MO-1

Item #567

Momentum control for AC and DC applications.

DALLEE ELECTRONICS, Inc.

246 W. Main St.
Leola, PA 17540
(717) 661-7041
www.dallee.com

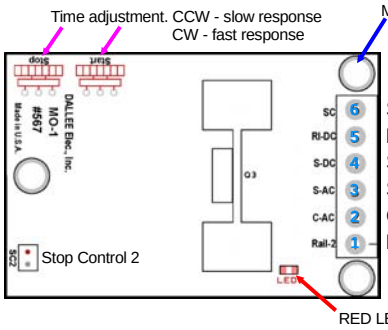


Fig 1: MO-1 connections

SC.....Stop Control
R1-DC...Rail 1-DC, common to stop rail DC
S-DC.....Stop - DC
S-AC.....Stop - AC
C-AC.....Common rail to stop rail AC
Rail-2.....Rail-2 DC = opposite rail, AC = opposite rail's track power

Install wires by stripping insulation back 3/16", place wire in hole, run screw down (CW) to clamp in position. Best to use stranded wire. Suggested wire sizes: SC wires can be 24 - 30 awg, Rail-2 input 20 - 26 awg, The track power inputs should be 12 - 18 awg.

The MO-1 provides the addition of momentum starts / stops of trains, trollies, or other items that a gradual on/off control is desired using AC or DC track power. By using momentum control to the start/stop control, wear and tear on the gear drive and motor can be greatly reduced even if the contols are set to the fastet response. The MO-1 can handle a total of 8 ampere's AC or DC. It's DC operation is limited to only one polarity, the opposite polarity will result in a passing of that power without any momentum control's. To obtain momentum in both directions, as in a Back-N-Forth, it is necessary to use the unit at the cab side (power unit powering the track). Drawings for use with our DC Back-N-Forth can be found on our web site as well as our Wiring Guide #20 or newer. When used in this mode, DC power is limited to 8 amperes maximum. Checking the black vertical heat sink should be done to make sure it's not super hot, if it is, then the load current being controlled needs to be lowered or damage to the MO-1 may occur. Burn out damage from overloads is not covered by warranty, whether expressed or implied. The MO-1 is intented for connection to loads for track segments, not continuous power for a sustained period of time, doing otherwise may result in overheating.

Installation: Find a convenient location to place the MO-1 board. By using three #6 wood screws, secure the MO-1 to your control board. Connections are shown for general connections. They differ as to which type of track power you are controlling and by how you are controlling the MO-1. Basic drawings are shown with these instructions. More may be found on our web site or Wiring Guide. Follow the connections as shown on the wiring diagram that matches your application. The MO-1 has two input's for controlling it's operation. The "SC" input is common to the track power, as shown, the switch input utilizes the Rail-1 DC connection. This connection, while not used for AC operators, still contains power that is connected to the AC terminals. So care needs to be taken to make sure that these input wires do not connect / touch anything that it should not be. The "SC2" input is an optically coupled Stop Control input. This input is set to accept 12 volts DC and is polarity sensitive. The MO-1 comes with a two pin jumper wire that allows it to easily connect to the Trak-DT family of detectors. The "EXP" connection on the Trak-DT units can be directly plugged into the MO-1 "SC2" connector. If you desire to use anything else for control in the "SC2" input, then the jumper wire assembly may be cut in two. The red wire is the "+" connection and the black is the "-" connection. Failure to use correct polarity may damage the MO-1. If you are using an expansion relay board, item #555, with the Trak-DT units, then you can splice the 555 relay board into the two wires jumper harness to also utilize the 555 expansion relay. No harm will occur when doing this. If cutting the jumper wire set in two, be sure to connect them to the same wires or damage will occur to the MO-1's "SC2" input.

When using the Trak-DTRL, the "SC" input has to be used since it does not have any other output connection. It may be necessary to power an expansion relay from the DTRL's relay to yield enough connections for your application.

