Thank you for purchasing the

SwapHelper.com Tach Helper

Please solder all wire connections and cover in the included shrink wrap for best performance. Wire nuts, butt connectors and other similar connection methods can lead to intermittent signal issues. These methods are only suitable in temporary testing situations.

Your Tach Helper has a total of eight wires, and not all will be used in every swap scenario. Here is the list of the wire colors and their use:

Black : Ground, **please connect directly to battery ground**

Red : **Switched** +12v (FYI, the adapter only consumes a fraction of an amp)

Orange : Truck Output 1 (See attached diagrams for wiring)

Blue : Truck Output 2 (See attached diagrams for wiring)

Green : Enable programming mode (Saves switches to memory)

Brown : Cummins RPM Sensor Ground (Typically only used on 12 Valves)

Grey : Cummins RPM Sensor Signal

White : Cummins RPM Sensor Positive (Typically only used on 12 Valves)

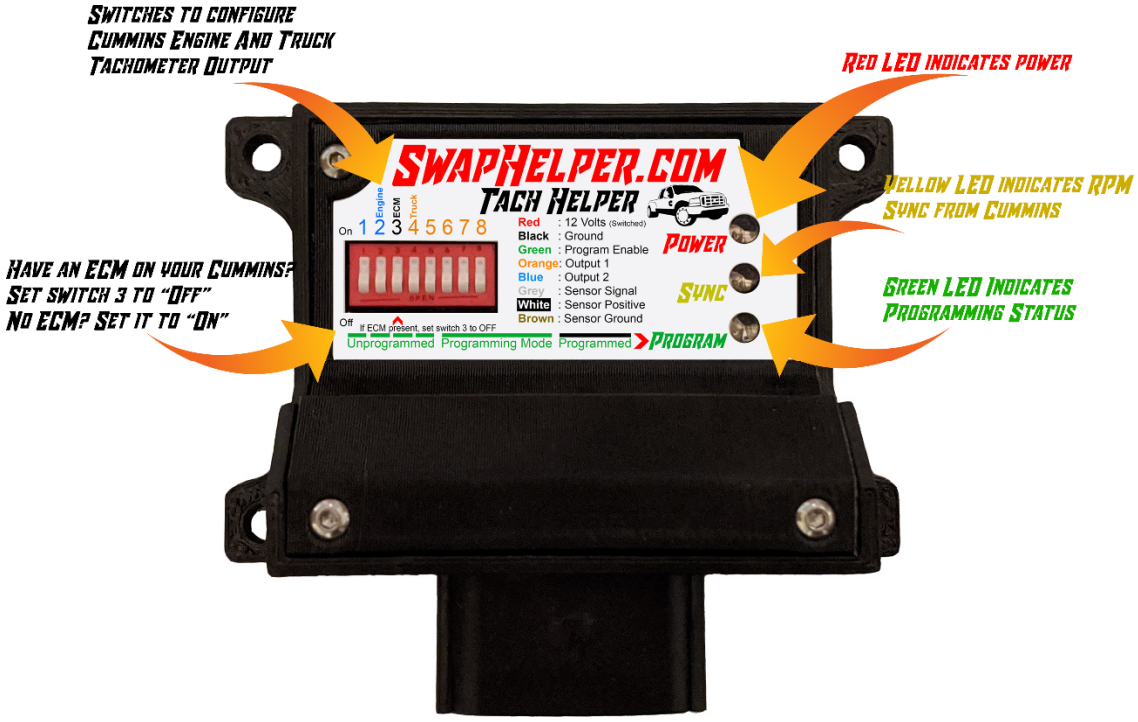
Opening the box:

The following items are included with your controller:

1. Tach Helper
2. Wiring Harness with 4ft of wire
3. 8 x Marine Grade Shrink-wrap
4. Alligator clip to assist with programming mode
5. Instructions

Getting to know your Tach Helper:

The red "power" LED will illuminate when the Tach Helper is powered, and the yellow "sync" LED will illuminate when the Tach Helper is receiving a proper signal from the Cummins RPM sensor. The yellow "sync" LED will also blink three times on initial power up. The green "programming" LED turns on when in programming mode. The use and functionality of the programming mode will be covered later and is not required to use the Tach Helper.



The Tach Helper has switches to allow you to change the configuration to match your swap scenario. Setting switches 1 and 2 control what Cummins engine is used for the input, switch 3 controls whether the Cummins has an ECM (if ECM present, set switch 3 to "OFF"), and switches 4 through 8 control the output (the "truck" side).

Installation:

Review the Tach Helper switch configuration options below and set accordingly. Mount the Tach Helper in such a way to avoid excessive moisture and heat. While the Tach Helper is sealed from the elements, prolonged submersion and/or exposure to moisture could possibly damage the Tach Helper.

The Tach Helper is designed to operate in temperatures from -40*F to 185*F (-40*C to 85*C) but should be kept as cool as possible to increase it's longevity. Do NOT mount near exhaust, turbos, hot/charge pipes, radiators, fan exhaust, etc., as this will severely degrade the Tach Helper's life span!

If space is limited under hood, or you are concerned about excessive heat exposure, you can mount the Tach Helper in the cab as long as the wires are kept as short as needed – long or bundled wires increase the chance for interference. The dimensions of the Tach Helper footprint are supplied in Appendix B to assist with installation.

