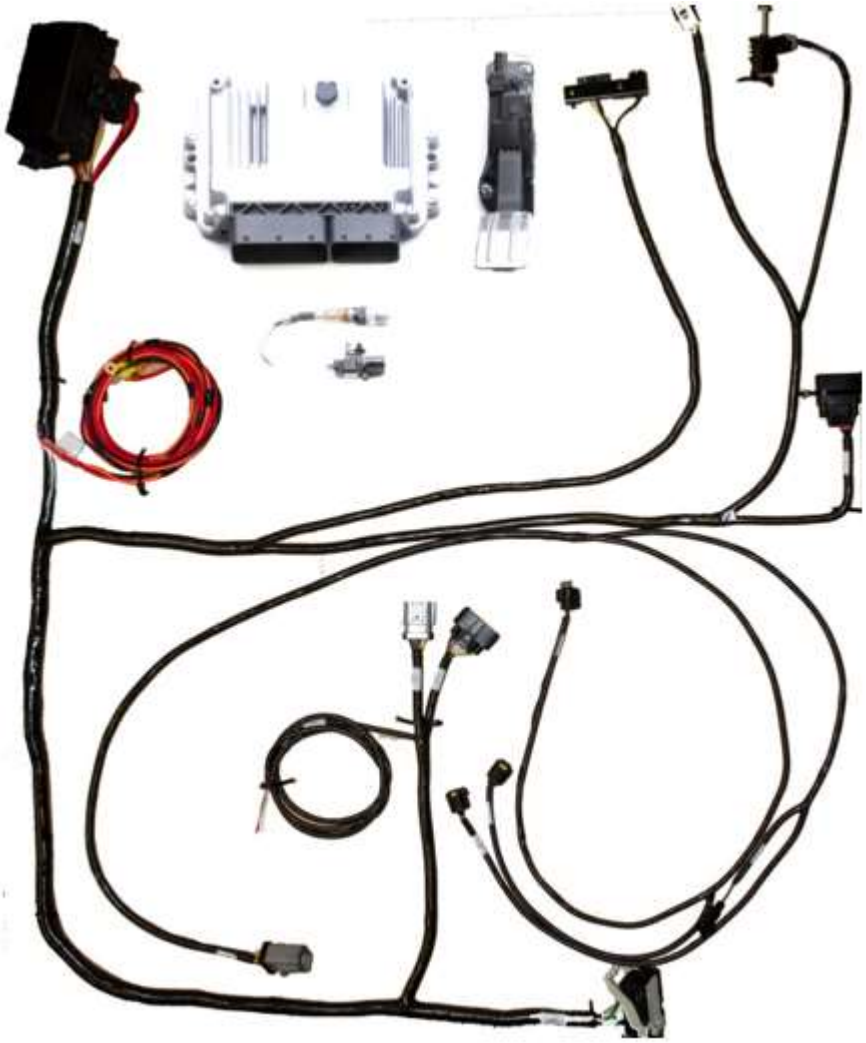
FORD PERFORMANCE

M-6017-23T - 2.3L EcoBoost Control Pack Installation Instruction

Please visit www. performanceparts.ford.com for the most current instruction and warranty information.

PLEASE READ ALL OF THE FOLLOWING INSTRUCTIONS CAREFULLY PRIOR TO INSTALLATION. AT ANY TIME YOU DO NOT UNDERSTAND THE INSTRUCTIONS, PLEASE CALL THE FORD PERFORMANCE TECHLINE AT 1-800-367-3788



Factory Ford shop manuals are available from Helm Publications, 1-800-782-4356

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1.0 - Introduction

This kit was developed by Ford Performance in order to allow performance enthusiasts the ability to install our 2.3L 4V TiVCT GDTI Crate Engine (Ford Performance P/N: M-6007-23T/23TA) into the application of their choice. The system supports use of a manual transmission only.

Note: Cruise control is not available with this system

2.0 - Overview

This booklet provides a step by step guide for the preparation and installation of the controls pack. Please read the instructions thoroughly before starting the installation. If you have any questions, contact Ford Performance Technical Support at (800) 367-3788.

The kit is designed for a running return fuel system and only one cooling fan. There will only be one battery positive (we will call it B+ from here) and one ground lead from the controls pack harness side, but you will need to provide your own battery cable connection from battery to in-line fuse.

3.0 - Included Components

3.1 Powertrain Control Module (PCM) – FR3Z-12A650-EANP

- The PCM is the central processing unit for engine operation. Input data/engine operation feedback is provided from each of the engine's sensors connected to the PCM via wiring leads. This input data is used to perform

calculations that in turn adjusts fuel quantity and spark timing according to varying driver demand (ie – accelerator pedal input).

- The wiring that plugs into the PCM is integral to the wiring harness that was included with your 2.3L crate engine, the length of these wiring leads dictate that mounting location be in close proximity to the engine itself.

- The PCM in this Controls Pack has a custom software and calibration dataset which were specifically modified/developed by Ford Performance engineers to provide peak performance and reliability with the 2.3L 4V TiVCT GDTI Crate Engine (Ford Performance P/N: M-6007-23T)

PCM Calibration Application Notes:

- The calibration provided in this PCM will NOT work with the 'Returnless' fuel system as used on factory Mustang vehicles. Use of a return style fuel system is required. Refer to Section 7 of this manual for more information on fuel system requirements for this PCM.
- The Air Filter Assembly with Integral Intake Air Temperature Sensor (IAT) included with this kit must be used to achieve acceptable engine performance. If air filter assembly provided is not used, additional calibration may be required. Refer to Section 3.7 for more information about Air Inlet System requirements.
- **Premium Fuel Only (91 Octane or higher).**

****NOTE****: Due to the fuel system requirement described above, installation of this PCM in ANY Production Mustang vehicle will result in a no-start condition!

3.2 Accelerator Pedal Position Sensor (APPS) – CR3Z-9F836-C

- The accelerator pedal assembly includes a pair of integrated pedal position sensors (APPS1/APPS2). This pedal has electrical properties designed specifically for correct interface with PCM: **FR3Z-12A650-EANP** and is required for proper engine operation.

3.3 Clutch Pedal Position Switch: Bottom Travel (CBT) - 6G9Z-11A152-A (Gray Plunger)

- The switch translates the clutch pedal position to the PCM.
- The bottom travel switch also acts as a starter safety interlock. The starter motor will not energize until the clutch has been fully depressed.
- CBT switch is Normally Open (Clutch Pedal NOT fully depressed); Closed with Clutch Pedal fully depressed
- Clutch pedal assembly P/N: BV61-7B633-AA is available through an Authorized Ford Parts dealer. Includes a clutch pedal and mounting bracket with provisions to hold both the Top and Bottom of Travel switches in the appropriate locations.

WARNING: DO NOT BYPASS THE STARTER INTERLOCK. DOING SO CREATES A HAZARD TO THOSE IN AND AROUND THE VEHICLE AS THE STARTER CAN OPERATE WITH THE TRANSMISSION IN GEAR AND THE CLUTCH PEDAL ENGAGED.

