

VCMSII Change of Direction Alarm, Lighting and Motion Module RST-VCMS2-PM1-CTRL1-SPC305

Purpose: The RST-VCMS2-PM1-CTRL1-SPC305 is designed to provide a hi-rail vehicle with the needed control and changes to the vehicle lighting while on-rail, while also providing for audible alerts whenever the vehicle changes direction or is in motion, to comply with FRA 214 and APTA on-rail regulations.

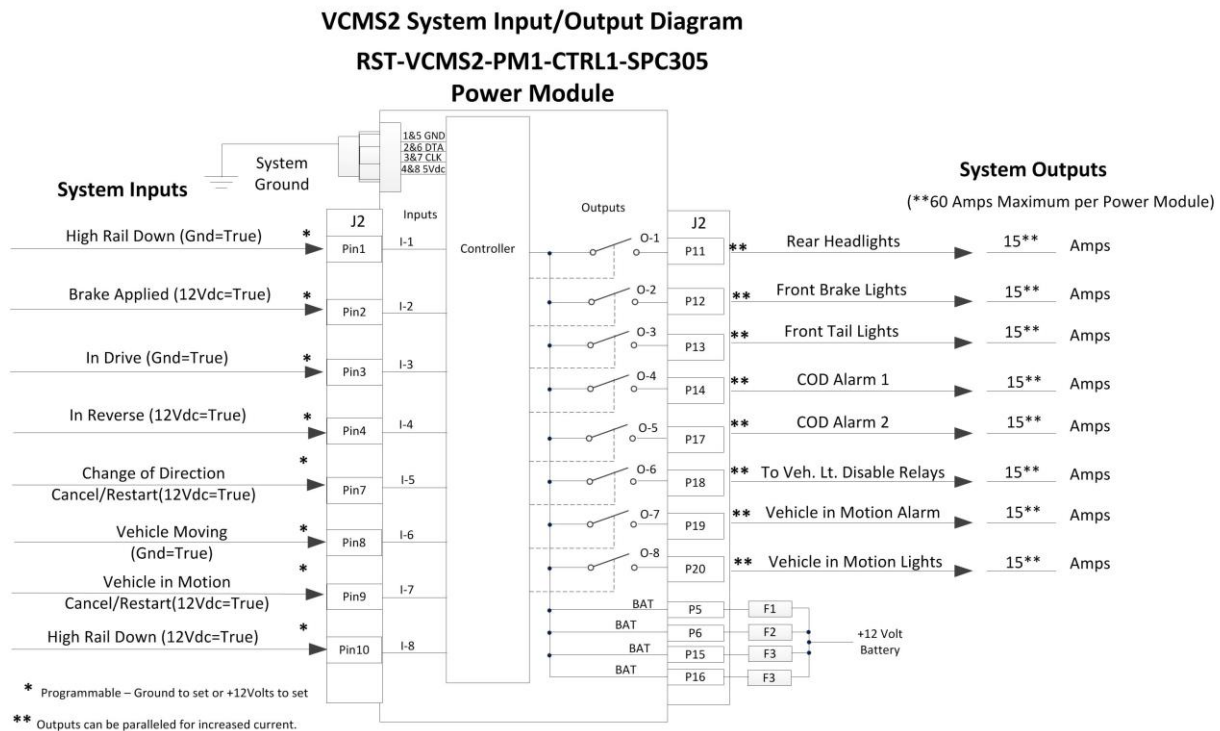
The system requires the following signals to be provided to the following pins, in order for the system to function:

- Brake Applied (I-2, Input 2)
- In Drive (I-3, Input 3)
- In Reverse (I-4, Input 4)
- Vehicle in Motion (I-7, Input 7)

These signals may be sourced from the chassis or OEM sources, or to avoid the need to hard wire to the chassis, these signals can be provided from an optional InPower DBT-MD-C module (see page 7).

The RST-VCMS2-PM1-CTRL1-SPC305 module may be connected to installer-provided switching, or to an optional InPower VCMS2-SS232 switch system (see page 7).

