MODERN IGNITION. CLASSIC POWER.

LT-DIS

INSTALLATION INSTRUCTIONS

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LT-DIS
INTRODUCTION

For best results it is recommended that you read and understand these instructions completely prior to commencing installation. For best results this instruction manual should always be supplemented with a factory service manual or repair manual. Improper installation can result in damage to the components, the vehicle or yourself.

- LT-DIS Main Unit (Spline drive or Pin Drive). Also referred to as “sensing unit” or “Head unit”.
- Main Wiring Harness
- Power Module with extension harness
- Dash Module (Bluetooth, In-Field Programmer, and Logic Analyzer)
- Programming wiring harness
- Keyed Crank Hub with integrated crank reluctor. Crank key included.
- Cam Sensor
- Crank Sensor with shims
- Hub Spacer – Included and needed on 1992-1995 LT1 engines. Not required on 1996+ LT1 engines
- Crank sensor alignment tool
- Crank sensor air gap yellow shim gauge (0.020”)
- Water pump gaskets

The LT-DIS unit replaces the Optispark distributer currently installed on your LT1 or LT4 engine. Due to the number of engines and vehicle platforms the Optispark originally came on, it is recommended that you have access to the service manual for your vehicle. This instruction will supplement the service manual.

Important: To complete your conversion to the LT-DIS ignition system you will require eight (8) LS (4 wire) type ignition coils, coil mountings, coil harnesses and new spark plug wires. These components can be installed and purchased yourself or Torqhead offers coils, coil mountings and coil harnesses for LT1 engines. For any questions feel free to reach out to Torqhead or any of our sales partners.

LT1/LT4/L99 Compatible Platforms:

1994-1996 B-Body – Chevrolet Impala SS, Buick Roadmaster, Chevrolet Caprice

1993-1997 F-Body – Chevrolet Camaro, Pontiac Firebird

1992-1996 Y-Body – Chevrolet Corvette

1994-1996 D-Body – Cadillac Fleetwood

LT-DIS
UNIT DRIVE TYPES

The LT-DIS main unit utilizes the same drive mechanism(s) as the original Optispark distributors offered by GM. This allows the sensing unit to conveniently fit on all years of LT1 and LT4 engines. The two drive mechanisms are spline drive (92-94) and pin drive (95-97). The Pin drive style was found one year early in 1994 on B-Body and D-Body platform vehicles.

Let's take a moment to understand these drive types and how they properly index.

Spline Drive:

The early LT engine Optisparks were driven by Spline shaft. This spline shaft, on the optispark, has an index tab which correctly mates with the camshaft spline since it has a mating index notch. This notch indexed spline ensures that the TH 24x Signal unit installs and is oriented correctly with engine position.

Fig 1- Spline Drive Shaft

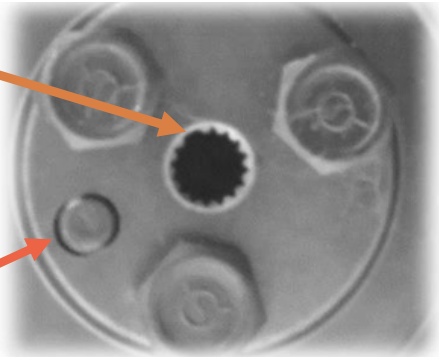


Fig 2- Spline Drive hole in camshaft timing gear

Pin Drive (aka Clover Drive):

The later LT engine Optisparks were driven via an extended camshaft timing gear dowel pin. The camshaft dowel pin is longer than the camshaft dowel pin on early year engines and protruded into the Optispark pin drive spindle. This pin drive ensures the later Optisparks only installed in one way and were properly oriented to engine position. It is important to ensure the dowel lands in the correct drive slot hole.

Figure 3 – Pin drive spindle. Has locating hole for cam dowel pin. This drive hole is oval in shape

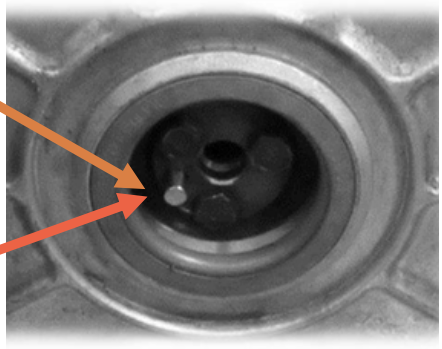


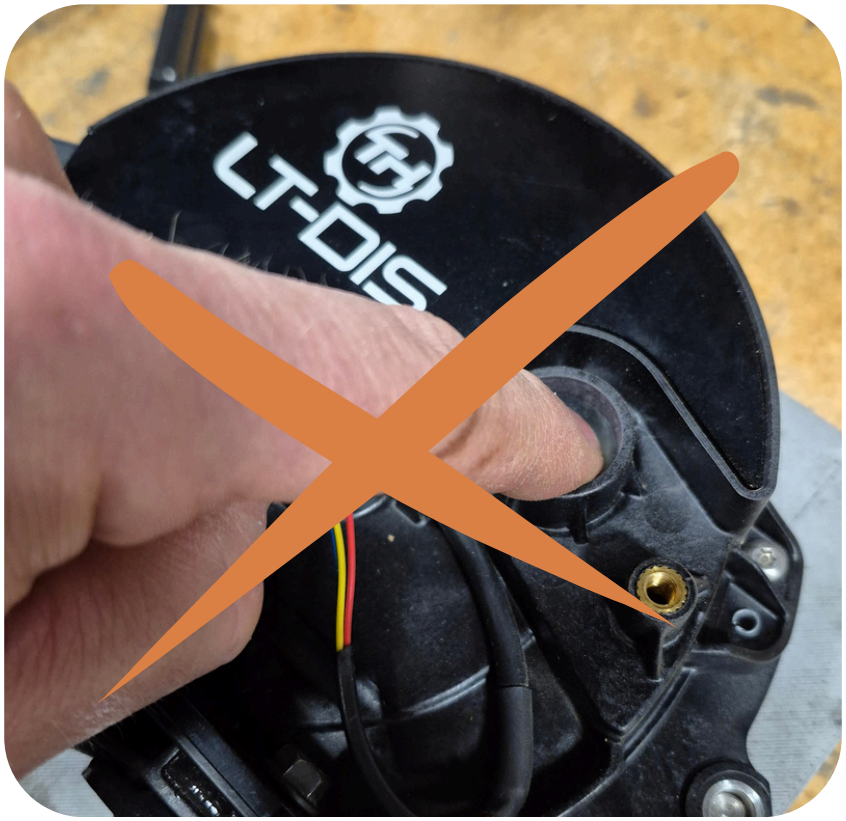
Figure 4 – Pin drive Optispark drive dowel pin.

LT-DIS
DRIVE TYPES

Depending on the style of drive mechanism your vehicle has, ensure you understand how it mates with the driveshaft and ensure your alignment is correct during installation.

When either drive type is properly aligned the engagement should be smooth and effortless. Without proper alignment damage may occur if excessive force is used.

IMPORTANT: **DO NOT stick your fingers or any other tool into the sensing unit camshaft sensor hole.** The internal timing disc is precisely setup for optimal performance during manufacturing. Interfering with disc in any way could result in damage.



SAFETY

Before rushing in with excitement to upgrade your LT engine with TORQHEAD 24x components, take the time to ensure your safety is not jeopardized. This instruction is a guide only and the steps within are a suggestion only. It is up to you, the customer, to ensure during each step you use every precaution applicable to keep yourself safe.

During the installation you will be in contact with tools, engine fluids, and other elements that must be treated with caution. It is assumed that you will have all the appropriate tools, knowledge and safety equipment to perform the job correctly.

Never use a tool for a purpose it was not intended. If you do not feel capable of performing the installation or you do not have the basic tools to perform the installation, it is recommended that you seek help from a qualified person.

LT-DIS DISASSEMBLY

Wait until the engine is completely cool before starting this procedure.

1. Disconnect the negative battery terminal. Locate the radiator petcock or optionally the lower radiator hose and drain the engine coolant from the system

2. Disconnect the MAF, IAC, and IAT connectors.

3. Remove the intake air duct work.

4. Once the coolant is drained, loosen and remove the upper radiator hoses from the radiator (Fig. 5).

5. Remove the heater core hoses from the water pump housing. Be prepared for these to drain additional fluid that was not completely drained during previous steps. (Fig. 5)

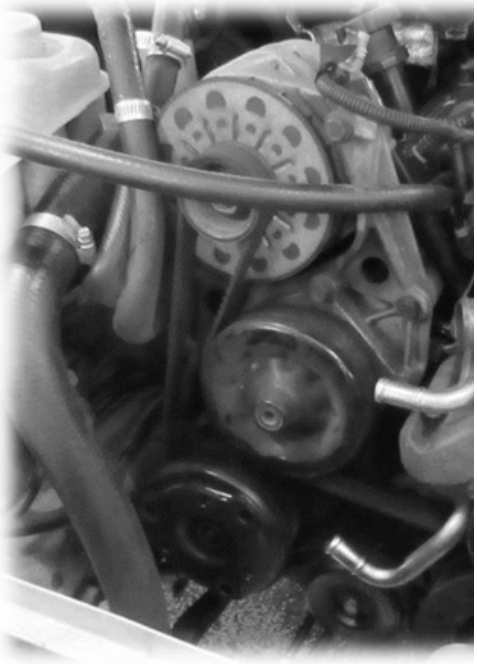


Figure 5 – Heater core hoses removed

6. Remove the serpentine drive belt by rotating the spring loaded idler pulley. Use caution as this pulley is spring loaded. Once the belt is removed the idler pulley will settle beyond its usual position.

7. Remove the three bolts that hold the crank pulley to the crank hub. (Fig. 6). Remove the pulley from the crank hub.

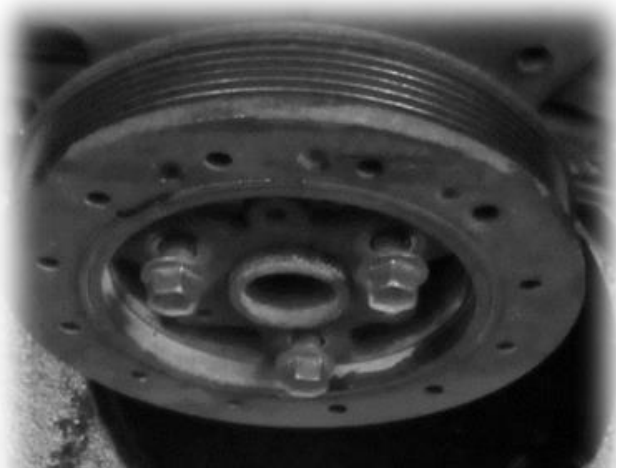


Figure 6 – Crank pulley bolts being removed

8 Disconnect the water pump ECT sensor connector. (Fig 7)

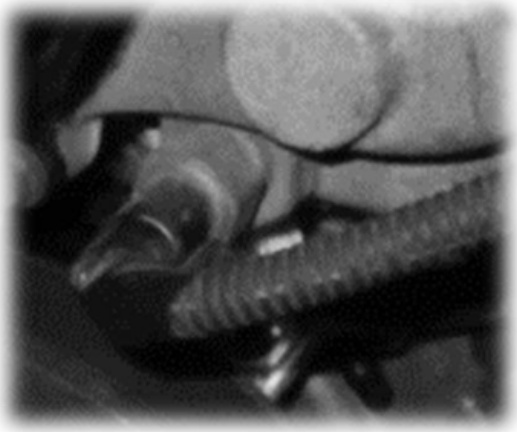


Figure 7 – ECT sensor connector

9 If not already performed, loosen and remove the lower radiator hose from the water pump. Coolant may still leak, so be prepared.