3.4 Universal Exhaust Gas Oxygen Sensor (UEGO) – FR3Z-9F472-A

- UEGO sensor provides wide range feedback to the PCM for closed loop air fuel ratio control by measuring the quantity of oxygen present in exhaust leaving the combustion chamber.
- UEGO sensor is supplied with a light coating of anti-seize lubricant on its threads. Please use caution when installing as this lubricant will damage the sensor element, so make sure no lubricant comes in contact with the sensor element (tip).
- Tighten to 48 Nm (35 lb-ft).
- **NOTE:** Do not splice, lengthen or otherwise modify the UEGO wiring. Doing so will adversely affect the sensor performance & reliability of the signal.

The engine harness and controls package M-6017-23T is designed to operate with the UEGO sensors in the 2015 Mustang GT stock locations. Moving the UEGO sensors to alternate locations can result in the need to recalibrate the PCM.

Here are some tips if sensors have to be relocated:

The best option is to locate the sensor so it is sampling from all 4 cylinders and at a distance that does not require modification of the UEGO harness, 4~7 inches from the turbo outlet pre-catalytic.

NOTE: Modification of the UEGO harness can affect function of UEGO sensor.

3.5 Cable Assembly, B+ to Starter & Alternator – CV6Z-14300-AB

- Provides B+ from Alternator Output Post to the Battery "+" Post, Starter and Starter Solenoid
- Pigtail from Starter Solenoid plugs into the controls pack harness starter connector.

NOTE: If your Control Pack Harness does not have the mating connector pictured below, continue with Step A-C for CV6Z-14300-AB harness modification. Control Pack Harness's that do not contain this connector will have an eyelet for the starter solenoid circuit. If your Control Pack Harness does include this connector, do not perform this modification.

- **Step A: Remove and discard the starter solenoid circuit & plastic shield from the CV6Z-14300-AB harness (pictured below).**

- **Step B: Apply the 1.5" length of supplied non-adhesive shrink tubing (larger diameter) to the CV6Z-14300-AB starter motor circuit as pictured below.**

- **Step C: Apply the 1" length of supplied adhesive backed shrink tubing (smaller diameter) to the CV6Z-14300-AB starter motor circuit overlapping the previously applied shrink as pictured below.**

3.6 Plastic Bag of Assorted Items

- B+ Jumper Cable
- Buss 90A In-line Fuse and a mini fuse
- Small diameter heat shrink
- Large diameter heat shrink
- Large diameter eyelet terminal
- Small diameter eyelet terminal

3.7 Air Cleaner Assembly with Integral Intake Air Temperature Sensor – FR3Z-9600-B, FR3Z-6C646-A, FR3Z-9F763-B

IMPORTANT NOTE: The PCM you have received is calibrated in the way that the use of this air box/IAT sensor system as received is expected. Any changes to the air inlet system will result in changes to how the air entering the engine is measured and will require modification to the PCM's calibration.

Ford Performance recognizes that it may not be practical to package this Air Box/IAT sensor system in some vehicle applications. The recommendations listed below are intended to serve as guidelines for designing an air inlet system that will provide good control system performance once the control system calibration has been modified to work with the new Air Inlet System:

Intake Air Temperature Sensor: should the received intake air assembly not be used, make sure to measure the distance from the turbo inlet to the air box provided and locate the same position in your assembly;

Temperature/Mass Airflow Pressure Sensor: should be mounted between intercooler and throttle body.

3.8 Controls Pack Wiring Assembly – CM-14A006-23TC

- Connects to vehicle battery and inline connector on engine harness
- Contains Ford Performance Power Distribution Box (FPPDB) and High Power 90AA inline fuse
- Electrical connections to Accelerator Pedal (APPS) and Clutch Switches (CBT)
- Wire leads for Ignition Switch & Starter
- Data Link Connector for reading Diagnostic Trouble Codes (DTCs)
- Check Engine/Malfunction Indicator Lamp (MIL) for visual indication of engine control system fault code presence
- MIL will stay illuminated when the ignition is ON and the engine is NOT running(if not the light bulb is dead); therefore this condition does not indicate a system fault; Not all DTCs will cause the MIL to illuminate
- MIL on stock instrument panel will not work—only the MIL included in this kit will illuminate if a fault exists.

4.0 - Pre-Installation of Harness and Parts

4.1 Planning

The following is a list of key factors to consider before any installation takes place:

- PCM mounting location is limited by the lengths of the 2 corresponding leads into which the PCM is connected. These leads are an integral part of the CRATE ENGINE HARNESS (not included with Controls Pack)
- Inline Fuse Holder must be mounted within 12" of the vehicle battery "+" post
- Ford Performance Power Distribution Box must be mounted within 60" of the vehicle battery as dictated by the B+/Ground Lead Lengths of the controls pack wiring harness
- Lay out the harness and components first in order to ensure that the wiring leads will reach everywhere you intend them to. This is a good reality check before you drill any holes or mount any components!

4.2 Connector ID

Item	Connector #	Description		Item	Connector #	Description
A	-	FPPDB		I	J47	Jumper connector(PCM side)
B	-	B+MAIN/GND/Fan Lead		J	C1045	Auxiliary Engine Connector
C	-	UEGO		K	C103	PCM connector
D	-	Data Link Connector		L	J47M	Jumper Connector(Engine side)
E	-	Accelerator Pedal Position		M	-	Temperature/Manifold Absolute Pressure Sensor
F	C257	Clutch Bottom of Travel		N	-	Intake Air Temperature Sensor
G	J16	Inline to IP Pigtail		O	-	Alternator
H	-	Power steering wheel BL		P	-	Starter Lead