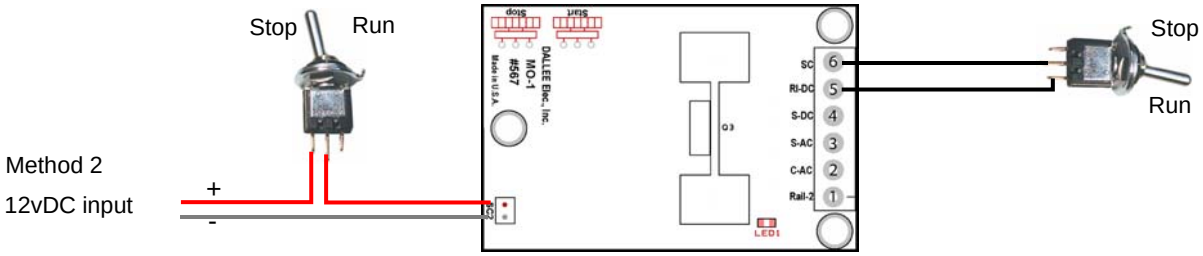
Operation: When first powering up the MO-1, it will illuminate it's RED LED indicating a stop. This prevents an engine from running when first powering the board which with automated systems could be devastating. If the power input is not connected properly, you will not see the RED LED turn on upon first power up, and DC operators will experience full power to the load that they are attempting to control.

If the "SC" and "SC2" are not activated ("SC" requires a switch closure for activation, "SC2" requires 12vDC input to activate) upon power up, a timeout will occur and then the load / track will gradually be given power according to the "START" potentiometer's setting. Whenever the stop control is activated, the output of the MO-1 will gradually reduce the power to the load / track until it is fully stopped. Again the timing is controlled by the "STOP" potentiometer. When operating a train, the engine needs to be contained within the controlled section of track for the full time set. Otherwise it will not be controlled by the MO-1 and will assume full track power. Illuminated passenger cars must also not bridge the track power from the main section to the MO-1 controlled section. If this happens, full power will "jump" into the reduced power section causing the passenger train not to stop in a smooth fashion. The easiest way to prevent this is to have the Trak-DTT2 (or whatever you are controlling the MO-1 with) only activate the MO-1 once the entire train is contained within the MO-1's controlled area. Keep this in mind when setting up the controlled area's for the momentum control installation.

Basic control modes:

1 - using a switch with input "SC".

2 - using a switch with power to "SC2".



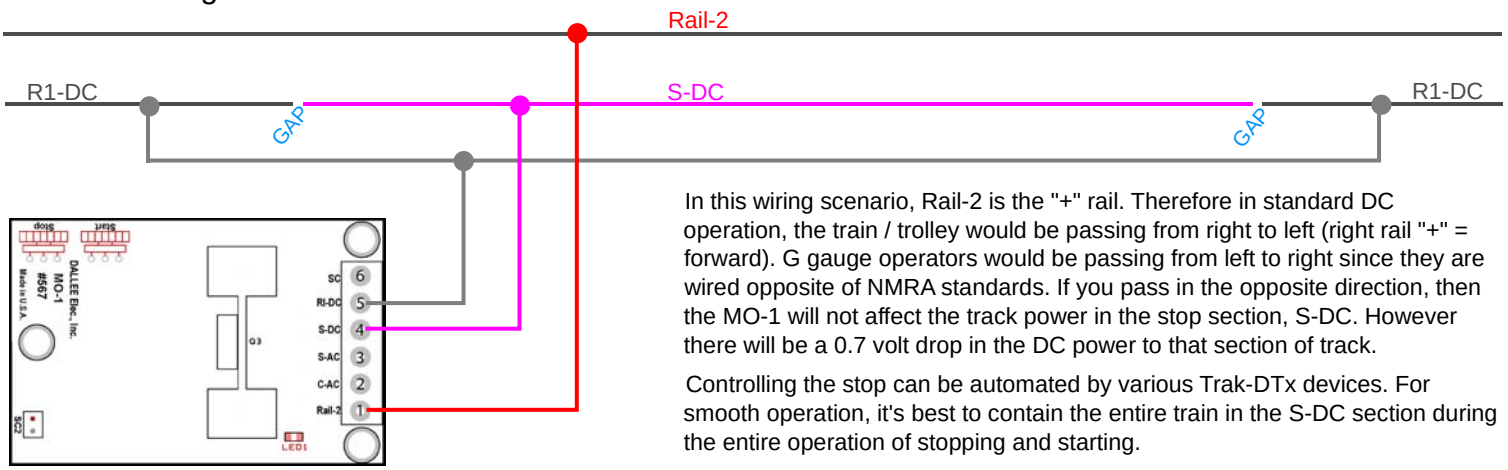
These are the control connections of the MO-1. They will not be redrawn in the rest of the instructions since either method may be used to control the MO-1.

