

Revision - 1.1

Parts List

| # | Part number | Description |
|---|-------------|---|
| 1 | 8PK1655 | 8 rib 1655mm belt |
| 1 | L250150309 | LSA LS9 10 bolt supercharger Pulley Hub Kit |
| 1 | L220300709 | 2.55" 8 rib 10 bolt pulley |
| 1 | ETN307091 | Pulley Cap |
| 1 | L960130709 | Solid SC isolator coupling |
| 2 | SPIR-69427 | Supercharger cover alignment dowel pin |
| 1 | 82180 | Permatex Ultra Black Gasket Maker, 3.35 oz. |
| 1 | ETN86063 | Vacuum bypass positioning tool |
| 1 | L310065307 | 160 degree thermostat |
| 1 | L650140709 | 2009-2014 CTS-V air inlet duct kit |
| 1 | 33-2411 | K&N air filter |
| 1 | L450110095 | LPE diagnostic port cover kit |
| 1 | L920010000 | LPE decal |
| 1 | | Instructions |

Tools & Materials Required

- Ratchet
- Torque wrench
- 8 mm socket
- 10 mm socket
- 18 mm socket
- 8 mm hex bit Allen socket
- 6" socket extension
- 1/2" breaker bar
- T-25 Torx head driver or socket
- Hose clamp pliers or standard pliers
- Hammer
- Punch
- Mallet
- Fork type pry tool
- Wooden block
- Flat head screwdriver
- Pulley removal tool
- Die grinder/Dremel tool (optional - needed if you are making the alteration to the factory air box)
- Cut-off attachment (optional - needed if you are making the alteration to the factory air box)
- Razor blade or gasket scraper
- Drill press (optional - needed if you are drilling into the pulley for the dowel pin)
- 3/16" hardened solid/tipped carbide 2-fluted drill bit (optional - needed if you are drilling into the pulley for the dowel pin)
- 3/32" Allen wrench

Optional Items

| Description | Part number |
|--|-------------|
| LPE pulley removal and installation tool | L950066509 |
| LSA damper kit (SC pulley required) | L220050709 |
| Stock diameter LSA pulley for LPE LSA damper, 8 rib, 7.87" | L220646509 |
| 6% OD LSA pulley, 8.25", for LSA damper kit | L220060709 |
| 11% OD LSA pulley, 8.66", for LSA damper kit | L220070709 |
| 18% overdrive LSA damper pulley, 9.17" OD | L220170709 |
| 23% overdrive LSA damper pulley, 9.55" OD | L220290709 |
| 28% overdrive LSA damper pulley, 10" OD | L220380709 |
| LSA Idler Pulley Relocation Bracket Kit | L220636509 |
| 76mm idler kit | L250120309 |
| 90mm idler pulley kit | L250260090 |
| 100mm idler pulley kit | L250130309 |
| Stock GM LSA supercharger front cover | GM-341500 |
| EFI Live programming tool | EFIFS2-T |
| Throttle body gasket | 12576549 |
| Supercharger manifold gasket kit | 19180613 |
| Supercharger manifold gasket rivets (also part of manifold gasket kit) | 12558759 |
| Charge air cooler housing gasket | 12613457 |
| Charge air cooler insulator | 12612467 |
| Supercharger actuator kit | 19180860 |

The Lingenfelter 630HP Cadillac CTS-V Kit is designed to increase the horsepower of your 2009-2014 Cadillac CTS-V. The primary method of doing this is increasing the speed of the LSA Eaton TVS1900 supercharger in order to deliver increased airflow resulting in increased boost and power. The supplied Lingenfelter 2.55" LSA pulley is a roughly 18% overdrive compared to the stock 3.0" pulley, resulting in gains of approximately 3 to 4 psi of boost on an otherwise stock vehicle.

The increased airflow and increased inlet pressure drop that results from the higher supercharger speed can cause the factory rubber inlet duct to get sucked shut under high RPM use. For this reason Lingenfelter Performance Engineering has designed a replacement metal duct that is included as part of this upgrade package.