RST-VCMS2-PM1-CTRL1-SPC305 Power Module System Diagram



VCMSII System and Interface Description:

Change-of-Direction Alarm

The Change-of-Direction alarm is designed for hi-rail vehicles and provides an automatically-timed four second audible alarm whenever the vehicle changes direction while the hi-rail gear is down. The Change-of-Direction alarm output can be connected to provide a pulsing output (O-5), or a steady state output (O-4) during the four second timer period. This Change-of-Direction alarm can be cancelled immediately and automatically reset for another cycle if the Cancel/Reset Input (I-5) gets an override +12Vdc signal from an installer-provided switch, or from the VCMS2-SS232 switch system (if used, see page 7).

Vehicle-in-Motion Alarm

The Vehicle-in-Motion alarm is designed to provide an audible alarm (O-7) anytime the vehicle is on rail and is in motion (forward or reverse). The Vehicle-in-Motion alarm can be cancelled by applying +12Vdc to (I-7) of the module, or by using the Motion Alarm Cancel signal output from the VCMS2-SS232 system (if used, see page 7). Whenever the Vehicle-in-Motion alarm is cancelled, a flashing output (O-8) is supplied to the Vehicle-in-Motion lights. At all times, when the hi-rail is down and the vehicle is in motion, either the audible alarm or flashing light output will be active. Anytime the motion cancel input (I-7) is activated, the mode will toggle from audible alarm to visual flashing alarm, and when activated again it will toggle back from visual flashing alarm to audible alarm. The Audible Vehicle-in-Motion alarm will be the default when the hi-rail is first activated.

Change-of-Direction Lighting

The Change-of-Direction lighting is designed to provide for the exchange of headlamp lighting and brake/tail lamp lighting from front to rear when both the hi-rail gear is down and the vehicle is in reverse. With the hi-rail down and the vehicle in reverse gear, (O-6) supplies +12Vdc to the disable-relays installed on the front and rear of the vehicle (see page 1, SPC305 Input Output Diagram). This disables the relay which disconnects the standard headlights, diverting them to (O-1) for activation the rear headlights installed on the rear of vehicle, and disconnects the standard brake and tail lights on the rear of vehicle, diverting them to the front lights (O-2) Brake and (O-3) Tail lights installed on the front of the vehicle.

Notes:

- 1) In all cases, the hi-rail must be down for the Change of Direction alarm, Change of Direction lighting, and the vehicle motion features to be active.
- 2) The RST-VCMS2-PM1-CTRL1-SPC305 must be grounded via the 8-Pin Molex connector, using the black wire located in Pin 1 of Connector J1.

Functions of the Inputs/Outputs for RST-VCMS2-PM1-CTRL1-SPC305

Connectors: The RST-VCMS2-PM1-CTRL1-SPC305 has two Molex Series 150 connectors [(1) 8-Pin (Molex P/N 33472-4801) and (1) 20 Pin (Molex P/N 33472-2001)], that provide all the inputs and outputs to your system. Connections to the pre-assembled blunt cut wires must be soldered and covered with a weatherproof sealed heat shrink tubing. Unused wires must be covered with waterproof heat shrink and taped back to ensure they do not short out or get used for other electrical applications.

The following tables show all the pins and their functions on the two Molex connectors.

INPUT Description:

Note* it is recommended that the inputs be sourced using the DBT-MD-C. If you do not use the DBT-MD-C the input signals will need to be sourced from the chassis using their respective body-builder's manual.

