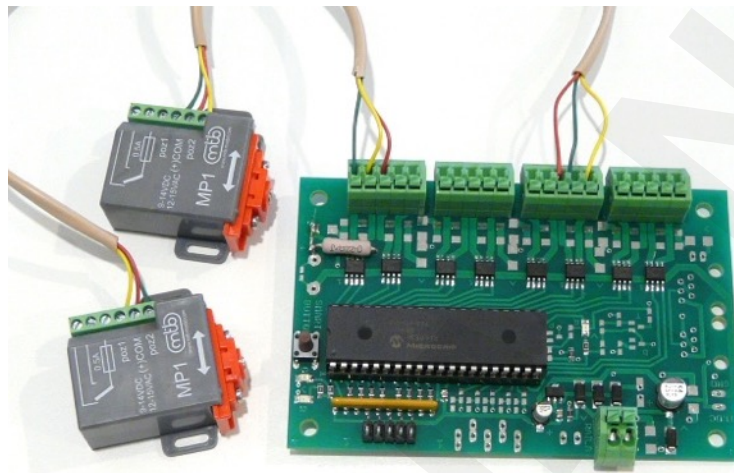


Model Railroad Control Systems

MPD8

MP1/MP5 Switch Motor Driver

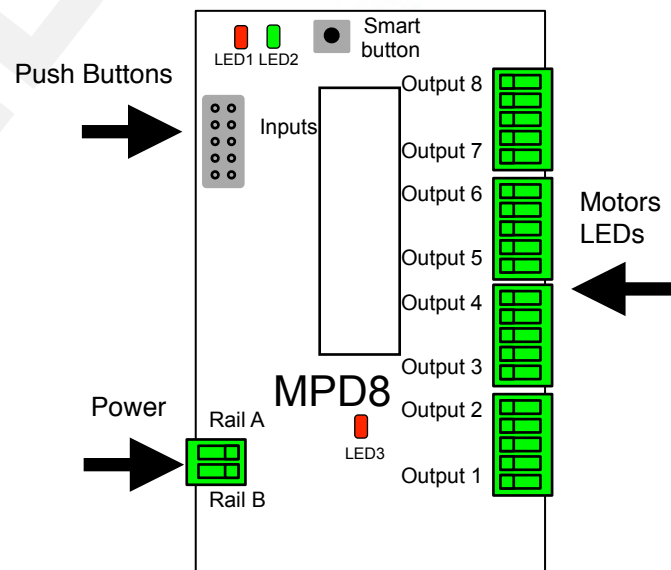
- > DCC compatible accessory decoder
- > Drives eight MP1/MP5 switch motors
- > Reduced current draw by queued motor moves
- > Eight configurable routes
- > Easy programming using “Smart” Programming



Description

The MPD8 is a DCC compatible accessory decoder. It can control up to eight MP switch motors that can be used for switches (turnouts) or other tasks. It can drive LEDs for turnout state. The inputs can be used for push buttons to control switches or other devices connected to the outputs. It has route capability for multiple turnout control.

The MPD8 works out of the box with no programming. If you need to change output addresses or setup routes its as easy as issuing switch commands using “Smart” Programming. No programming of individual CVs is required.



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1 Operation

The MPD8 is DCC compatible accessory decoder. When powered from a DCC system it will control the motors connected to its outputs when it receives a DCC command that matches one of its addresses. The MPD8 is designed to drive the MP1/MP5 switch motors when they are connected to the MPD8 outputs using three wires. See the MP switch motor instructions.

The MP series of motors are not stall type and require significantly more current than a stall motor. For this reason the MPD8 will not move more than two motors at the same time. Since more than one motor may be requested to change state at the same time, as in a route, the requests are held or queued so that each motor may move in turn. The time between moves is typically about three seconds. This significantly reduces the current required compared to all motors moving at once.

Note: the MP series of motors only draw power when moving.