This upgrade kit is designed to work with the stock engine and premium unleaded fuel. Recalibration of the production ECM is required when installing this kit.

The production fuel injectors and production fuel pump are able to supply the correct amount of fuel for this power level so no changes to the injectors or the fuel system are needed if you are only installing this kit. If you are using these parts in combination with a larger supercharger drive pulley on the damper or a larger supercharger you will need larger fuel injectors and you may need to increase fuel pump output as well.

The belt size included with this kit is designed for use with the stock diameter damper.

The production CTS-V spark plugs are the same spark plugs used in the Z06 and ZR1 Corvettes. In engine dynamometer, chassis dynamometer and track testing performed by LPE, we have found these spark plugs to be well suited to stock to highly modified LSA, LS9 and LS7 engines. Unless you are running top speed testing or endurance type road racing applications or this is a marine engine application, LPE recommends retaining the stock LSA spark plugs at the production gap of 0.040" (1 mm). If you do find you need to go to a colder range spark plug, the production 12571165 (AC Delco 41-104) iridium spark plugs are roughly the same heat range as the Denso IT20 spark plugs and the NGK TR7ix spark plugs. The next stage in colder plugs would be a Denso IT22 or an NGK TR8ix.

If you would prefer not to modify your production supercharger front cover, LPE can supply a stock GM cover for you to modify or one with the parts already installed.

Read the entire instruction manual before beginning installation. Many of the stock parts will be used in reassembly.

When referencing the side of the vehicle, the driver side of the vehicle is considered the left side and the passenger side of the vehicle is considered the right side of the vehicle.

Torque value warning - the torque values for the fasteners are provided in metric (Nm) and then imperial units. For the imperial units some are referenced in lb-ft and others in lb-in. Make sure you notice the difference and set your torque wrench correctly.



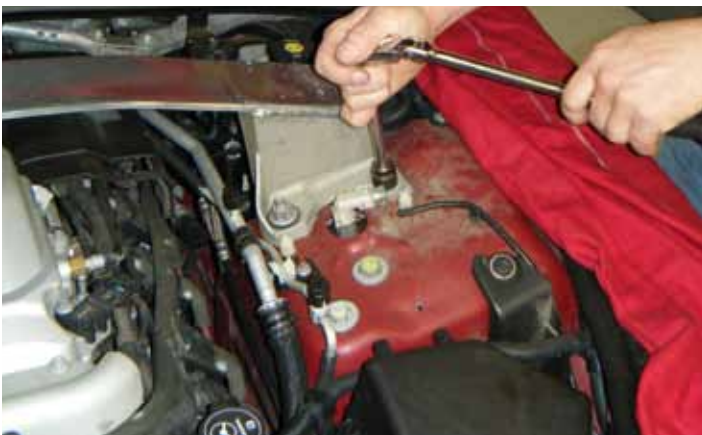
1. Open the hood of the vehicle. If you have been driving the vehicle, allow the vehicle to cool down for a few hours before beginning this work.



2. Disconnect the battery located in the trunk by releasing the latch and disconnecting the negative (black) from the battery terminal.



3. Remove the plastic covers on both sides of the motor by un-clipping the covers on the strut tower brace.



4. Using an 18 mm socket with an extension, remove the strut tower bar by unbolting the two bolts on each strut tower and carefully lifting the strut tower brace out.



5. With the strut tower brace removed, remove the back plastic cover by pulling up from either side of the intercooler.



6. Remove the connector from the mass air flow/intake air temperature (MAF/IAT) sensor located on the end of the intake duct on the air filter box.



7. Remove the fresh air inlet positive crankcase ventilation (PCV) connector from the middle of the intake duct.



8. Loosen the band clamp on the intake duct that connects to the throttle body.



9. Loosen the band clamp on the factory air cleaner housing using a flat head screwdriver or an 8 mm hex bit Allen socket.



