MP1/MP5/MP10 Application Note

Rev X1, June 28, 2023

What's new:

- Mechanical installation suggestions
- DCC Specialties Jack Wabbit
- MP10
- NCE Switch-Kat Decoder
- Berrett Hill Relay Base
- Simple control from two points

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Introduction

The MP1/MP5/MP10 series of switch machines are *extremely compact* switch motors measuring 1.5" wide, 1.5" high by .5" deep (MP1) or 2" x 2.25" x .75" (MP5 with connector installed), 2.3" x 2.12" x 0.8" (MP10 with connector) making them especially suitable for use on upper decks of multilevel layouts and for modular layouts. While they have about the same outline as the industry-standard stall motor switch machine, the MP series are less than 1/4 as deep!

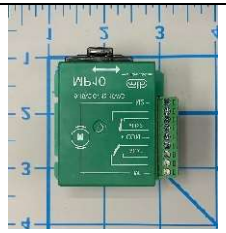
The MP series are powered by either 9-14 VDC (we recommend at least 12V when using DC) or 12-15 VAC. The MP series are *NOT* stall motors but have a common power supply lead and an operate lead for each direction. This makes for an extremely simple basic control installation, consisting of an SPST contact for each direction, or a single SPDT toggle switch. The MP5 and MP10 can optionally be wired for two wire control, like a stall motor, but does not draw current continuously, however they draw about 100 mA while moving (about 2 seconds). See below for a neat trick on operating the MP1 with just two wires!

Operating current (at 12V) while the motor is moving is 150mA for the MP1, 100mA for the MP5 (comparable to a servo) so an adapter such as MRCS' ITC, RSMC or CSNK must be used when operating the an MP series switch machine from a digital output such as a cpNode or IOX. (Dr Chubb's SMINI and DOUT can sink about 0.5A, so they're OK) The MP series is also compatible with 3rd party DCC accessory decoders such as the "Jack Wabbit" from DCC Specialties, our (discontinued) MPD8 and Digitrax' DS52 DS64 and DS74. No current is drawn once the motor reaches its limit of travel.

Features:

- The stroke can be set in one of 4 positions: 3 mm, 6 mm, 9 mm (and 12 mm - MP5/MP10 only) – see the instructions. The cam mechanism provides slow end position stop and lock.
- The MP series can use either DC or AC power supplies, with a current draw of < 150 mA during motion. The mechanism has a position end limit switch, e.g. the control voltage can be applied permanently, to be disconnected internally once the end position is reached and the motion stops, similar to the PFM/Fulgerex switch machines of days past.
- SPDT contact for position indication or frog polarity switching. (With resettable thermal protection fuse set to 0.5 A short–circuit protection on the point frog on MP1 Rev 1 only). Later (V2) MP1s do not have the current limiting feature. The MP5 and MP10 have DPDT Switches (no current limiting).
- Linear motion - the actuating rod follows a straight line and keeps a constant height through its travel. The supplied actuator rod is 0.043" x 2" long and will fit through roadbed/subroadbed of about 1.5." We recommend substituting a piece of 0.032, 0.039 or 0.047" Music Wire which makes the end alignment a little less critical.

Table of features and identification:

	MP1	MP5	MP10	Standard Stall Motor
				
2 wire operation	With external diodes, See note below	X	X	X
3 Wire operation	X	X	X	
Operating Current	Momentary < 150mA @12V, 85 mA @ 9V	Momentary < 100 @ 12V, 75 mA @ 9V	Momentary < 100 @ 12V, 75 mA @ 9V	20mA Continuous
Throw	3,6,9 mm, (fulcrum linkage provided with version 2 discontinued)	3,6,9,12 mm (or fulcrum linkage – discontinued)	3,6,9,12 mm	Move fulcrum
Linear or Radial Motion	Linear	Linear	Linear	Radial
Auxiliary Contacts	SPDT (with current limiting Rev 1) , no current limiting in Rev 2	DPDT – no current limiting	DPDT – no current limiting	DPDT – no current limtiing
Dimensions	1.5" wide, .5" high by 1.5" deep	2” wide x .75” high x 2.25” deep	2” wide x .75” high x 2.25” deep	2” wide x .3.25” high x 2” deep
Connections	6 position screw terminal	12 position push on connector with no-solder – included. (Push in) connector – 16-24 Ga wire	9 position 3.5mm removable screw terminal	PCB edge connector (user supplied) – try our Tortoise to RJ45 or screw terminal adapter

Crossover wiring	Multiple MP1s may be connected in parallel, just be sure the driver can sink 150 mA per machine (2.g. 2 MPs = 300mA). If Poz1 is connected to Poz1 and Poz2 to Poz2, no diodes are required, if reversed insert diodes in series with Poz2 of each MP5.	Insert Diodes in series with the Poz2 leads of all MP5s, Anode (pointy end) towards the switch. See diagram below. Multiple MP5s may be connected in parallel, just be sure the driver can sink 150 mA per machine (2.g. 2 MPs = 300mA)	No diodes required, multiple MP10 may be connected in parallel	Multiple Tortii may be connected in parallel, just be sure the driver can sink 30 mA per machine (2.g. 2 Tortii = 60mA)

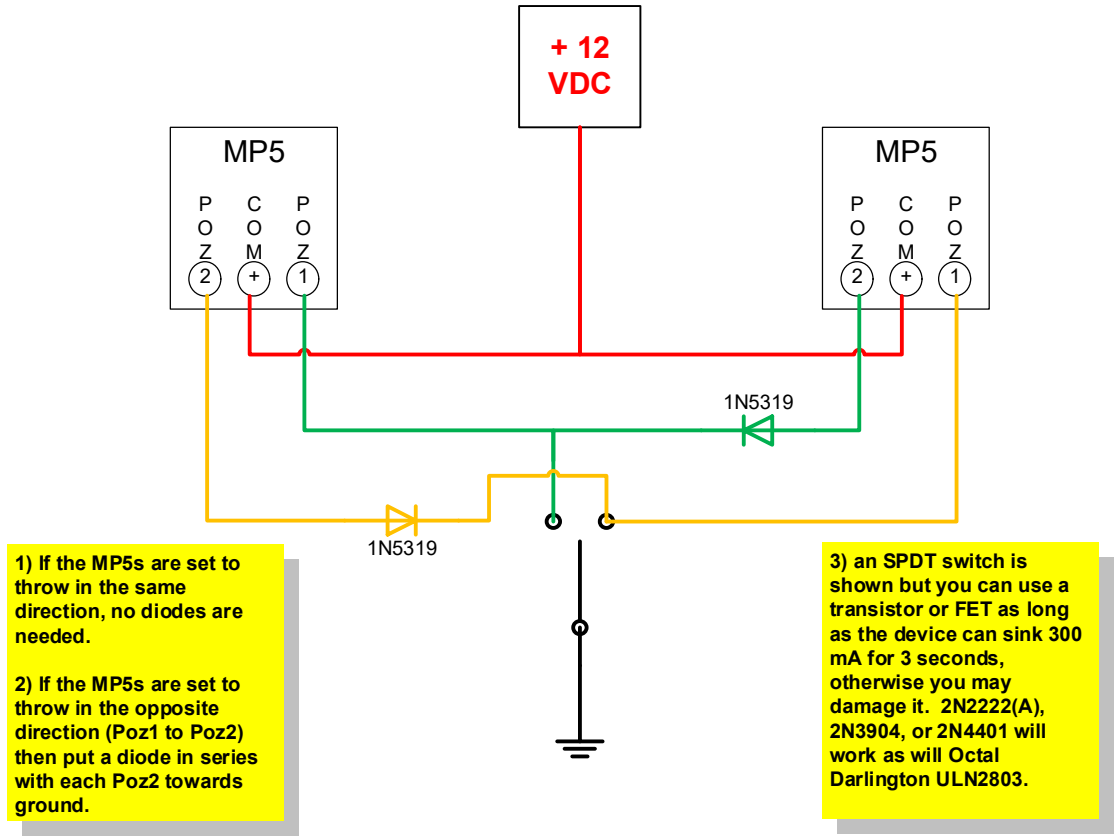


Figure 1 - MP5 Crossover Wiring

1) If the MP5s are set to throw in the same direction, no diodes are needed.
2) If the MP5s are set to throw in the opposite direction (Poz1 to Poz2) then put a diode in series with each Poz2 towards ground. I recommend the iN5819 as it has a low forward voltage (~ 0.3V) but you can use the ubiquitous 1N4001.