Table 1 – Summary of ControlsPack Connectors

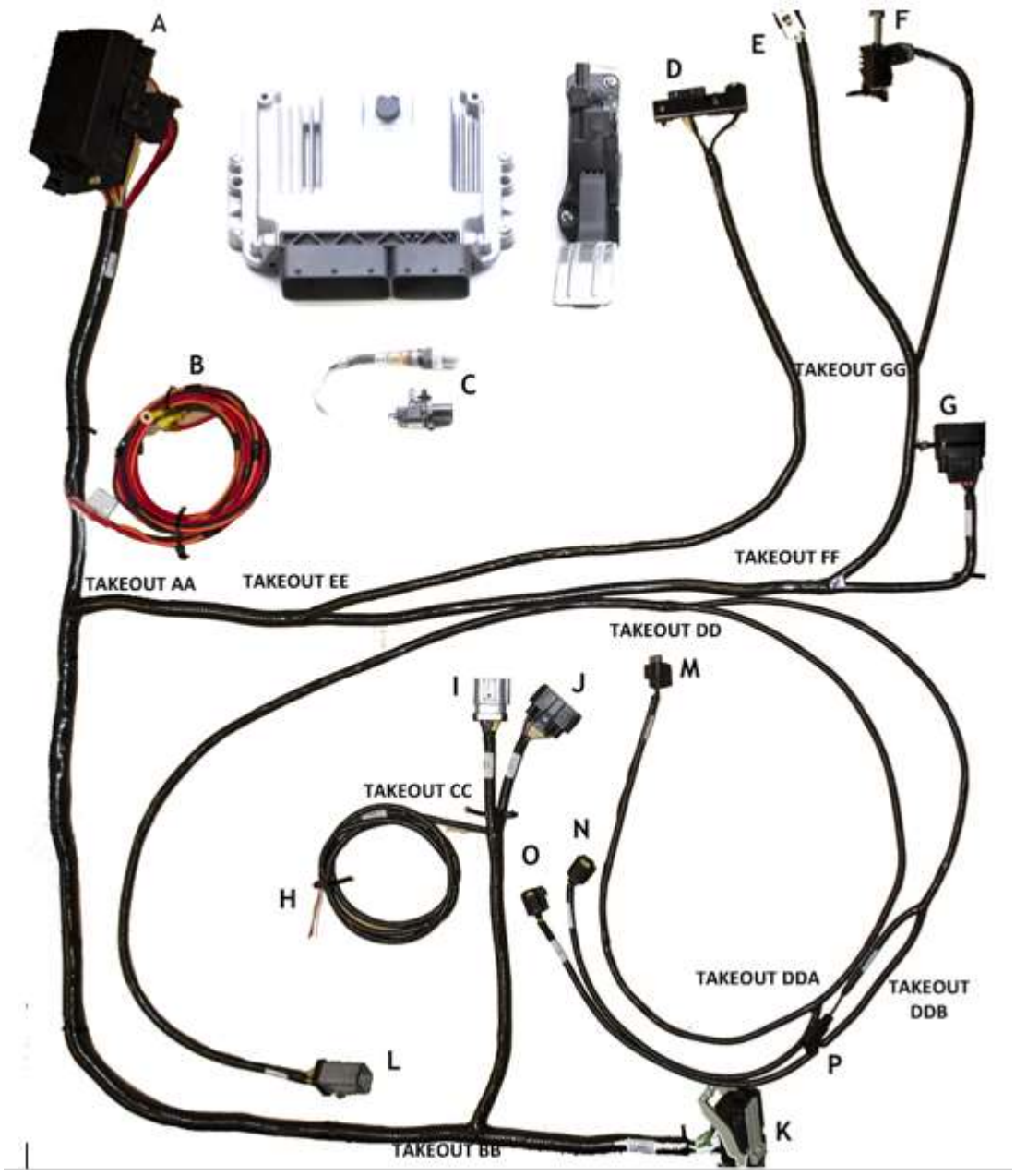


Figure 1 - Controls Pack Wiring Harness Components

4.3 Tools Required

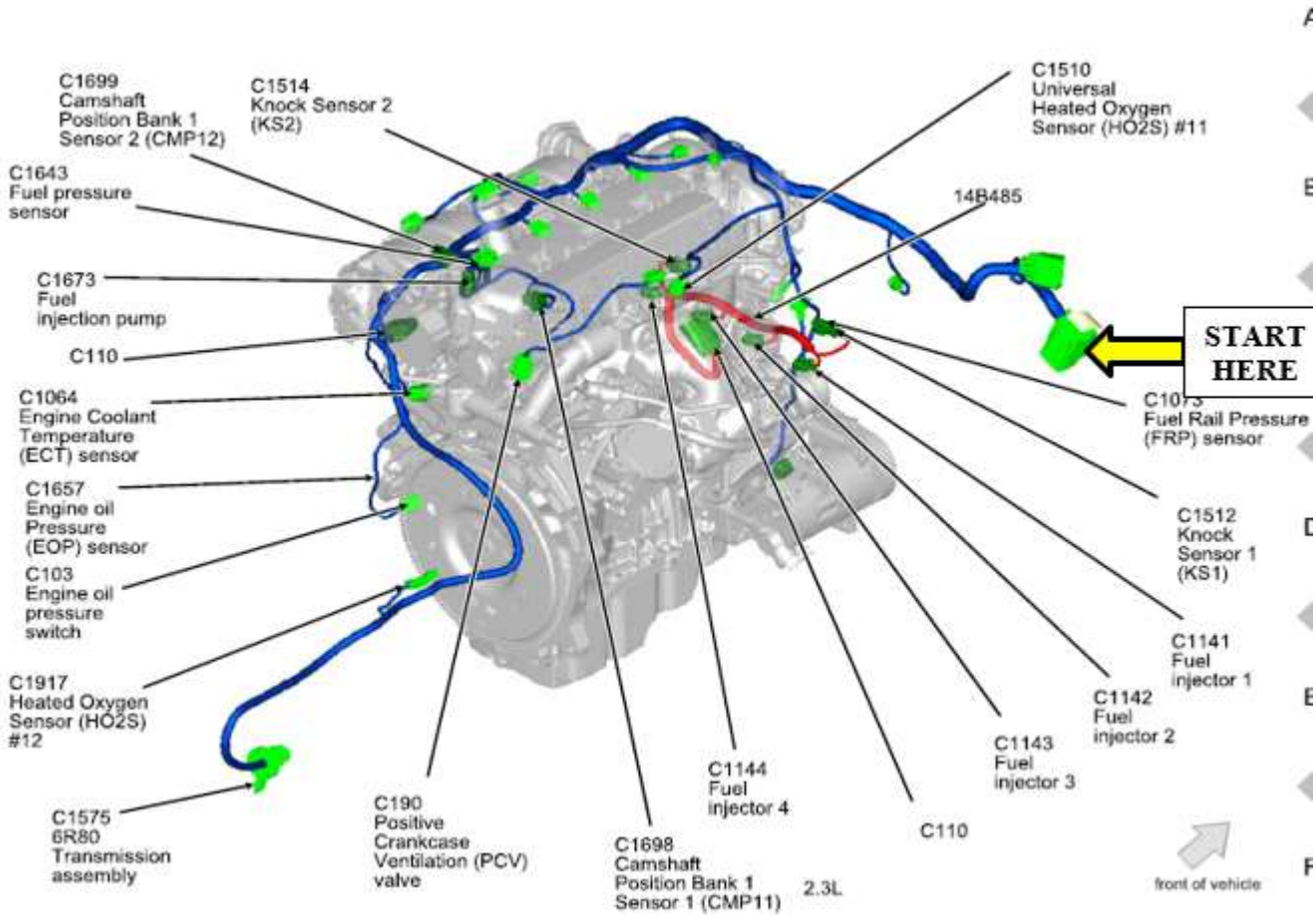
- Wire Cutter/Stripping Tool
- Crimper
- Digital Volt/Ohm Meter
- Solder Gun / Solder
- Center Punch
- Cordless Drill / Drill bits / Hole saw / Screwdriver bits

4.4 Seal the power steering wheel Blunt Leads if not used

If you do not intend to use the power steering wheel function, locate the 3-wire blunt leads (Item H) and seal the wires and tape each wire, or place shrink tube over it, INDIVIDUALLY. This is very important in order to ensure that you do not inadvertently short a hot and ground lead together, causing damage to your PCM and/or other sensitive electronics.