10 Remove the six bolts that secure the water pump housing to the engine. A small extension will help. Coolant may leak out, so be prepared.

11 You should now be able to remove the water pump. It may need some nudging to knock it loose from the engine. Do not use hammer, or high force as you may crack the housing. Again be prepared for coolant to leak. (Fig 8)

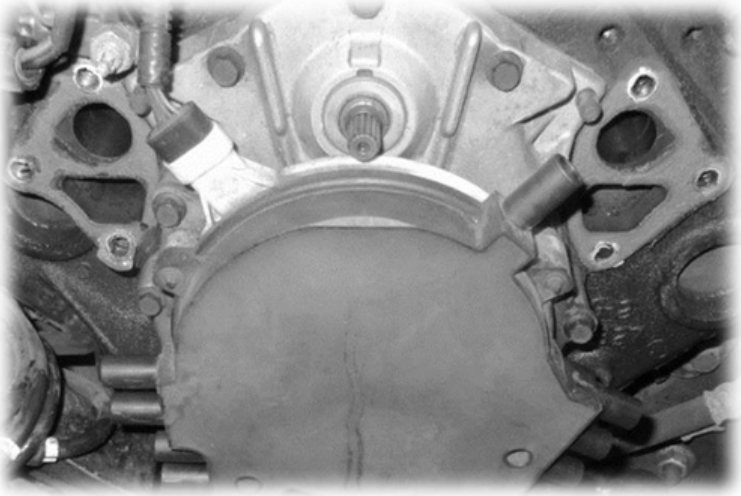


Figure 8 – Water pump removed

12 Complete access to the Optispark distributor is now complete. Disconnect the spark plug wires, coil wire, and distributor signal connector from the distributor. If equipped also disconnect the vacuum line from the distributor (late model “vented” Optisparks only).

13

Remove the three bolts that secure the Optispark distributor to the front timing cover of the engine. The Optispark can now be removed.

Figure 9 – Optispark Distributor removed. Late model type shown.

TIP: *To aid crank key installation, step 14 below can be followed. This will place the crank snout keyway upwards (12 o'clock position) which allows easier installation of supplied crank key.*

14

Rotate the engine so that the cam dowel pin is in either position (8 o'clock or 2 o'clock) shown in Figure 10. If your engine is the early type spline drive rotate the engine so that the spline drive index notch is in either the 5 o'clock or 11 o'clock position (You'll have to use a light to peer through the spline drive hole in the front timing cover.) This step is just a tip only so that the crank snout key location ends up in 12o'clock position.

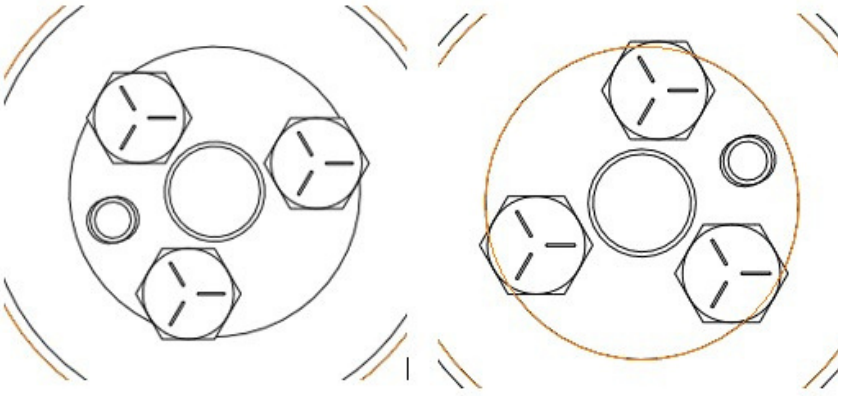


Figure 10 – Acceptable cam dowel positions when viewed straight on from front of engine. Viewable when using late model type pin drive.

15

Without rotating the engine, you can now remove the crankshaft hub retaining bolt.

16 Without rotating the engine, the crankshaft hub can be removed. A puller will need to be used once the crank hub is press fit onto the crankshaft snout. The best/ recommended tool is J-39046 from Kent Moore or equivalent. TIP: Use at your own caution. A standard 3 bolt puller can be used to avoid purchasing a special tool. To use the 3 bolt puller you will need three (3) four inch long 5/16" grade 8 bolts, washers & nuts. You will also need a four inch long grade 8 allen head bolt, this must be an allen head. The standard 3 bolt puller's beveled tip will not fit through the crank hub retaining bolt hole to press against the crankshaft snout. This is where the four inch allen bolt will be used. Insert it in the crank hub retaining bolt hole, without engaging the threads, so that it presses against the crank. Now the beveled tip of the puller can engage & press against the allen head. The three standard grade 8 four inch bolt, washers & nut can be engaged in the puller & inserted through the three crank pulley bolt holes. Working slowly pull the hub from the crankshaft. Try not to rotate the crank.

17 With the stock crank hub removed, install the supplied crankshaft key. If you followed step 14 above the keyway on snout will be at 12 o'clock position. Gently tap it into place, ensuring that it is completely installed. Avoid hitting it too hard, as this can mushroom the key, making it thicker and hub will be harder to install.

18 Now is a good time to remove and clean up any gasket surfaces, such as the water pump. It is recommended that you take this opportunity to replace any of the seals in the timing cover

19 Remove the factory single coil and ignition control module from the front of cylinder head. These devices can be completely removed and no longer required.

LT-DIS
Sensing Unit and Hub Installation

1

Before proceeding, or installing the TORQHEAD 24x crank hub, it is recommended that you rotate the engine such that the camshaft gear dowel or spline drive notch is in the following position based on your drive mechanism. These will make pre-aligning the drives and engaging correctly easier.

- Pin Drive (Late style): Camshaft gear dowel in the 3 or 9 o'clock position when viewed from front.
- Spline Drive (Early Style): Camshaft gear spline drive notch in the 6 o'clock position when viewed from front (peer through spline drive shaft hole using light).

2

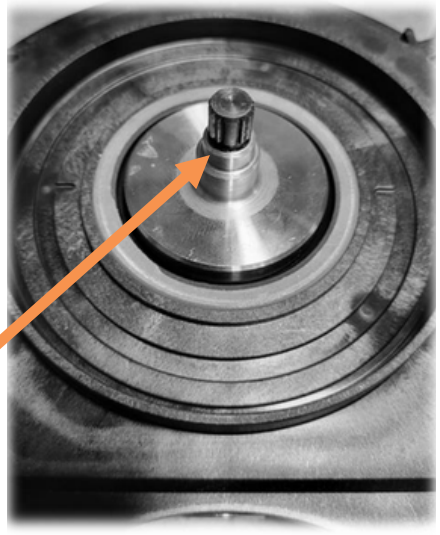
Install the TORQHEAD 24x sensing unit. Refer to the beginning of this instruction to re- familiarize yourself with the two types of drive mechanisms and how each is correctly aligned.
If you have a pin drive late style sensing unit, apply some engine oil to the two O-Rings on the pin drive spindle. This will aid insertion of the sensing unit.

!

IMPORTANT If you correctly aligned the camshaft and drive mechanism the sensing unit should engage easily and smoothly. The sensing units mounting points will land flush with the timing cover (no gap). If it does not fully seat to the timing cover you probably do not have correct alignment. Do not use bolts to draw it in. DO NOT APPLY FORCE, realign and try again. Patience for a few minutes is required, please take your time.

If you followed assembly step 1, rotate your sensing unit drive mechanism into one of the following two positions:

Pin Drive: Drive pin slot pointing at #1 indicator (Fig 11.)



Spline Drive: Sensing unit drive tab in 6 o'clock position as shown in Figure 12

Sensing Unit and Hub Installation

If your dowel or spline drive notch are not in one of the position indicated in step 1, then you must ensure you correctly index the sensing unit to the appropriate position before attempting installation of the sensing unit.

Incorrect alignment and unnecessary force can result in damage to the sensing unit.

3 With the sensing unit installed and seated correctly you can now install the three sensing unit retaining bolts that were used to retain the original Optispark. Torque to manufacturers spec of 106 lb-in (9 lb-ft).

4 If not already installed, install the camshaft position sensor in the front cover of the sensing unit. Do not over-tighten the camshaft-retaining bolt. Just snug it up.

Figure 13

Figure 14

5

Remove the crank sensor from sensing unit (to avoid any potential damage when installing the hub). Then install the TORQHEAD 24x crank hub, ensuring to align the crank hub keyway with the crankshaft key. Install the supplied crank hub spacer prior to installing the hub if your vehicle is a 1992-1995 vehicle (Fig 15). Do not use the supplied spacer if you vehicle is 1996+ (Fig 16).
Note: This hub is a press fit onto the crank snout so it will need to be pulled on. **NEVER use a hammer** to drive it on.

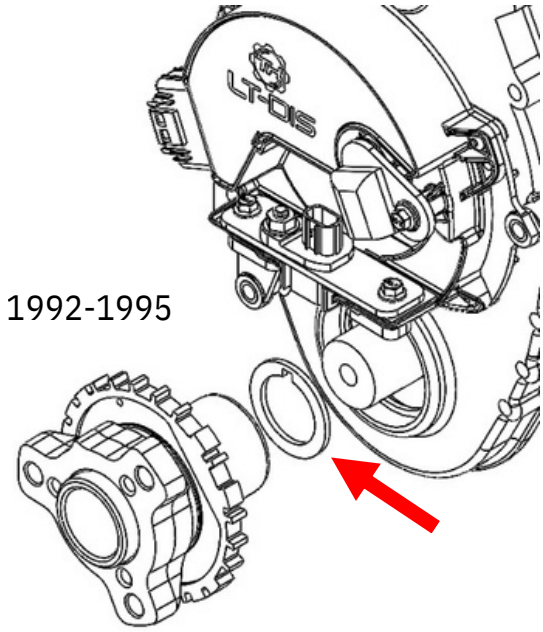


Figure 15

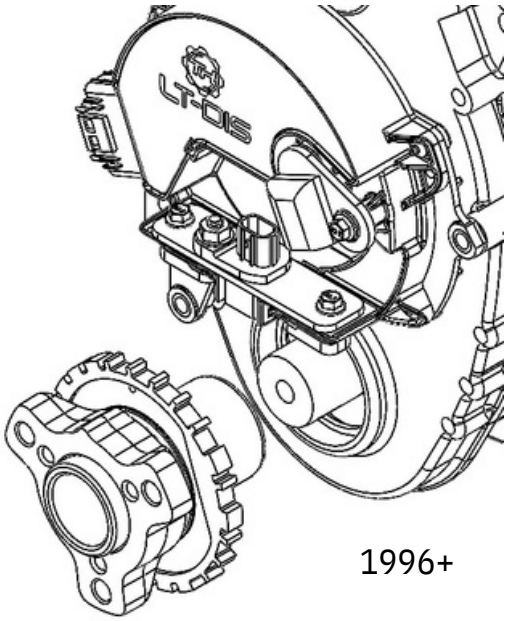


Figure16

6

Install and torque the crank hub retaining bolt to manufacturer spec of 75 lb-ft.