Inputs - 20 Pin Molex Connector (Molex P/N 33472-2001)				
Pin	Function/ Wire Color	Function	Type of signal (True State)	Description
1	(I-1) Input 1 White	High Rail Down	GND when True	This signal comes from a high-rail down proximity switch, providing a quality chassis ground that enables the entire system, and denotes that the vehicle is now "On-Rail" Note 1: without this high rail ground input the RST-VCMS2-PM1-CTRL1-SPC305 will not be operational.
2	(I-2) Input 2 White	Brake Applied	+12Vdc when True	This signal comes from the chassis and provides the signal for your front brake light circuit. <i>Alternately, this signal comes from the DBT-MD-01-SPC306 or DBT-MD-03-SPC329 Rail Decoder Pin 9 (Pink) wire if a DBT is used.</i>
3	(I-3) Input 3 White	Vehicle in Drive	GND when True	This signal comes from the chassis and is part of the CoD alert output logic. <i>Alternately, this signal comes from the DBT-MD-C-SPC306 or DBT-MD-C-SPC329 Decoder Pin 1 (Dark Green) wire if a DBT is used.</i>
4	(I-4) Input 4 White	Vehicle in Reverse	+12Vdc when True	This signal comes from the chassis and is part of the CoD alert output logic. <i>Alternately, this signal comes from the DBT-MD-C-SPC306 or DBT-MD-C-SPC329 Decoder Pin 10 (Tan) wire if a DBT is used.</i>
7	(I-5) Input 5 White	Cancel CoD Alarm Switch	+12Vdc when True	This signal comes from the CoD Cancel switch (installer provided), or as an output of the VCMS2-SS232 switch system (if used, see page 7). When activated, this input will cancel the CoD alarm during its four second timer period and resets itself for the next cycle.
8	(I-6) Input 6 White	Vehicle Moving	GND when True	This signal comes from the chassis and is part of the vehicle in motion alarm logic. <i>Alternately, this signal comes from the DBT-MD-C-SPC306 or DBT-MD-C-SPC329 Pin 15 (Gray) wire if a DBT is used.</i>
9	(I-7) Input 7 White	Vehicle in Motion Alarm Toggle	+12Vdc when True	This signal comes from a Motional-Alarm-Cancel switch (installer provided) or as an output of the VCMS2-SS232 switch system (if used, see page 7). When activated, this signal toggles the Vehicle-in-Motion alarm, to a flashing light output providing a silent-run Vehicle-in-Motion visual alert. To reset to the audible alarm, the cancel switch will need to be activated again, and will default back to the audible alert when the hi-rail gear is cycled.
10	(I-8) Input 8 White	High Rail Down	+12Vdc when True	This signal comes from a high-rail down proximity switch, providing a quality +12Vdc that enables the entire system, and denotes that the vehicle is now "On-Rail" Note 1: without this high rail +12Vdc the RST-VCMS2-PM1-CTRL1-SPC305 will not be operational.

POWER Input Description:

There are four battery power inputs to your RST-VCMS2-PM1-CTRL1-SPC305 (Pins 5, 6, 15, 16) – See System Diagram. Each of the inputs **are required to be fused at 15 amps**. You only need to connect the number of fused inputs required to carry the total load carried by your module. (e.g. for a total load 46-60 amps all four wires are required, while for a total load of 31-45 amps only three are required, etc.).

Note: Unused power inputs need to be properly insulated and tied back to avoid shorting them out or being used for other battery power requirements. These red inputs should only be used for the VCMSII installation!

Molex 8-Pin (Molex P/N 33472-4801) this connector can be purchased from your local supplier, or supplied with your kit using pre-assembled connectors with 12" blunt cut wires (CA-VCMS2-GRND). The 8 Pin connector has 1 black wire that grounds your system. If you need to make changes to either the 8-Pin or 20-Pin connectors care must be taken to use proper parts and tools by reviewing the InPower LLC Cable Assembly Bulletin (TB-137) for details related terminal part numbers, plugs, crimpers, etc. Changes made to the cables and connectors using improper or unapproved parts could void your warranty on these products and result in equipment damage.

Power - 20 Pin Molex Connector (Molex P/N 33472-2001, or InPower P/N CA-VCMS2-POWER)				
Pin	Function/ Wire Color	Label	Type of signal	Description
5	Battery Input 1 Red	Power	Power	Fuse at 15 amps individually. Each additional Battery input must be fused at 15 amps to add additional current up to a maximum of 60 amps.
6	Battery Input 2 Red	Power	Power	Fuse at 15 amps individually. This Power input added to Battery input 1 will provide 30 amps. <u>If not used, insulate to avoid shorting and causing failures!</u>
15	Battery Input 3 Red	Power	Power	Fuse at 15 amps individually. This Power input added to Battery Input 1 and 2 will provide 45 amps. <u>If not used, insulate to avoid shorting and causing failures!</u>
16	Battery Input 4 Red	Power	Power	Fuse at 15 amps individually. This Power input added to Battery Inputs 1-3 will provide 60 amps. <u>If not used, insulate to avoid shorting and causing failures!</u>

Ground Connection - 8 Pin Molex Connector (Molex P/N 33472-4801, or InPower P/N CA-VCMS2-GRND)				
Pin	Function/ Wire Color	Label	Type of signal	Description and Notes
1	Battery Ground Black	Power Ground	Power	Ground to a quality Chassis Ground.
2	Not used, plugged.			
3	Not used, plugged.			
4	Not used, plugged.			
5	Not used, plugged.			
6	Not used, plugged.			
7	Not used, plugged.			
8	Not used, plugged.			