3) an SPDT switch is shown (or an SPDT contact from a relay) but you can use a transistor or FET as long as the device can sink 300 mA for 3 seconds, otherwise you may damage it. 2N2222(A), 2N3904, or 2N4401 will work as will Octal Darlington ULN2803.

4) if using a DCC accessory decoder, be sure it can sink at least 300 mA. Our RSMC and ITC can sink up to 1.5A, so they will be fine, but use 1N4001 diodes in series with poz1, poz2 on MP5s.

Installation Guide from MP5 Brochure – shows how pivot works (note the manufacturer MTB has discontinued these pivots, this information is provided for reference)

This graphic answers many frequently asked questions. We recommend replacing the rigid needle with music wire, (start with 0.039 but users have reported good results anywhere from 0.020 to 0.047 depending on the application) this allows a little freedom at the end of travel and prevents problems where the machine may move one way but not move back. Note the manufacturer no longer supplies the "accessory actuator arm (swinger)."

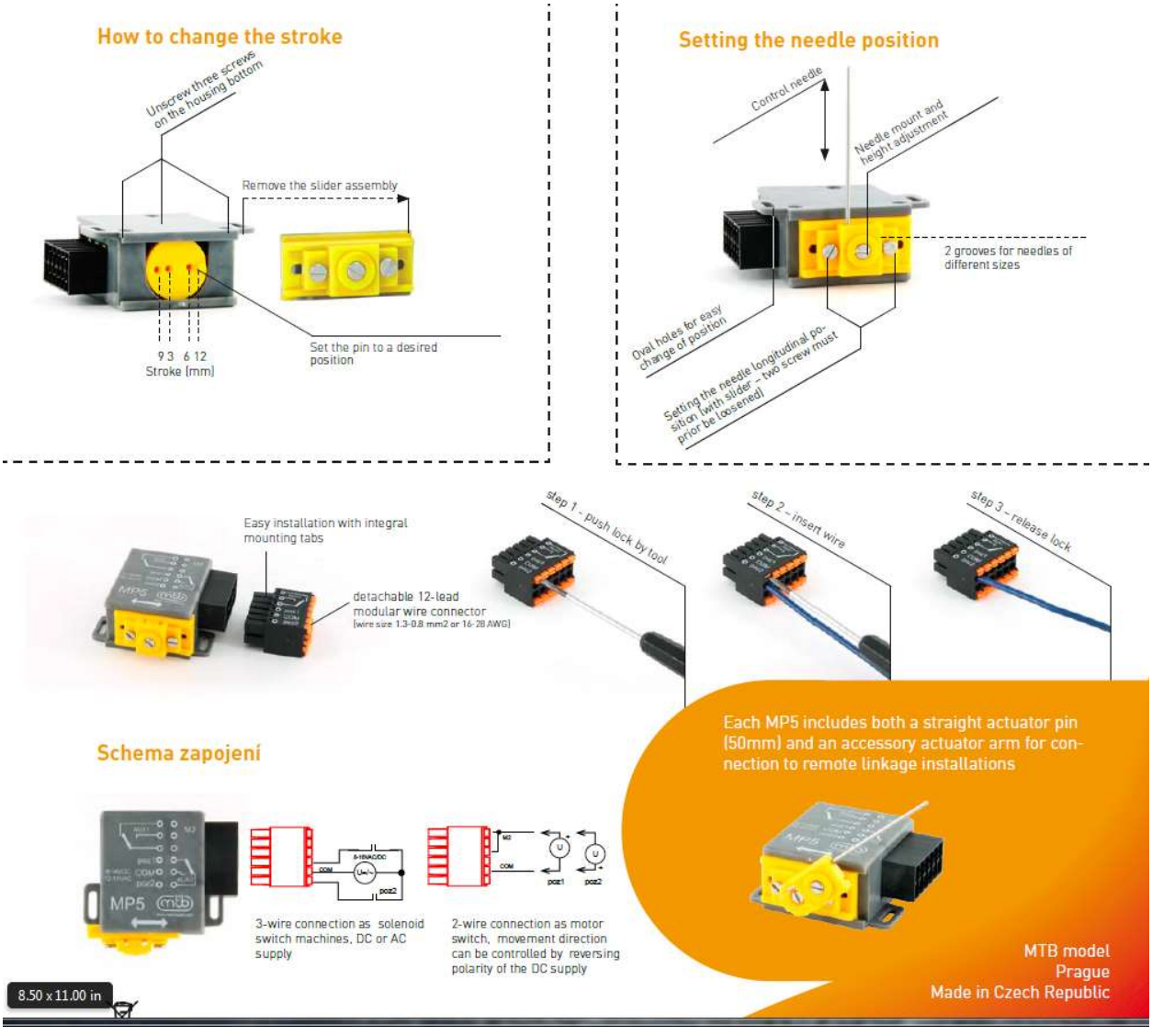


Figure 2 - Handy diagram from MP5 Brochure

Manual Control

Manual control installation for the MP series is very simple. A single pole, double throw (SPDT) switch is connected with the center pole to ground and each of the normally open and normally closed contacts connected to one of the position screw terminals. They are labeled POZ1 and POZ2. A common positive, typically 12 V, is connected to the plus COM terminal. See figure 1. Typically, a toggle switch or a slide switch is used.

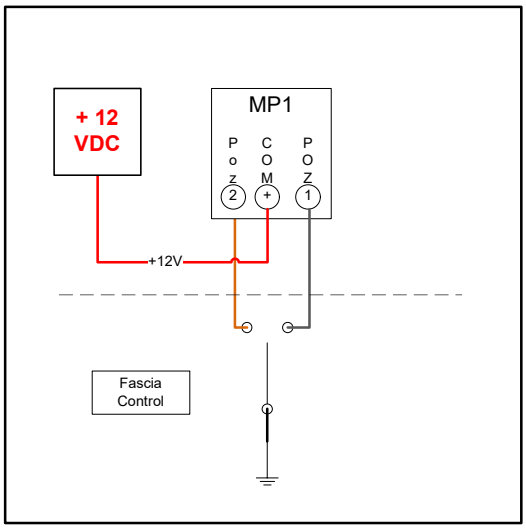


Figure 3 - Manual Control of MP1

Hint: If the turnout throws opposite of what you intend simply reverse the wires to Poz1 and Poz2.

The auxiliary contacts can either be used to power a live frog or for position reporting to a computer or simply to light LEDs on a control panel. Note that the MP1 Version 1 auxiliary contact is current limited by a semiconductor device, so there is about a .5V drop across each one, therefore powering a daisy chain through the MP1's aux contact is not recommended. Version 2 MP1s and MP5s and MP10s (MP5s and MP 10s have DPDT contacts) are not current limited.

There is a 2 wire variant on this connection, submitted by George Warner who uses two switching diodes (any diode that can handle 150 mA); one each from Poz1 & 2 to the COMmon terminal to eliminate the need of a 3rd wire.