Sensing Unit and Hub Installation

7

The crank sensor mount comes pre-installed.However if it was removed, install the crank sensor mount onto the sensing unit. Two small M5 flange head screws and serrated washers retain the crank sensor mount (Fig17).Do not fully tighten the two screws, leave them loose enough that the crank sensor mount can slide back and forth.

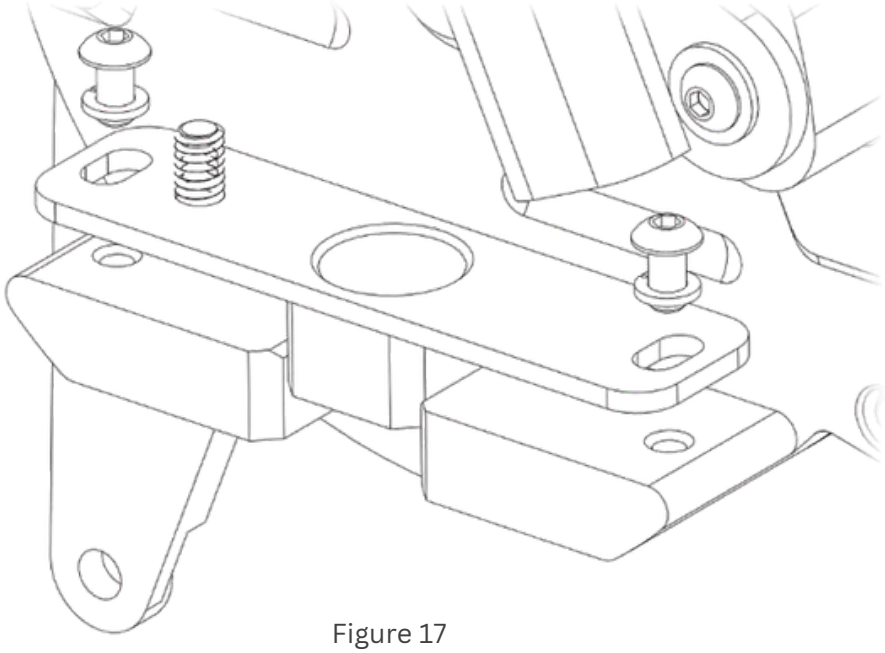
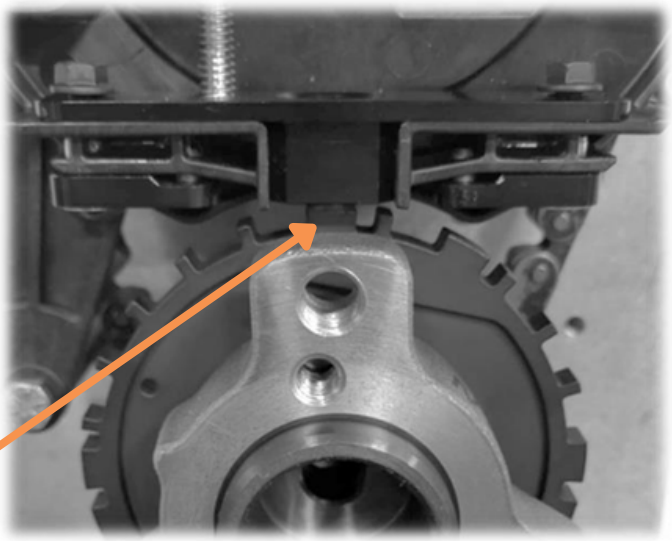


Figure 17

8

With the crank sensor removed, and to aid incentering and air gap accuracy, rotate the crank hub so that a “large tooth” (there are many to choosefrom) is directly below the crank sensor window. This will put a large tooth in the 12 o’clock position.The large tooth should be centered in the window.



Large tooth below crank sensor window

Sensing Unit and Hub Installation

9

Insert the crank sensor alignment tool into the crank sensor mount. Once fully inserted this tool will setup the position of the crank sensor mount such that it, and the crank sensor window, become centered over the 24x reluctor. When inserting the tool ensure the slot/notch in the tool runs side to side and engages the 24x crank reluctor on the hub. Also ensure the tool is fully seated on a large tooth. See figures 18 and 19.

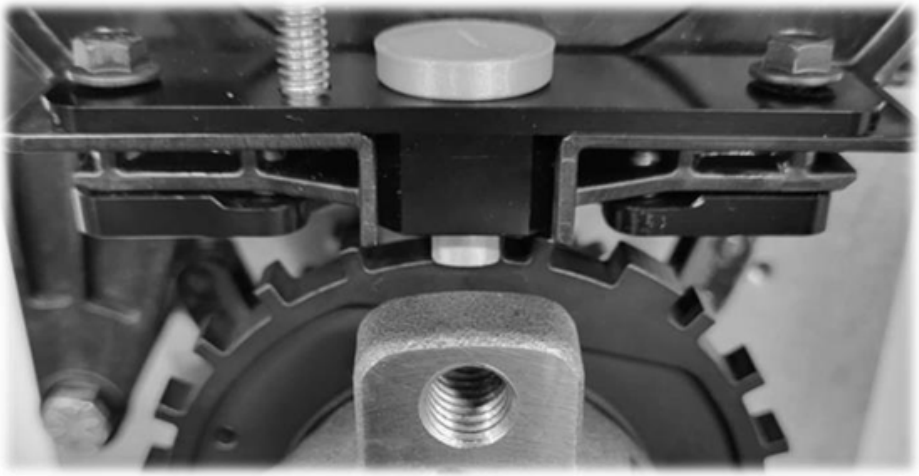


Figure 18

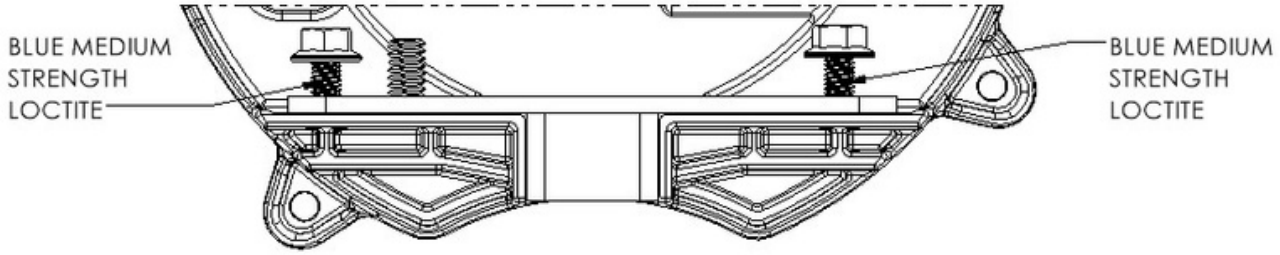
Figure 19

Sensing Unit and Hub Installation

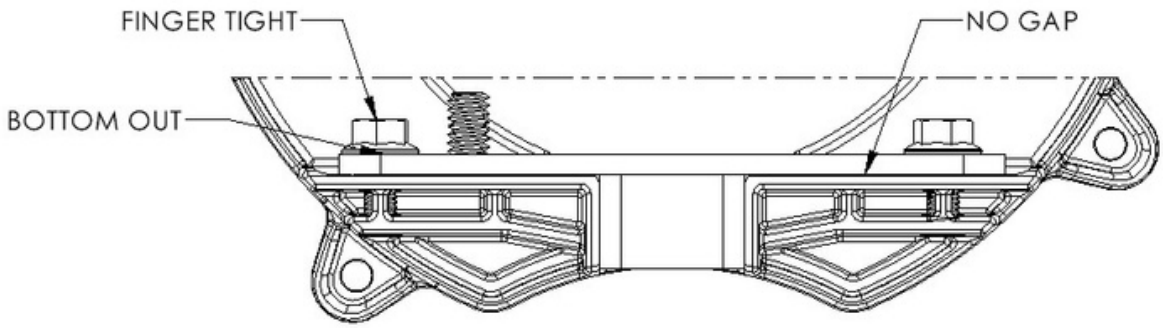
IMPORTANT The instruction steps below must be followed to ensure successful installation and to avoid damage. Failure to follow this instruction may result in damage.

Crank sensor mount – Fastener torquing and Loctite procedure. While the Loctite is not mandatory it is recommended for added assurance. **Blue medium strength Loctite only is recommended. DO NOT USE permanent Red grade Loctite.**

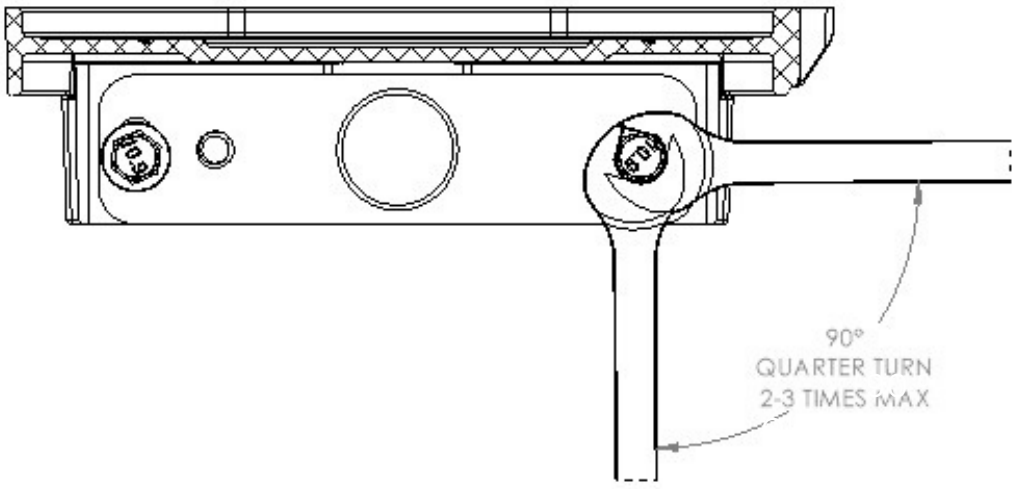
10 With the centering tool in place from step 9, now back off the two crank mount screws and apply a small amount of blue Loctite to the bolt threads. See figure below.



11 Thread the two screws down by hand and bottom them each out to a fairly strong **FINGER TIGHT**. There should also be no gap between sensing unit shelf and crank mount. The goal is to take out all the gaps, with finger tightening, prior to the final torquing procedure. See figure below.



12 Now using 8mm (or 5/16”) wrench apply two to three quarter (1/4) turns of the wrench to each screw. See figure below. This is equal to turning the screw one half turn to three quarters turn in total. It is recommended to do a quarter turn on one screw at a time to tighten them evenly and progressively. Quarter turn on one screw, quarter turn on the other screw, final quarter turn on first screw and then final quarter turn on 2nd screw. After two quarter turns it should have felt quite tight, if it felt like it still wanted to become tighter you can do one final third quarter turn. Three quarter turns is only needed (absolute maximum) due to perhaps the finger tightening/gap removal from step 10 might have been smidge loose before using wrench. You should never need to exceed three quarter turns after doing step 10 above or you risk damage.



13 The crank sensor mount is now centered over the 24x crank reluctor and is securely tightened down.

14 Remove the crank mount alignment tool.

15 Install the crank sensor with three (3) adjustment shims. Install the ¼-20 flange head nut that retains the crank sensor.

