LINGENFELTER
PERFORMANCE ENGINEERING

Lingenfelter RPM-003
Digital RPM Controlled Window Switch with Analog Input
Installation Instructions

PN: L460160000

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v2.3
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Parts List

#	Description	Part number
1	LPE digital RPM controlled window switch with analog input	RPM-003
1	Hook & loop tape	
2	Self-tapping screw	AV16037
1	LPE decal	L920010000
1	Instructions	

Optional Items

Description	Part Number
• Red 7 LED warning light, 10 ft two wire cable	RP-WLRBLK001
• Sealed 40 amp heavy duty relay kit	L450100000
• LPE Technician's Screwdriver	L950050000
• E38/E67 ECM terminal	0334680003

Specifications:

- The Lingenfelter Performance Engineering RPM-003 RPM Controlled Switch incorporates a precision 32-bit timer to realize microsecond precision over a very wide operating RPM range. Most common tachometer pulse frequencies are supported with no additional components required.
- The RPM-003 can perform as a standard RPM activated switch or it can provide "Window" switch type capability, switching at one RPM level and then switching back at a second RPM level.
- Available output types:
  - Normally ON ground
  - Normally OFF ground
  - Normally OFF +12vdc
- All three outputs (+12v activation normally OFF, GROUND activation normally ON and OFF) can be used simultaneously.
- Current draw: 0.1 amp plus current draw of device being controlled (when active).
- Outputs rated for up to 0.75 amps each.
  - The RPM switch should control a relay for higher current level applications.
- Outputs have a self protect feature and will turn OFF in case of a direct short or over current condition.
- Includes a built in 2.2k Ohm tachometer pull up resistor enabled by a DIP switch inside the back cover.
- Operating voltage range: 9.0 to 18.0 volts.
- Input signal type: +12 volt DC square wave or coil negative terminal and +5 volt DC reference signal applications.
  - Accepts both traditional 12 volt tachometer signals and also accepts 5 volt reference engine speed signals found on many newer cars, trucks and motorcycles.
- Analog 0-5 volt input that can accept a Throttle Position Sensor (TPS), Clutch Pedal Position (CPP) sensor, Accelerator Pedal Position (APP) sensor, Manifold Absolute Pressure (MAP) sensor, or most any other rising or falling 0-5 volt signals.
- RPM switch settings can be adjusted in 100 RPM increments from 400 to 19900 RPM.
- Adjustable RPM hysteresis settings of 0, 50, 100, 150, 200, 250, 300, and 350 RPM.
- Custom molded high temperature glass filled Nylon 6 enclosure.
- Fully encapsulated (potted) construction for increased durability.
- When operated in standard RPM activated switch mode, the RPM-003 can be a shift light controller. For shift lights that draw more than 0.75 amps, a relay would need to control the light.
- Input signal impedance: 100k ohms.
- One year warranty (from date of purchase).

Table A - Wiring (also labeled on module):

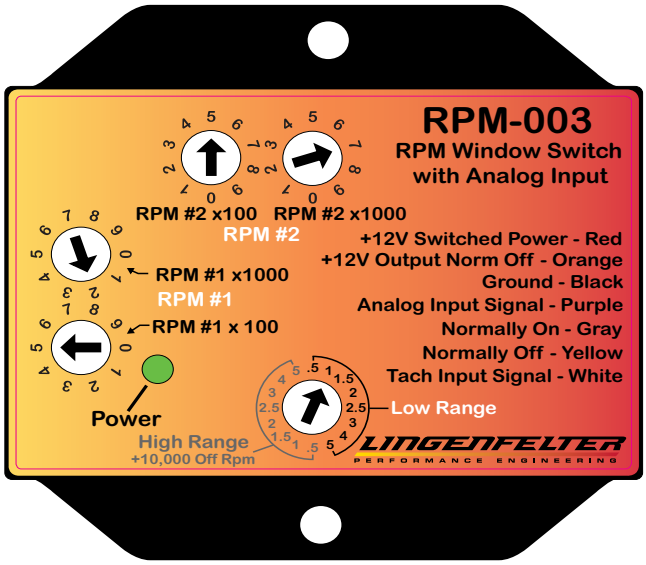
Wire color	Label	Notes
Red	+12 Vdc	Connects to a switched and fused +12 volt DC source.
Orange	Normally Off +12 Vdc Output	This is the normally open (off) +12 Vdc output wire. +12 Vdc will flow through this wire when the switch is activated. This connects to the +12 Vdc side of the device you plan to control.
Black	Ground	Connects to a vehicle ground.
Purple	Analog Input	This connects to the analog signal output wire of a clutch pedal position sensor, throttle position sensor, MAP sensor, or other rising or falling 0-5 volts signal sensors.
Gray	Normally On Ground Output	This is the normally closed (on) ground output wire. This wire will open the ground path when the switch is activated. This connects to the ground side of the device you plan to control.
Yellow	Normally Off Ground Output	This is the normally open (off) ground output wire. This wire connects to ground when switch is activated. This connects to the ground side of the device you plan to activate.
White	Tach Input	This is the RPM input wire. This connects to your RPM signal wire.

Settings:

- Controlled by one sixteen position switch, four ten position switches, five DIP switches, and one push button.

Settings on the front face of the RPM-003:

- Single sixteen position switch for selecting pulse per revolution count. Refer to Table B on page 16 for a list of various vehicle applications and their correct pulse per revolution setting.
  - First half of the range is the Low Range (9,900 & below). Low range should be selected if the RPM switch point will occur below 9,900 RPM.
  - Second half of the range is for the High Range (10,000+ RPM). High Range mode should be used if the RPM switch point will occur above 9,900 RPM. High Range mode only applies to the RPM #2 range.
- Two ten position switches for selecting the RPM #1
  - RPM x1000
  - RPM x100
  - If set to zero, the RPM-003 functions in RPM switch mode. With RPM #1 set to zero, the outputs will be swapped from what is labeled on the RPM-003 (i.e. +12 normally OFF output is now normally ON) until RPM #2 is reached. See the activation charts on page 17 for clarification of the switch logic.
  - If RPM #1 and RPM #2 are both non-zero, the RPM-003 functions as a window switch, which means that the outputs will change their condition when the first switch point is reached, and then will switch back to the their original condition when the second switch point is reached. See the activation charts on page 17 for clarification of the switch logic.