Cummins Engine Configuration:

Switch settings:	Switch 1	Switch 2	Switch 3	Description
	Off	Off	On	Cummins 12v, stock RPM sensor
	On	Off	Off	'98.5-'00 Cummins 24v (Crank Sensor)
	Off	On	Off	'01-'02 Cummins 24v (Cam Sensor)
	On	On	Off	'03 & up Cummins Commonrail

Truck Configuration:

A full list and description of available modes can be found in Appendix A. The following is a list of common truck configurations:

2003.5 – 2010 Ford Diesel (6.0L & 6.4L)	Switch 4 Off, Switch 5 Off, Switch 6 Off, Switch 7 Off, Switch 8 Off
1999 – 2010 Ford 6.8 L Gas	Switch 4 On, Switch 5 off, Switch 6 Off, Switch 7 Off, Switch 8 Off

1999 – 2010 Ford 5.4 L Gas	Switch 4 Off, Switch 5 On, Switch 6 Off, Switch 7 Off, Switch 8 Off
1983 – 1997 Ford Diesel IDI	Switch 4 On, Switch 5 On, Switch 6 Off, Switch 7 Off, Switch 8 Off
1994 – 2003 Ford 7.3 Powerstroke	Switch 4 Off, Switch 5 Off, Switch 6 Off, Switch 7 Off, Switch 8 On
1968 – 2001 Ford Gas & Diesel (Non-IDI or PS)	Switch 4 On, Switch 5 Off, Switch 6 Off, Switch 7 Off, Switch 8 On
1973 – 1999 Chevy Gas	Switch 4 On, Switch 5 Off, Switch 6 Off, Switch 7 Off, Switch 8 On

Cummins ECM switch (Switch 3):

This switch provides power to the signal wire. You want to avoid powering the signal wire with both the Tach Helper and the Cummins ECM. Rule of thumb, if you are "tapping into" an RPM signal wire, you have an ECM or a PCM. On the 24 valve and Common Rail Cummins, the ECM is mounted on the side of the engine, requiring this switch to be set to the "Off" position. Cummins 12 valves do not have an ECM, so the switch would be set to the "On" position, unless you retained the Dodge PCM for some reason and are tapping into the signal wire. Cummins "P-pumped" 24v (mechanical injection pump swap) typically will no longer have an ECM, requiring the switch to be set to "On".

*Programming Mode: **DO NOT PROGRAM UNTIL WORKING PROPERLY***

The Tach Helper has the ability to save the switch configuration to its memory. Saving the configuration to memory makes the Tach Helper more robust to environmental exposure, because potential switch contamination is no longer a concern. The Tach Helper can be operated without ever using programming mode. In this case, the unit will check the switch configuration every time it powers up.

If the Tach Helper is unprogrammed, the Green LED will blink indefinitely to let you know it hasn't been programmed.

Programming the Tach Helper is simple: Once the switches are set and the unit is functioning as intended, connect the Green wire to the positive battery terminal (an

alligator clip has been supplied to help attach the Green wire to the battery) and power up the Tach Helper. That's it, it is programmed! The Green LED will turn on solid until the Green wire is disconnected from the battery terminal.

Once programming is completed, the Green LED will permanently turn off. Trim the Green wire and cover it with one of the included shrink wraps.

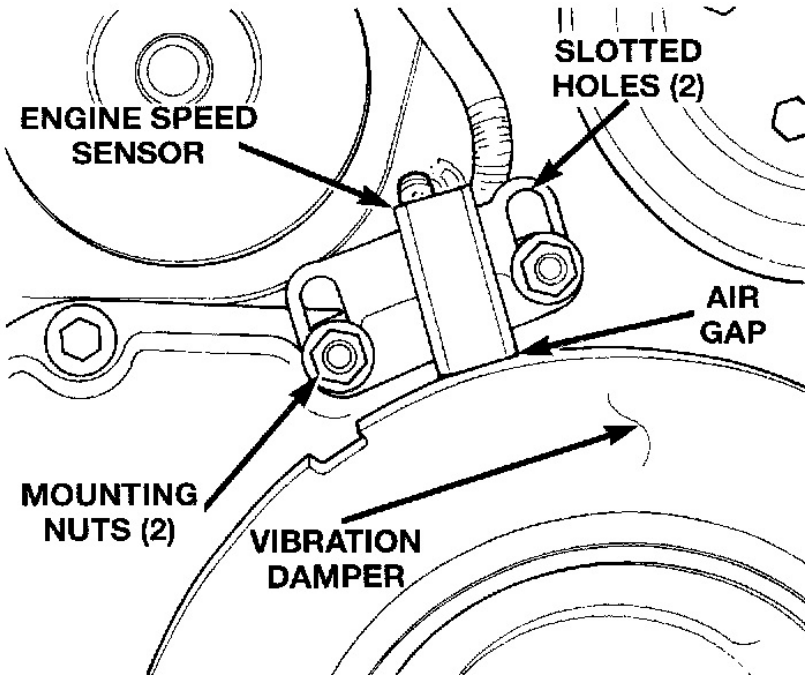
If you need to make a change, reconnect the Green wire to battery positive and cycle the power to the Tach Helper. The Green LED will again turn on solid, indicating the configuration has been saved/updated.