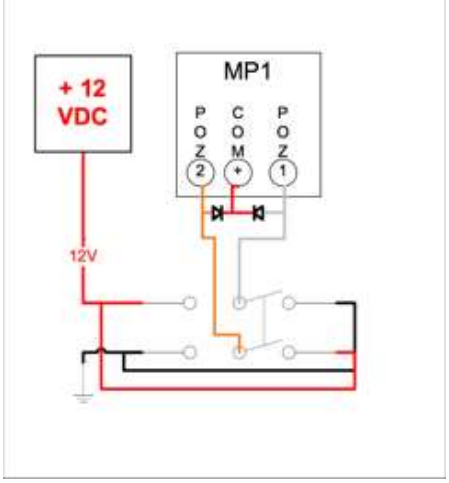


Figure 4 - George Warner's 2 wire solution

Control of an MP Motor in 2 wire mode from multiple locations

Here's how you can control one motor from two control panels (perhaps on opposite sides of a peninsula). The principle is the same as a hallway or stairway light switch that can be controlled from either end of the passage. Essentially the switches are in series and a change in position of either switch inverts the polarity to a 2 wire motor (this works with stall motors, too!). I recommend DPDT push-on-push-off buttons if you can find them (as of this writing June 2023 All Electronics had some) but Richard Brennan just mounts toggle switches horizontally so the handles don't suggest direction of the switch.

An MP5 or MP10 does need diodes to operate in 2 wire mode. Just connect to COM and M2 (where there are 2 wires jumped together. See the diagram on the case of the motor.

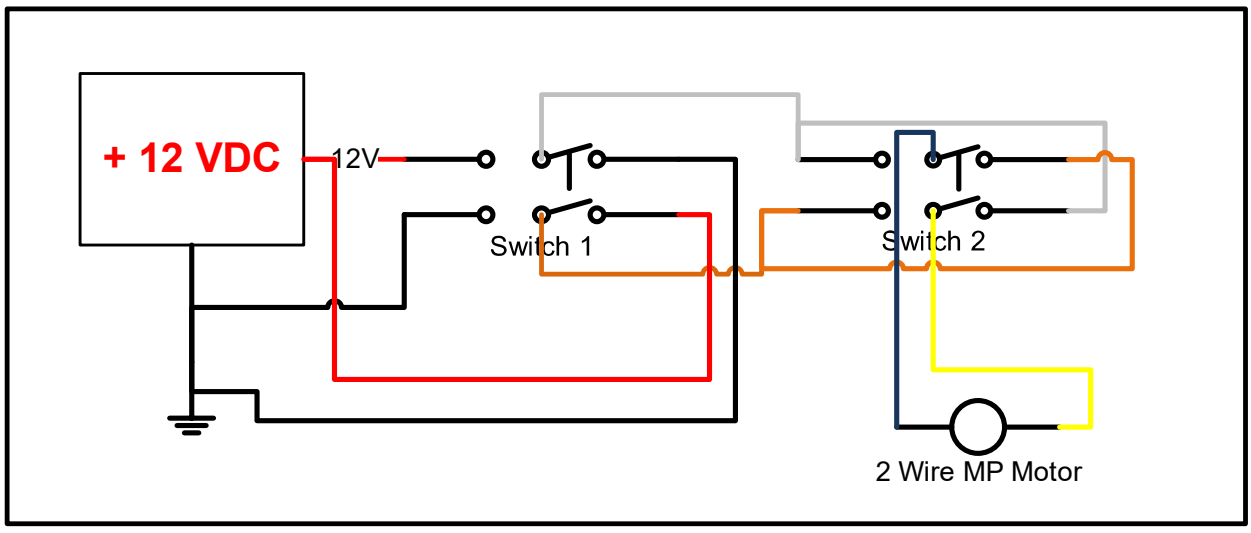


Figure 5 - Control of 2 wire MP from two locations

How does a manual MP Series Installation differ From a Tortoise Installation?

For many years the Tortoise™ by Circuitron has been the standard stall motor switch machine used by serious model railroaders, at least in HO scale, although there are several stall motor options available. Stall motors feature a motor winding of fairly high (~700 ohms) resistance such that there is low torque and a low stall current. Voltage is reversed across the motor to reverse the turnout. Current continues to flow at about 20 mA as long as there's power to the motor, which is required to maintain pressure on the points. Stall motor connections are "two wire": one to each side of the motor. Most stall motor installations are done with a double pole, double throw (DPDT) switch such that the center poles go to the ends of the motor winding and 12 V is brought into the outer contacts and flipped so the left side and the right side are opposite polarity and flipping the switch reverses polarity to the motor, causing the turnout to move as shown in figure 6.

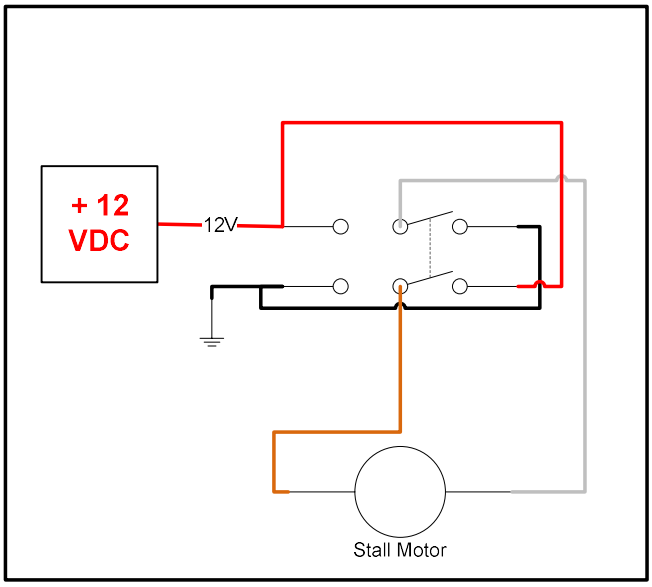


Figure 6 - Stall Motor Control with DPDT Switch

In contrast, the MP series uses a three wire connection. However it turns out that the stall motor control leads can be connected to Poz1 and Poz2 of an MP1 and 12 V from the same power supply can be connected to the common terminal of the MP one and the MP one will operate quite happily. Note that the MP Series switch machine draw as much as 150 mA while operating, so be sure your power supply is rated for at least 150 milliamps. The MP5 and MP10 have an option to operate in 2-wiremode, which is useful in replacing or extending existing two wire control systems. See Figure 4.

You can drive an MP Series switch machine with our ITC or RSMC, either as a standalone unit or as part of a cpNode as long as the same 12V supply is used for the ITC/RSMC and the MP series switch machine. Note that you should install diodes (typically 1N4001) in series with each POZ2 lead with the MP5 (not required on MP10).

There are other arrangements for manually operating stall motors, so check your wiring before replacing any stall motor with an MP series switch machine.

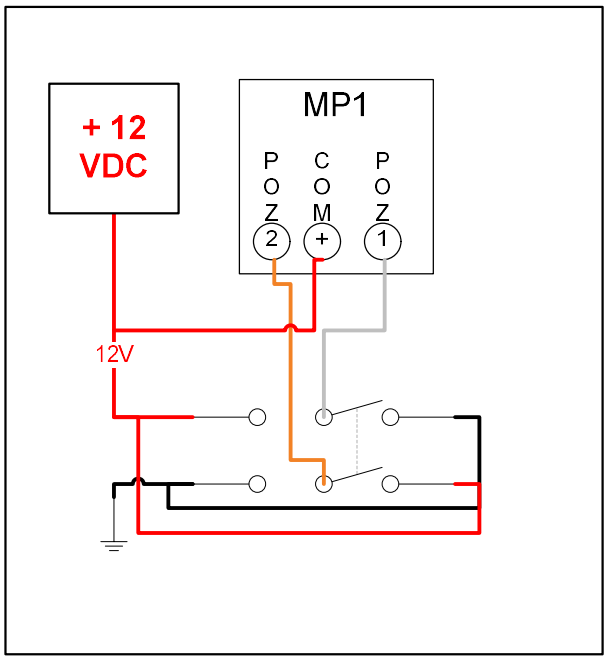


Figure 7 - DPDT Stall Motor installation Adapted for MP 1 Motor

Controlling an MP Series Switch Machine Electronically with a Digital Logic Signal

Electronic control of an MP1 is also fairly simple. All you need is a way to sink (connect to ground) 150 mA at 12 V for each of the control lines connected to POZ1 and POZ2.