4.5 Engine Harness Routing

Rear View of Engine:



NOTE: the wire harness shown in blue above is the ENGINE harness that comes standard with the 2.3L Crate Engine (Ford Performance P/N: M-6007-23T); THIS IS NOT THE CONTROLS PACK WIRING HARNESS.

Front View of Engine:

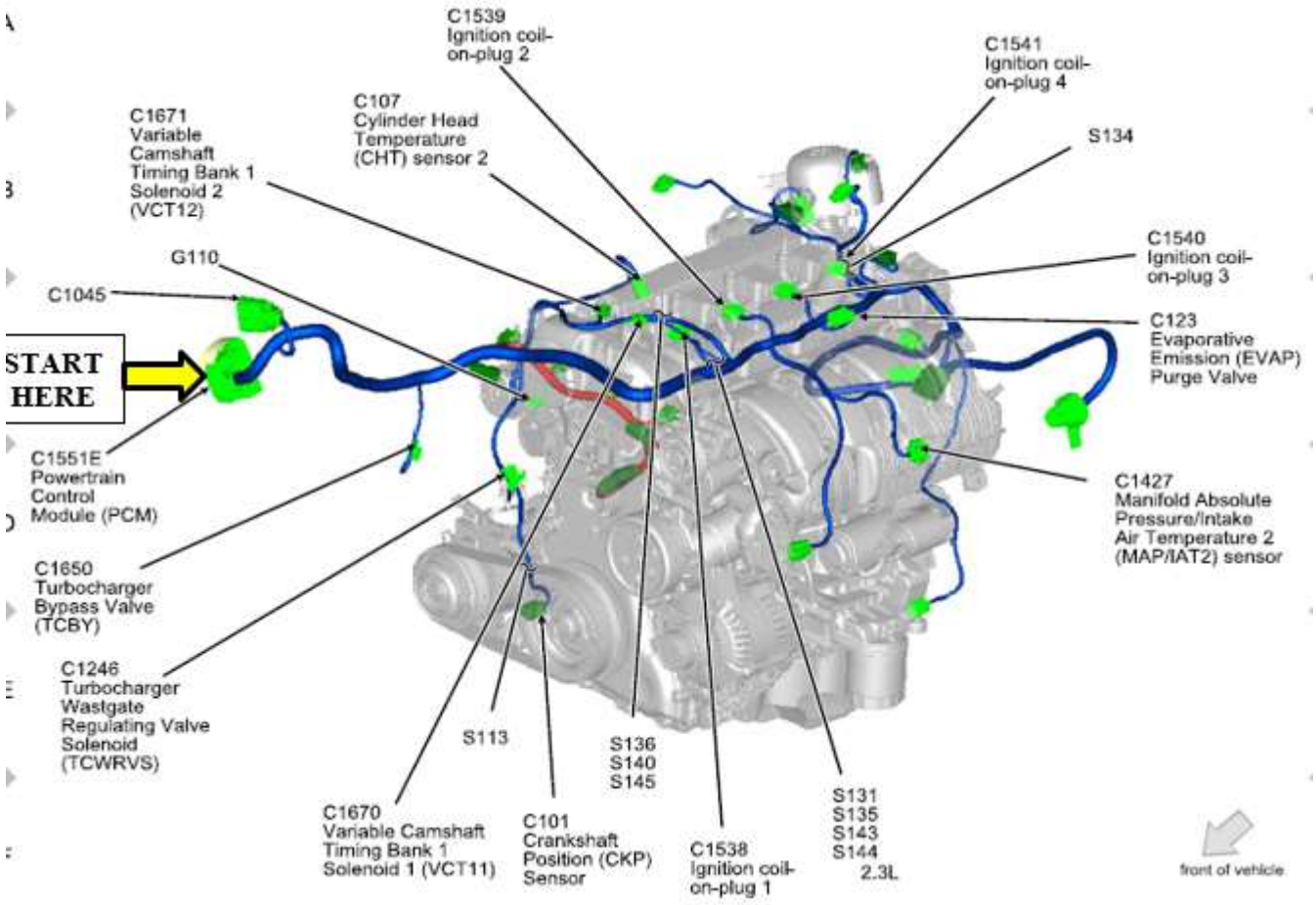


Figure 3 – Front View of Engine.

Note: the wire harness shown in blue above is the ENGINE harness that comes standard with the 2.3L Crate Engine (Ford Performance P/N: M-6007-23T); THIS IS NOT THE CONTROLS PACK WIRING HARNESS.

Please keep in mind that some of the connectors from the engine harness may not be used. Remove the unused connector if you are 100% sure they are not needed and will not be in the future, and then seal the ends. If provided parts/system are used, remove C123 Evaporative Emission Purge Valve(EVAP) and C1643 Fuel Pressure Sensor. Then seal the end with heat shrink tubes and electrical tapes for isolation.

5.0 - 2.3L EcoBoost Control Pack Harness Installation Instructions

NOTE: To avoid electrical shock and/or damage to sensitive electrical control system components, before beginning any work, remove the vehicle's Negative Battery Terminal and place a rag or towel between it and the Battery Negative Post. The Negative Battery Terminal is not to be reinstalled until the last step of installation.

1. Install the battery cable from B+ to alternator and starter on your engine.
2. Identify proper mounting location for the PCM, Power Distribution Box (Item A) & Inline Fuse Holder (can be found in the plastic bag). Lay each component on its own piece of cardboard and use a pencil to create a template of the footprint. Use the templates to drill holes in the proper location/orientation within the vehicle engine compartment. Attach components to vehicle taking special care not to drop or bang the PCM against anything.
3. Locate the PCM connector on the engine harness as indicated in Figures 2 and 3 by the "START HERE" arrow.
4. If a stock PCM is present (crate engines do NOT include a stock PCM, only the controls pack PCM), unplug it and store it in a cool, dry place in case it is needed in the future.
5. Plug the engine pocket connector (from the engine harness) and C103 (Item K from the controls pack harness) into the controls pack PCM: FR3Z-12A650-EANP; once plugged-in, use a zip-tie to tie the bundle of wires exiting each connector back together. In the steps that follow, we will be repeating this process of using zip-ties to piggy-back/tie the controls pack harness to the existing engine harness approximately every 200 mm or so along the engine harness.
6. Moving away from the PCM connector on the controls pack harness (Item K), we reach the first wire split, which we'll refer to as "Takeout BB" Takeout BB is located approximately 250 mm from the PCM connectors and consists of 2 routings off of the main line.
7. Takeout CC is 315mm from Takeout AA, from there connect the in-line connector (Item J) from the controls pack harness to the mating connector on the engine harness.
8. As discussed earlier, seal the power steering wheel blunt leads(Item H) if you do not intend to use the function.
9. A pair of jumper connectors have been introduced in the harness for easy installation and separate the engine side harness from the PCM side.
10. Route the separate routing following jumper connector engine side(Item L) along the engine harness, being sure to "piggyback" to the engine harness every 200 mm or so.
11. Coming down from Item L we reach Takeout DD, consisting of four routings :
    a. Temperature/Manifold Air Pressure Connector (Item M)
    b. Intake Air Temperature Connector (Item N)
    c. Alternator Connector (Item O)
    d. Starter Lead Connector (Item P)
12. Connect each of the connectors (if applicable) mentioned above to their respective locations being sure to avoid any pinch-points or exhaust hot-spots, then connect the jumper connectors(Item I and L).
13. Located about 925 mm from Takeout BB, is what we'll call Takeout AA, near which you will see 3 blunt leads: fan feed(yellow), battery positive(red) and main ground(black). Connect the fan feed wire to your cooling fan with your own wirings. Locate the proper mounting position for the FPPDB, attach the B+ blunt lead to one of the terminals of inline fuse holder, use the ring terminals, shrink tubes and battery lugs to finish installation, you'll need to provide you own battery cables. DO NOT install the battery negative terminal yet.
14. Continuing down the main line away from Takeout AA, you should come across Takeout EE. All takeouts and connections previously mentioned are located under hood; all takeouts and connections mentioned from this point on are located in the passenger compartment.
15. Identify the most appropriate location, based on your application, for the controls pack wiring harness to pass through the engine compartment/passenger compartment bulkhead. Use a center punch to mark the location of the center of the hole, this will keep the drill bit from 'walking' while you are cutting through the bulkhead. Next use a hole saw to create a hole large enough (~2") for the remaining portion of the controls pack harness to pass through. It is strongly recommended to file/smooth the sharp metal edges created by the hole saw and install a rubber grommet in the hole so as to prevent the