Do not permanently install/connect the Green wire to 12 volts, as this will defeat the purpose of the programming mode. If it is installed permanently, the Tach Helper will then check the switches on every power up, defeating the purpose of programming.

Cummins Wiring:

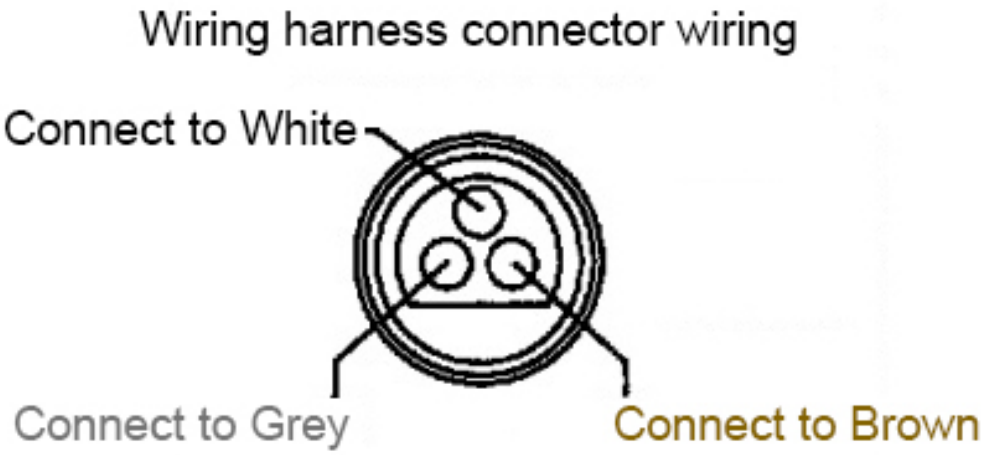
Cummins 12v ('89 to '98, aka 6BT):

You will be wiring into the stock tachometer pickup, as seen below.



The “air gap” of the sensor (how far the sensor is from the balancer) should be 0.049” (1.25mm) to 0.051” (1.3mm).

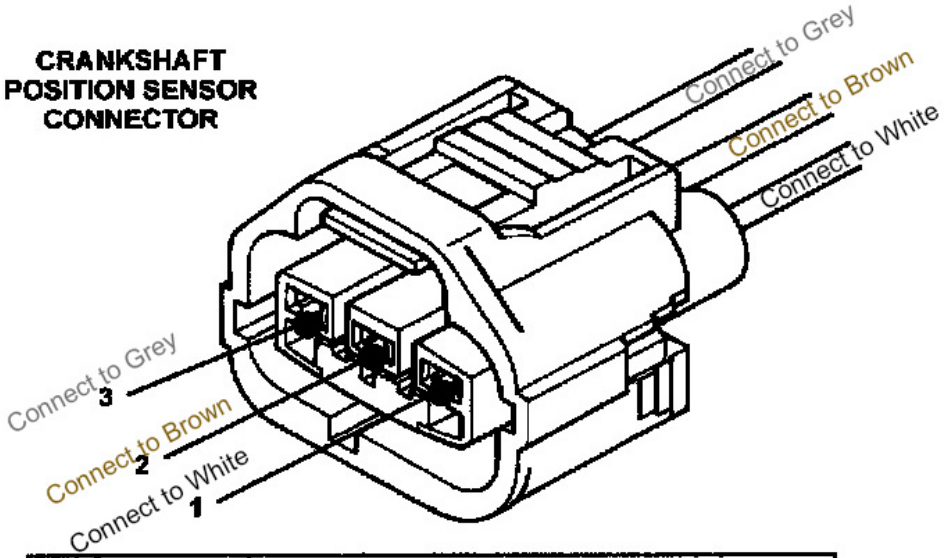
The sensor has three wires and came in two different connector variants. You will be wiring directly to the sensor wiring harness connector. The connector from ‘89 to late ’97 was a circular one, and came with various wire colors across the different years, but the wiring is the same:



The above diagram is for the female side of the connector, on the wiring harness side, and is from the perspective of looking into the connector.

NOTE: If you are using the Dodge PCM, do not connect the Brown or White wire.

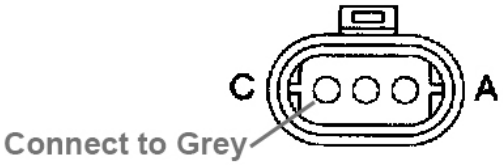
The late model (‘97/’98) 12v and/or 6BT sensor wiring:



CAV	COLOR	FUNCTION
1	VT/WT	5-VOLT SUPPLY
2	BK/LB	SENSOR GROUND
3	GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL

‘98.5 - ’02 Cummins 24v:

While different years had different sensor locations (crankshaft or camshaft), the sensor connector and wiring colors are the same. When connecting to either the crankshaft or camshaft sensor on the 24v, you will need to splice into the signal wire. You do not want to break the connection between the sensor itself and the Cummins ECM. Doing so will cause a no-start condition.