- Two ten position switches for selecting the RPM #2
  - RPM x1000 (10000 RPM is added to this setting when in High Range)
  - RPM x100
  - If set to zero, the RPM-003 functions in RPM switch mode. With RPM #2 set to zero, the outputs will remain as labeled on the RPM-003 until RPM #1 is reached. See the activation charts on page 17 for clarification of the switch logic.
  - RPM #1 MUST BE LESS THEN RPM #2 IF BOTH SETTINGS ARE NON-ZERO VALUES.

Settings inside the rear cover of the RPM-003:

- Five two position DIP switches (The location of these switches are shown in Figure 2.)
  - DIP switches #1-3 select desired RPM hysteresis (The hysteresis DIP switch settings are shown in Figure 1.)
    - The RPM-003 features RPM hysteresis settings of 0, 50, 100, 150, 200, 250, 300, and 350 RPM.
    - When an RPM hysteresis is enabled, the RPM-003 will still switch at the RPM set point (which is set by the RPM #1 and/or RPM #2 settings), but the RPM-003 will not switch again until the set point and the hysteresis is reached. (i.e. RPM-003 will switch at 4500 RPM but will not switch back until engine speed falls below 4300 RPM due to a 200 RPM hysteresis).
    - It is recommended to use at least a small amount of hysteresis as it is possible for the RPM-003 to continually switch the outputs on and off if the RPM is held at the user-defined RPM switch point with no hysteresis.
  - DIP switch #4 toggles analog input ON or OFF (fixed at 90% trip point with 2% hysteresis)
    - This option can be used to activate the outputs on the RPM-003 based on a 0-5 volt analog input signal from the following vehicle sensors:
      - Throttle Position Sensor (TPS)
      - Clutch Pedal Position (CPP) sensor
      - Accelerator Pedal Position (APP) sensor
      - Manifold Absolute Pressure (MAP) sensor
      - Or any other rising or falling 0-5 volt signal
    - When this option is enabled, the outputs will not activate until both the RPM set point and the analog input trip point have been reached.
    - This function can be used in nitrous applications to prevent nitrous oxide from being released prematurely (before BOTH the RPM set point and analog input trip point has been reached)
  - Dip switch #5 toggles the built in tachometer pull-up resistor ON or OFF
    - This option is normally used when connecting to the engine speed signal output from the ECM through a circuit that does not have a pull-up resistor installed. On vehicles that already have this signal connected to another system or module, a pull-up resistor is most likely already present in the circuit. You DO NOT want to have multiple pull-up resistors in the circuit. Vehicles that have a pull-up resistor in the instrument cluster (such as C5 and C6 Corvettes) will require the RPM-003's pull-up resistor feature to be disabled as it will create too much resistance in the circuit. Vehicles that do not have a pull-up resistor in the instrument cluster (such as 2010-2013 Camaro and 2007-2012 CK trucks) should have this feature enabled if you plan to connect to the ECM signal source.
    - ONLY use the tachometer pull-up setting when connected to a TACH signal. Enabling this when connected a coil or injector may cause a check engine light and/or a misfire to occur.
- One push button (The location of this button is shown in Figure 2.)
  - Used to program the analog input voltage range when device is in programming mode
  - In order for the device to enter programming mode, all four 10 position switches must be set to zero and the 16 position switch must be set to 0.5, low range (arrow pointing straight up). See illustration on the right for switch positions.

Figure 1: DIP switch settings label (also found on the backside of the RPM-003 back cover).

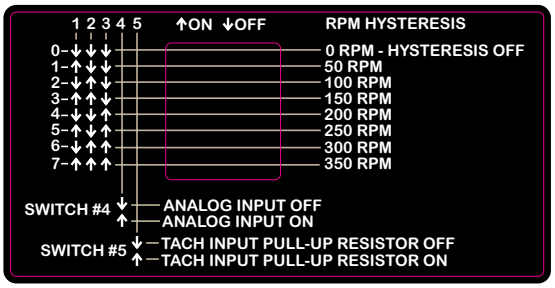
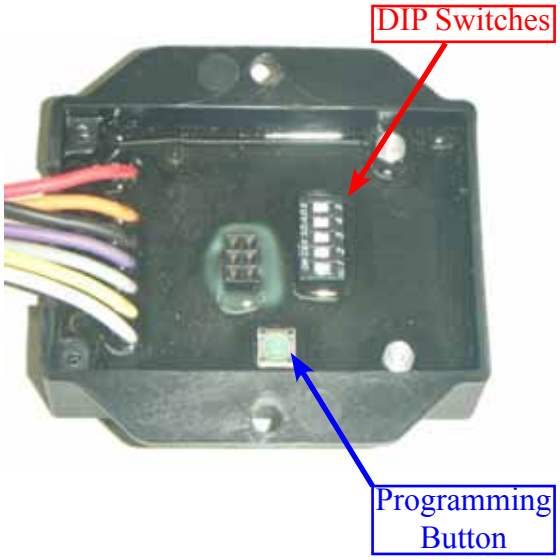
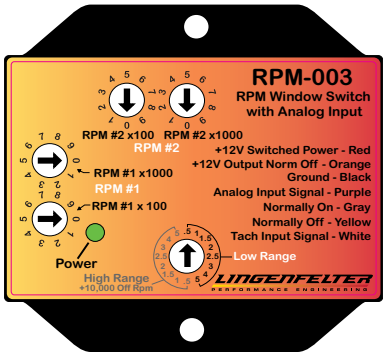


Figure 2: Location of components inside the RPM-003's back cover.