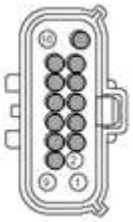
metal edges from perforating the harness and causing damage to it. Feed the controls pack harness through the opening and route to the appropriate locations.

16. Identify proper mounting location for the Accelerator pedal, Clutch pedal (purchased separately) and Ignition Switch (purchased separately). Lay each component on its own piece of cardboard and use a pencil to create a template of the footprint. Use the templates to drill holes in the proper location/orientation within the vehicle passenger compartment. Attach components to vehicle.
17. Identify mounting location for the Bracket with OBDII connector(Item D). Be sure to complete Step 16 before you do this as you will be limited by the harness lead length. Use a piece of paper or cardboard and a pencil to create a template of the bracket footprint. Use the template to drill holes in the proper location/orientation within the vehicle passenger compartment. Attach the bracket to the vehicle.
18. Located approximately 1 foot down the main line of the controls pack harness from Takeout EE is Takeout FF, which consists of one routing off of the mainline:
    a. Instrument Panel Pigtail connector (J16)
19. Route J16 to approximately the base of the steering wheel to be connected as explained in a later step (Step 22).
20. From Takeout FF, the only remaining routing takes us to "Takeout GG," which consists of one routing off of the mainline:
    a. Accelerator Pedal Position Sensor (APPS) (Item E)
    b. Clutch Bottom of Travel (Item F)
21. Connect each of the connectors to their respective locations.
22. Locate the 16-way I/P Pigtail connector with blunt leads and continue to Section 6.

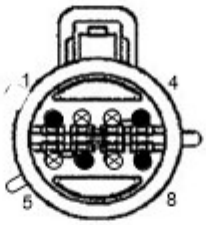
* Removal Procedures for Unused Connectors:

If 100% sure connector is not currently needed and will not be needed in the future, cut routing leading-up to unused connector and individually heat shrink each wire herein. To ensure that the wires are completely isolated from one another and the outside environment, you may also want to wrap the heat-shrinked wire in electrical tape to provide an additional layer of protection from moisture and dirt.

6.0 - 8/16-way I/P Pigtail Connection Details



Cavity	Lead Label	Wire Color	Description
1	Fuel Pump Relay Out	DG-YE	Provides constant +12V to the fuel pump
3	Starter Motor Request (SMR)	RD-LB	Apply +12V to send a request to the PCM to energize the starter solenoid
5	Ignition Relay Trigger	RD-LG	Apply +12V to energize the ignition relay/wake-up the system



Cavity	Lead Label	Wire Color	Description
2	12V HAAT	RD	Provides constant +12V
3	Starter Motor Request (SMR)	RD-LB	Apply +12V to send a request to the PCM to energize the starter solenoid
5	Fuel Pump Relay Out	DG-YE	Provides constant +12V to the fuel pump
7	Ignition Relay Trigger		

The 8/16-way pigtail is to be connected according to the chart below. See also the diagrams on the following pages for illustrations of wire connection points, based on the ignition/starter switches that you intend to use. Setup A uses separate toggle switches for ignition and starter inputs, while Setup B uses an ignition cylinder with a key.

NOTE: If you have the 16-way connector, this early system DOES NOT have a 12V wire so you'll have to provide your own 12V to your ignition and starter switches.

6.1 Locate each of the Blunt Leads. This is where you will need to make all of the soldered connections for the harness. Connect the following REQUIRED blunt leads as follows:

6.1.1 **Fuel Pump Relay Out (Dark Green-Yellow):** Connect to Fuel Pump positive. Separate ground for fuel pump must be provided. The fuel pump will be running any time key is on.

6.1.2 **Starter Motor Request (Red-Light Blue):**
Set-up A:
Connect to input node of starter momentary switch so that 12 volts is provided when engine starting is requested.*
Set-up B:
Connect to 'Start' output node of ignition cylinder so that 12 volts is provided when engine starting is requested.*

6.1.3 **Ignition Relay Trigger (Red-Light Green):**
Set-up A:
Connect this wire to the output side of the ignition toggle switch so that 12 volts is provided when the key is in the 'Start' (cranking) and 'Run' positions. It is imperative that this circuit be reliable, the PCM will interpret an intermittent voltage on this signal as a request to shut down the engine! (Hint, if your engine shuts down after a hard launch check here first).
Set-up B:
Connect to the 'Start/Run' output node of ignition cylinder so that 12 volts is provided when engine starting is requested. It is imperative that this circuit be reliable, the PCM will interpret an intermittent voltage on this signal as a request to shut down the engine! (Hint, if your engine shuts down after a hard launch check here first).

Note: If you have the 8-way connector, use 12V HAAT at pin#2; if you have the 16-way connector, please provide your own 12V.

6.2 Once all of the blunt lead connections have been soldered onto their appropriate location, insert the 8/16-way I/P Pigtail connector into J16(Item G).