CRANKSHAFT POSITION SENSOR (DIESEL)

CRANKSHAFT POSITION SENSOR (DIESEL) - 3 WAY

CAV	CIRCUIT	FUNCTION
A	K6 18VT/WT	5V SUPPLY
B	K14 18BK/DB	SENSOR GROUND
C	K124 18GY	CRANKSHAFT POSITION SENSOR SIGNAL Connect to Grey

Cummins “Common Rail” (’03 and up 5.9L and 6.7L):

When connecting to the crankshaft position sensor on the Common Rail, you will need to splice into the signal wire. You do not want to break the connection between the sensor itself and the Cummins ECM. Doing so will cause a no-start condition. While the wire colors vary by year, the sensors are the same:

Wiring harness connector wiring

SENSOR-CRANKSHAFT POSITION (DIESEL)

SENSOR-CRANKSHAFT POSITION (DIESEL) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	K853 18DB/BR	5 VOLT SUPPLY
2	K975 18BR/OR	SENSOR GROUND
3	K24 18LB/BR	CKP SIGNAL Connect to Grey

Cummins “P-Pumped” or VE swapped 24 Valve:

If you have swapped a mechanical pump on to your 24 valve (or even common rail), you will need to provide power to the sensor in the absence of the Cummins ECM. Find the corresponding diagram above for your sensor and connect the Brown wire from the Tach Helper to the “Sensor Ground” and connect the White wire from the Tach Helper to the “5 Volt Supply”. You will also need to set switch 3 (the “Cummins ECM” switch) to the “On” position.

Wiring into a Cummins with an ECM (24 valve or CR, or Dodge PCM on a 12 valve):

Assume this tan wire is the signal wire you need to tap into. Cut the wire:

Strip the wire back and put the provided shrink wrap over one end:

Wrap the two stripped sections:

Strip the Grey wire from the Tach Helper and wrap it around the signal wire:

Solder the three sections together, making sure the solder is sucked into the wire strands. This step is imperative – a cold or poor solder joint will impact engine operation.

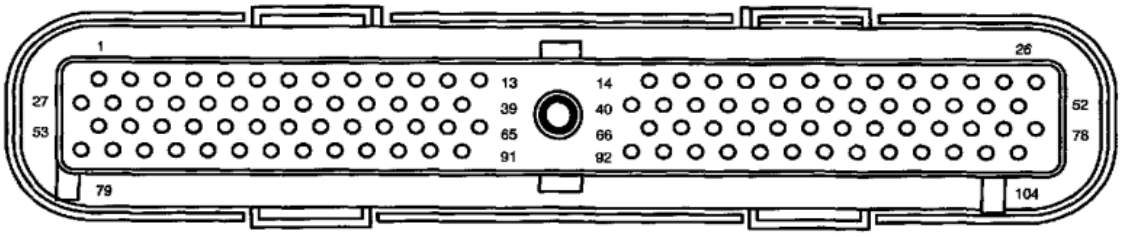
Lastly, slide the shrink wrap over the solder joint and heat until you see the adhesive:

Truck Wiring:

The tach signal to your truck is output on the orange and blue wires. Not all trucks use both wires. Below is a list of common configurations. The color listed in parentheses is the wire color in the truck. While every effort has been made to provide the correct wire color on the truck side, your truck may vary. If your truck wiring had foil covering, it can be removed.

'99 to '04 Ford 6.8L & 5.4 Gas: Orange – Crank- (Dark Blue)

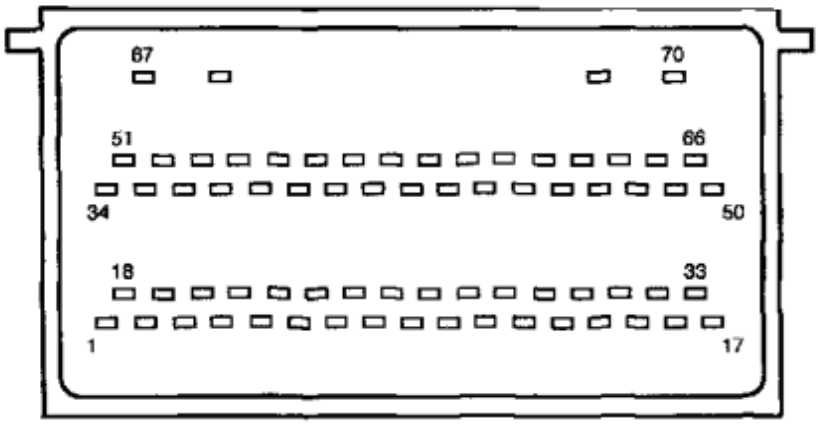
Blue – Crank+ (Grey)



21	349 (DB)	Crankshaft position sensor (6C315) –
22	350 (GY)	Crankshaft position sensor (6C315) +

‘05 to ‘07 Ford 6.8L & 5.4 Gas: Orange – Crank- (Grey)

Blue – Crank+ (Dark Blue)