OUTPUT Description:

Outputs - 20 Pin Molex Connector (Molex P/N 33472-2001, or InPower P/N CA-VCMS2-POWER)				
Pin	Function/ Wire Color	Label	Type of signal	Description
11	(O-1) Output 1 Blue	Rear Headlights	Provides +12Vdc	This output powers the added rear headlight. When the rail gear is down and the vehicle gear lever is in reverse this output supplies +12Vdc to the added rear headlight.
12	(O-2) Output 2 Blue	Front Brake Lights	Provides +12Vdc	To Lights - This output powers the added front brake lights. When the rail gear is down, the vehicle gear lever is in reverse, and the service brake is pressed this output supplies 12Vdc to the added front brake lights
13	(O-3) Output 3 Blue	Front Tail Lights	Provides +12Vdc	To Lights - This output powers the added front tail lights. When the rail gear is down and the vehicle gear lever is in reverse this output supplies +12Vdc to the added front tail lights.
14	(O-4) Output 4 Blue	CoD Alarm 1	Provides Steady +12Vdc	To Audible Alert Device Steady - When the hi-rail is down and the vehicle gear lever is moved into reverse or drive this output supplies 4 seconds of 12Vdc power to an alarm. This output is usually used when the alarm is a self-beeping alarm.
17	(O-5) Output 5 Blue	CoD Alarm 2	Provides Pulsing +12Vdc	To Audible Alert Device Pulsed- When the hi-rail is down and the vehicle gear lever is moved into reverse or drive this output supplies an On/Off pulsing output for 4 seconds (12Vdc during the On half of the cycle). This output is usually used when the alarm is a solid sounding alarm.
18	(O-6) Output 6 Blue	OEM Lighting Relay	Provides +12Vdc Control Power for Relays	This output provides control power for the relay that interrupts the OEM lighting (see page 4 SPC 305 data sheet). When the hi-rail is down and the vehicle is placed into reverse, this output enables the Vehicle Lighting Disable Relays. *Note: The truck manufacturer chassis “failed-light-detection” circuits needs to be turned off to prevent setting error codes in the OEM chassis computers.
19	(O-7) Output 7 Blue	Vehicle-In-Motion Alarm	Provides +12Vdc	This output supplies 12Vdc out to run an installer provided self-beeping alarm when the rail gear is down and the vehicle is in motion. Note that the sound of this alarm should be different than the Change of Direction Alarm so the workers know it is movement. While this alarm is sounding a momentary 12Vdc input signal to I-7 will shut off this output and switch on the flashing of output O-8.
20	(O-8) Output 8 Blue	Vehicle-In-Motion Flashing Lights	Provides +12Vdc	This output supplies 12Vdc to the installer provided amber lights installed on the front and rear of the truck pointed downwards to alert workers of a nearby moving vehicle when the Vehicle-in-Motion Alarm has been silenced.

Connector Description:

Molex 8-Pin (Molex P/N 33472-4801) - this connector can be purchased from your local supplier, or supplied with your kit pre-assembled with a 12" blunt cut wire (InPower P/N CA-VCMS-GRND). The 8 Pin connector has 1 black wire for grounding your system.

Molex 20-Pin (Molex P/N 33472-2001) – This connector can be purchased from your local supplier, or supplied with your kit pre-assembled with all necessary 12" blunt-cut wires (InPower P/N CA-VCMS2-POWER). This connector contains all of the required inputs, outputs, and primary battery power for your hi-rail system. Pins 1, 2, 3, 4, 7, 8, 9 & 10 are your Input connections and are white in the blunt-cut purchased connector. Pins 11, 12, 13, 14, 17, 18, 19, 20 are your Output connections and are blue in the blunt-cut purchased connector. Pins 5, 6, 15, 16 are your Battery Power Input connections and are red in the blunt-cut purchased connector.