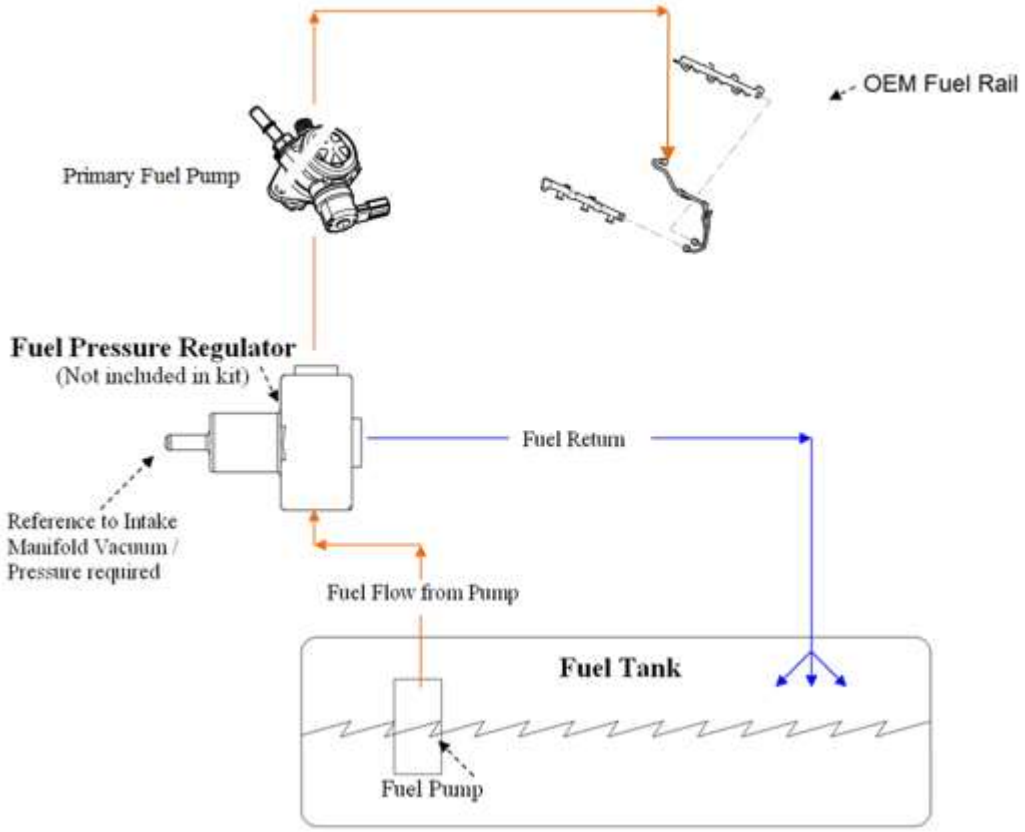
6.3 Verify that you have a good reliable (dry and clean) ground path from the battery negative post to the location being used as chassis ground. In general, the resistance from the battery ground to this chassis location should be less than 0.1 ohm. Install and tighten the Negative Battery Terminal onto the Vehicle Battery.

* Important Note on the Starting System

This kit includes connections and installation instructions for PCM controlled engine starting; however, it is not required that the customer utilize this option. Customers may choose to use their existing non-PCM controlled starting system if desired. If non-PCM controlled starting is used, any unused blunt leads should be cut to ~2" length and sealed using heat shrink.

7.0 - Fuel System

The PCM is calibrated for a return style fuel system as shown below.



- Set regulator to maintain 65 psi delta fuel pressure across injector (65 psi at fuel rail with engine off):
- Use only AN type fuel fitting to interface with OEM fuel rail.
- Fuel pressure regulator must have reference to manifold vacuum.

Fuel pump requirements: 155L/Hr minimum at 65psi

Fuel pump location

A common and often overlooked problem is the location of the fuel pump or pumps. Optimally, the fuel pump should be mounted IN THE TANK to reduce the possibility of pump cavitation. Cavitation is essentially localized boiling caused by a reduction in pressure,

generally occurring on the inlet side of a pump. This localized boiling results in fuel vapor bubbles which will reduce the volume of fuel the pump is capable of delivering to the engine. Any reduction in pressure or increase in temperature at the inlet side of the

pump increases the chances that cavitation will occur. For this reason, it is always best to either have the pump inside the tank immersed in fuel or (in the case of an external pump) gravity fed, which will increase the pressure on the inlet side of the pump. If the fuel pump has to "pull" the fuel, this will result in a reduction in pressure at the fuel pump inlet potentially allowing cavitation and, thus, vapor bubbles to develop. These vapor bubbles are then drawn into the fuel pump and exit the high-pressure side of the fuel pump as compressed vapor.

They travel the entire length of the fuel system and are expelled through the fuel injector. This can cause issues ranging from stumbles and hesitations to engine damage due to insufficient fuel delivery and lean A/F ratios. Sometimes this problem can characterize itself by only appearing when the weather gets warmer, which can confound the diagnosis of the issue. In certain cases, it may seem to only develop when driving on certain surfaces, because pavement reflects more heat than an off-road 4x4 trail. Remember, more heat and lower pressure on the inlet side of the pump means a greater chance of cavitation, which is to be avoided whenever possible.

If you are using an external mounted fuel pump, you should run a very coarse (typically around 100 micron) filter on the inlet side of the fuel pump, and a finer (typically around 10 micron) filter on the outlet side of the pump. A paper filter is NOT recommended on the inlet of the fuel pump because it can cause a restriction in fuel flow which, as mentioned previously, can lead to cavitation.

Warning: It is highly recommended that an inertia switch is incorporated into the fuel pump wiring to turn off the fuel pump in event of an accident.

8.0 - Initial Start-Up

Note: The following information assumes completion of each of the previous steps of this installation manual.

9.1. Check all fluid levels, electrical and fluid connections.

9.2. Pressurize the fuel system by turning the key on. Inspect the entire fuel system (from tank to engine) for leaks.

!!! NOTE: If any leaks are found, do not proceed further until these have been corrected !!!