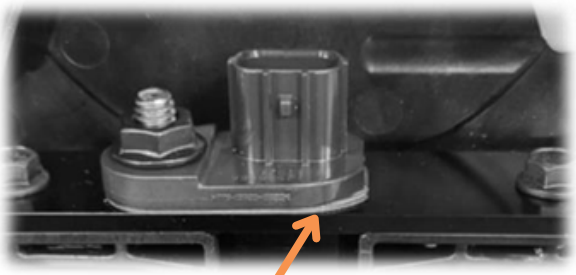


Figure 20

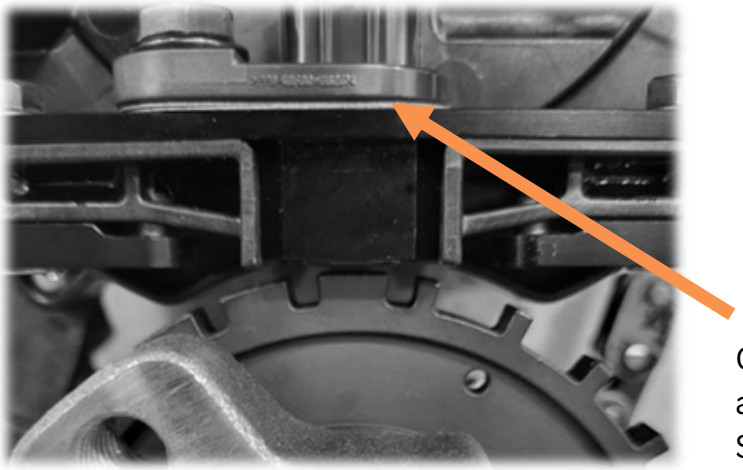
Figure 21

16 Dial in crank sensor air gap: Using the supplied yellow feeler gauge, test the crank sensor to reluctor air gap. Double check, as per step 8, that a large tooth is below the crank sensor window. Try to slide the yellow feeler gauge between the crank sensor and 24x reluctor as shown in Figure 21.

With only three sensor adjustment shims installed (as per step 15) the yellow feeler gauge should likely not slide thru. If it does slide thru then remove a shim, one at a time, until the feeler gauge does not want to slide thru. If with no shims installed the feeler gauge still slides thru then loosen the three sensing unit retaining bolts and ever so slightly pull down on the sensing unit.Then re-tighten the three retaining bolts. It might have been the case where the sensing unit was bolted down, ever so slightly, too high.

17 Remove the crank sensor and add one of the supplied stainless shims under the crank sensor. Reinstall the crank sensor, ensure it seats fully and ensure to tighten the retaining nut down. See Figure 22.

Figure 22



Sensing Unit and Hub Installation

18 Test the air gap again with the yellow feeler gauge. If it passes through, even with some light drag, that is OK the crank sensor air gap is now set (Figure 23). Do not force feeler gauge thru. If it still does not pass through repeat step 17 & 18, adding one shim at a time, until the yellow feeler gauge passes through. It is better to be a shim extra then too few & too tight.

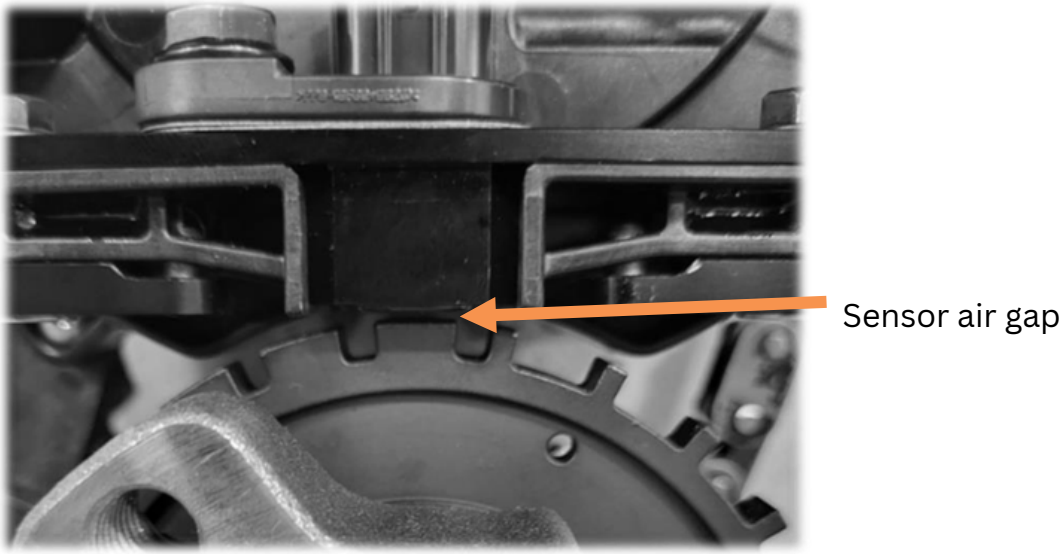


Figure 23

19 Double check all fasteners are tight and/or torqued to spec.

20 Installation of the LT-DIS sensing unit and hub is now complete. We will now proceed to re- assemble the engine and install rest of LT-DIS kit components.

21 Re-Install the water pump with the supplied water pump gaskets that are included in kit. Remember to use thread sealant on water pump retaining bolts. Do not yet re-connect all the coolant hoses and do not fill system will coolant quite yet. Water pump mounting bolts are torqued to 30 lb-ft.

LT-DIS
Main Wiring Harness Installation

1 Ensure air intake system, pipes and components are still removed for better access.

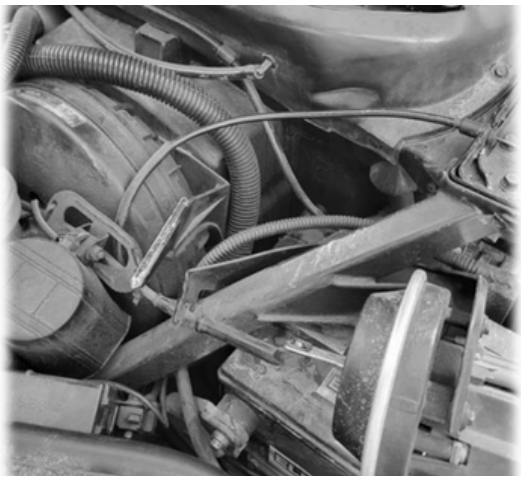
2 It can help to temporarily disconnect and move out the way the IAC and TPS sensor connectors.

IAC and TPS sensors unhooked

3 Take the time now to remove the original Optispark extension harness.It runs from 4 pin connector on passenger side injector valley down to optispark. This extension can be removed from engine bay, leaving only the 4 pin Opti connector remaining on passenger side injector valley. Note: 1992 Corvettes will have a 6 pin connector for opti spark on passenger injector valley.

4 On F-Body and Y-Body platforms remove the factory PCM and PCM mounting tray. F-Body: Remove the two bolts holding the PCM tray to the passenger fender, liftout the PCM with tray and unhook the PCM connectors. Y-Body: Disconnect main PCM connector,remove bolt securing PCM tray to hood post, remove PCM from plastic tray and finally remove tray from lower “spike” mount.

F-Body

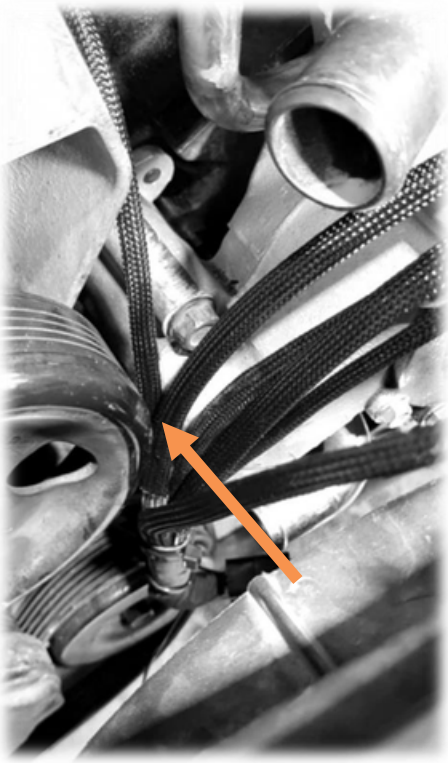


Y-Body

Main Wiring Harness Installation

5

On F-Body installation, with the main LT-DIS 39 pin connector just below the water pump, feed the individual wire bundles thru the gap between power steering pump pulley and water pump one at a time. DO NOT connect the main 39 pin connector to LT-DIS quite yet. A similar procedure will need to be done on B/D Body installation, but it will be more about feeding each wire bundle one at a time thru the gap between accessory bracket and water pump.



F-Body

B/D-Body

B/D-Body

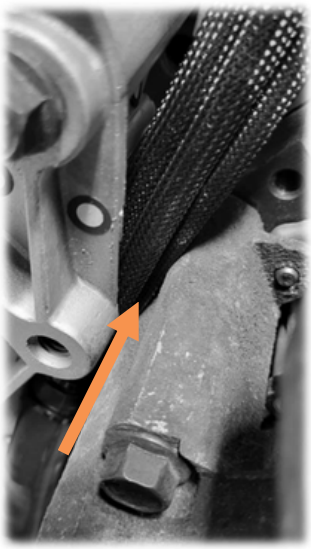
Feed main wire bundles thru gap <u>one at a time</u>

Main LT-DIS Wiring Harness Installation

6

Position the bundles as far in towards the block as possible. Ensure harness bundles are back as far as will go so that it has no chance of contacting the power steering pulley. On F Body installations the harness bundles will sit nicely in gap between the accessory bracket and waterpump. On B/D Body installation the wire bundles will sit behind the accessory bracket.

F-Body



B/D Body

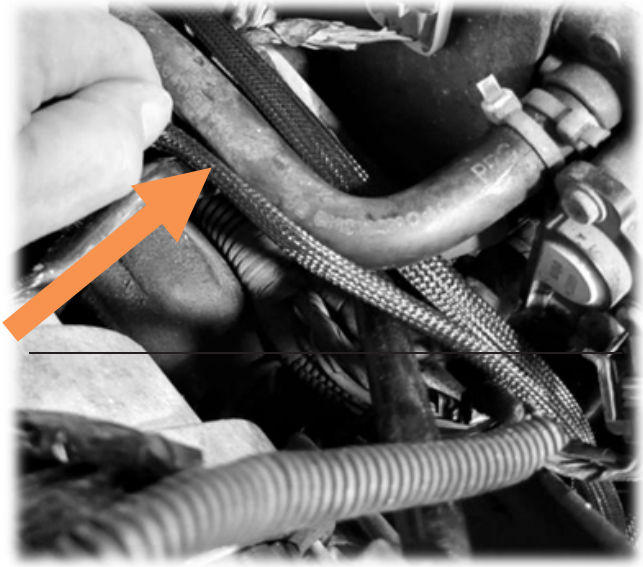
7

On F/B/D Installations route the connector and wire bundle labelled “ignition mod connector” under the throttle body, behind the water pump and over to drivers side front cylinder head location. Y- Body installations this connector can stay on the passenger side cylinder head location.