Eight routes are supported. Routes can be executed from the DCC system just like a single switch is or from buttons connected to inputs (local control). Each route has eight cells. There is one top or route execution address for each route. Each top address is completely independent of an MPD8 output address.

1.1 LED Indicators

LED 1 flashes indicates “Smart” programming steps. LED 2 flash indicates accepted program value or a valid received address. LED 3 slow flash indicates heartbeat.

2 Getting Started

The MPD8 comes from the factory ready to use. It is ready to drive MP1/MP5 switch motor using three wires. The eight outputs are programmed with addresses one to eight respectively. Connect the outputs of the MPD8 to the switch motor and RAIL A and RAIL B terminals to the track power as shown in section 5. You are now ready to control your switches from with your DCC system.

You can control the outputs from fascia buttons by connecting them to the inputs. The inputs, when grounded, will toggle the eight outputs respectively.

If you want to change the output addresses go on to “Smart” Programming section. If you want to use the MPD8 routes go on to the Configuration Variables section.

3 “Smart” Programming

“Smart” programming is a term used to describe an easy way to program Configuration Variables (CVs). A controller (any device used for locomotive or switch/accessory control) is used to issue switch (turnout) or accessory commands. With “Smart” programming the addresses that the MPD8 response to can be changed. To program routes see section 4.

“Smart” programming only works when the MPD8 is connected to track power.

There are two parts to “Smart” programming. You can:

1. change the output addresses (default 1 - 8).
2. setup routes.

To program in “Smart” mode, connect the MPD8 power terminals to track power.

To start turn on track power. Wait 6 or 7 seconds.

You can start from any part. Also at any time you can exit “Smart” mode by pressing the button for approximately one second until LED1 stops flashing.

Part 1: To change addresses and mode, press the “Smart” program button and hold it down for approximately one second until LED1 (red) starts to flash. Then release it. The MPD8 is now ready to have the addresses changed. You can set eight sequential addresses in one (first) step or continue and set each of the individual addresses (non-sequential).

Eight sequential addresses:

Using the controller select the switch address or accessory number you want for the start of eight sequential addresses and issue a close (normal) or throw (reverse) command. Now press the “Smart” button until LED1 stops flashing, the MPD8 will restart and be ready to use with the new addresses.

Switch (Turnout) Terminology		
This manual	throw or t	close or c
Digitrax	throw or t	close or c
NCE	reverse or OFF or 2	normal or ON or 1
Lenz	-	+
MRC	OFF	ON

Note: To use an accessory decoder to control switches (turnouts) an address and a switch state are required. The address is typically the number assigned to a switch. DCC manufacturers use different terminology for switch state. See table.

Smart Programming - Change addresses (sequential addresses)					
<i>Part 1: To start - Press the "Smart" button until LED1 starts to flash</i>					
LED1 #Flashes	Description	t	c	Example	
1	Select beginning address for 8 sequential addresses	accept	accept	9	c
<i>To stop - press the "Smart" button until LED1 stops flashing, the MPD8 will then restart and be ready to operate</i>					

For example, to set addresses 9-16, select switch address 9 and issue a c (close) command

Non-sequential addresses:

Using the controller select the switch address or accessory number you want for the first address and issue a close (normal) or throw (reverse) command. LED1 will now be flashing twice with a pause and then repeats indicating that output 2 address is ready to be programmed. Select the switch address you want for the second output address and issue the same close/throw command as in step one.

As you progress through the "Smart" programming steps, LED1 flashes the number of times indicating which output is ready to be programmed. After the 8th step the MPD8 will restart and be ready to use with the new addresses.

You can exit "Smart" programming after any step by pressing the "Smart" button until LED1 stops flashing.