Operation LED Status:

- Solid RED when the unit is powered up but no tachometer signal is detected
- Solid GREEN when a tachometer signal is detected, but is not within the RPM window or has not reached the RPM activation point
- GREEN blinking when outputs are active in RPM switch mode or Window switch mode
- GREEN blinking when module is in programming mode (all 10 position switches set to zero and 16 position switch set to 0.5, low range)
- Blinking GREEN+RED after the programming button has been pressed and the RPM-003 is recording the analog input voltages. The LED will continue blinking GREEN+RED until two sweeps (from closed throttle/released clutch to Wide Open Throttle/depressed clutch) of at least 1.5 volts are taken. Once this parameter is met, the LED will change to one of the following colors:
  - In programming mode, a solid RED LED signifies that the programming of the analog voltage range was successful.
  - Blinking RED when an error occurs, which can be fixed by reprogramming the module. The following conditions must be met for the programming to be successful:
    - The range between the closed throttle/released clutch voltage and the wide open throttle (WOT)/depressed clutch voltages must be at least 1.5 volts.
    - The difference between the first WOT/depressed signal voltage and the second WOT/depressed signal voltage must be less than or equal to 0.1 volts.

Installation:

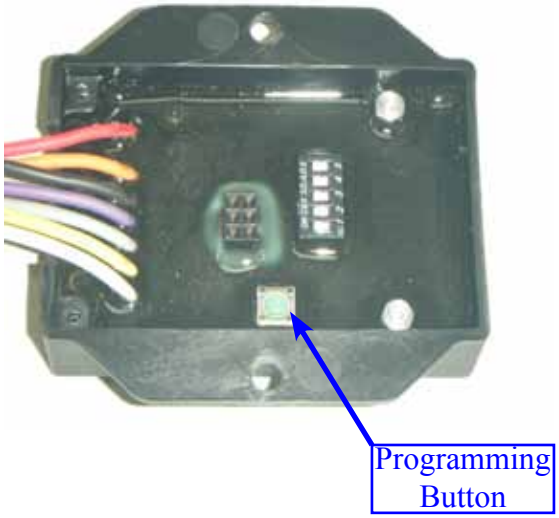
- Disconnect the negative battery terminal.
- Connect black wire of RPM switch to a suitable vehicle ground. **Failure to fully secure the ground wire to a vehicle ground source could result in malfunction of the module.**
- Connect the red wire to a **switched and fused** +12 volt DC source. The +12vdc source that the red wire is connected to should be powered anytime the ECM is powered. A 5-10 amp fuse should be sufficient, but remember that each output is rated for up to only 0.75 amps, so a relay should be used if any of the RPM-003 outputs will be controlling a device that pulls more than 0.75 amps.
- Connect the white wire to the RPM signal source. This can be the tachometer output lead of the vehicle, the switched side of the ignition coil (negative side) or the 5 volt RPM reference signal.
  - **See Table A on page 15 for information on some of the common vehicle ECM/PCM tachometer signal wiring information.**
- If you will be using the Normally Off (open) ground activation output, such as to control a shift light, connect the yellow wire to the ground side of the device you plan to activate.
- If you will be using the Normally On (closed) ground activation output, connect the gray wire to the ground side of the device you plan to activate.
- If you will be using the Normally OFF (open) +12 Vdc activation output, connect the orange wire to the +12 Vdc side of the device you plan to activate.
- If you will be using the analog input, connect the purple wire to a rising or falling 0-5 volt analog signal wire running from the TPS, CPP sensor, APP sensor, MAP sensor, or other analog 0-5 volt signal vehicle sensor.
- If the device you will be controlling draws more than 0.75 amps, make sure to control the device through a relay.
- Secure the RPM-003 using the supplied hook and loop tape or using the supplied self-tapping screws.
- Set the Input Signal Pulse Per Revolution switch to the correct setting for your vehicle application. See Table B on page 16 for the settings.
- Set the DIP switch settings inside the back cover of the module. Refer to page 3 for an explanation of DIP switch settings (hysteresis, tach pull-up, and analog input) and to Figure 1 on page 3 for a table of DIP switch settings.
- Reconnect the negative battery terminal.

Additional Notes and Warnings:

- **Changes to the switch settings must be done with the RPM-003 powered off.**
  - The switch positions are only read on start up (initial device power up).
- The low RPM setting (RPM #1) must be less than the high RPM setting (RPM #2) if both are non-zero values (window switch mode). If RPM #1 is greater than or equal to RPM #2, the outputs can never be active because the condition can never be met.
- The RPM Controlled Switch will not work at RPM levels below 400 RPM.
- The minimum difference between the ON RPM and the OFF RPM when in Window Switch mode is 500 RPM.
- The minimum difference between the minimum and maximum analog voltage is 1.5 volts.
- Make sure that the RPM-003 ground wire is sufficiently secured to a vehicle ground. Failure to fully secure the RPM-003 ground wire to a vehicle ground source could cause the RPM-003 to malfunction
- Do NOT submerge the module in liquid or directly wash the unit with liquid of any type! The switches on the RPM-003 are sealed but are NOT rated for high pressure washing, use caution if power washing near the RPM-003 module.
- Do NOT mount the RPM-003 directly on top of the engine or near the exhaust manifolds due to heat concerns.
- Do NOT mount the RPM-003 in the line of site of high temperature objects such as exhaust manifolds, turbine housings etc. If needed, install a heat shield in between the heat source and the module to protect the plastic case.
- Do NOT install within 6" of nitrous solenoids or other devices with strong magnetic fields.
- Do NOT install near the spark plugs or the spark plug wires (or other potential strong sources of electrical noise).
- LPE recommends the use of resistor type spark plugs and RFI (radio frequency interference) and EMI (electromagnetic Interference) suppression spark plug wires on all EFI engines and any vehicle that has electronic control modules on board (including the RPM-003). Failure to do so may result in erratic operation of electronic devices including the RPM-003.
- It is important to note that the throttle on an electronic throttle body is usually not fully closed with the vehicle keyed on and the engine off. Because of this, the analog input trip point of 90% on the RPM-003 may not match the 90% TPS value displayed on the scan tool.
- **The connection of this device to an electronic throttle body should be done on off-road and racing applications only.**
- **Caution must be taken if you are going to wire the purple analog input wire from the RPM-003 into the wire that relays the throttle position between the ECM and an Electronic Throttle Body. On Electronic Throttle Body equipped (or drive-by-wire) vehicles, DTC codes or even a disabled vehicle could result if the electronic throttle body loses its connection to the ECM. While every effort has been made by LPE to test the RPM-003 on a variety of vehicles, we can not guarantee that this module will work with every electronic throttle currently in use. If this module causes the ECM to set a code or causes any other engine operation issues, disconnect and discontinue the use of this module IMMEDIATELY.**