If higher than 12 volts DC is used, an external limiting resistor must be used in series with either the + or - line into SC2. Suggested values: 18v - 470 ohm, 24v - 1k ohm.

As stated before, SC2 can be directly plugged into the "EXP" connector of our Trak-DTx family of detectors. The shown switch can be replaced by a relay contact as well.

Either or both inputs can be used. If both are used, either input in the Stop position will make a stop function. Both have to be in the Run position to make the MO-1 apply power to the load.

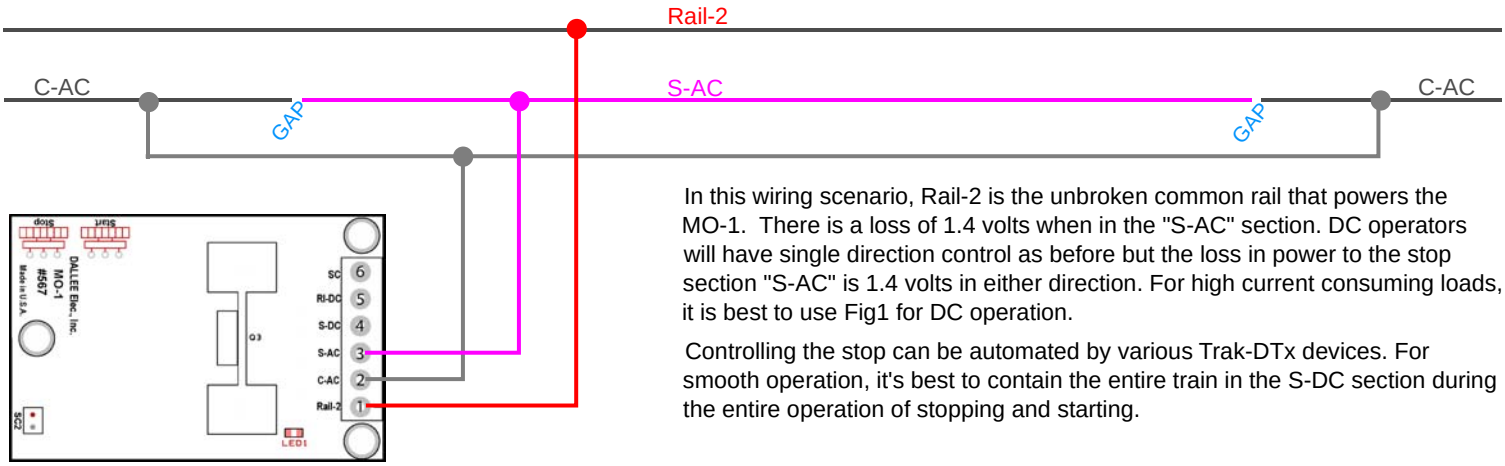
DC - Single direction control



In this wiring scenario, Rail-2 is the "+" rail. Therefore in standard DC operation, the train / trolley would be passing from right to left (right rail "+" = forward). G gauge operators would be passing from left to right since they are wired opposite of NMRA standards. If you pass in the opposite direction, then the MO-1 will not affect the track power in the stop section, S-DC. However there will be a 0.7 volt drop in the DC power to that section of track.

Controlling the stop can be automated by various Trak-DTx devices. For smooth operation, it's best to contain the entire train in the S-DC section during the entire operation of stopping and starting.