Smart Programming - Change addresses (non-sequential addresses)					
<i>Part 1: To start - Press the "Smart" button until LED1 starts to flash</i>					
LED1 #Flashes	Description	t	c	Example	
1	Select 1 output address	accept	accept	22	c
<i>Continue to step 2 for non-sequential addresses</i>					
2	Select 2 output address	accept	accept	23	c
3	Select 3 output address	accept	accept	24	c
4	Select 4 output address	accept	accept	28	c
5	Select 5 output address	accept	accept	33	c
6	Select 6 output address	accept	accept	34	c
7	Select 7 output address	accept	accept	35	c
8	Select 8 output address	accept	accept	36	c
<i>After the last step the MPD8 will restart and be ready to operate</i>					

Part 2: A route consists of a top or execute address and up to eight cells. A route is executed when a turnout (switch) command matches the top address and switch state for that route. When a route is executed, turnout commands are issued for each cell containing an address.

To setup routes press the "Smart" program button and hold it down. After about a second LED1 (red) starts to flash. Continue to hold it down until LED2 (green) turns on. Then release it. LED1 will be flashing and LED2 will be on. The MPD8 is now ready to have route addresses entered.

Smart Programming - SetUp Addresses					
<i>Part 2: To start here - Press the "Smart" button until LED2 lights</i>					
LED1 #Flashes	Description	t	c	Example	
1	Route number 1 - 8	accept	accept	2	c
2	Execute (Top) address	accept	accept	103	t
3	Cell 1 address	accept	accept	33	c
4	Cell 2 address	accept	accept	34	t
5	Cell 3 address	accept	accept	35	c
6	Cell 4 address	accept	accept		
7	Cell 5 address	accept	accept		
8	Cell 6 address	accept	accept		
9	Cell 7 address	accept	accept		
10	Cell 8 address	accept	accept		
<i>After the last step the MPD8 will restart and be ready to operate</i>					

For example, to setup route 2, select switch address 2 and issue a c (close) command then select switch address 103 and issue a t (throw) command. Continue until all the cell addresses have been entered.

LED1 will flash indicated the step number.

4 Reset

4.1 Reset the MPD8 to factory defaults

To “reset” the MPD8 to factory defaults, turn power on and wait until the LED 1 (red) turns off. Then press the “Smart” button and continue to hold the button down (at least 16 seconds) until both LEDs are alternately flashing. Output addresses are set to 1 - 8 and all route addresses are cleared.

Alternately, programming CV7 with 170 will “reset” all CV’s to the factory default value. In page mode this may not work with some systems as they do not keep power applied to the programming track long enough for all the CVs to be programmed.

5 Connections

5.1 Power

The MPD8 is powered by using the two terminal connector labeled Power. Power can be from the track (accessory decoder operation) or a filtered DC voltage (9.5 to 14 VDC) power supply. DO NOT use AC power. For a DC supply do not use old analog 'Power Packs'. The MPD8 power connector is non polarized and either terminal can be connected to plus or minus of the DC power supply. The power supply should be isolated from the system ground. That is, not connected to ground (booster ground, house wiring ground, etc). When multiple MPD8s are used they can be all connected to one power supply. The plus and minus of the power supply should be connected to the same power input terminal on each MPD8.

Power supply current requirements: 500 mA minimum. Each MP switch motor requires a maximum of approx. 150 mA. However, the MPD8 queues motor move requests so that no more than two motor will move at once. This limits the current requirement.

5.2 Input Interface

Each input has a 4.7K ‘pullup’ resistor connected to 5 volts, so the input is normally at 5 volts with respect to pin 5 (minus) when no device is connected. This is a high or true state. When the input is connected to pin 5 (minus) by a push button switch, the input is “grounded” and the state is low or false.