Programming Analog Input Signal Range:

1. To put the RPM-003 in programming mode, all four 10 position switches must be set to zero and the 16 position switch must be set to 0.5, low range (arrow pointing straight up). The position of the DIP Switches do not have to be changed. Upon powering up the unit, the LED on the RPM-003 should now be blinking GREEN.
2. Using a #1 Phillips head screwdriver, remove the back cover on the RPM-003 to access the green programming button. The location of the programming button is shown in the adjacent illustration.



3. With the vehicle keyed on, the engine off, and the clutch or accelerator pedal fully released, press the green programming button on the back of the RPM-003. The LED should now be blinking RED+GREEN. The RPM-003 will now take the current closed throttle voltage or released clutch voltage, depending on which sensor you connected the RPM-003's purple analog input wire to.
4. Fully depress and then fully release the pedal that the RPM-003 is connected to (throttle or clutch) two times. The RPM-003 will find the average of the two depressed voltages and then compare the average to the released voltage to determine whether the calibration is valid. If the LED turns solid RED, the calibration was successful and is programmed into memory. If the LED begins to blink RED, the calibration was unsuccessful for one of the following reasons:
    - The range between the closed throttle/released clutch signal and the wide open throttle (WOT)/depressed clutch voltages must be at least 1.5 volts.
    - The difference between the first WOT/depressed voltage and the second WOT/depressed voltage must be less than or equal to 0.1 volts.
5. If an error occurs, simply power down the RPM-003 and re-program the pedal position voltages.

Example settings:

GM LS1/LS6/LS2 V8 engines with tachometer signal from ECM/PCM (1997-2013 Corvette, 1998-2002 Camaro/ Firebird, 1999-2006 C/K truck, 2004-2006 GTO):

- Connect white Tachometer Input Signal wire to ECM/PCM tachometer output -- see page 15 for tachometer signal wire information.
- (1800 RPM) RPM switch mode example with no hysteresis, analog input, or pull-up resistor:
    - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 2 pulses per revolution
    - RPM #1 programming switch for thousands of RPM (X000) on position 1
    - RPM #1 programming switch for hundreds of RPM (0X00) on position 8
    - Both RPM #2 programming switches on position 0
    - DIP switches 1-5 flipped down (all DIP switches in OFF position)
        - NOTE - if this is a custom vehicle application using one of these ECM/PCM's and nothing is connected to the tachometer signal or your aftermarket tachometer does not have a pull-up resistor then you will need to enable the pull-up resistor using DIP switch # 5
- (1800 RPM - 6000 RPM) Window switch mode example with no hysteresis, analog input, or pull-up resistor
    - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 2 pulses per revolution
    - RPM #1 programming switch for thousands of RPM (X000) on position 1
    - RPM #1 programming switch for hundreds of RPM (0X00) on position 8
    - RPM #2 programming switch for thousands of RPM (X000) on position 6
    - RPM #2 programming switch for hundreds of RPM (0X00) on position 0
    - DIP switches 1-5 flipped down (all DIP switches in OFF position)
        - NOTE - if this is a custom vehicle application using one of these ECM/PCM's and nothing is connected to the tachometer signal or your aftermarket tachometer does not have a pull-up resistor then you will need to enable the pull-up resistor using DIP switch # 5

2010-2015 Camaro and 2007-2013 GM CK trucks (Escalade, Denali, Tahoe, Yukon etc.) that do not have a tachometer output wire:

- Connect the white Tachometer Input Signal wire to any of the 4 coil trigger wires on the coil harness to either bank of cylinders, as shown on page 14 of the instructions. If you prefer to retrieve the tachometer signal from the ECM, connect the RPM-003 to the ECM by first populating the correct pin and then enabling the output in the ECM, as shown on page 12 of the instructions. If you choose the latter method for obtaining the tachometer signal, refer to the G**M LS1/LS6/LS2 V8 engines with tachometer signal from ECM/PCM** settings example on page 6 for the correct settings (The RPM-003 tachometer pull-up resistor function will need to be enabled if you are populating a tachometer wire in the ECM).
- (2700 RPM) RPM switch mode example with 100 RPM hysteresis, analog input disabled, and tachometer pull-up resistor disabled
  - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 0.5 pulses per revolution
  - RPM #1 programming switch for thousands of RPM (X000) on position 2
  - RPM #1 programming switch for hundreds of RPM (0X00) on position 7
  - Both RPM #2 programming switches on position 0
  - Combination of DIP switches 1-3 set hysteresis of 100 RPM
    - DIP switch #1 flipped down (OFF)
    - DIP switch #2 flipped up (ON)
    - DIP switch #3 flipped down (OFF)
  - DIP switch #4 (Analog input activation) flipped down (OFF)
  - DIP switch #5 (Tachometer pull-up resistor activation) flipped down (OFF)
    - Make sure the pull-up is OFF or you will set a diagnostic code and potentially cause an engine misfire to occur.
- (2700-5500 RPM) Window switch mode example with 100 RPM hysteresis, analog input disabled, and tachometer pull-up resistor disabled:
  - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 0.5 pulses per revolution
  - RPM #1 programming switch for thousands of RPM (X000) on position 2
  - RPM #1 programming switch for hundreds of RPM (0X00) on position 7
  - RPM #1 programming switch for thousands of RPM (X000) on position 5
  - RPM #1 programming switch for hundreds of RPM (0X00) on position 5
  - Combination of DIP switches 1-3 set hysteresis of 100 RPM
    - DIP switch #1 flipped down (OFF)
    - DIP switch #2 flipped up (ON)
    - DIP switch #3 flipped down (OFF)
  - DIP switch #4 (Analog input activation) flipped down (OFF)
  - DIP switch #5 (Tachometer pull-up resistor activation) flipped down (OFF)
    - Make sure the pull-up is OFF or you will set a diagnostic code and potentially cause an engine misfire to occur.