10. Carefully remove the intake duct.

NOTE: Be careful not to let dirt or debris enter any of the intake components throughout this installation.



11. Using a T-25 Torx tool, remove the three (3) Torx bolts from the top portion of the air filter housing. The location of the first bolt is next to the power steering reservoir.



12. The location of the second bolt is located in between the fender and the strut tower.



13. The location of the third bolt is directly behind the driver front headlight assembly.



14. Carefully remove the top of the air filter housing.

WARNING: set the top of the airbox aside and be careful not to damage the MAF sensor.



15. Using a 10 mm socket, remove the air filter housing bracket bolt located on the driver side strut tower.



16. Carefully remove the bottom portion of the air filter housing by pulling up and away from the fender from the location shown.



17. Using a fork type pry tool, pry the plastic push pin out at the location shown by the white arrow. Then using a 10 mm socket, remove four (4) bolts on the front fuel line protective cover located on the front of the intercooler shown by the yellow arrows.

NOTE: some early models did not have this feature.



18. Using a 1/2" breaker bar, release the tension in the supercharger belt tensioner located on the passenger side by turning the tensioner counter-clockwise. Grab the belt in an open location and remove from the pulleys

CAUTION: Pinch Hazard! Do not place fingers in between belt and pulleys.



19. Disconnect the throttle actuator electrical connector from the throttle body.



20. Using a 10 mm socket, remove the four (4) bolts that secure the throttle body to the supercharger assembly.



21. Carefully remove the throttle body. Do not allow dirt or debris to enter the throttle body or front cover during the installation.



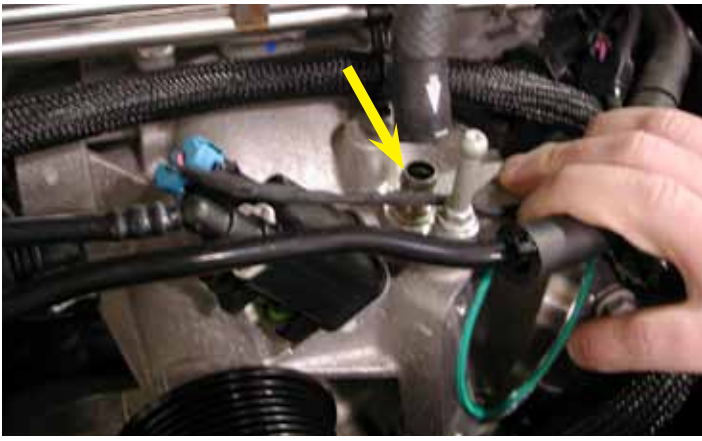
22. Remove the barometric pressure (BARO) sensor electrical connector from the left front of the intercooler.



23. Remove the supercharger inlet air temperature sensor (IAT2) electrical connector from the sensor on the left side of the intercooler.



24. Disconnect the manifold absolute pressure (MAP) sensor electrical connector from the left rear of the intercooler.



25. Disconnect the brake booster hose from the top of the supercharger front cover.



26. Disconnect the purge solenoid electrical connector from the top of the supercharger front cover.



27. Disconnect the evap line from the purge solenoid on the left side of the supercharger front cover.



28. Unbolt the purge solenoid using a 10 mm ratchet and extension and carefully remove the purge solenoid.

IMPORTANT: GM does not offer the O-rings separate from any of the sensors. Handle with extreme care.



29. Disconnect the electrical connector to the inlet air pressure sensor from the supercharger front cover.



30. Remove the two (2) vacuum lines from the bypass actuator to the intercooler and boost solenoid.



31. Using a 10 mm socket, remove the boost solenoid bracket from the bypass actuator. Make sure any vacuum lines that are connected from the solenoid are disconnected.



32. Using a 10 mm socket, remove the two bolts on the bypass actuator bracket.

NOTE: Do not remove the actuator at this time.