Use our RSMC or ITC

You can use MRCS' RSMC (Remote Stall Motor Controller) or MRCS' Intelligent Turnout Controller (ITC) either via a cpNode or as a freestanding device. Just tie the MP1's COM lead to the same +12 supply as the M+ on the RSMC. The Poz1/Poz2 of the MP1 should connect to motor output pins 1 and 8 of the RSMC respectively. The "Throw" input provides single-line control of the MP1. An MP5 can either be connected the same as an MP1 or you can use it in "2_wire Mode" and connect COM to pin 1 of the RSMC and both M2 connections to the other side. If using an MP5, insert diodes (1N4001) in series with the poz1 and poz2 leads. MP10s do not require external diodes.

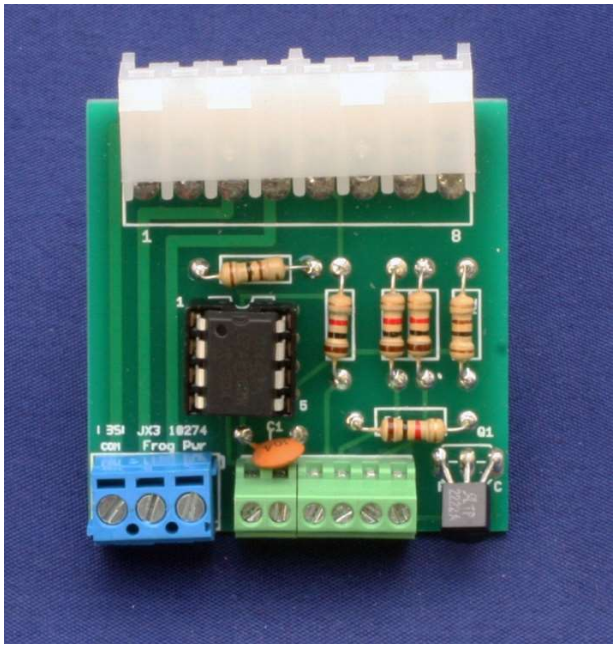


Figure 8 – RSMC

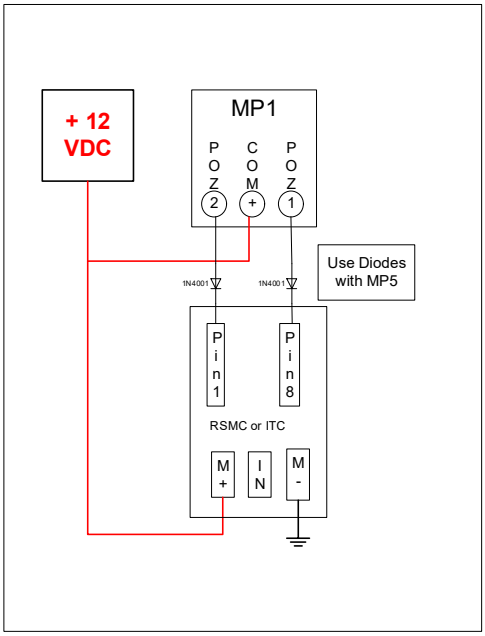


Figure 9 - RSMC Connections

See the RSMC Connection Instructions at
http://www.modelrailroadcontrolsystems.com/content/RSMC%20Instructions%201.2.pdf

See the ITC Connection Instructions at

http://www.modelrailroadcontrolsystems.com/content/ITC%20Quick%20Start%20v1.0.pdf

MP1 Instructions are at
http://www.modelrailroadcontrolsystems.com/content/MP1%20Instructions.pdf

MP5 Instructions are at

http://www.modelrailroadcontrolsystems.com/content/MP5%20instruction_EN_V1.pdf

MP10 Instructions are at

MRCS's Current Sink Adapter for cpNode and IOX16/32

MRCS' High Current Adapter (CSNK) may be used with a cpNode or IOX. The CSNK plugs into our cpNode (release 2 or higher), IOX16 expansion card or IOX32 expansion card (IOX32 release 2 or higher) and provides 16 high current lines. A single CSNK will support as many as eight MP1s.

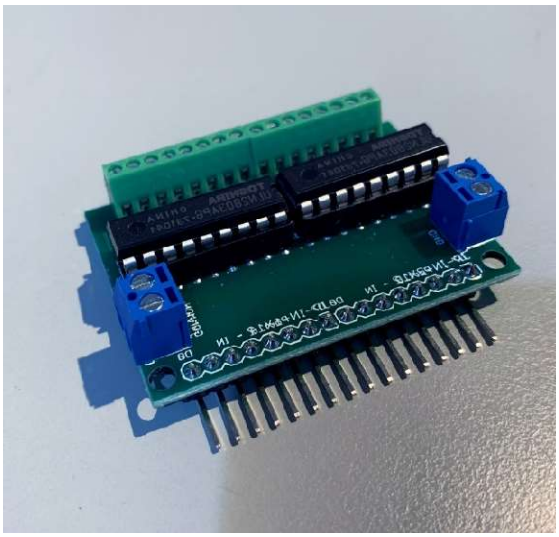


Figure 10 - CSNK - Daughterboard fits on IOX16 and can drive up to 8 MP1s

The CSNK circuit uses a pair of ULN2803 octal Darlington arrays, ($1.75 ea at Jameco) each of which provides eight drivers capable of sinking up to 500 mA at 50 V. We recommend this chip as an economical solution for controlling MP1s. A nice feature is built-in snubbing diodes which protect the Darlington outputs and suppress unwanted electrical noise sometimes caused by inductive devices such as electric motors. If using C/MRI with MRCS's cpNode you will need to define 2 lines for each MP1: one line to move it in each direction.

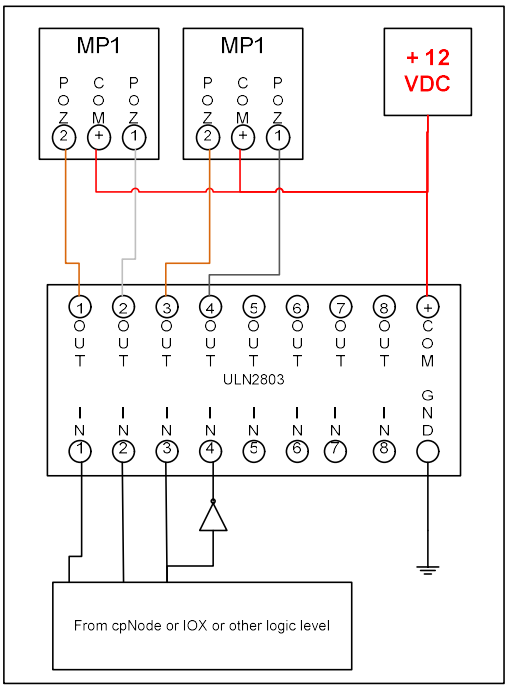


Figure 11 - ULN2803 drivers - Equivalent to one half of a CSNK

If you are short on output lines, you can use an inverter to force one line high (Poz1) and the other low (Poz2) and so on, so you can have one output line control the MP1. Note the inverter on input 4 of the ULN2803 in figure 6.

Use an "Arduino Relay"

These are handy and inexpensive and can be found on eBay or Amazon or any of the offshore marketplaces with a search for "Arduino Relay." Connect the input of the "Arduino Relay" to an output on the cpNode/IOX. These are usually configured as SPDT, so just wire according to figure 1 above.