NOTE - when connecting to the coil wire it is critical that the RPM-003 be powered up whenever the ignition is powered up. If you need to put a disable switch into the circuit make sure you disable the output from the RPM-003 and keep the RPM-003 powered when the ignition is on. If not you will likely cause a check engine light.

Most earlier GM V8 electronic fuel injection (EFI) engine applications including L98, LT1 and LT4 engines:

- Connect white Tachometer Input Signal wire to PCM/ECM tachometer output -- see page 15 for tachometer signal wire information.
- For analog input, connect the purple analog input wire to the Throttle Position Sensor, Clutch Pedal Position sensor, or MAP sensor.
- 4500 RPM window switch example with 200 RPM hysteresis, analog input enabled, and tachometer pull-up resistor disabled.
    - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 4 pulses per revolution
    - RPM #1 programming switch for thousands of RPM (X000) on position 4
    - RPM #1 programming switch for hundreds of RPM (0X00) on position 5
    - Combination of DIP switches 1-3 set hysteresis of 200 RPM
        - DIP switch #1 flipped down (OFF)
        - DIP switch #2 flipped down (OFF)
        - DIP switch #3 flipped up (ON)
    - DIP switch #4 (Analog input activation) flipped up (ON) -- only if connected to an analog input
    - DIP switch #5 (Tachometer pull-up resistor activation) flipped down (OFF)
- 1800–7200 RPM window switch example with 200 RPM hysteresis, analog input enabled, and tachometer pull-up resistor disabled.
    - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 4 pulses per revolution
    - RPM #1 programming switch for thousands of RPM (X000) on position 1
    - RPM #1 programming switch for hundreds of RPM (0X00) on position 8
    - RPM #2 programming switch for thousands of RPM (X000) on position 7
    - RPM #2 programming switch for hundreds of RPM (0X00) on position 2
    - Combination of DIP switches 1-3 set hysteresis of 200 RPM
        - DIP switch #1 flipped down (OFF)
        - DIP switch #2 flipped down (OFF)
        - DIP switch #3 flipped up (ON)
    - DIP switch #4 (Analog input activation) flipped up (ON) -- only if connected to an analog input
    - DIP switch #5 (Tachometer pull-up resistor activation) flipped down (OFF)

Most traditional single coil V8 applications:

- Connect white Tachometer Input Signal wire to the coil negative terminal
- 4500 RPM switch example with 200 RPM hysteresis, analog input disabled, and tachometer pull-up resistor disabled.
  - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 0.5 pulses per revolution (straight up)
  - RPM #1 programming switch for thousands of RPM (X000) on position 4
  - RPM #1 programming switch for hundreds of RPM (0X00) on position 5
  - Combination of DIP switches 1-3 set hysteresis of 200 RPM
    - DIP switch #1 flipped down (OFF)
    - DIP switch #2 flipped down (OFF)
    - DIP switch #3 flipped up (ON)
  - DIP switch #4 (Analog input activation) flipped down (OFF)
  - DIP switch #5 (Tachometer pull-up resistor activation) flipped down (OFF)
- 4500–7200 RPM window switch example with 200 RPM hysteresis, analog input disabled, and tachometer pull-up resistor disabled.
  - Sixteen position Input Signal Pulse Per Revolution switch set to Low Range and 0.5 pulses per revolution (straight up)
  - RPM #1 programming switch for thousands of RPM (X000) on position 4
  - RPM #1 programming switch for hundreds of RPM (0X00) on position 5
  - RPM #2 programming switch for thousands of RPM (X000) on position 7
  - RPM #2 programming switch for hundreds of RPM (0X00) on position 2
  - Combination of DIP switches 1-3 set hysteresis of 200 RPM
    - DIP switch #1 flipped down (OFF)
    - DIP switch #2 flipped down (OFF)
    - DIP switch #3 flipped up (ON)
  - DIP switch #4 (Analog input activation) flipped down (OFF)
  - DIP switch #5 (Tachometer pull-up resistor activation) flipped down (OFF)

Most modern sportbike motorcycles including all years of the Suzuki GSXR-1300 Hayabusa, all years of the Kawasaki ZX-14 and 2002 and newer Suzuki GSXR-1000:

- Connect white Tachometer Input Signal to one of the coil negative terminals
- (11,000 RPM) RPM switch mode example with 300 RPM hysteresis enabled, analog input disabled, and tachometer pull-up resistor disabled
    - Sixteen position Input Signal Pulse Per Revolution switch set to High Range and 0.5 pulses per revolution
    - RPM #1 programming switch for thousands of RPM (X000) on position 4
    - RPM #1 programming switch for hundreds of RPM (0X00) on position 5
    - Both RPM #2 programming switches on position 0
    - Combination of DIP switches 1-3 set hysteresis of 300 RPM
        - DIP switch #1 flipped down (OFF)
        - DIP switch #2 flipped up (ON)
        - DIP switch #3 flipped up (ON)
    - DIP switch #4 (Analog input activation) flipped down (OFF)
    - DIP switch #5 (Tachometer pull-up resistor activation) flipped down (OFF)
- (6,000–12,500 RPM) Window switch mode example with RPM hysteresis disabled, analog input disabled, and tachometer pull-up resistor disabled
    - Sixteen position Input Signal Pulse Per Revolution switch set to High Range and 0.5 pulses per revolution
    - RPM #1 programming switch for thousands of RPM (X000) on position 6
    - RPM #1 programming switch for hundreds of RPM (0X00) on position 0
    - RPM #2 programming switch for thousands of RPM (X000) on position 2
    - RPM #2 programming switch for hundreds of RPM (0X00) on position 5
    - DIP switches 1-5 flipped to the down (OFF)

Installation notes:

- On most engines the Tachometer Input Signal wire can be connected to one coil negative terminal or wire (may have 1, 2 or 4 individual coils - just connect to one of these). Start at 0.5 pulse/revolution. If the RPM reads double, switch to 1 pulse per revolution.
- If connecting to an older vehicle (including motorcycles with analog ignitions and solid core spark plug wires), interference may occur. If this happens modern noise suppression spark plug wires and spark plugs MUST be used.
- If connecting to an MSD or other multi-strike ignition system you will need to connect to the tachometer output terminal on the ignition system. Refer to the user manual of your ignition system for output location and pulse frequency.
- On odd fire engines such as Harley Davidson engines connect to one coil and use the single cylinder (0.5 pulse per revolution) mode setting.