Main LT-DIS Wiring Harness Installation

8

All other wire harness bundles can be routed up and into the passengerside injector valley. Route them under the IAC and TPS wiring. As a tip on F-Body installation you can slide each wire bundle under the PCV and EVAP hoses between alternator brackets. Then farther up in the injector valley route the connector. The “programming” wire bundle/connector can go under or over top of the IAC and TPS wiring.



Main LT-DIS Wiring Harness Installation

9

Connect the main 39P harness connector to the LT-DIS main unit. This might require pushing the harness bundle up and carefully getting it seated in place. Use best judgement to get it connected and harness sitting correctly and as far as possible from power steering pump pulley.

10

Route all wire bundles in the passenger side injector valley low, cleanly and neatly. Run all to back of intake manifold, except the “PWR” and “OPTI” connectors will end up routing to approx. the midpoint of intake manifold.

11

Coil bank connector 2468 can be routed and placed near back of intake manifold on passenger side. These coil bank connectors will eventually connect to 1347 and 2468 coil harnesses (sold separately or supplied by customer).

12

Connect "OPTI" connector to original 4 pin Optispark connector in injector valley. This is connector to the Optispark extension harness was originally hooked to. On 1992 Y-Body installation you must first install the 6 pin to 4 pin wiring adapter (sold separately).

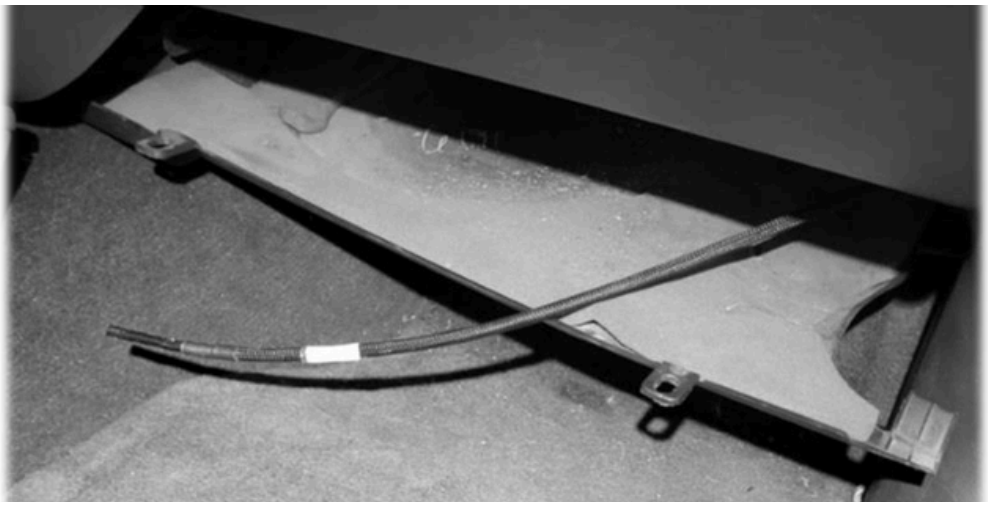
13

The long wiring bundle length labelled “DASH MODULE” can be routed to rear of intake manifold. This dash module wiring bundle will get routed to interior passenger cabin. **Important: The Dash Module can ONLY be installed in the interior cabin as it is not weatherproof.** We will now show and discuss best areas to route the wiring dash module bundle thru the firewall on the different platforms. If you find better or more suitable locations that is OK too. In all circumstances, if desired, the braided wrap on the dash module wiring bundle can be removed and/or shortened for easier routing.

Main LT-DIS Wiring Harness Installation

13

a) F-Body installations: The dash module wire bundle can route from rear of passenger injector valley to the firewall, then towards factory PCM location. A good pass thru from engine bay into interior cabin is via the rubber grommet for factory engine wiring harness. It is located down and below PCM mounting area. You can cut/ poke a small hole and then feed the wiring bundle thru into the interior cabin. Pull it all the way thru to take up any slack in engine bay. Ensure clean and tidy routing.



Main LT-DIS Wiring Harness Installation

13

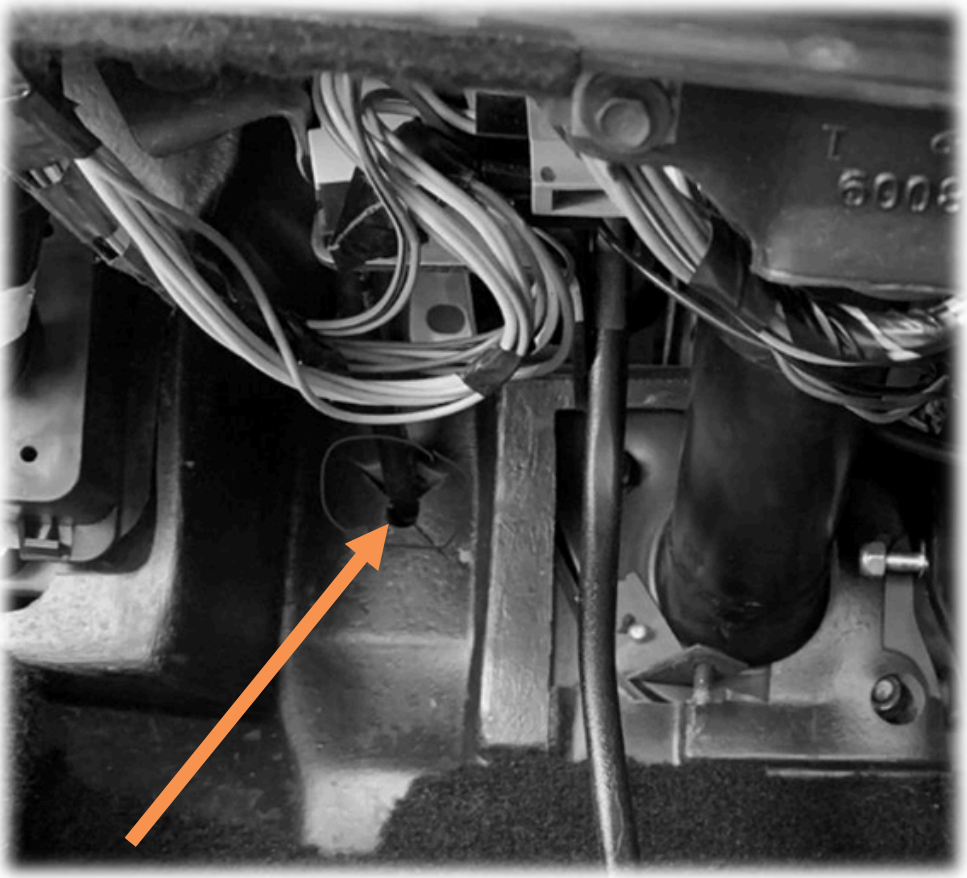
b) B/D Body Installation: The dash module wiring bundle can route to back of intake manifold thru passenger side injector valley. It can then route to firewall and over to brake booster. Up, behind and over the brake booster to rear of drivers fender location. It can then be routed into interior cabin via the hood release cable grommet. Due to space restrictions it may be required to use a wire puller/feeder to aid in pulling wire bundle thru this location.

B/D Body Rear of drivers fender

Main LT-DIS Wiring Harness Installation

13

c) Y-Body Installation: The dash module wiring bundle can be routed through the passenger injector valley area and to firewall. Then route it behind the intake manifold and over to the battery location. Remove battery from vehicle, which requires removal of small side body panel. This will allow much greater access to the drivers side firewall location where the dash module wiring can routed. There is a grommet for the vacuum line that goes to brake pedal. This grommet is over 1” in diameter with plenty of space to poke hole. Route the dash module wiring bundle thru this grommet and into interior cabin. Pull cable tight in engine bay to avoid any slack with a nice tidy routing. Tip: Wait until the LT-DIS power module is installed also in this location before re-installing battery and side body panel.



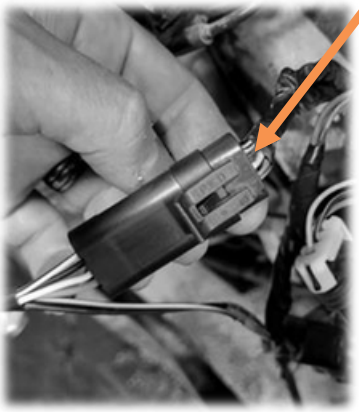
Main LT-DIS Wiring Harness Installation

14 We now have the main wiring harness routed to all locations, the main 39P connector hooked up to the LT-DIS, and the OPTI connector connected to original optispark connector.

15 If your coil brackets and coil harnesses are installed for each bank. You can connect coil bank connector 1357 to coil harness 1357. Similarly you can connect coil bank connector 2468 to coil harness 2468.

16 The connector on main harness labelled “IGN MOD CONNECTOR” can be connected to the original 4p ignition module connector from factory harness. On 1995 and older LT1 engines the JUMPER can also be installed onto the original coil connectors. **Note**: The original single coil and ignition module devices are deleted from engine bay entirely. We are making connections to their old wiring connectors only.

Factory ICM connector



Connect to original single coil connectors. 1995 and older harnesses.

17 There are two wires labelled “GROUND” with ring terminals that are in same wire bundle as the ignition module connector. These two wires can be attached to front of cylinder heads where the other engine harness grounds are located. Driver cylinder head for F/B/D installations and Passenger side cylinder head for Y-Body installations. Please make sure all ground terminals, connections and cylinder head are clean, touching bare metal (no paint or corrosion) and tight when finished.

Main LT-DIS Wiring Harness Installation

18

The connector labelled “Programming” with its protective cap can be mounted and placed near passenger side of throttle body. Mount it securely and keep its wire bundle safe. This connector is used for any potential in-field software updates of the LT-DIS main system controller (located in main LT-DIS head unit).

19

The “PWR” connector and its extension harness is up next. There is a small extension harness included int the kit. This will be routed from the PWR connector (passenger injector valley) to the included power module. The location of mounting the Power module and routing of extension harness is different based on platform.