If you need to make changes to either the 8-Pin or 20-Pin connectors, care must be taken to use proper parts and tools by reviewing the InPower LLC Cable Assembly Bulletin TB-137 for details related terminal part numbers, plugs, crimpers, etc. Changes made to the cables and connectors using improper or unapproved parts could void your warranty on these products

Logical Operation Description:

All functions of the RST-VCMS2-PM1-CTRL1-SPC305 require the vehicle to be on rail. It should be noted that all of the following logical operations, they are predicated on the high rail gear being down. When this happens, the following logical functions of the RST-VCMS2-PM1-CTRL1-SPC305 will be engaged.

1. If the vehicle is set in motion, in drive, and no service brake applied, then the in motion alarm output will be engaged (alarm).
2. If the Vehicle-in-Motion alarm needs to be silenced, the Vehicle-in-Motion cancel switch (Sw8) will transfer this audible sound to a flashing output for Vehicle-in-Motion lighting.
3. The Vehicle-in-Motion alarm can be reset (moving alarm from flashing lights to audible alarm) by again pressing the alarm cancel/reset switch (Sw8).
4. If the vehicle is in the Vehicle-in-Motion lighting mode, it will automatically be reset to alarm mode when the vehicle is taken off rail (hi-rail up).
5. While on rail, if the vehicle is changed from drive to reverse, or reverse to drive, a four second alarm will sound as your Change-of-Direction alarm. This output can be cancelled using the Change-of-Direction cancel/reset switch (Sw7).
6. When the vehicle is shifted into reverse gear, the Change-of-Direction lighting will transfer headlights to the rear, and brake and tail to the front mode.
7. When the vehicle is shifted back into drive, the Change-of-Direction lighting will transfer headlights back to the front, and brake and tail back to the rear mode.

Recommended practice for headlight control

Many chassis manufacture's ground the headlamps in the vicinity of each front headlamp. Source this ground wire and run this ground through a set of NC relay contacts. (Waytek Wire 800-328-2724 p/n 75610 sealed connector; 75605 hooded sealed relay with blunt cut leads). Use the PM1 output #6 (+12 Vdc) to enable the relay opening this ground, disabling the front headlamps during the time vehicle is in reverse and rear headlamps are to be "on".

Optional Additional Modules

DBT-MD-C Chassis Signal Decoder and High Idle System

This section describes the applicable uses of a DBT-MD-C in relation to the Change-of-Direction module (RST-VCMS2-PM1-CTRL1-SPC305) detailed above.

The DBT-MD-C modules output the required chassis condition signals for the CoD module, and can provide your vehicle with an electronically controlled high idle throttle, depending on the chassis configuration. High-Idle control is available on Ford vehicles, and on other types of Medium Duty truck chassis that are equipped with both Cummins Engines and Allison Transmissions. If your vehicle is not a Ford, or is not equipped with both a Cummins engine and Allison transmission installation, but is otherwise J1939 compliant, the DBT-MD-C will provide the needed input signals to your CoD system, but will not be able to provide an electronic controlled high idle throttle.

The DBT-MD-C-**SPC306** model is for a Ford chassis, and the DBT-MD-C-**SPC329** model is for any other J1939 Medium Duty Chassis.

Chassis	DBT-Model	Comments:
Ford	DBT-MD-C-SPC306	CoD input signals; High Idle Throttle
J1939 Chassis w/Cummins & Allison	DBT-MD-C-SPC329	CoD input signals; High Idle Throttle
J1939 Chassis w/out Cummins or Allison	DBT-MD-C-SPC329	CoD inputs signals only

VCMS2-SS232 Switching System

This is an optional switch system frequently installed on high-rail trucks. It is used to control lighting and other systems already in place. The VCMS2-SS232 system has a power module that is similar to the RST-VCMS2-PM1-CTRL1-SPC305 module detailed above, and this module has (2) outputs, O-7 and O-8, that may be connected to the RST-VCMS2-PM1-CTRL1-SPC305.

Output O-7 of the VCMS2-SS232 provides a *Cancel CoD* signal that can be wired to Input I-5 of the RST-VCMS2-PM1-CTRL1-SPC305.

Output O-8 of the VCMS2-SS232 provides a *Cancel Motion Alarm* that can be wired to Input I-7 of the RST-VCMS2-PM1-CTRL1-SPC305.

Change Log:

Rev 0 Initial Release

Rev 1 Initial Corrections

Rev 2 incorporates an alternative Active High (+12Vdc) High Rail Down signal. 3/30/2018