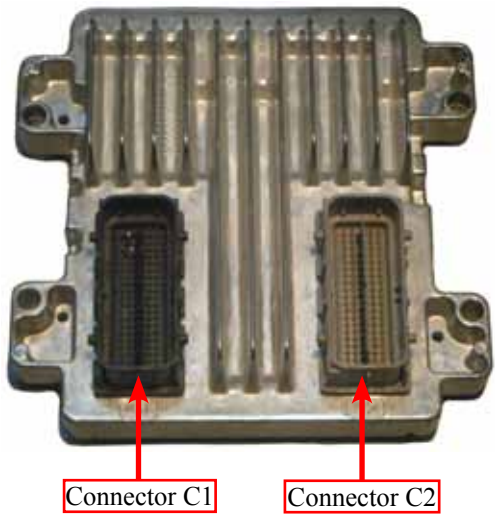
Connecting and enabling a tachometer signal on an ECM with no existing tachometer wire (GM E38, E67 ECM's)

On some vehicles (such as the 2010-2015 Camaro, 2007-2013 C/K Trucks, and 2009-2015 CTS-V), the tachometer is not connected to the ECM by a direct tachometer signal wire. Instead, the dash receives the RPM signal via some other method (such as serial data or CAN). In most cases, however, the vehicle's ECM has an unpopulated pin that can be used to communicate the tachometer signal from the ECM to an external device, such as the RPM-003. The following steps explain how to connect a wire to the correct pin on the ECM, as well as how to enable the ECM tachometer output using EFILive Tune v7.5.

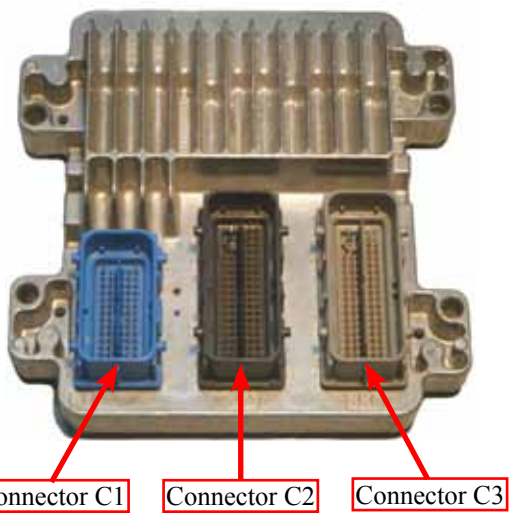
Populating the Tachometer signal wire on the ECM (GM E38, E67 ECM's)

1. Determine the correct ECM pin location for the engine speed (tachometer) output signal on your vehicle. A list of tachometer signal pin locations for some GM vehicles has been provided on page 15.
2. Disconnect the ECM connector that houses the tachometer output signal terminal. Use a small flat head screwdriver to open the wire enclosure on the back side of the connector. This exposes the wires as they come out of the connector.
3. If there is a terminal cover on the front side of the connector, use a small flat head screwdriver to remove it by prying up on each end. You should now see the terminals of each wire, along with colored terminal plugs in pin locations that are not currently populated.
4. Locate the ECM's engine speed (tachometer) output signal pin location on the connector. Remove the colored terminal plug from the connector with a small screwdriver.
5. Crimp a terminal (PN: 0334680003 -- for E38/E67 ECM's) to a piece of wire (long enough to reach from the ECM to the RPM-003 harness), which will become your tachometer output signal wire. **The terminal will lock into the connector when oriented correctly, so make sure that you have the terminal correctly oriented before attempting to insert the terminal into the connector.**
6. Insert the terminal into the correct pin location from the back side of the connector. You should here an audible "click," which tells you that the terminal was inserted in the correct orientation and has locked into place.
7. Reinstall the terminal cover, close the connector wire enclosure, and reinstall the connector onto the ECM.
8. This wire can now be connected to the white Tach input wire on the RPM-003.