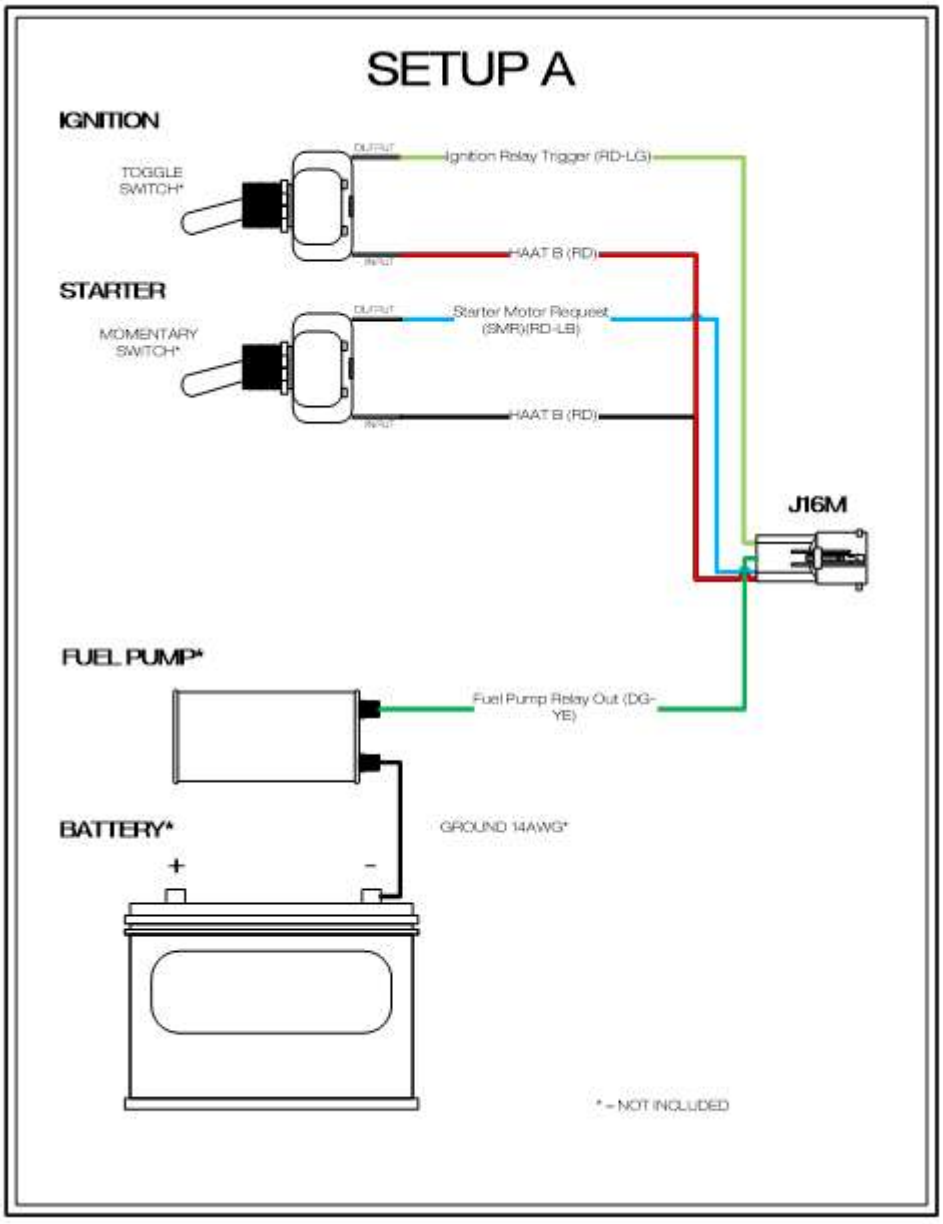
9.3. Start Engine.

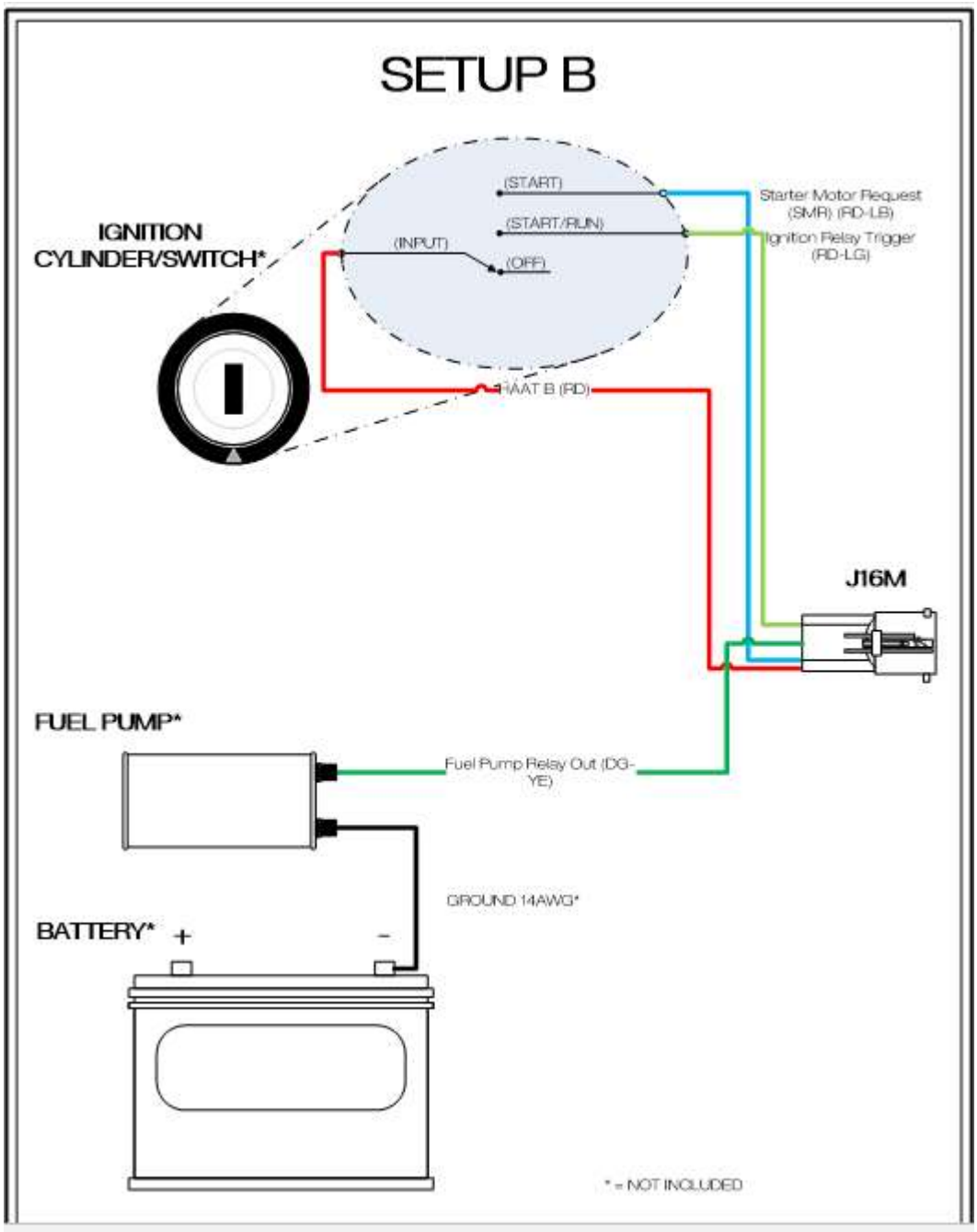
9.4. Check for leaks and/or noises that may indicate a problem.

CAUTION: Be certain to run the vehicle in a well ventilated area.