Here's an image of typical Arduino Relays:

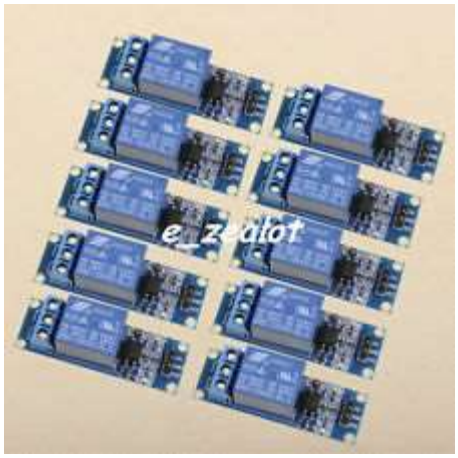


Figure 12 - Arduino Relay

These were available from various off-shore marketplaces for less than $1 per segment in June of 2023.

Figure 13 - 2 Channel Arduino Relay

Arduino Relays can be purchased in 1,2,4,8, or 16 channel modules

Driving an MP Series Switch Machine from Classic JLC CMRI Boards

If you are using C/MRI with any of the classic JLC (Chubb) devices such as a DOUT[24/32] or SMINI you will need to define 2 lines for each MP1: one line to move it in each direction. Incidentally this looks a great deal like the arrangement on page 3 – 12 of Dr. Chubb's User's Manual version 3.0. (The C/MRI User's Manual is available from JLC Enterprises and is a must for anyone implementing a model railroad signal system, regardless of the technology used. It's available from JLC at http://www.jlcenterprises.net). If you have a CMRI system with mixed cpNodes and classic JLC nodes, this is a good place to use your classic JLC nodes.

Output with Discrete Transistors

Another approach is to use discrete transistors. All you need is a transistor capable of handling 150 mA of collector current and a maximum collector voltage greater than 12 V. Be conservative when specifying the part: the 2N4401 ($0.19 ea at Jameco) sinks up to 600mA and is a good candidate. The open collector output circuit Dr. Chubb uses in the SMINI and DOUT (which uses the 2N4401) is simple and effective and can be found in the C/MRI user's manual referenced above on page 4-15. The 2N3904 and the venerable 2N2222/2N2222A are good substitutes. Most DIY model railroaders will have these in their parts drawers.

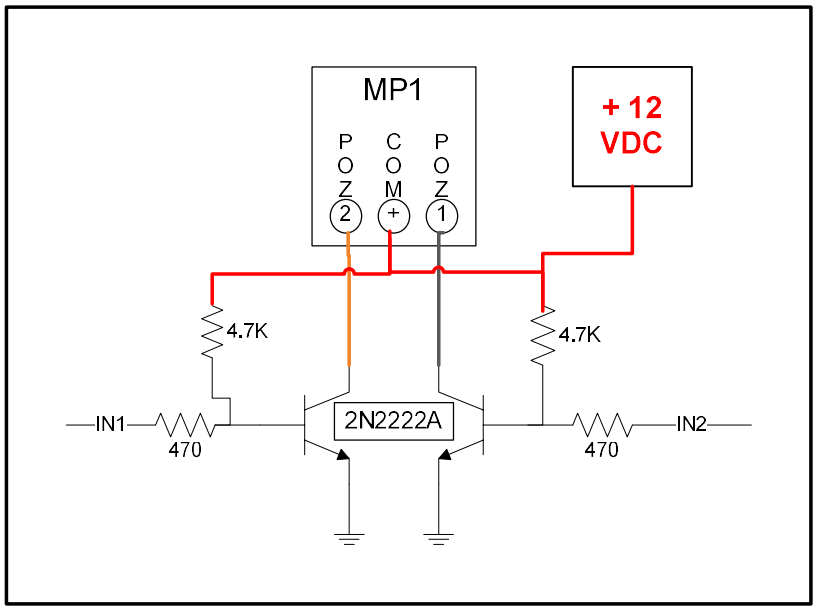


Figure 14 - Transistor Drive

Don’t use an existing SMC12

Dr Chubb’s excellent SMC12 stall motor controller uses LM324 Op Amps for output which will NOT sink enough current (MP1 requires 120 mA, MP5 100mA, and SMC12 only sinks about 30) to drive an MP1. The SMC12 can drive our Stall Motor Control Adapter for MP Motor if you just need to replace a stall motor and want to make minimal wiring changes.

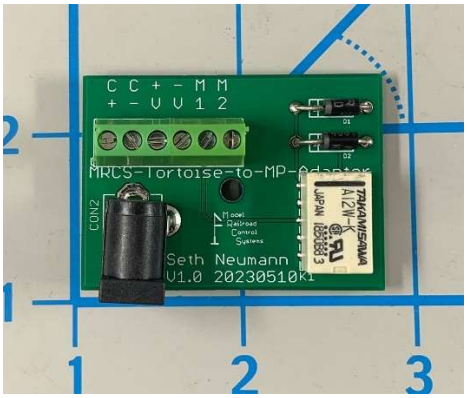


Figure 15 - Stall Motor Control Adapter

DCC Control for MP Series Switch Machines

There are lots of DCC Auxiliary decoders and many will work with the MP Series switch machines. This is not an exhaustive list of DCC switch machine controllers: if you want to use one that you don’t see here, send us a message at sales@modelrailroadcontrolsystems.com and we will test a unit you send us. We’ll return it for free with your order!

MRCS MPD8 8- Channel DCC Decoder – Discontinued as of this writing (December 2022 – info for reference only)

The MPD8 is a stationary DCC Decoder designed to drive up to 8 MP series switch motors, it is available Assembled and Tested only, it works with most DCC systems that support accessory decoders and controls up to 8 MP Series Switch Motors

Provides 8 inputs from:
- local turnout controls such as push buttons
- occupancy sensors
- turnout feedback sensors

Control up to 8 routes on your layout for yard throats and interlocking plants

The eight outputs of the MPD8 can individually be assigned any DCC accessory address from 1 to 2040. There are eight wired inputs available for local control. See the manual at http://www.modelrailroadcontrolsystems.com/content/mpd8_p2_doc.pdf

CVP Products AD4

CVP's Documentation indicates that the AD4 will handle up to 600 mA which is more than enough current to operate an MP Series switch machine. Either select the "always on" mode or select a pulse duration > 2 Seconds.

DCC Specialties ~~Hare/Wabbit~~/Jack Wabbit

The Hare and Wabbit are limited to 25mA so they aren't a good choice, however the **Jack Wabbit** works great! Just set wire the MP motors to J4 (Switch output) per the quick start instructions on page 2 of the Jack Wabbit manual for two wire operation. If using 3 wire mode, connect COM on the MP to terminal 2,5,8 or 11 as needed. DO NOT SET CV 79 to 1 (the pulse may be too short for full travel, just leave it at 0 as the MP motor will automatically shut down at the end of travel). All Jack Wabbit functions I tested worked fine MP Motors. User Rich Jacobs provided a sample.