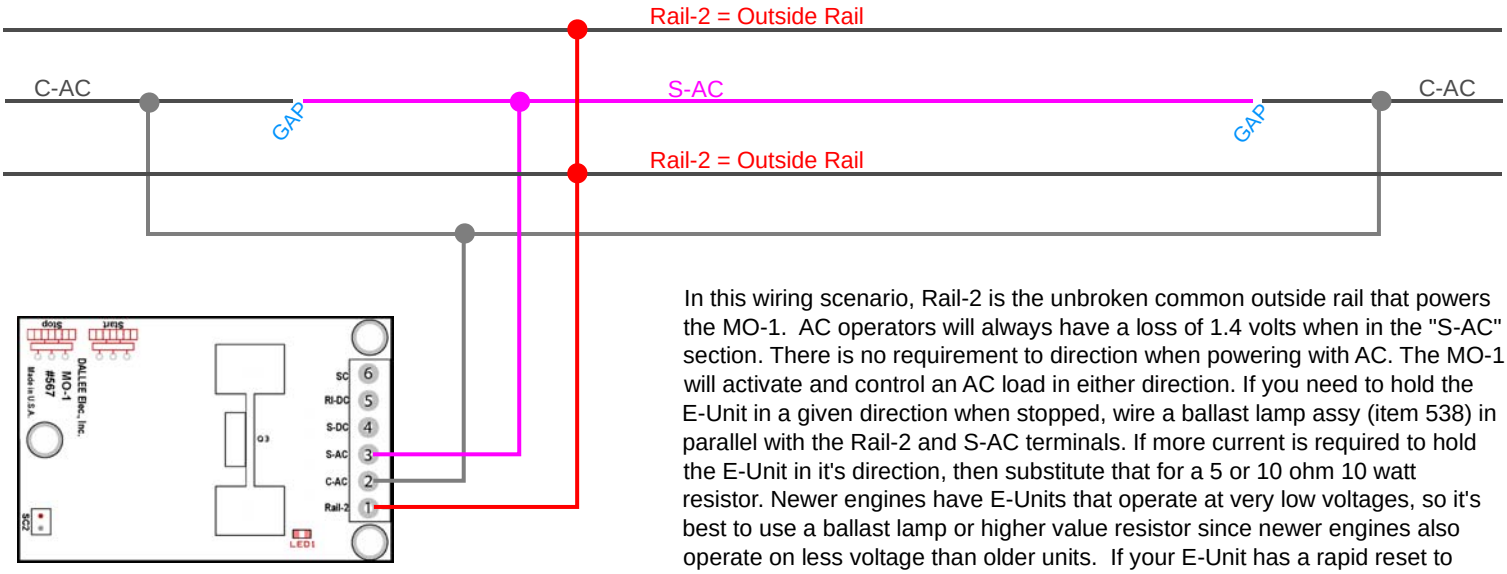
Two Rail AC or DC



In this wiring scenario, Rail-2 is the unbroken common rail that powers the MO-1. There is a loss of 1.4 volts when in the "S-AC" section. DC operators will have single direction control as before but the loss in power to the stop section "S-AC" is 1.4 volts in either direction. For high current consuming loads, it is best to use Fig1 for DC operation.

Controlling the stop can be automated by various Trak-DTx devices. For smooth operation, it's best to contain the entire train in the S-DC section during the entire operation of stopping and starting.