9.0 - Wire Usage Schematics

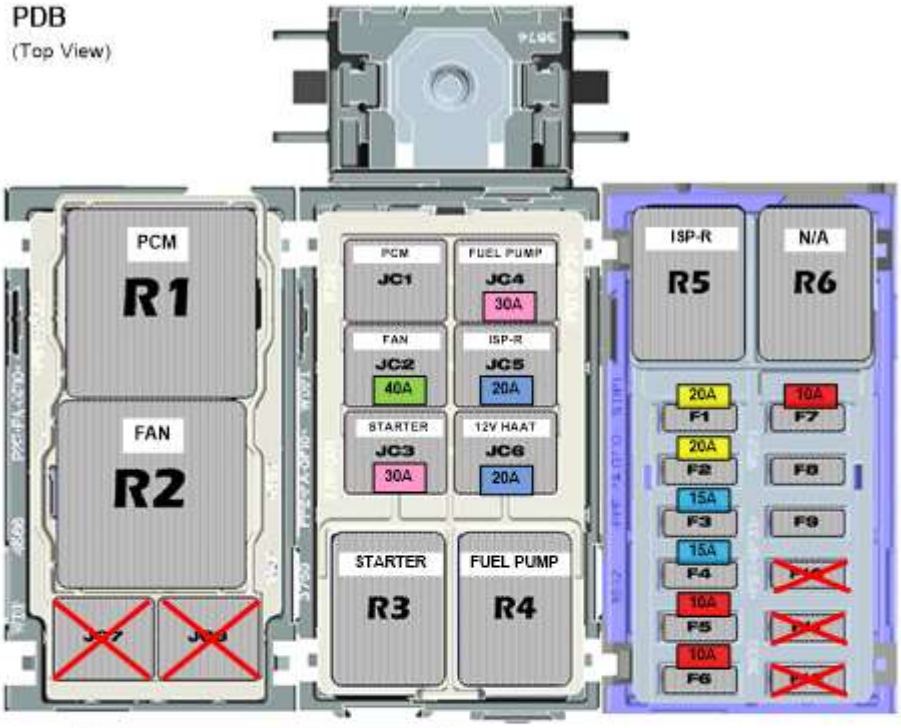
The following two pages detail the two most common wiring configurations—please choose one to complete installation of your controls pack kit.





10.0 - Fuses & Relays

- The following diagram outlines the array of fuses and relays included in the controls pack wiring harness, and the function of each.
- NOTE: Do NOT replace any of the fuses with a higher value than those specified below.



FUSES
Fuse 1 - IN
Fuse 1 – OUT (20A) VPWR1, PCM
Fuse 2 – IN
Fuse 2 – OUT (20A) VPWR2, MIL LOADS
Fuse 3 – IN
Fuse 3 – OUT (15A) VPWR3, NON-MIL LOADS
Fuse 4 – IN
Fuse 4 – OUT (15A) VPWR4, Coils
Fuse 5 – IN
Fuse 5 – OUT (5A) ISP-R
Fuse 6 – IN
Fuse 6 – OUT (10A) 12V HAAT, DLC
Fuse 7 – IN
Fuse 7 – OUT (10A) 12V HAAT, GEN
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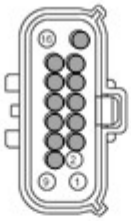
Fuse 9 – IN
Fuse 9 – OUT (5A) AUX CAN Feed

J-Case FUSES

JC Fuse 1 – IN
JC Fuse 1 – OUT, 40A, PCM Relay Feed
JC Fuse 2 – IN
JC Fuse 2 – OUT, 40A, Fan Relay Feed
JC Fuse 3 – IN
JC Fuse 3 – OUT, 30A, Starter Relay Feed
JC Fuse 4 – IN
JC Fuse 4 – OUT, 30A, Fuel Pump Relay Feed
JC Fuse 5 – IN
JC Fuse 5 – OUT, 20A, ISP-R Relay Feed
JC Fuse 6 – IN
JC Fuse 6 – OUT, 20A, 12V HAAT Feed

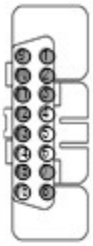
11.0 - Connector Faces

CAVITY	WIRE		CIRCUIT FUNCTION
1	VT	14	VPWR4, Ignition Coils
2	GY	16	VPWR3, NON-MIL Loads
16	LG	16	VPWR2, MIL Loads



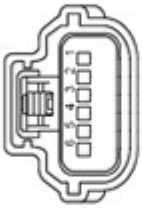
Auxiliary Inline to Engine

CAVITY	WIRE		CIRCUIT FUNCTION
4	BK	20	PWR GROUND
5	BK	20	PWR GROUND
6	WH-BU	20	HS CAN (+)
14	WH	20	HS CAN (-)
16	YE	16	12V HAAT



DLC

CAVITY	WIRE		CIRCUIT FUNCTION
1	LG-OG	20	APPVREF1
2	YE-OG	20	APP1
3	VT-LG	20	APPRTN1
4	YE-LG	20	APPRTN2
5	DB-WH	20	APP2
6	DB	20	APPVREF2



APPS

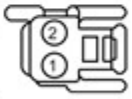
CAVITY	WIRE		CIRCUIT FUNCTION
1	VT-WH	20	GENLI (Load Indicator)
2	DB-OG	20	GENRC (Regular Control)
3	YE	20	12V HAAT

Alternator

CAVITY	WIRE		CIRCUIT FUNCTION
1	YE-LG	18	TCBP, SIGNAL
2	GY-VT	18	TCBP, SIGRTN
3	LG-VT	18	TCBP, VREF

Turbocharger/Manifold Absolute Pressure Sensor

CAVITY	WIRE		CIRCUIT FUNCTION
1	DB-OG	20	CPP-BT
2	BK	20	GROUND



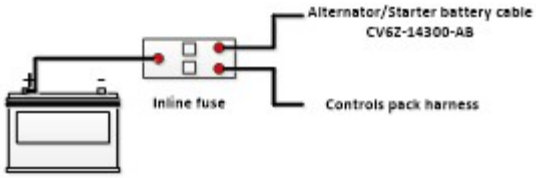
Clutch Pedal Position – Bottom of Travel

CAVITY	WIRE		CIRCUIT FUNCTION
1	VT-GY	20	IAT, SIGNAL
2	DB	20	IAT, SIGRTN

Intake Air Temperature Sensor

CAVITY	WIRE		CIRCUIT FUNCTION
1	BN	14	STARTER SOLENOID,12V

Starter Solenoid



12.0 - Troubleshooting tips:

The following troubleshooting tips are intended for you to run a few quick tests to roughly determine what the issues are before calling or find a solution yourself:

- Always double check all your grounds. The wirings included in this kit are extremely sensitive to ground issues. Secure all the connections from chassis grounds to battery negative. Do a continuity test with your multimeter between all your ground terminals and battery ground.
- Check for all you reference voltage 5V, make sure they are not short to elsewhere. Use a multimeter to measure the voltage. The reference voltage are sent out from PCM so if wirings are all good and still you have a different voltage level, PCM might not be properly calibrated.
- If you don't have any power at all, check for your ignition switch, ignition relay R5 and PCM relay R1 wirings. You should have 12V at both relay outputs once ignition on, which is fused via F5 and F1 separately. Again use a meter to measure the voltage at F5 and F1, 12Vexpected, there are tiny holes on all mini fuses for your probe to thrust in.
- If ignition circuitry works but no cranking, check for your starter switch and starter relay R3 wirings. You should have 12V at the relay output WHEN you push the start button. Use a meter to measure the voltage at the Starter solenoid leads from harness(disconnect from starter), 12V expected WHEN you push the start button.
- If your engine will only crank but not fire up, fuel system malfunction can be the cause in most cases. First make sure that you have 12V at fuel pump + and all injectors when key on. Measure the pressure at your fuel rail it should start building up once you hit starter button.