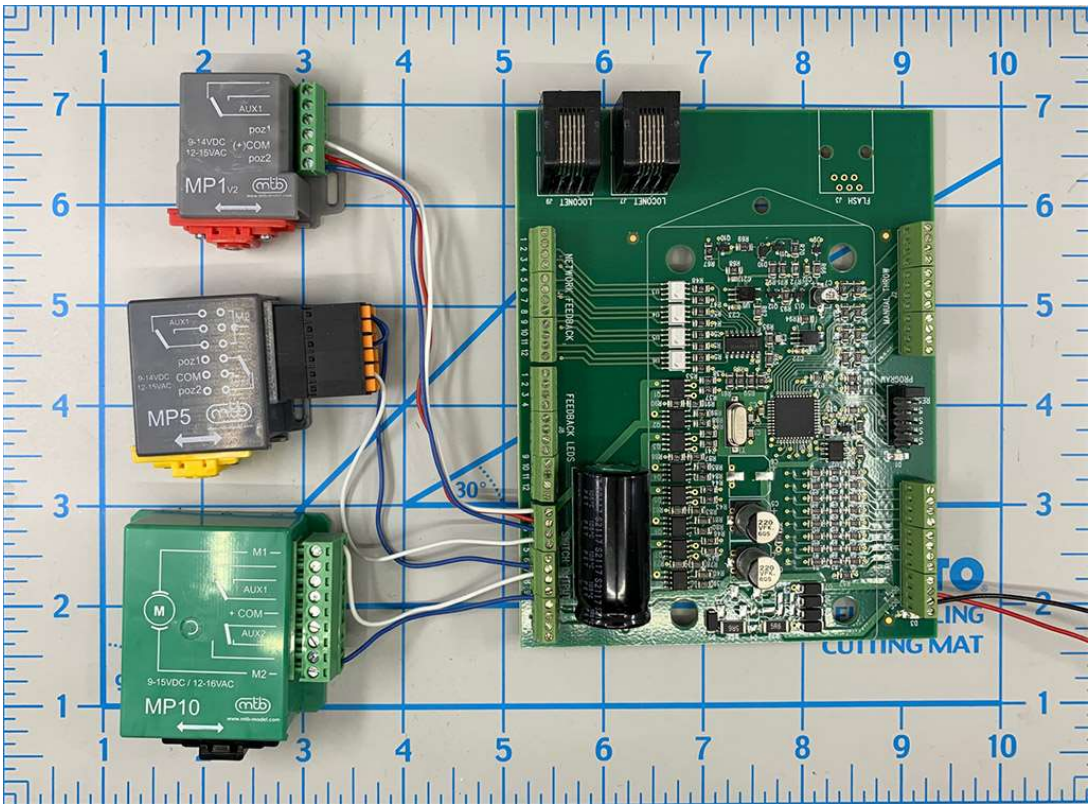


Figure 16 - Jack Wabbit with MP1, MP5 and MP10

Digitrax DS52

User Jay Fuller provided a DS52 for testing. He has had success with the MP1, configuring it as 3 wire device, in “slow motion” mode, with the top jumper on.

I configured the MP5 for 2 wire operation (one side to COM and the other to the two connections called out as M2). I configured the DS52 as a "slow motion" machine and wired the COM to terminal 1 or 6 and M2 to terminal 6 or 8.

I did try to operate the MP5 as a 3-wire slow motion machine, but the results were erratic, so I don’t recommend that.

Digitrax DS64

With MP1:

The DS64 has been a staple in the Digitrax community for many years. It can drive as many as 4 stall motors or twin coil machines and supports local inputs and some advanced features on the LocoNet Layout Control Bus. It can be used as an auxiliary decoder on any DCC system. To use the DS64 with an MP1, program your DS64 per page 5 of the DS64 manual as a slow motion switch.

Being careful to disconnect the DS64 from power and DCC track, connect the 1R lead to Poz1 on the MP1, 1G to Poz2 and P+ to the Common on the MP1. The reconnect the DS64 to track and power.

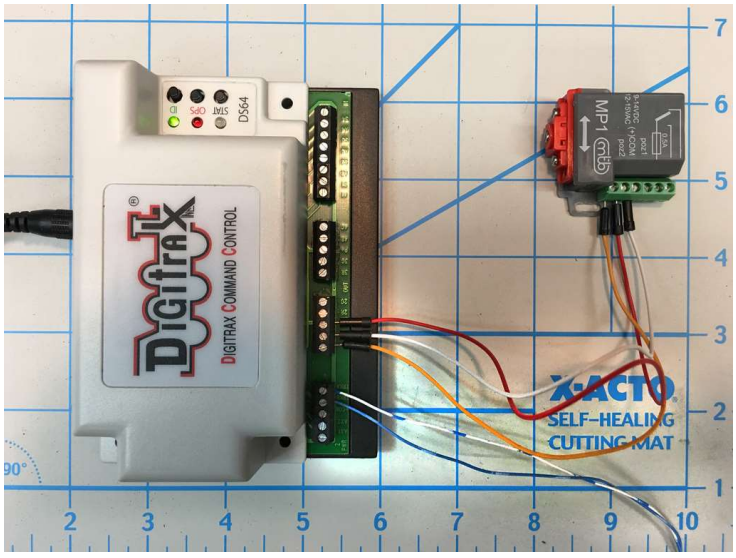


Figure 17 - MP1 with DS64 as the first device

DS64 with MP5

User Mike Hughes posted in his blog on MRH

https://model-railroad-hobbyist.com/node/42200#comment-468786

the gist of his solution is

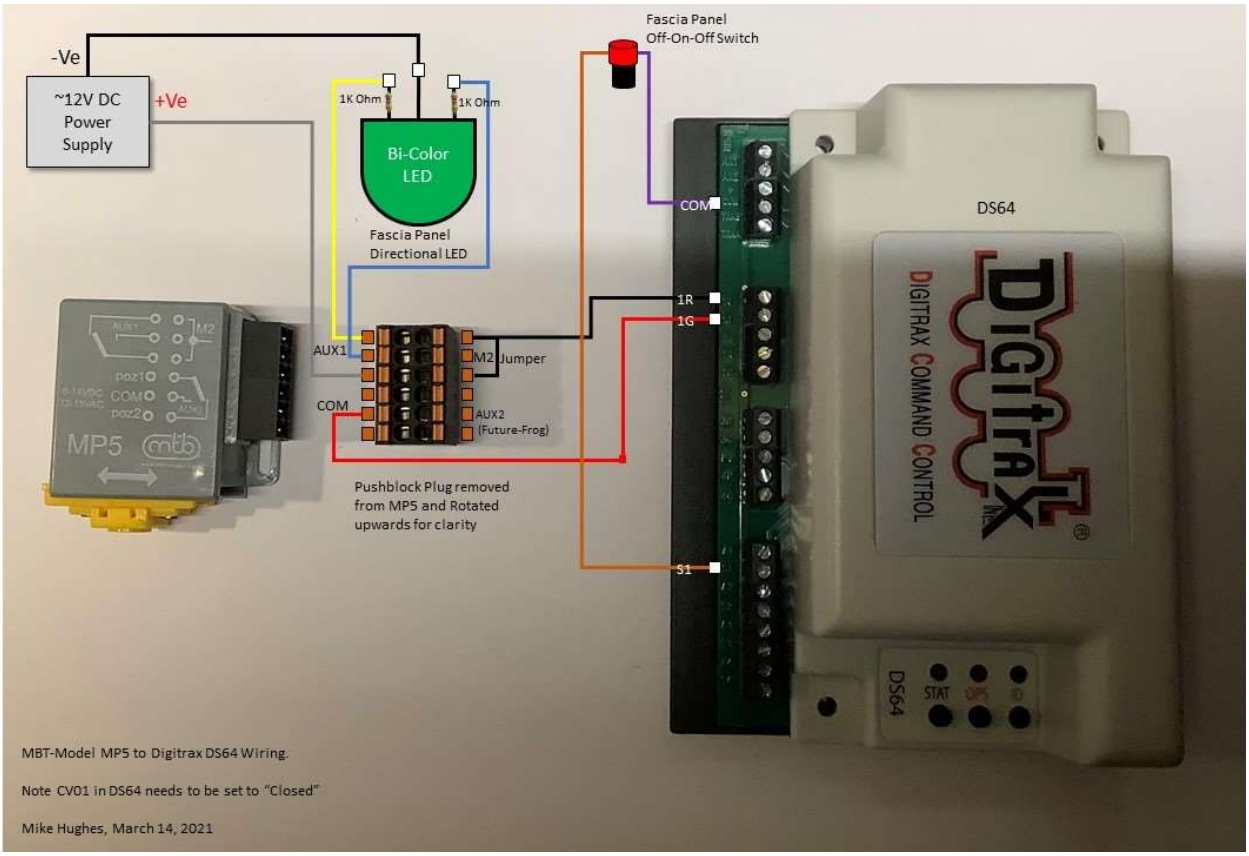


Figure 18 – Mike Hughes' schematic for MP5 and DS64

And Mike's notes:

- The only thing needed to control an MP5 with a DS64 are the red wire from COM to 1G (or 1R) and the black Jumper and wire from MB2 to 1R (or 1G)
- The LED circuit I'm using has its own power supply and the current direction is switched by the AUX1 portion of the MP5.
- The push-button is only connected to the DS64 and has nothing to do with the MP5. It is an alternative way of triggering a turnout if you happen to be standing in front of it and would rather use the push-button on the facia rather than your Digitrax throttle. Of course, when it triggers the DS64, the MP5 gets triggered by the DS64.
- As shown, this is a drop-in substitute for a Tortoise.
- Make sure your DS64 is in **Stall Motor mode** (***CV01 set to Closed***) as described in the Digitrax **Manual** for the DS64.
- Unplug the DS64 from Loconet and remove the power source whenever tinkering or you might bugger it! [Always a good idea while wiring – Seth]
- I recommend using solid rather than stranded wire [me too – Seth]

- The push block is awesome but requires a fair bit of force and trying to juggle it while making sure you don't have errant strands of stranded wire may cause you to accidentally put a wee screwdriver through your finger! [Try to use 22 Ga wire for this – Seth]
- Make sure you pay special attention to the labelling on the MP5 - it's easy to accidentally run wires to the wrong row on the push block.
- I'd recommend doing the wiring with the push block joined with the MP5, or label the top side of the push lock with a sharpie or something. It will only plug in one way, but it is hard to tell which side is which when it's unplugged. [the slightly smaller pins go towards the bottom of the MP5]
- I'm using 26 gauge solid wire. If I'd been thinking better, I would have bought a lot more colours of wire before I started this layout and then things would be much easier to trace.

DS74/SE74 with MP10

User Tim Kelley posted this on the DIgitrax List after receiving a pre-production MP10:

> "I am **VERY** happy to report that I got MTB's MP10 switch machine working with a Digitrax SE74 signal decoder.
> I believe that a Digitrax DS74 quad switch stationary decoder is very similar to the SE74 so I would guess that the DS74
> would also work with this method but I don't have one to test with to confirm that. Both the SE74 and the DS74 can be used for driving up to
> four switch machines. (turnout motors). The MP10 is the next generation of "slow" switch machines from MTB. Thanks very much to Seth at modelrailroadcontrolsystems.com
> for hand holding me into getting this working. Actually it was pretty simple but I'm a software guy so needed some additional coaching. The MP10 should be
> available for general purchase next month (June).
> I did NOT have to change any OpSwitches on the SE74 to get the MP10 working. OpSwitch #1 does need to be set to operate in
> pulse /. solenoid mode (OpSwitch 1 = Thrown) **NOT** slow motion mode. (This is the default setting) The MP10 does NOT come with a mounting template but it's base footprint
> appears to be identical to that of the Tortoise switch machine, so I just used my mounting template for the Tortoise which I already had lying around.
> The MP10 is ONLY 20mm tall while the Tortoise is 83mm tall so it is only 25% of the height of the Tortoise.
> If you look at the wiring diagram on page 2 of the SE74 instruction manual it is pretty straightforward.
> The SE74 / 1R pin goes to the MP10 port labeled M2.
> The SE74 / 1G pin goes to the MP10 port labeled M1.
> The SE74 / P+ pin (on the connector at the far left side of the SE74) goes to the MP10 port labeled COM."

NCE: Don't Use a Switchit, Switch-8 or Snapit, use the Switch-Kat

NCE's Switchit/Swithchit 8 series are fine DCC auxiliary decoders for stall motors, however they can only handle 60mA (fine for up to 3 Tortii – as they point out) but they cannot provide the 120mA the MP Series switch machines require while it is moving. The MP Series switch machines turn off and draw no current when they reach their limit of travel so overall power consumption is far lower over time as MP Series switch machines move in about 1.5 seconds, but they won't work with the Switch-8. If you've already got a Switch-it or Switch-8 in place and want to keep it there, try our Stall Motor Control Adapter for MP Motors (see figure 15).

NCE makes, or made, a Dual-Relay unit that operates off one channel of a Switch-8 but it's a bulky and expensive solution. You can use our Stall Motor Control Adapter for MP Motor if you just need to replace a stall motor and want to make minimal wiring changes, leaving your switch-it or Switch-8 in place – or if you have an unused section of a Switch-8 available. See figure 15 above.

The Snap-it will sink lots of current but the pulse only last for 100mS which isn't long enough for the MP1 to complete its travel

NCE's Switch-Kat:

User John Eldridge brought the Switch-Kat to my attention. This is a wonderful single device controller. Note that as of June 2023 some dealers report not being able to get this product from the manufacturer apparently because of parts shortages.

1) MP1 - works 2 ways:

a) use the "SWITCH" outputs with a pair of diodes (1N4001s worked fine) per figure 4 above. (diodes from Poz1, Poz2 with Cathodes (pointy ends) to COM). See note below on CV515.

b) connect the MP1 to the position indicator pads, N=Poz1, R=Poz2 and center=COM. Note that the three pads for position indicator are on 0.100" spacing and work with standard headers and terminal blocks. I recommend soldering a terminal block onto the Switch-Kat rather than soldering wires to the board. The connectors are about $0.30 ea. in 10s from a variety of sources.

2) MP5 – Didn't test.

3) MP10 - works 2 ways:

a) Connect the Switch-Kat SWITCH outputs to M1/M2 (2 wire mode), no diodes necessary. See note below on CV515.

b) Connect the position indicator pads N=Poz1, R =Poz2 and center to COM

Note:

if you are using the SWITCH outputs, be sure to program CV515 in Accessory mode per page 4 of the Switch-Kat instruction sheet (use a power cab or the programming track of an NCE command station) to "0" which leaves the outputs on rather than pulsing as the maximum pulse length (255 mS) is too short for the MP to complete its travel. Factory default pulse length is 40mS which will cause the MP motor to stop in the middle of travel.

RR-Cirkits

The only RR-Cirkits switch motor driver that will ***not*** drive the MP1/MP5 is the SignalMan. The SMD-8 and MotorMan devices should have no problem. I have not actually tried the SMD-8, but I don't see why there would be any issue with it.

Tam Valley Depot Turtle (these are discontinued as of this writing -- August 2021 but if you find one, it's worth a try)

The Turtle is a 1 channel DCC controller which also supports fascia switch control and indicators. See the manual: https://www.tamvalleydepot.com/images/Turtle_Manual_v01.pdf The turtle works with MP1 but not the MP5.

Non-DCC Electronic Controls:

Barrett Hill Shops

Barrett Hill Shops' Real-Switch Relay Base – 4 output https://www.berretthillshop.com/store/products/relay-base/ can control up to 4 MP series motors in 3 wire mode as part of their "Touch Toggle" system. For each of 4 circuits:

1. Select the appropriate touch toggle (several styles, with different colors and choice of tile (behind plexiglass) or recessed "minicups") and plug into the **Relay Base** which provides power.
2. Connect Poz1 and Poz2 (M1, M2 on the MP10) on the MP Motor to the red and green contacts on the relay corresponding to the touch toggle.
3. Use the left terminal of the AUX power connector on the relay base to provide +12 to the COM/+COM terminal on the MP motor
4. Use the right terminal of the AUX power connector to provide a ground to the center terminal of the relay corresponding to the touch toggle.