33. Remove the vacuum line and PCV line as indicated on the left.

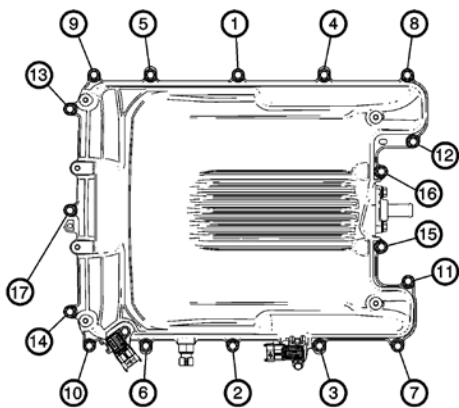


34. Remove the bypass actuator by tilting it upward and removing the metal bar from the bypass shaft linkage.

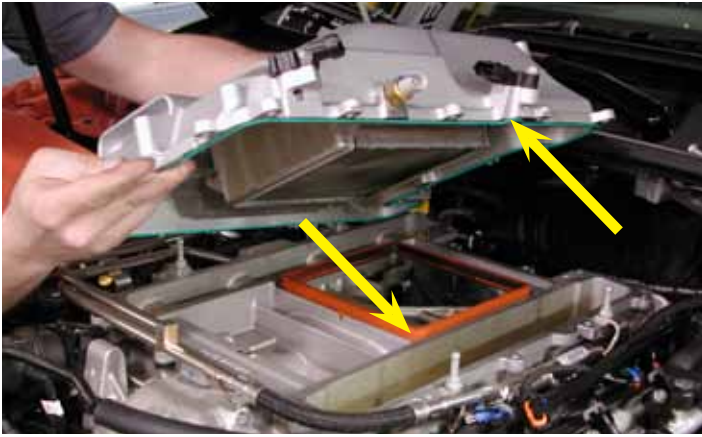


35. Using an 10 mm socket, start with the back six (6) bolts and remove the sixteen (16) bolts from the supercharger cover. Refer to the bolt locations below.

NOTE: Use caution when removing and installing cover and supercharger bolts. They have plastic Isolators in the bolt holes that can fall out. Isolators must be re-used.



(BOLT LOCATIONS)



36. Carefully remove the supercharger cover and inspect the supercharger cover seal and insulator seal for wear or damage.



37. Cover the supercharger cover with rags or plastic to prevent debris from entering the cover.



38. Cover the supercharger inlet with rags or plastic to prevent debris from entering the supercharger.



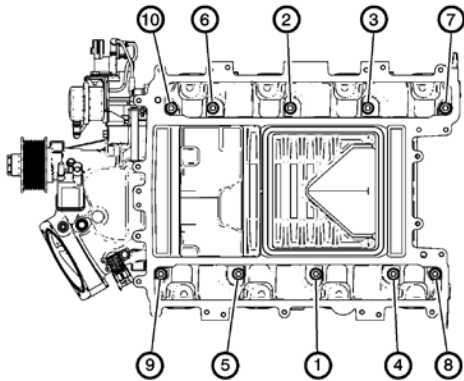
39. Using a 10 mm socket, remove the inlet air pressure sensor. Handle the sensor and O-ring with care.



40. Using an 8 mm socket, remove the ten (10) bolts from the supercharger. Refer to the bolt locations below.

NOTE: Use caution when removing and installing cover and supercharger bolts. They have plastic Isolators in the bolt holes that can fall out. Isolators must be re-used.

(BOLT LOCATIONS)



41. Carefully lift up on the front of the supercharger and place a wooden block or equivalent underneath to wedge the front of the supercharger up 1" to 2". Make certain your wedging device is clean and clear of debris



42. Using a 10 mm socket, remove the (6) bolts on the front supercharger cover.



43. Using a pry bar, carefully pry the front cover in the location shown. Make certain any wires or lines are not in the way. This step may require a rubber mallet. Gently tap on the front of the supercharger cover to loosen and continue prying.