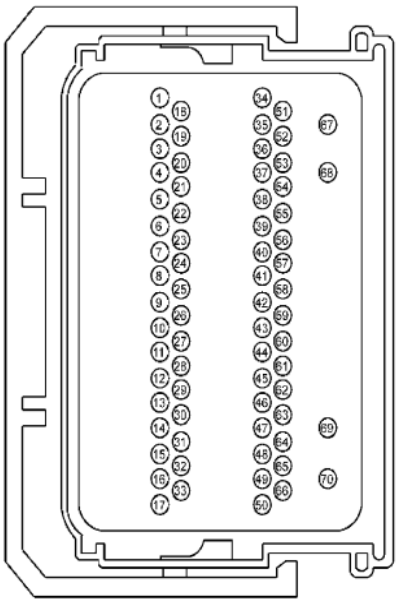


FEMALE

46	350 (GY)	Crankshaft position sensor (6C315) –	
47	349 (DB)	Crankshaft position sensor (6C315) +	

‘08 to ‘10 Ford 6.8L & 5.4 Gas: Orange – Crank- (Green/Brown)

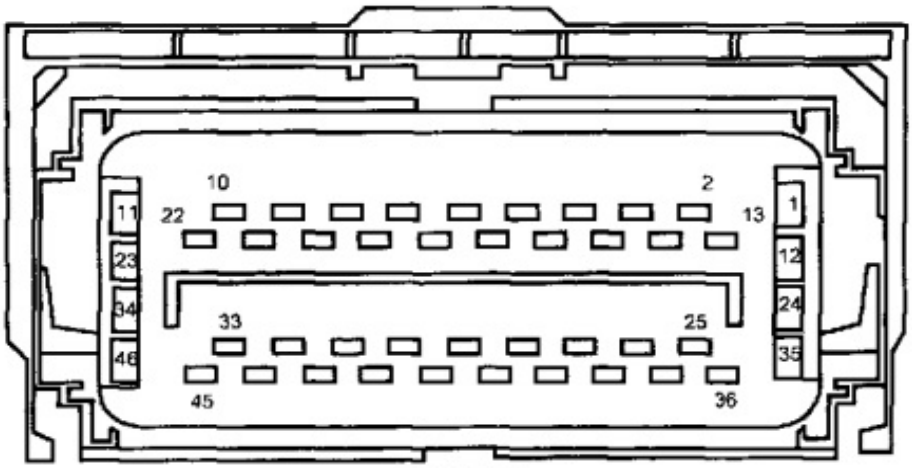
Blue – Crank+ (Yellow/Violet)



46	RE135 (GN-BN)	CRANKSHAFT POSITION SENSOR (CKPN)	
47	VE711 (YE-VT)	SENSOR - CRANKSHAFT POSITION (CKPP)	

‘03.5 to ‘07 Ford 6.0L Diesel: Orange – Crank+ (Dark Blue)

Blue – Cam+ (Red)

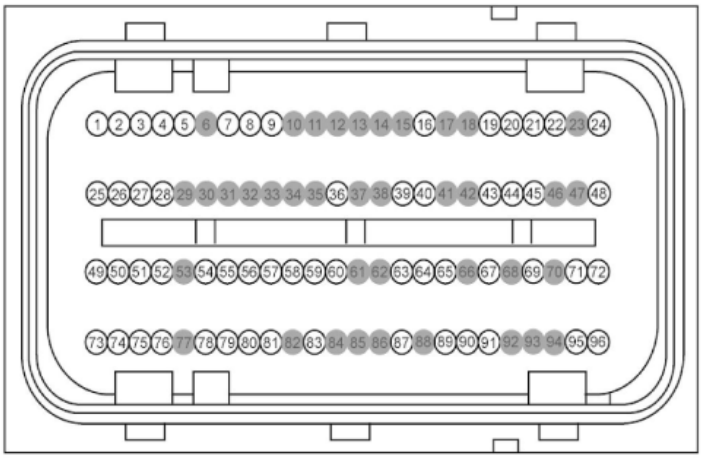


FEMALE

Pin		
30	349 (DB)	Crankshaft position sensor (6C315) +
31	50 (RD)	Camshaft position sensor (6B288) +

‘08 to ‘10 Ford 6.4L Diesel: Orange – Crank+ (Yellow/Violet)

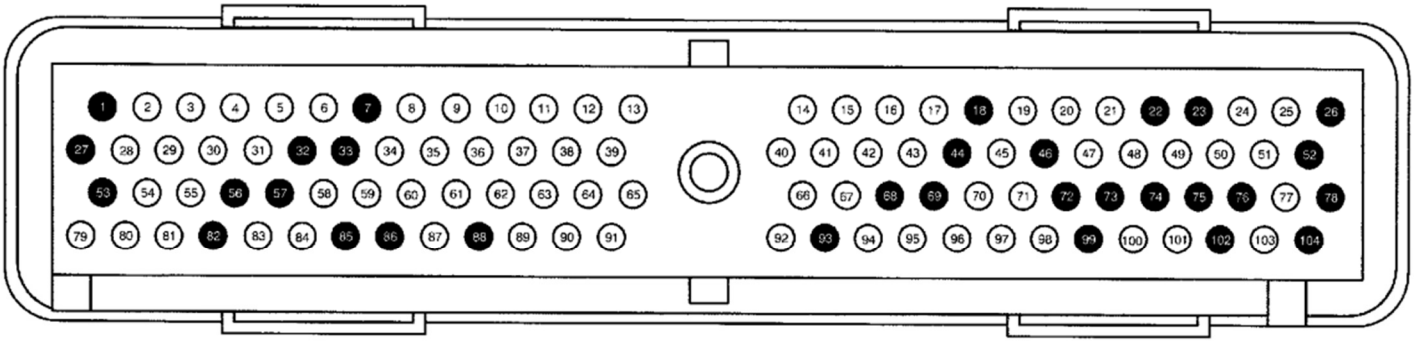
Blue – Cam+ (Brown/Blue)