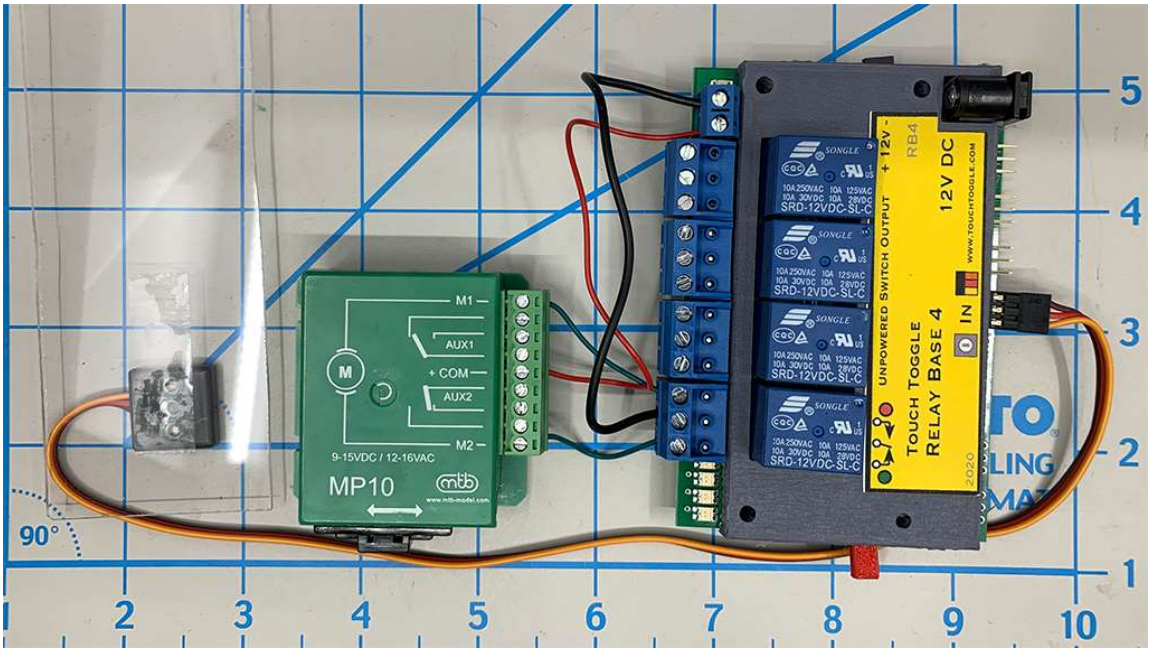


Figure 19 - Berrett Hill Real Switch Relay Base with MP10

General Comments on Installing MP Motors:

I recently (December 2022) installed a couple of MP5s to replace some very old Tortii (the contacts eventually fell off the actuator arm) on my layout and had to get into some very tight places. Some things I learned:

a) consider the location of the connector before starting and set things up so you have enough room to install/remove it or prewire everything before starting the installation. (same for the screw terminals on MP1s). Also leave some room to adjust the actuator height adjustment screw, that way you can just drop the actuator when you're done aligning the motor, rather than trimming in place and risk nicking the rails (ask me how I know <g>).
b) Use music wire (0.032, 0.039 or 0.047) instead of the rigid pin supplied with the motor
c) Xuron makes a hard wire cutter for music wire, don't try to cut music wire with rail nippers: you'll wreck them. You can also cut music wire with a Dremel cut-off wheel, but it's a pain and the disks can shatter, so wear eye protection.
d) The mounting ears are designed with 2.5mm screws, available from many sources, #2 sheet metal screws also work. I've gotten 2.5mm x 8mm screws on eBay and from offshore sources
e) We've made mounting adapters with 1/8" craft plywood so we could secure the motor to the adapter with the 2.5mm screws and then did an initial set up with carrier-less tape on the back of the adapter. Once we were happy with the alignment, we used #4 sheet metal screws to secure the mounting adapter. TT-West (the North American importer of MTB Products) has designed laser cut adapters which we offer.
f) If you want to use the 2 small screws in front of MP to adjust the horizontal position, loosen them first as they are tight and will be hard to adjust under the layout. Generally using music wire and the 6mm cam setting is easier.

g) If you want to play with the cam, be careful gripping the pin: then tend to fly off into the KaDee coupler spring dimension. MTB supplies extra can pins in the packet with the rigid pins.

Mechanical Issues

The rigid actuating pins provided by MTB do not allow much play and puts a premium on precise location of the motor. This can be difficult for under-table mounting, so we recommend using 0.039" or 0.047" music wire which has a little give. For top side mounting I use a smaller gauge music wire, like 0.020" and a Z bend to absorb some overthrow. Richard Brennan (TT-West) has designed an adapter plate to which the motor mounts, and this has slots to help adjust the position. Look for it on our website http://www.modelrailroadcontrolsystems.com/switch-motors-drivers-mounts-etc/.

Note the slots in the "ears" are for 2.5mm screws.

Sound Deadening Techniques on Foam Benchwork

Michael Petersen started a thread on the proto-layouts group about mounting MP motors to foam benchwork: "once mounted to the underside of the 2" foam (using double sided foam tape), the noise became obnoxious: https://www.youtube.com/watch?v=man0dpG5JV8

"The foam is amplifying the vibration of the motor and basically turning into a giant speaker cone. Has anyone figured out a way to minimize or dampen the resulting sound from a switch machine when using foam as a scenery base? I suspect servos have a similar problem. Not sure about Tortoises. "

I (the author) wrote: "mount the MP motor on a small wooden block and then cut a hole to match in the foam. You can cut all the way thru the foam board and hot glue the block to a piece of masonite or luan and glue that to the bottom of the foam and it won't make as much noise. All that said, foam is noisy."

Michael replied "I tried a piece of thin plywood and that did help take the edge off the sound. But then I combined that idea with some of what I had read last night about general (non-MR) sound deadening techniques. I tried putting the switch machine on a chuck of a steel I had cut off a large angle brace. Much better! Intuitively I would have thought the steel would be a better sound transmitter, being nice and solid. But from what I was reading last night, sound deadening also relies on mass (i.e. inertia). It still needs some more experimentation, but I suspect the larger mass of the steel plate provides enough inertia to resist transmitting the switch motor vibrations to the foam."

Another poster commented: "We used a material called dynamat on door speaker installations to prevent rattling. It's essentially a very mass heavy sheet of pliable material with adhesive on one side. The idea is that it adheres and forms over the base you're installing the speaker on and adds lots of mass in a small space. The mass absorbs the vibrations.

https://www.dynamat.com/applications-industries/automotive-and-transportation/

Don Mitchell offered: “Using a thick coating of silicone adhesive to glue Tortoises to plywood is a fairly effective noise deadener. Might work on foam if willing to glue instead of screw.”

Allen Montgomery added: “I took a couple steps to avoid this...[noise]. As I am building freemo modules, I have the main line on the 1' mark straight down the module. I put a piece of 3/4" plywood under this the whole way so the luan sub roadbed is right on that. Then the 2" foam fills in the voids of the framework, but I put a layer of luan under the foam so I can attach anything I need to that. I'm hoping that's as far as I need to go (to kill the noise of the foam).”

Scott Haycock asked: “I wonder if a layer of cork (or closed-cell foam) laminated between the foam, and the wood block that the machine is mounted on, would help?” to which Michael replied: “Cork by itself does no good. Again, back to the mass argument. However, I tried laminating like you suggest and it does seem to improve every method slightly. I'm guessing the mass of whatever the switch machine is attached to (wood, steel, etc) dampens the vibrations and the cork attenuates the transmission to the foam.”

The discussion continued with the conclusion that mass/density is the main attribute but that a layer of foam or double-stick tape helps incrementally. If you have a different technique, please send it along and I’ll insert it in a future version of this app note.

Conclusion

This is not an exhaustive list of all possible control circuits and mounting techniques, but it will get you started with the MP Series Switch Machines. By the way if you have a control circuit you’d like us to test, send us an email at sales@modelrailroadcontrolsystems.com and we will test a unit you send us (we’ll send it back free with your order!)