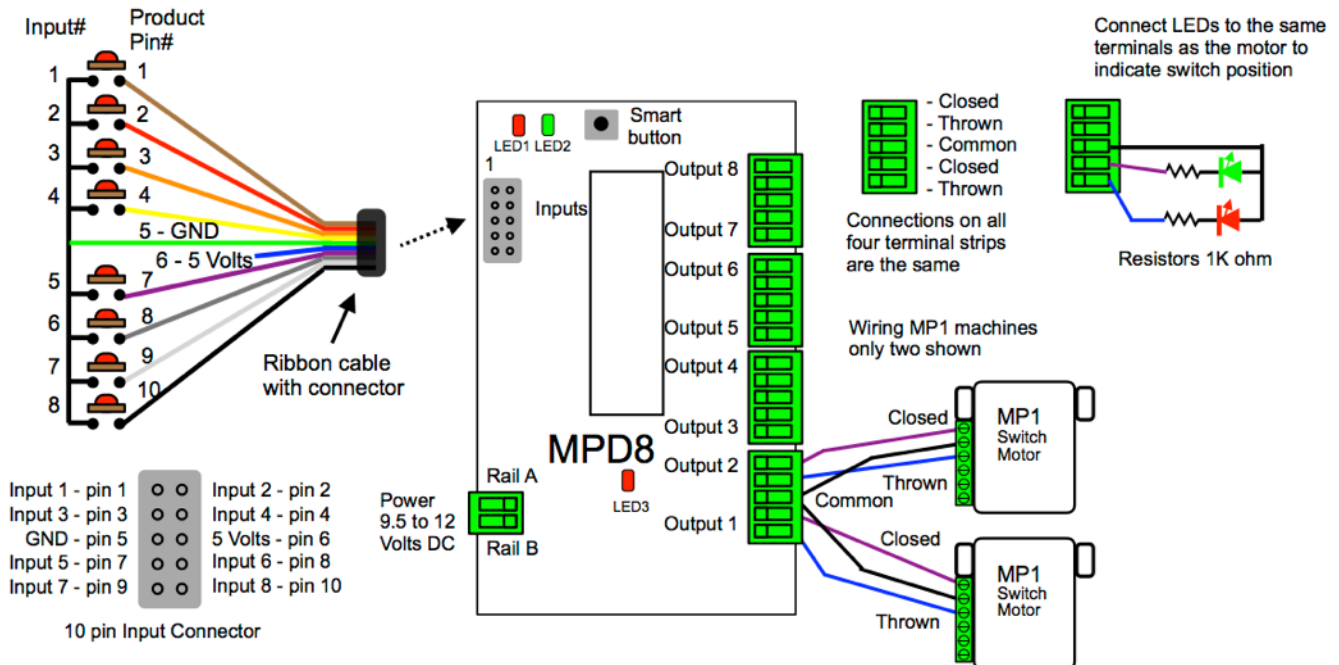
5.3 Output Drive

Each output is capable of driving up to two MP motors and related LEDs. If LEDs are used to indicate switch state current limiting resistors are required and should not be less the 1K ohms. This is a general guide line for a typical LED.

5.4 10 PIN Input

If push buttons are used, you can build your own by using flat ribbon cable Insulation Displacement (IDC) and connectors from Jameco. The mating connector is #138376. 10 ft of multicolor flat ribbon cable is #639672.

Warning: Do not connect the power supply ground (minus) to the ground (minus) pin 5 of the 10 pin IDC connector. Do not connect any outputs together or to other MPD8 outputs.



6 Applications

6.1 Routes

The MPD8 is suited to handle routes in a yard. The following shows an example of five routes using four switches. The route CV values were determined using the information in the route address sections. This assumes the MPD8 output addresses include 33 to 36.



Yard diagram

A route can be executed with an actual turnout (switch) address or a pseudo address of a switch (not a physical switch). Program the top address of the route with the address you want to execute the route. Inputs can execute a route from a push button if the corresponding output address matches a route execute address.

Route Example								
Route	1	2	3	4	5	6	7	8
Execute address	101 t	101 c	102 t	102 c	103 t			
Address 1	33 t	33 t	33 c	33 c	33 c			
Address 2	36 c	36 t	34 c	34 t	34 t			
Address 3				35 t	35 c			
Address 4								
Address 5								
Address 6								
Address 7								
Address 8								