80	VE711 (YE-VT)	SENSOR - CRANKSHAFT POSITION
7	VE706 (BN-BU)	SENSOR - CAMSHAFT POSITION

’98 to ’03 Ford 7.3L Diesel: Orange – Cam Sensor (Dark Green)

Blue – Unused



REVISED

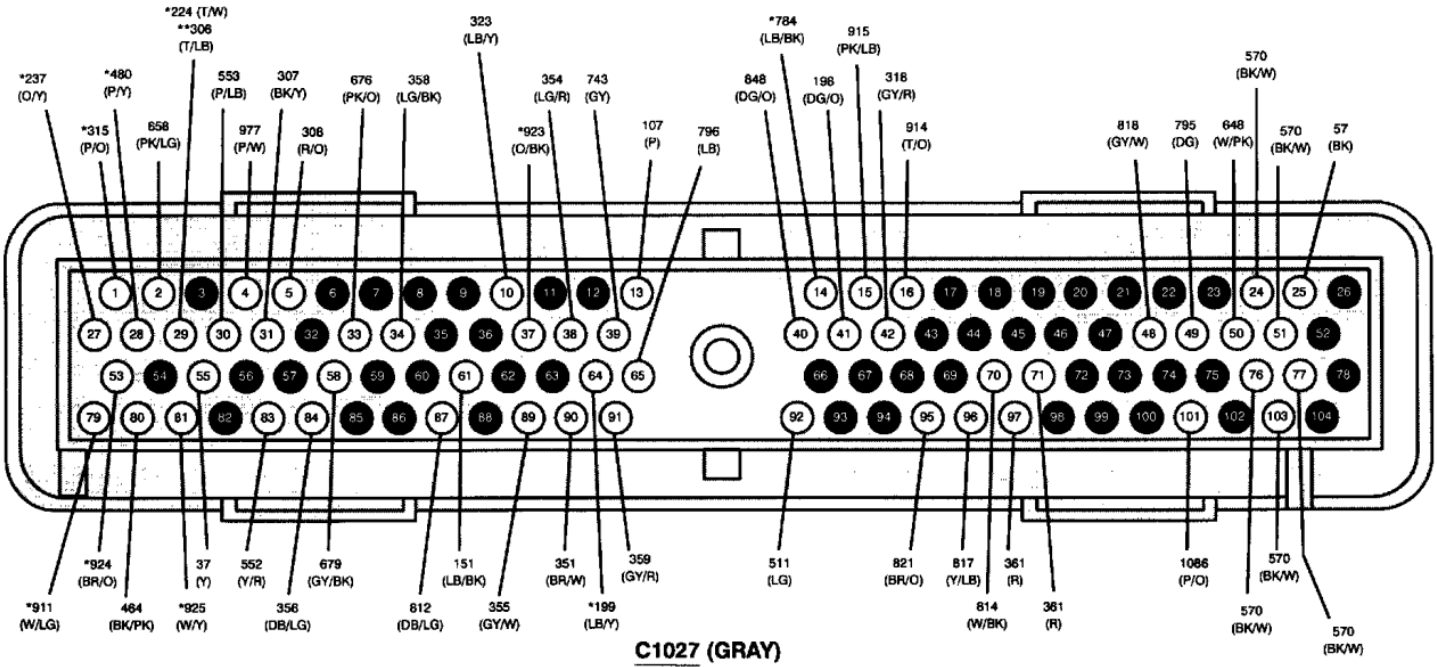
C1027

POWERTRAIN CONTROL MODULE (PCM)

PIN	CIRCUIT	CIRCUIT FUNCTION
21	795 (DG)	Camshaft Position (CMP) Sensor

’94 to ’97 Ford 7.3L Diesel: Orange – Cam Sensor (Dark Green)