E38 ECM

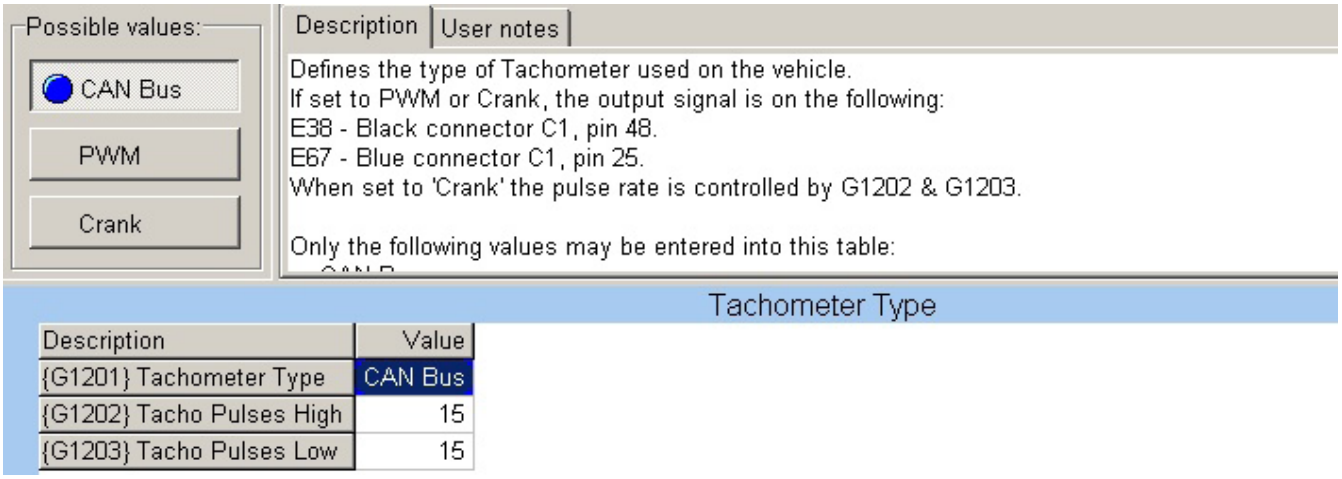


E67 ECM

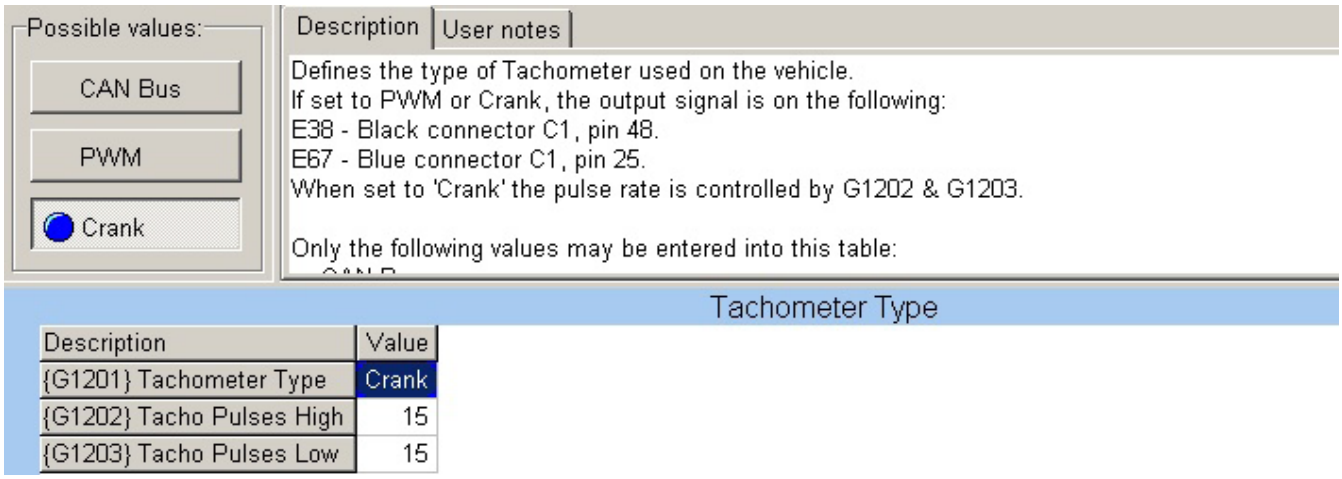


Enabling the ECM's tachometer signal output through EFILive Tune v7.5

9. Double-click on 'Parameters' to bring up the window shown in following illustration, which should appear to the right of the browser window. This calibration is currently set to communicate the tachometer signal via CAN Bus, as shown by the blue dot on the depressed 'CAN Bus' button.



10. In the upper part of the same window, click on the 'Crank' button. Pressing this button enables the tachometer signal output from the ECM. There should now be a blue dot on the depressed 'Crank' button, showing that the selection has been changed.

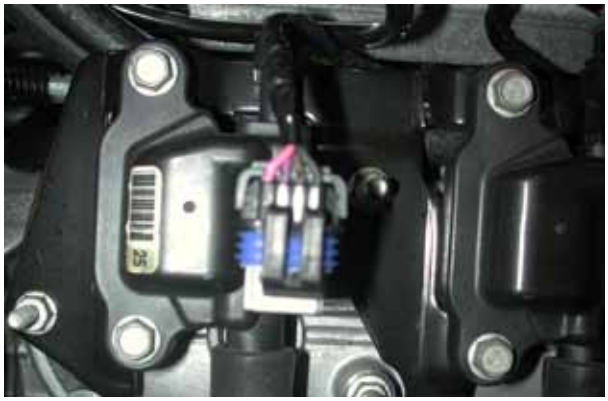


11. Save the calibration and then flash the new calibration to the vehicle.
12. Since no other device will be connected to the tachometer signal output or the ECM, make sure to enable the pull-up resistor on the RPM-003.

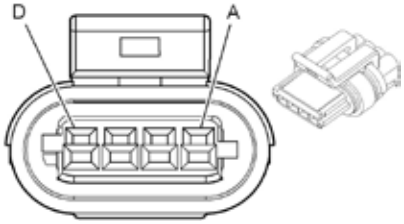
NOTE: Similar changes will be required if using HP Tuners or any other programming system

2010-2013 Camaro and 2007-2013 C/K Truck Instructions (If connecting to coil pack wire instead of ECM)

1. Locate coil pack one (1) on the driver side front of the engine. The ECM on 2010 and newer Camaros (and 2007-2012 C/K Truck) does not contain the signal wire that is needed for the LPE RPM-003 activation switch.



2. Remove the coil electrical connector. The purple wire in pin C of this electrical connector is the wire that must be used for input signal to the RPM switch.