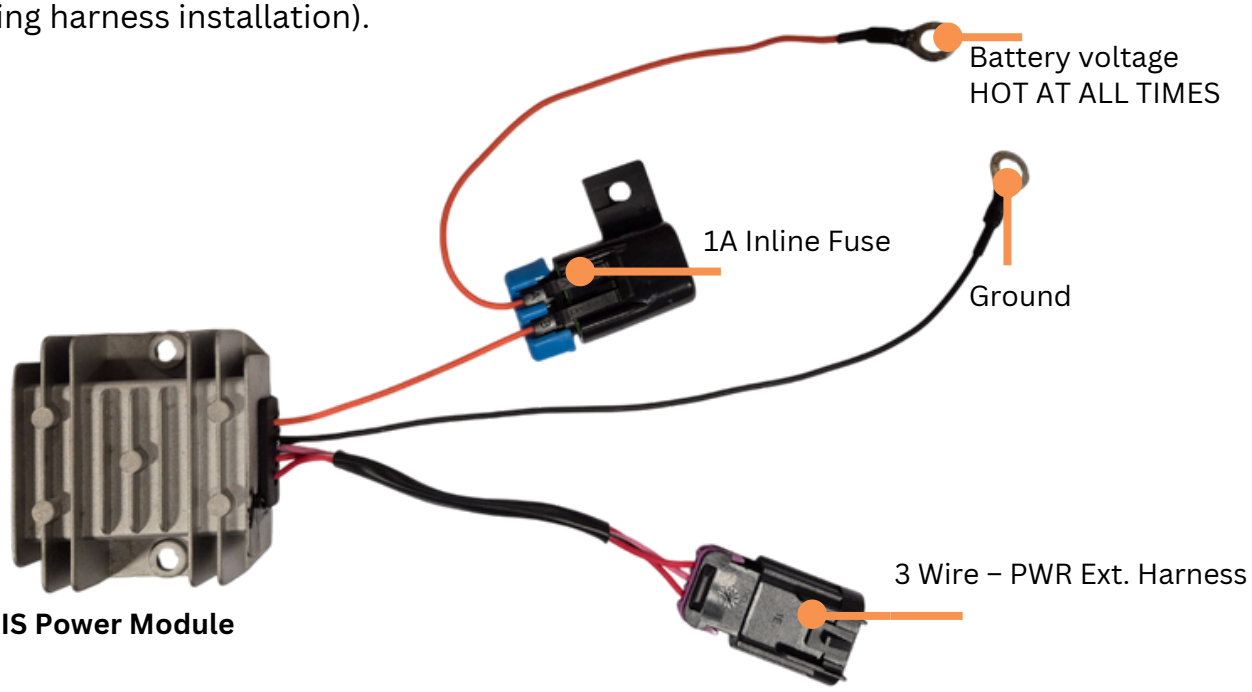
a) F-Body Installations: The power module can be mounted by the main ground and battery tap location on front of passenger fender. Route the extension harness from the PWR connector in passenger injector valley to back of intake, behind and over HVAC block and then forwards up the passenger fender to the battery location where it will be mated to the Power module.

b) B/D Body Installations: The power module can be mounted near the under hood fuse panel located at the rear of passenger fender by the wiper motor. Route the extension harness from the PWR connector in passenger injector valley to back of intake, towards and over the wiper motor and into the under hood fuse panel location where it will be mated to the power module.

c) Y-Body Installations: The power module can be mounted by the battery. There are a few mounting locations to choose from in this area, that are all under the PCM. Route the extension harness from the PWR connector in passenger injector valley to back of intake, behind intake, towards PCM and down to battery location area.

LT-DIS
Power Module Installation

The LT-DIS system comes included with its own dedicated power source. This power module is directly connected to battery voltage and ground via wires with rings terminals. It is only activated once the engine computer is turned on via switched ignition voltage. There is an inline 1A fuse on the battery feed source connection. The 3 wire connector on the power module connects to the PWR extension harness on main harness (Step 19 on main wiring harness installation).



LT-DIS Power Module

Black wire w/ Ring Terminal – Ground

a) F-Body – Wiring harness ground post location front passenger fender. Make sure clean/shiny.
b) B/D Body – Wiper motor mounting bolt. Make sure clean shiny metal and bolt.
c) Y-Body – Battery negative cable frame mounting location. Make sure clean and shiny.

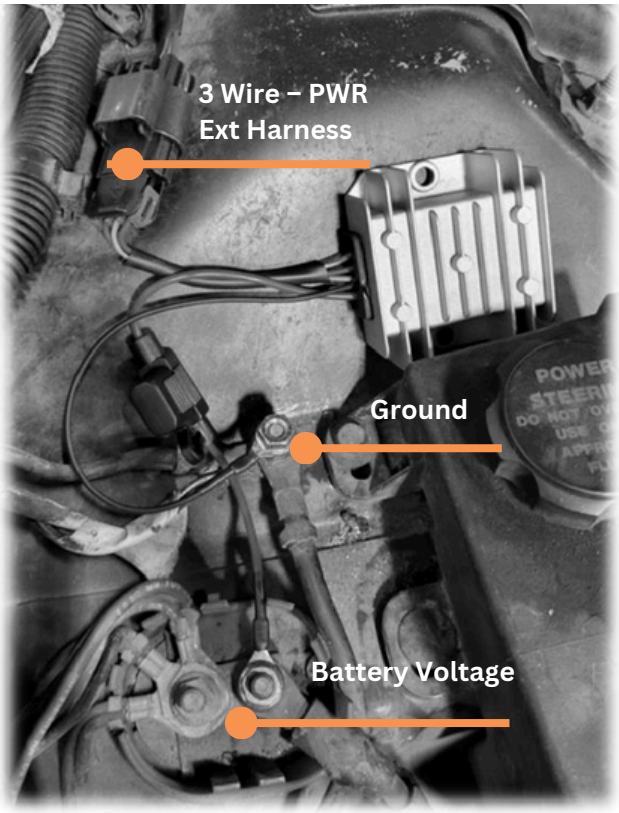
Orange wire w/Ring Terminal and in-line fuse – Battery Voltage (Hot at all times)

a) F-Body – Wiring harness battery voltage post on front passenger fender. Clean and shiny.
b) B/D Body – Engine bay fuse panel main harness battery voltage post. Clean all ring terminals.
c) Y-Body – Engine bay fuse panel battery voltage post. Under PCM.

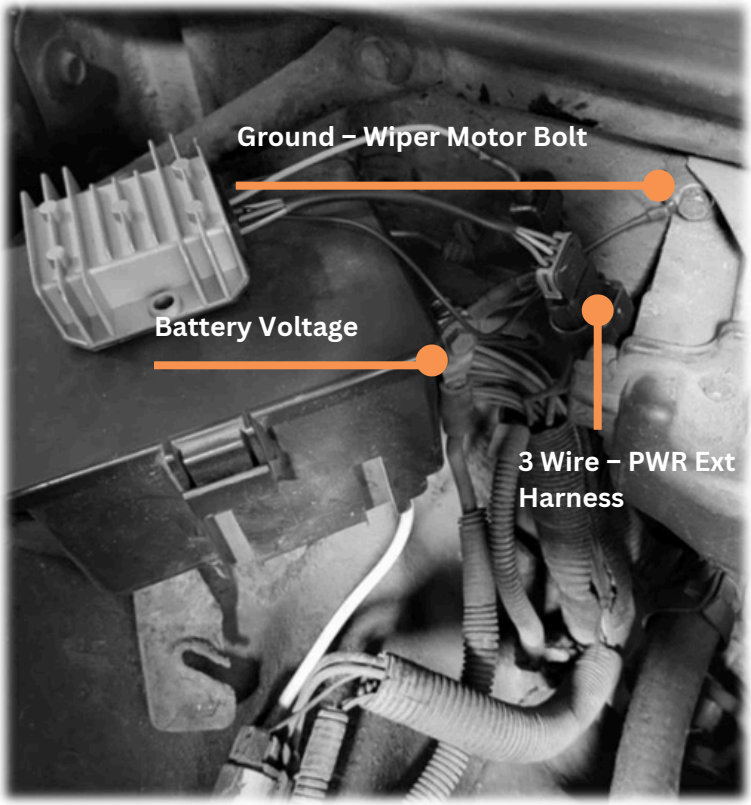
3 Wire connector – PWR Extension harness on main harness

LT-DIS
Power Module Installation

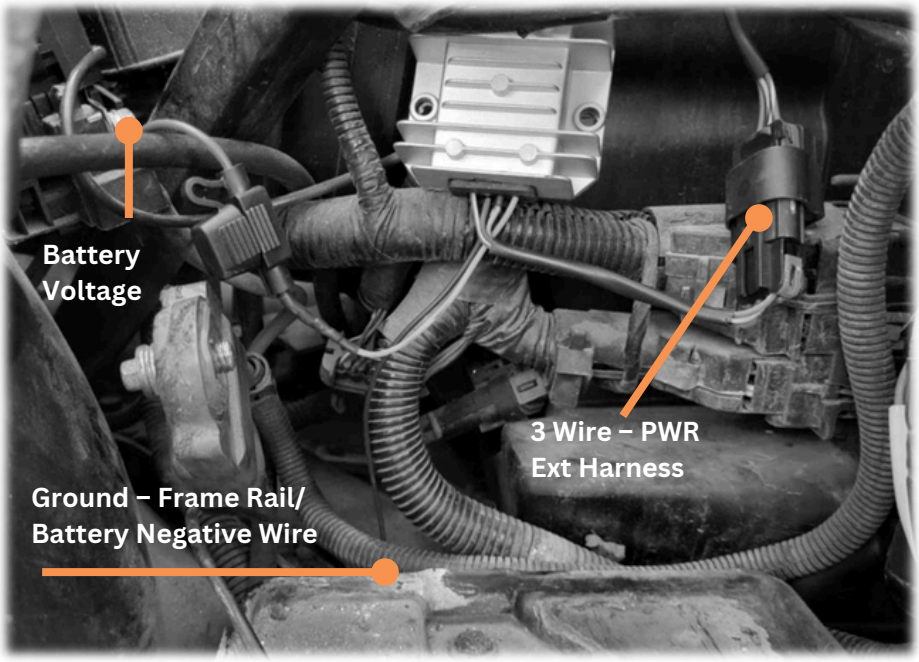
F-Body Power Module Location – Front of Passenger Fender



B-Body Power Module Location – Engine Bay Fuse Panel



Y-Body Power Module Location – Under PCM

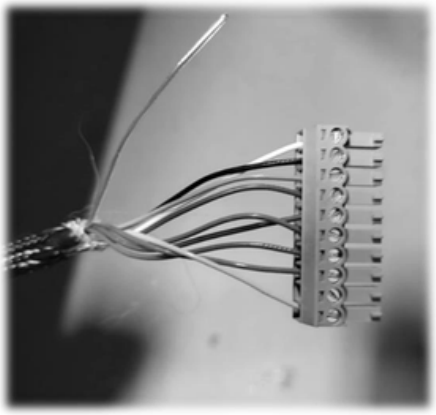


LT-DIS
Dash Module Installation

The LT-DIS system includes a module which mounts in the cabin under the dash. **This dash module can not be mounted in engine bay**. This module contains the Bluetooth controller/transmiter, in-field programmer (for firmware updates), and also a Logic Analyzer for viewing important sensor and system signals (via USB connection on computer). The main harness installation had you wire the “DASH MODULE” wiring bundle from the engine bay into the cabin. This wiring bundle is what gets attached to the Dash Module device.

We do not recommend shortening the dash module wiring bundle. Keep it full length so as to have more mounting locations now and in future as required. *Note: The translucent colored wire does not get used and is not required.*

1 Strip back the rubber coating on wiring bundle, this will expose the internal shielding.



2 Trim and strip back the internal braided shielding. 2-3”

3 Expose and fan out all the wires.

4 Included in the kit is a small green 10 pin terminal strip connector (may already be installed inside of the dash module). It has wire to screw lock sockets. Use this connector and install wires into each appropriate location. To do this accurately and correctly install the green connector into the dash module device first. The dash module device is labelled with wire colors so you can place the appropriate wire color into proper terminal socket location. Ensure to be accurate and double check your work. The translucent colored wire is NOT used. Do not mount it to the dash module.

5 The dash module can be mounted under the dash anywhere you see fit. Keep it in easy to get to access as it is also used for infield system programming and logic analyzer diagnostics. Easy to reach but out of sight is best.