Blue – Unused



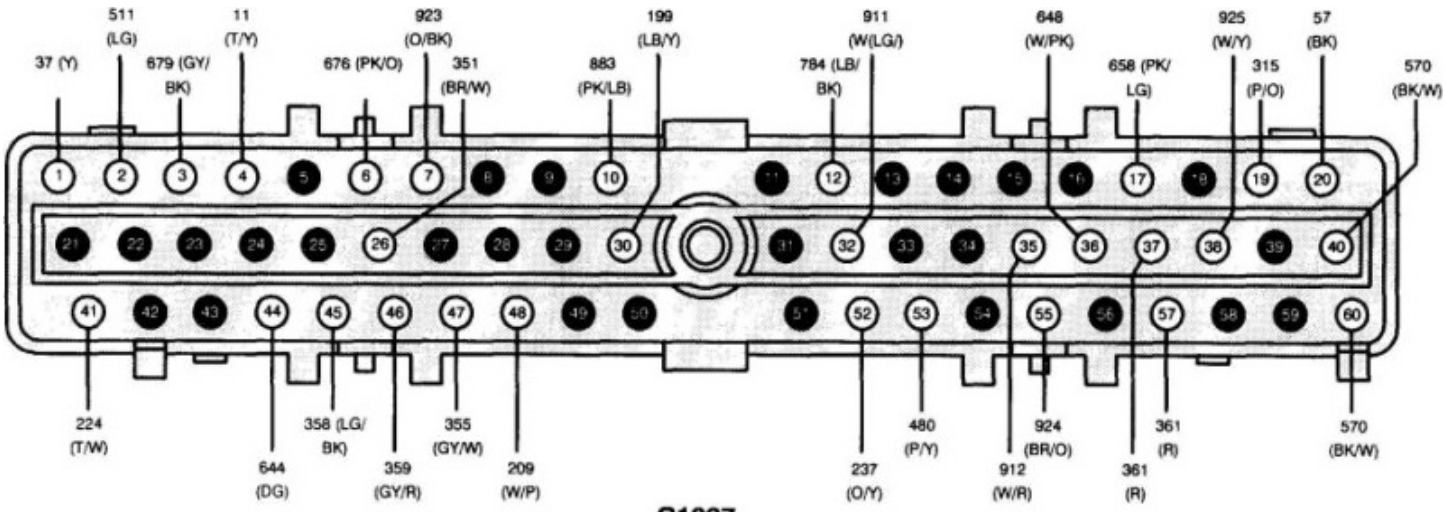
C1027 (GRAY)

POWERTRAIN CONTROL MODULE (PCM) (7.3L DI TURBO)

PIN	CIRCUIT	CIRCUIT FUNCTION
49	795 (DG)	CAM Position Sensor

’93 to ’94 Ford 7.3L IDI Diesel: Orange – Cam Sensor (Tan/Yellow)

Blue – Unused



C1027

POWERTRAIN CONTROL MODULE (PCM) (7.3L)

PIN NUMBER	CIRCUIT	CIRCUIT FUNCTION
4	11 (T/Y)	RPM Sensor (Positive)

Troubleshooting:

A few common points to check:

1. Grounds – You must have your ground straps in place for the Tach Helper to work properly. This means you need a strap from the battery to the frame, frame to engine, engine to other side of frame, frame to body, and engine to body. This is a common issue point and is especially important in the Common Rail and 24v applications.

2. Connectors and plugs – We get many support requests for connectors that are not fully inserted, including the PCM connector(s). Double check all connectors are fully seated.

3. Solder joints – Improper, poor or cold solder joints can cause intermittent issues. It is recommended that you use rosin core lead solder – leaded solder is much easier to work with and creates a lasting solder joint. If you

are new to soldering or do not have much experience, watch a tutorial on YouTube. Here is a link to a decent tutorial:

https://www.youtube.com/watch?v=Zu3TYBs65FM

Or, a QR Code to scan with your phone:

Please note, we are not affiliated with the above YouTube video or it's creator, we just thought it was a good tutorial for those new to soldering.

Common issues:

Issue:	Red Power LED is not illuminated
Answer:	Check that you have +12v on the red wire, and the black wire is going to ground. You can also try temporarily connecting the wires directly to the battery for testing.
Issue:	Yellow Sync LED is not illuminated when engine is running
Answer:	Check wiring to Cummins RPM sensor. For 24v and Commonrails, only one wire is required, the grey signal wire. Check wiring diagram to make sure you are connected to the proper wire on the Cummins ECM, and that proper ground straps are in place to the truck's chassis.
Issue:	Red Power LED and Yellow Sync LED are on when engine is running, but there is no tachometer output in the truck, or the tachometer is bouncy or unstable.

Answer: Firstly, double check the switch configuration. If switch configuration is changed, the Tach Helper must be power cycled to recognize the changes (Red Power led must turn off). Secondly, check that the crank and/or cam wires are not reversed. Thirdly, check truck PCM connector is fully inserted. Lastly, check wiring connections for proper soldering and shrink wrapping.

Still can't figure out your issue? Shoot us an e-mail for additional support:

Contact@SwapHelper.com

Appendix A, Available Modes:

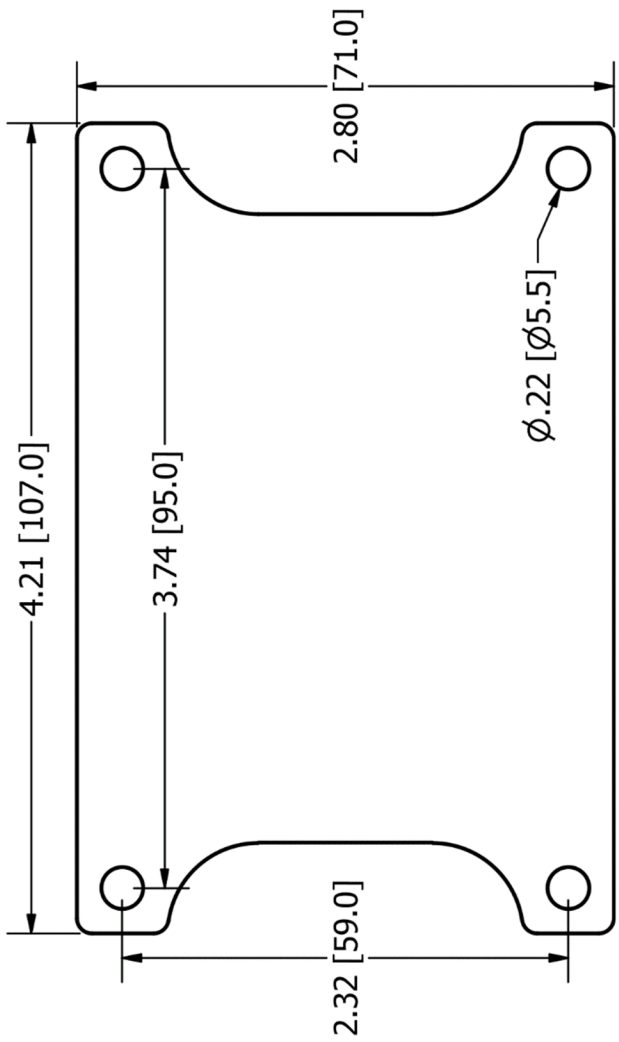
Description	Voltage	Switch 4	Switch 5	Switch 6	Switch 7	Switch 8
60-2 Pulse (with Ford Cam)	12 Volt	Off	Off	On	On	Off
60-2 Pulse (with Ford Cam)	5 Volt	Off	Off	Off	Off	Off
60-2 Pulse (with Ford Cam)	Low Only	Off	On	On	Off	Off
40-1 Pulse	12 Volt	On	Off	On	On	Off
40-1 Pulse	5 Volt	On	Off	Off	Off	Off
40-1 Pulse	Low Only	On	On	On	Off	Off
36-1 Pulse	12 Volt	Off	On	On	On	Off
36-1 Pulse	5 Volt	Off	On	Off	Off	Off
36-1 Pulse	Low Only	Off	Off	Off	On	Off
53 Pulse (Ford IDI)	12 Volt	On	On	On	On	Off
53 Pulse (Ford IDI)	5 Volt	On	On	Off	Off	Off
53 Pulse (Ford IDI)	Low Only	On	Off	Off	On	Off
12 Pulse	12 Volt	Off	Off	Off	Off	On
12 Pulse	5 Volt	Off	Off	On	Off	Off
12 Pulse	Low Only	Off	On	Off	On	Off
4 Pulse	12 Volt	On	Off	Off	Off	On
4 Pulse	5 Volt	On	Off	On	Off	Off
4 Pulse	Low Only	On	On	Off	On	Off
60-2 Pulse, Half Engine Speed*	5 Volt	Off	On	Off	Off	On
5 Pulse (with Dodge V10 Cam)*	5 Volt	On	On	Off	Off	On
Ford Early 7.3*	Low Only	Off	Off	On	Off	On

***60-2 Pulse Half Engine Speed, 5 Pulse (with Dodge V10 Cam) and Ford Early 7.3 modes are only available in firmware revision 5 or above. If your firmware revision is a date code, it does not contain these modes.**

Notes:

In 53, 12 and 4 pulse modes, output is the same on both the orange and blue wires.
In Ford 6.0, 5.4 and 6.8 swaps, either the 5 volt or 12 volt mode may be used.
In swaps replacing a hall effect sensor (like trucks that originally had a 7.3, or if you put a Common Rail in a 2nd Gen Dodge) the “Low Only” mode may be used.

Appendix B, Footprint Dimensions (in [mm]):



Suggested screw size for mounting holes:

Imperial #10 or Metric M5

Technical specs:

Operating temperature range	**: -40*C to 85*C (-40*F to 185*F)**
Maximum Input RPM	**: 6,000 RPM (Software Limited)**
Operating voltage range	**: 6v to 18v, DC only**
Reverse Polarity Protection	**: Yes**
Load dump protection	**: Yes**
Water Resistance	**: IP66**
Suitable for ignition or injection timing	**: No**
Error	**: 0% Min to 0.0651% Max (Engine/Truck Combo Dependent)**

Return Policy:

Unopened, unused product(s) may be returned within 30 days of purchase date by original purchaser for a refund, minus original shipping charges and a 25% restocking fee. Customer is responsible for return shipping. Used products(s) are not eligible for return but may be repaired or replaced under Warranty policy. Return requests must be made by submitting a request to Contact@SwapHelper.com.

Warranty:

Nentec Corporation (SwapHelper.com) warranties this product to be free of defects in material and workmanship for one (1) year from date of purchase. This warranty is limited to the correction of any such defect, or the replacement of any such defective item, provided that: (a) item(s) was/were purchased from SwapHelper.com or an authorized Nentec Corporation distributor; (b) we are properly notified and consent to the return of the item(s) in question; (c) the item(s) is/are returned with proof of purchase date; and (d) it is found upon inspection by us that the item(s) is/are defective as noted above; (e) the return request is made by original purchaser. This warranty does not cover labor costs, consequential damages, nor does it apply to any item(s) that have been improperly installed, overloaded, altered, or otherwise abused by the customer, its agent(s) or employee(s). Other than the described obligation, we assume no further liability with respect to the sale or use of our products. We make no warranty, expressed or implied, and disclaim any warranty of merchantability or fitness for a particular purpose. Warranty requests must be made by requesting a Return Merchandise Authorization from Contact@SwapHelper.com.