3 Rail AC

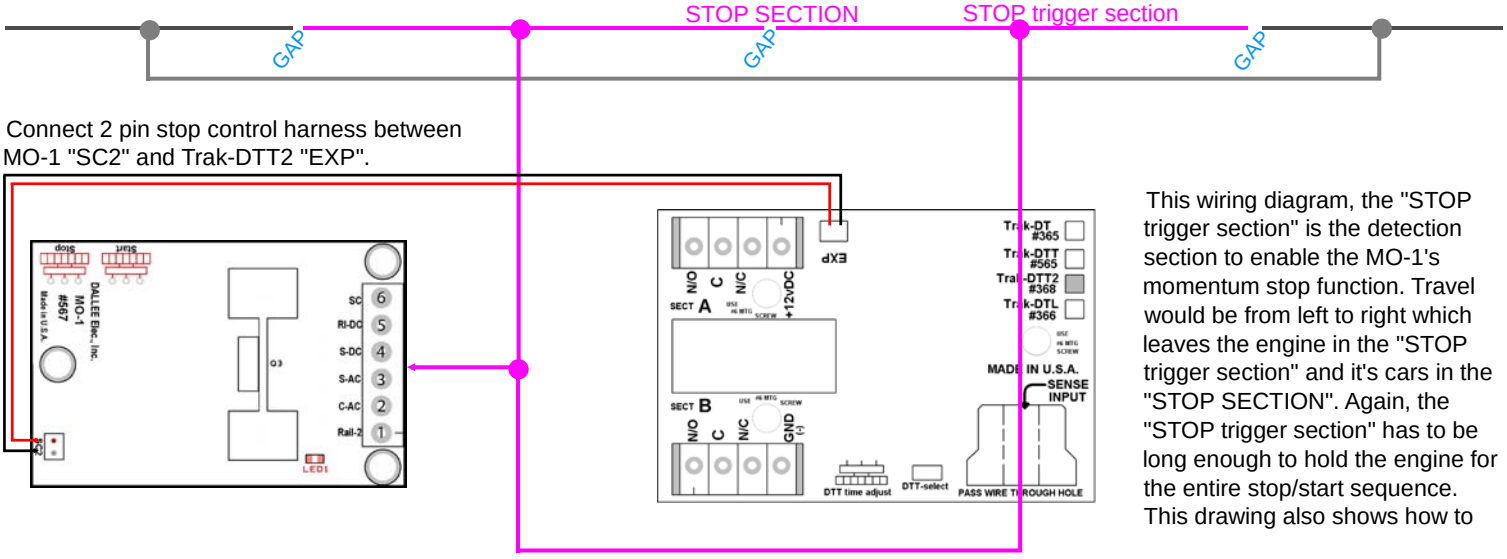


In this wiring scenario, Rail-2 is the unbroken common outside rail that powers the MO-1. AC operators will always have a loss of 1.4 volts when in the "S-AC" section. There is no requirement to direction when powering with AC. The MO-1 will activate and control an AC load in either direction. If you need to hold the E-Unit in a given direction when stopped, wire a ballast lamp assy (item 538) in parallel with the Rail-2 and S-AC terminals. If more current is required to hold the E-Unit in it's direction, then substitute that for a 5 or 10 ohm 10 watt resistor. Newer engines have E-Units that operate at very low voltages, so it's best to use a ballast lamp or higher value resistor since newer engines also operate on less voltage than older units. If your E-Unit has a rapid reset to Forward, such as all of our E-Units do, then you don't have to add anything other than just make sure that the stop time is adjusted long enough so that the E-Unit resets to the Forward direction before it's stop time is up (assuming that the engine / trolley was running in Forward to begin with).

Controlling the stop can be automated by various Trak-DTx devices. For smooth operation, it's best to contain the entire train in the S-DC section during the entire operation of stopping and starting.

Stop Detection

The following drawings only show the rail used to perform the stop/start function. The rest gets connected as per the previous applicable application.



This wiring diagram, the "STOP trigger section" is the detection section to enable the MO-1's momentum stop function. Travel would be from left to right which leaves the engine in the "STOP trigger section" and it's cars in the "STOP SECTION". Again, the "STOP trigger section" has to be long enough to hold the engine for the entire stop/start sequence. This drawing also shows how to split up the "STOP trigger section" into two areas. If you would like, the "STOP trigger section" can be the entire length but if doing it that way, you will have jumps in power when illuminated passenger cars enter the area. If stopping in both directions, you will need to make another "STOP SECTION" to the right of the "STOP trigger section" just like the one to the left adding another gap and jumper wire to power it. This way symmetry will be kept for the stopping area.