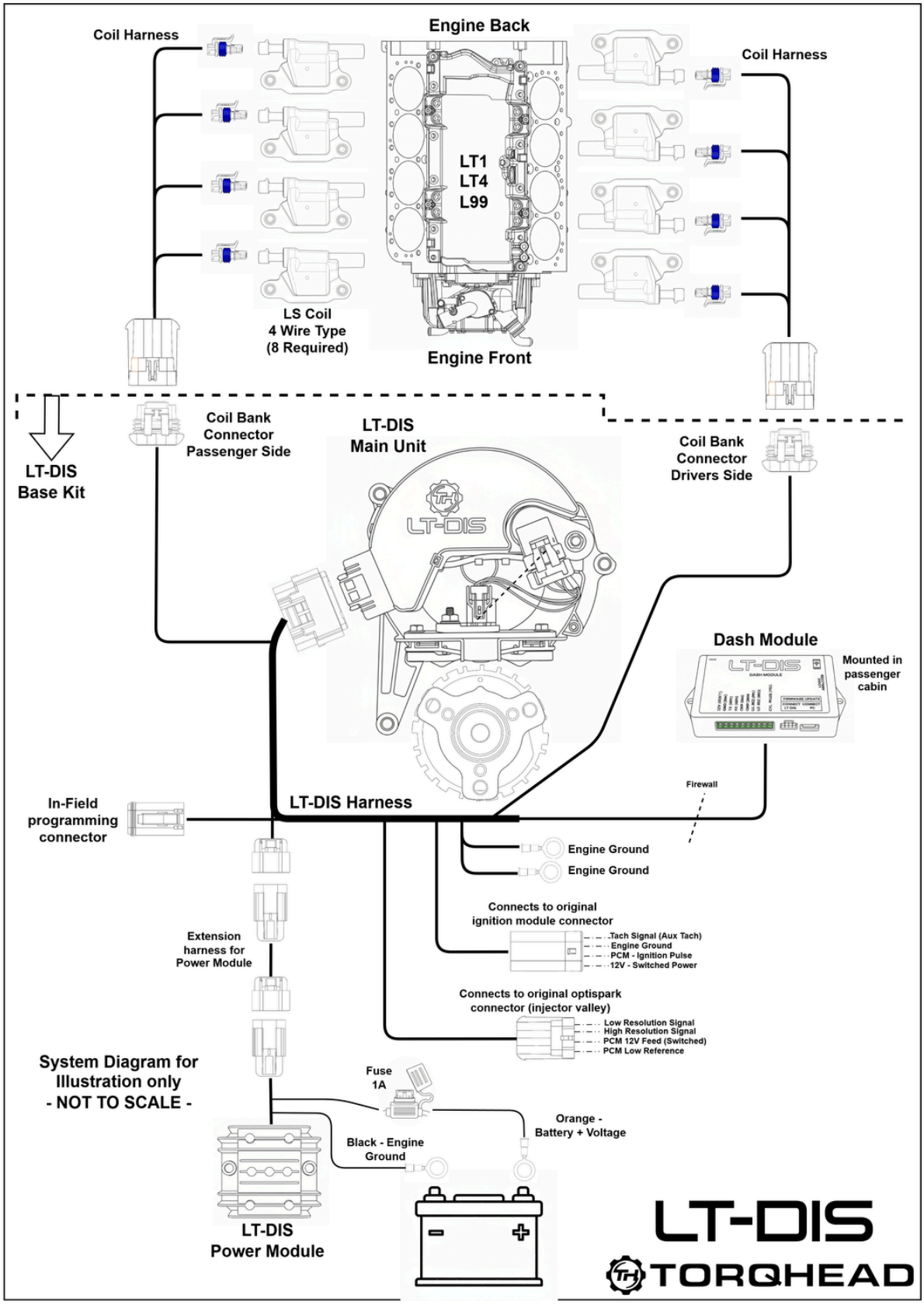
RE-ASSEMBLY:

The remaining installation steps are the reverse of removal. This includes installing the crank pulley, serpentine belt, coolant hoses, etc and ultimately filling the cooling system with coolant. Consult your service or repair manual for additional guidance. It would be a recommended idea to get most everything back together, engine sensors all hooked up, everything nice and tidy, double checked, however prior to filling system with coolant do a test fire of the engine (do not run engine for long. 20 to 30 seconds would be sufficient). Why might this test fire be helpful, well in the event any installation step was not performed correctly and needs attention it can be beneficial to not need to drain out any freshly filled coolant.

COIL BRACKETS, COIL HARNESSES AND SPARK PLUG WIRES:

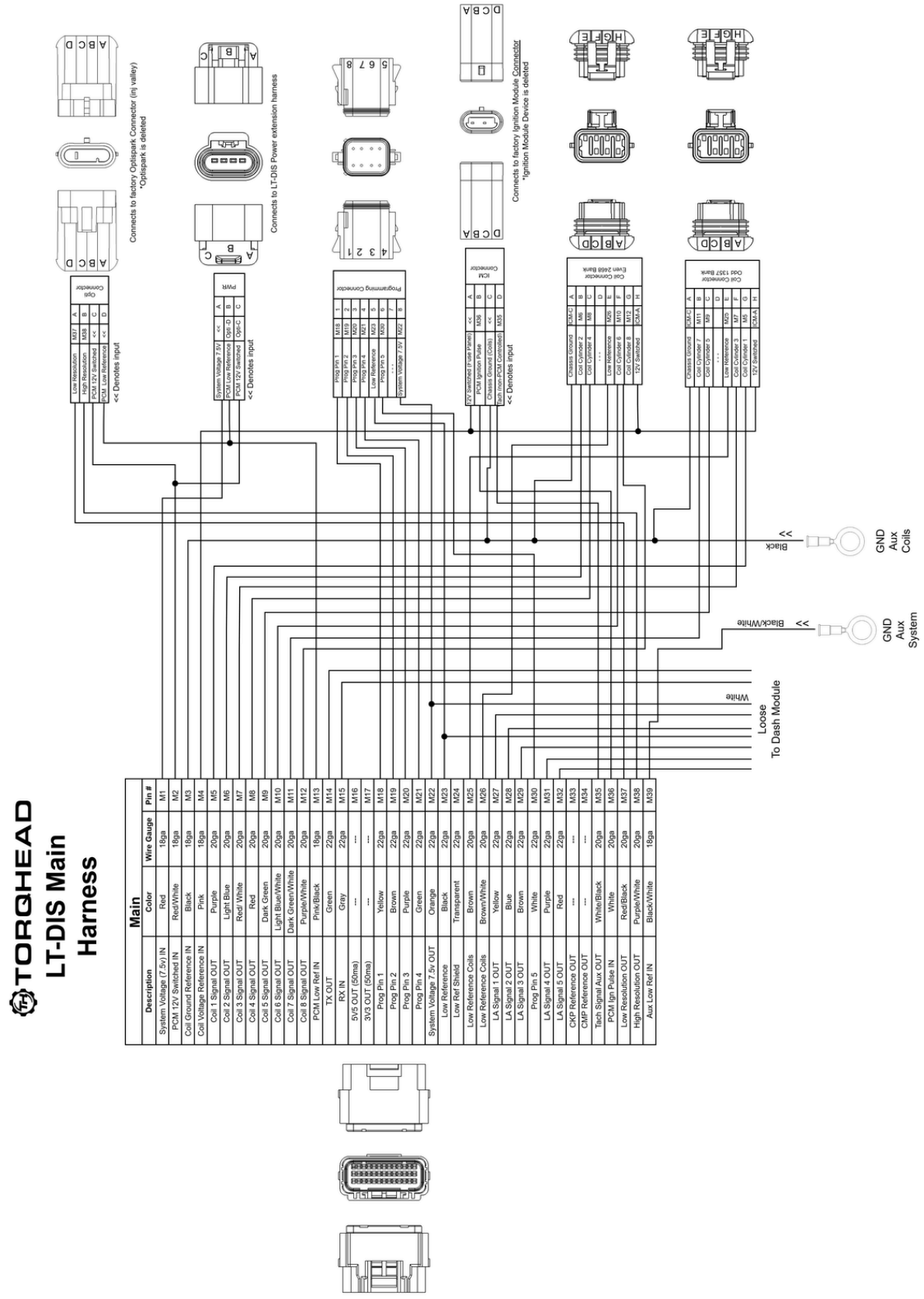
Before the LT-DIS system can be operational you must also supply and install eight LS type coil packs and their associated mounting brackets and coil harnesses. Also new spark plug wires will be required between coil packs and spark plugs. Torqhead LTD sells coils, coil brackets, coil harnesses and plug wire kits. You can choose to purchase from Torqhead LTD or supply your own parts for these items. Coil harnesses will connect to the two coil bank connectors on the main LT-DIS harness. There is a connector or 1357 cylinders and 2468 cylinders. Off shelf LS coil harnesses, that match your coils, will work just fine. It wont hurt to double check coil wiring routing just to make sure (see pin out and wire color information for coil bank connectors). Ensure LT-DIS bank connector, specific cylinder and wire, ultimately makes it to the proper matching cylinder/coil. The same can be said for spark plug wires. Ensure particular coil plug wire ultimately connects to the proper cylinder. All of this will ensure proper firing order is achieved.