3. Connect to this wire using a 2-1 butt connector or equivalent. Make sure to heat shrink the wires.

Table A

Common vehicle ECM/PCM tachometer signal wiring information						
Vehicle	**Year(s)**	**ECM/PCM**	**ECM/PCM location****	**Pin**	**Wire color**	**Circuit #**
Camaro & Firebird	1996-1997	32U	Connector C1 (Red)	13	White	121
Camaro & Firebird	1998	Warren	Connector C2 (Blue)	35	White	121
Camaro & Firebird	1999-2002	Warren	Connector C2 (Red)	10	White	121
Camaro	2010-2015	E38	Connector C1 (Black)	48	N/A	N/A
Camaro	2016-2017	E92	Connector X2 (Black)	39	White	121
C/K Truck*	2000-2006	Warren	Connector C2 (Red or Green)	10	White	121
C/K Truck*	2007-2012	E38	Connector C1 (Black)	48	N/A	N/A
Corvette	1995-1996	32U	Connector C1 (Red)	13	White	121
Corvette	1997-1998	Warren	Connector C2 (Blue)	35	White	121
Corvette	1999-2003	Warren	Connector C2 (Red)	10	White	121
Corvette	2004	Warren	Connector C2 (Green)	10	White	121
Corvette	2005	E40	Connector C1 (Blue)	48	White	121
Corvette	2006-2013	E38	Connector C1 (Black)	48	White	121
Corvette	2014-2017	E92	Connector X2 (Black)	39	Light Green/black	3633
Corvette ZR1	2009-2013	E67	Connector C1 (Blue)	25	White	121
CTS-V	2004-2005	Warren	Connector C2 (Green)	10	White	121
CTS-V	2006-2007	E67	Connector C1 (Blue)	25	White	121
CTS-V	2009-2015	E67	Connector C1 (Blue)	25	N/A	N/A
CTS-V	2016-2017	E92	Connector X2 (Black)	39	White	121
GTO	2004	Warren	Connector C2 (Green)	10	Brown	121
GTO	2005-2006	E40	Connector C1 (Blue)	48	Brown	121
SSR	2003-2004	Warren	Connector C2 (Blue)	10	White	121
SSR	2005-2006	E40	Connector C1 (Blue)	48	White	121
Trailblazer SS	2006	E40	Connector C1 (Blue)	48	White	121
Trailblazer SS	2007	E67	Connector C1 (Blue)	25	White	121
Trailblazer SS	2008-2009	E67	Connector C1 (Blue)	25	White	121

* VIN C/K Trucks include:

- For 2000-2015:
  - Chevrolet Avalanche, Suburban, Tahoe, and Silverado
  - GMC Yukon and Sierra
  - Cadillac Escalade

** Connectors C1, C2, and C3 (or X1 and X2) may be labeled as J1, J2, and J3 on the ECM itself.

Table B: RPM Pulse Counts for Various Applications

	Pulse/rev	Degrees between pulse	Common Application(s)
Low or High Range RPM Mode	0.5	720 degrees	Typical 1 cylinder engines & individual coil ignitions such as '99+ V8 Mustang, Suzuki Hayabusa, Kawasaki ZX-14
	1	360 degrees	Typical 2 cylinder engines & wasted spark coil packs such Viper/ SRT10 coil
	1.5	240 degrees	Typical 3 cylinder engines
	2	180 degrees	Typical 4 cylinder engines + LS1, LS2 etc.TACH signal
	2.5	144 degrees	Typical 5 cylinder engines
	3	120 degrees	Typical 6 cylinder engines
	4	90 degrees	Typical 8 cylinder engines
	5	72 degrees	Typical 10 cylinder engines

Table C

RPM in thousands (X000)		
0 to 9 equal to 0 to 9000 RPM (in LOW) or 10000 to 19000 (in HIGH)		
Switch setting	RPM	
	LOW mode	HIGH mode
0	0	10000
1	1000	11000
2	2000	12000
3	3000	13000
4	4000	14000
5	5000	15000
6	6000	16000
7	7000	17000
8	8000	18000
9	9000	19000

Table D

RPM in hundreds (0X00)	
0 to 9 equal to 0 to 900 RPM (in LOW or HIGH)	
Switch setting	RPM
0	0
1	100
2	200
3	300
4	400
5	500
6	600
7	700
8	800
9	900

Activation Reference Charts

Example 1:

- RPM Switch mode
- RPM 1 = 2500 RPM
- RPM 2 = 0 RPM

Engine RPM = 2500

Output (Wire Color)	Output state below RPM 1	Output state above RPM 1
+12v activation normally OFF (Orange)	OFF	ON
Ground activation normally ON (Gray)	ON	OFF
Ground activation normally OFF (Yellow)	OFF	ON
RPM-003 LED status	solid GREEN	blinking GREEN

Example 2:

- RPM Switch mode, reversed outputs (outputs behave the opposite to as they are labeled on the product decal)
- RPM 1 = 0 RPM
- RPM 2 = 2500 RPM

Engine RPM = 2500

Output (Wire Color)	Output state below RPM 2	Output state above RPM 2
+12v activation normally OFF (Orange)	ON	OFF
Ground activation normally ON (Gray)	OFF	ON
Ground activation normally OFF (Yellow)	ON	OFF
RPM-003 LED status	blinking GREEN	solid GREEN

Example 3:

- RPM Window Switch mode
- RPM 1 = 2500 RPM
- RPM 2 = 6500 RPM

Engine RPM = 2500 Engine RPM = 6500

Output (Wire Color)	Output state below RPM 1	Output state between RPM 1 and RPM 2	Output state above RPM 2
+12v activation normally OFF (Orange)	OFF	ON	OFF
Ground activation normally ON (Gray)	ON	OFF	ON
Ground activation normally OFF (Yellow)	OFF	ON	OFF
RPM-003 LED status	solid GREEN	blinking GREEN	solid GREEN

NOTE: If the analog input is enabled on the RPM-003, both the RPM and the analog voltage criteria must be met for the RPM-003 to switch the outputs as shown above. For the analog voltage criteria to be met, the clutch or throttle must reach at least 90% of it's travel (clutch pedal at least 90% depressed, throttle body at least 90% open).

NOTICES:

It is the responsibility of the purchaser to follow all guidelines and safety procedures supplied with this product and any other manufacture's product used with this product.

Lingenfelter Performance Engineering assumes no responsibility for damages resulting from accident, improper installation, misuse, abuse, improper operation, lack of reasonable care, or all previously stated reasons due to incompatibility with other manufacturer's products.

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Limited Warranty:

LPE warrants the Lingenfelter RPM-003 RPM Controlled Window Switch to be free from defects in material and workmanship under normal use and if properly installed for a period of one year from date of purchase. If the module is found to be defective as mentioned above, it will be replaced or repaired if returned prepaid along with proof of date of purchase. This shall constitute the sole remedy of the purchaser and the sole liability of LPE. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations whether expressed or implied, including any implied warranty of merchantability or fitness. In no event shall LPE be liable for special or consequential damages.

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