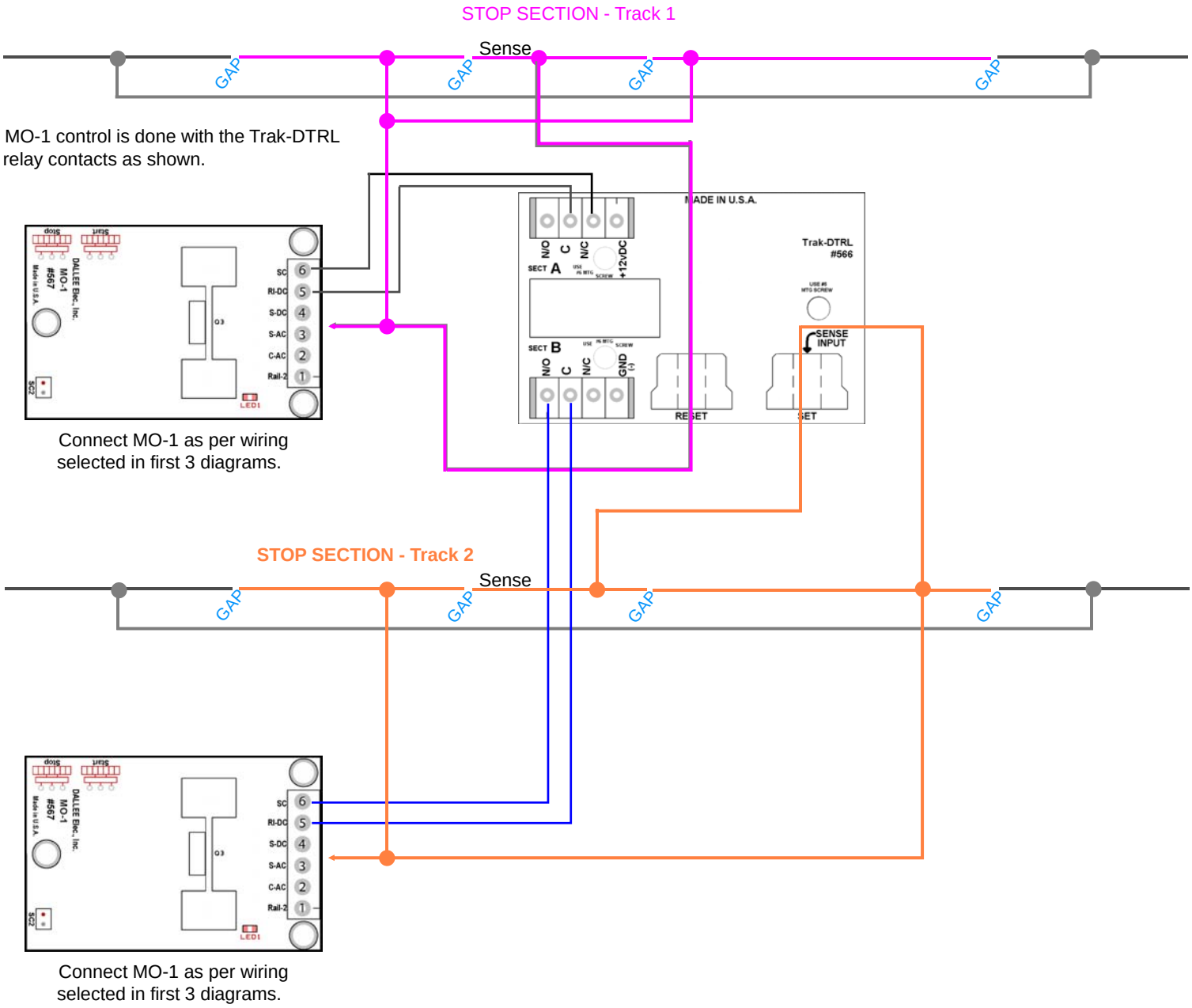
Connect MO-1 as per wiring selected in first 3 diagrams.

Trak-DTT2's "DTT-select" jumper must be removed and the "DTT time adjust" must be set to 9 o'clock or longer. This sets the time that you will be stopped before MO-1 reapplies track power. Timing adjustment must be set long enough to enable the deceleration, stop, and acceleration. If too short of a time is set, the Trak-DTT2 will not be reset correctly for the next stop nor will the train come to a full stop. If operating with an illuminated caboose, it needs to enter the "STOP trigger section" before the engine leaves. Otherwise the stop will only occur every other pass.

Trak-DTT2 must be powered from the 12VPS (item 369, not shown). The sense wire gets passed through the sense coil w/o stripping any insulation. It's relay contacts are free to operate whatever else you might like during it's stop time. One might like to have a red/green signal illuminated via the relay contacts or some other item.

Wiring for advanced operatiors.

Alternating Train Stops



This scenario requires two MO-1 units, a Trak-DTRL and a 12VPS if you don't already have one to power the Trak-DTRL. The basic operation is that train 1 enters the momentum control block. This block is also sensed by the Trak-DTRL's sensor. Upon sensing current flow, the Trak-DTRL's output is set to allow the MO-1 on "STOP SECTION - Track 2" to start the train sitting there while setting the entering train on "STOP SECTION - Track 1" to stop. The Trak-DTRL is designed so that whichever sense coil activates first, that sense coil overrides the other. Hence when the "RESET" sensor has current flowing in it, the "SET" sensor has no effect. While this shows a simple way of doing things, it has it's drawbacks for the minimal wiring. The main one is that the train leaving must completely exit the sense area before the other train comes to a stop. Otherwise the Trak-DTRL will sense the opposite sensor's input. To help eliminate this problem, the sense section has been added a bit into the sop area, after the initial sense section. This way the Trak-DTRL will trigger when the train enters the sense section and the leaving train should already be cleared of the sense area. This means that the "STOP SECTION" needs to be long enough, on each side of the sense section, so that the train is housed in either the left or right side of the sense section when stopped. This way the train pulling in cannot possibly trigger the DTRL to release the other train that's pulling out. The "sense" section should be long enough to encompass the length of one engine.