LT-DIS
System Diagram



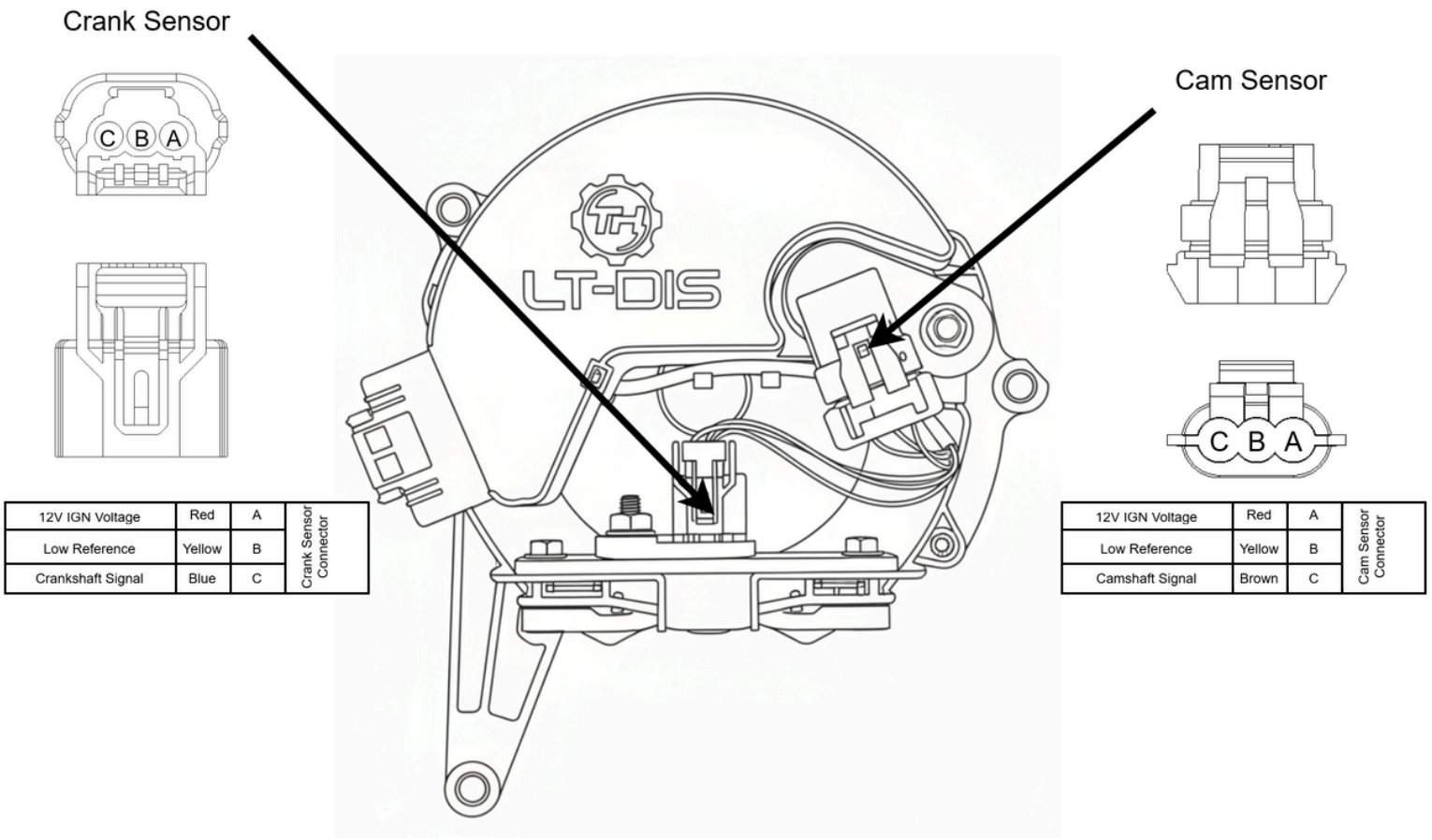
LT-DIS

Wiring Diagram - Main Harness



Main			
Description	Color	Wire Gauge	Pin #
System Voltage (7.5v) IN	Red	18ga	M1
PCM 12V Switched IN	Red/White	18ga	M2
Coil Ground Reference IN	Black	18ga	M3
Coil Voltage Reference IN	Pink	18ga	M4
Coil 1 Signal OUT	Purple	20ga	M5
Coil 2 Signal OUT	Light Blue	20ga	M6
Coil 3 Signal OUT	Red/ White	20ga	M7
Coil 4 Signal OUT	Red	20ga	M8
Coil 5 Signal OUT	Dark Green	20ga	M9
Coil 6 Signal OUT	Light Blue/White	20ga	M10
Coil 7 Signal OUT	Dark Green/White	20ga	M11
Coil 8 Signal OUT	Purple/White	20ga	M12
PCM Low Ref IN	Pink/Black	18ga	M13
TX OUT	Green	22ga	M14
RX IN	Gray	22ga	M15
5V5 OUT (50ma)	---	---	M16
3V3 OUT (50ma)	---	---	M17
Prog Pin 1	Yellow	22ga	M18
Prog Pin 2	Brown	22ga	M19
Prog Pin 3	Purple	22ga	M20
Prog Pin 4	Green	22ga	M21
System Voltage 7.5v OUT	Orange	22ga	M22
Low Reference	Black	22ga	M23
Low Ref Shield	Transparent	22ga	M24
Low Reference Coils	Brown	20ga	M25
Low Reference Coils	Brown/White	20ga	M26
LA Signal 1 OUT	Yellow	22ga	M27
LA Signal 2 OUT	Blue	22ga	M28
LA Signal 3 OUT	Brown	22ga	M29
Prog Pin 5	White	22ga	M30
LA Signal 4 OUT	Purple	22ga	M31
LA Signal 5 OUT	Red	22ga	M32
CKP Reference OUT	---	---	M33
CMP Reference OUT	---	---	M34
Tach Signal Aux OUT	White/Black	20ga	M35
PCM Ign Pulse IN	White	20ga	M36
Low Resolution OUT	Red/Black	20ga	M37
High Resolution OUT	Purple/White	20ga	M38
Aux Low Ref IN	Black/White	18ga	M39

LT-DIS
Wiring Pinout - CKP/CMP Sensors

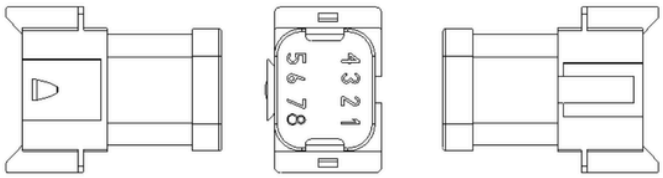


12V IGN Voltage	Red	A	Crank Sensor Connector
Low Reference	Yellow	B	
Crankshaft Signal	Blue	C	

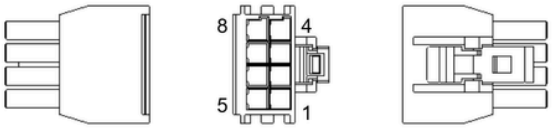
12V IGN Voltage	Red	A	Cam Sensor Connector
Low Reference	Yellow	B	
Camshaft Signal	Brown	C	

Crankshaft sensor - Requires pullup resistor on signal circuit to operate. LT-DIS unit has this pull-up resistor built in and ready to go. However if you ever use the crank and cam sensors for alternate ECU connection/setup (no longer using LT-DIS controller). Please note CKP signal wire may require addition of properly sized pull up resistor

System Firmware Update Harness



Connects to programming connector on main harness



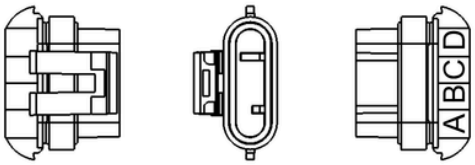
Connects to Dash Module programming header

Prog Pin 1	Yellow	1
Prog Pin 2	Brown	2
Prog Pin 3	Purple	3
Prog Pin 4	Green	4
Low Reference	Black	5
Low Reference	White	6
Not used	---	7
Sys Voltage (7.5v)	Orange	8

Low Reference	White	1
Low Reference	Black	2
Prog Pin 1	Yellow	3
Prog Pin 4	Green	4
Prog Pin 3	Purple	5
Prog Pin 2	Brown	6
Not Used	---	7
Sys Voltage (7.5v)	Orange	8

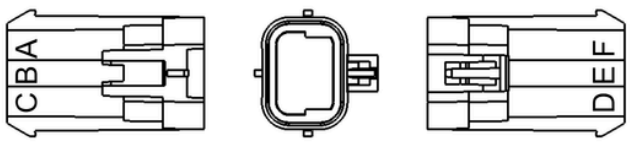
1992 Corvette Optispark Connector - Adapter

Only required for 1992 Corvette



Optispark Connector '93+		
Low Resolution	A	BLK/RED
High Resolution	B	PPL/WHT
PCM 12V Switched	C	RED
PCM Low Ref	D	PNK/BLK

Optispark Connector '92 Corvette		
A	Low Resolution	
B	High Resolution	
C	PCM 12V Switched	
D	PCM Low Reference	
E	---	
F	Shield (not used)	
G	---	



In 1992, on the Corvettes, GM used a 6 pin Optispark connector

Crank Sensor - GM# 12595966. We recommend sticking with the GM OEM or AC Delco Sensor
Cam Sensor - GM# 12591720. We recommend the GM/AC Delco sensor or SMP brand sensor

Both of the above sensors are available over the counter at local auto parts stores

LT-DIS
Troubleshooting

SYMPTOM	CAUSE	ACTION
Sensing unit is tough to install or will not fully seat against timing cover	Improper spline alignment and engagement (Early years)	Do not apply additional force. Realign spline shaft and camshaft to attempt installation again.
	Improper camshaft dowel pin engagement (Late years)	Do not apply additional force. Realign spline shaft and camshaft to attempt installation again.
	Foreign debris preventing engagement	Check to make sure there are no obstructions in the camshaft gear, camshaft dowel pin, or sensing unit drive mechanism. If debris, clean as required.
Crank sensor air gap too large	Too many adjustment shims added under crank sensor	Remove one shim at a time and recheck air gap with supplied yellow 0.020” feeler gauge.
	If no adjustment shims present, then the sensing unit is mounted slightly high.	Loosen the three sensing unit mounting bolts and apply a very slight downward pressure on the sensing unit. While applying this light pressure tighten the three mounting bolts. Do not apply to much pressure, only a very slight movement is needed. Re-check crank sensor gap and adjust with shims as required.
No Crank (RPM) signal	Crank sensor air gap not set properly.	Set air gap as per instructions (steps 13 & 14)
	Crank sensor not centered over 24x crank reluctor	Center crank sensor mount using supplied alignment tool as per instructions.
	Bad crankshaft position sensor	Replace with new or known-working crank sensor
	Crank sensor connector not connected	Connect crank sensor
	Bad wiring connection	Use system logic analyzer on PC. Log and while cranking monitor the crank sensor signal the LT-DIS system is recieving.

LT-DIS
Troubleshooting

SYMPTOM	CAUSE	ACTION
Hub will not press on or fully seat	Debris on crank snout or hub bore	Clean crank snout and hub bore of any debris
	Hub keyway not aligned with crank key or key has become burred	Remove hub and ensure keyway alignment is proper. Also ensure no burrs are present on key or hub due to installation attempts.
	Crankshaft snout OD too large (aftermarket crankshaft snout tolerances may be bigger than OEM)	Hone hub ID by .0005" to .001"
Crank Alignment Tool Will Not Engage With 24x Reluctor	Hub not fully seated	Fully seat the crank hub using proper tools. Re-Torque crank hub retaining bolt.
	Crank hub spacer not installed	If your car is a 1992-1995 you require the installation of the supplied crank hub spacer. Or if your car is a 1996+ and has the stock LT1 4x crank reluctor removed you will also require this spacer. Remove the hub and install this spacer. See hub installation step 5
	Crank hub spacer installed.	If you vehicle is a 1996+ you do not require the supplied crank spacer. Installing the spacer will only result in the hub being installed farther forward.
	Crank sensor mount adjusting screws are tight.	Loosen the crank sensor mount screws slightly so that the mount can slide back and forth while inserting the crank sensor alignment tool. If these screws are tight they will not allow the mount to center.

LT-DIS
Troubleshooting

SYMPTOM	CAUSE	ACTION
Lack of spark (injector pulse is present)	Crank sensor not centered and air-gapped correctly	Check crank sensor mount centering with tool and also re-adjust air gap to spec
	Coils have no power	Check “ignition module connector” location. Pink wire is coils 12V switched power. Ensure with key ON pink wire has 12V. Look for bad connection or blown fuse in fuse panel. Also make sure that if vehicle is 1995 and older that jumper is installed in old coil connectors
	Coils have no ground	Check “ignition module connector” location. Black wire is ground for coils. Look for bad connection. LT-DIS harness ring terminal with Black wire is also coil ground. Make sure ring terminal has good ground connection.
???	?	?
	?	?
	?	??
	?	??

Important Specifications: Crank Sensor Air Gap – 0.020” to 0.025” (Yellow feeler gauge is 0.020”)

WARRANTY

This product (not included sensors) is warrantied against defects in material and workmanship for two years from the date of purchase. If, within two years, you find this product to be defective then please return the product to us and we will – at our discretion – either repair or replace it at no cost to you. Sensors carry a 1 year warranty from date of purchase. This warranty is your sole remedy in the event that the product fails in any way. We hereby also disclaim all liability for incidental or consequential damages arising from the use of this product. Misuse, abuse, or any failure to follow the instructions provided with the product, will result in voiding this warranty.