44. Carefully remove the supercharger front cover from the assembly.



45. Remove dowel sleeves from supercharger front cover (they may also still be in the supercharger) by squeezing with a pair of pliers while twisting and pulling the sleeves out of the cover. You will be replacing these sleeves with new ones.

NOTE: Some early vehicles may not have these.



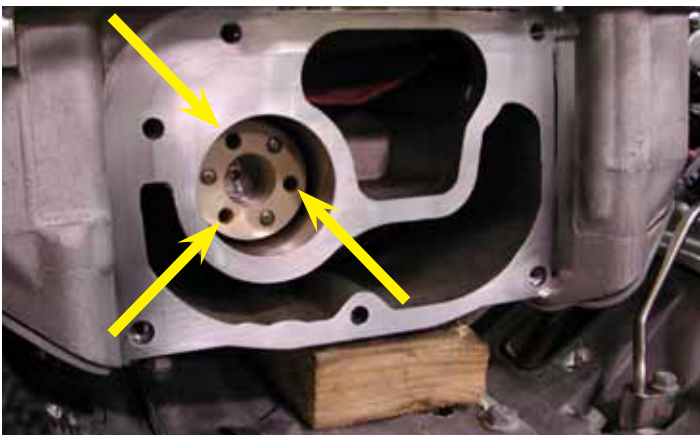
46. If you are installing the pulley hub on the front cover yourself, follow the steps in the instructions included with the 10 bolt press on hub kit (part # L250150309). LPE can also perform the pulley installation for you or we can also supply you with a new replacement front cover with the pulley already installed. We also offer porting and polishing of the front cover (as shown). Contact LPE or your LPE dealer for more details.

47. Once you have installed the 10 bolt press-on hub and the 10 bolt 2.55" pulley, you are ready to continue the installation process.

48. Clean the mounting surface of the supercharger housing with a razor blade and Scotch pads.



49. Replace the factory isolator coupling with the supplied LPE solid supercharger isolator coupling (LPE part # L960130709).



50. Notice the unoccupied holes on the coupler. The drive pins on the supercharger cover shaft will go into these holes.



51. Using a razor blade and Scotch pads, scrape and clean the mounting surface of the supercharger front cover.



52. Apply a thin film of the supplied Permatex Ultra Black Gasket maker to the mounting surface of the front cover.



53. Insert the LPE provided dowel sleeves (part # SPIR-69427) into the two (2) locations shown on the supercharger housing by squeezing and twisting them in with pliers.

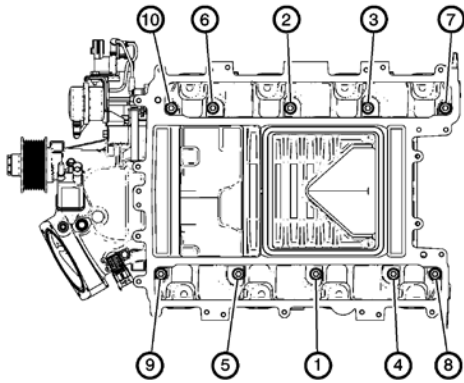


54. Carefully place the supercharger front cover on the supercharger housing. Make sure the pins insert into the empty isolator coupler holes. Using a 10 mm ratchet, torque down the six bolts to 20 lb-ft (27 Nm). As the front cover is being pulled to the supercharger, slight tapping with a rubber mallet on the pulley will help seat the isolator and allow it to spin freely.

NOTE: The torque pattern is not critical on this component.



55. Lift up on the front of the supercharger and remove the wood block or wedge that was inserted earlier. Line up the supercharger bolt holes with the corresponding holes in the cylinder heads and insert the ten (10) bolts that secure it.



56. Tighten the bolts down in the order shown, using an 8 mm socket make a first pass of 44 lb-in (4 Nm). Then make a final pass in sequence to 89 lb-in (10 Nm).

NOTE: Use caution when removing and installing cover and supercharger bolts. They have plastic Isolators in the bolt holes that can fall out. Isolators must be re-used.

57. Thermostat installation:

Drain the engine coolant by turning the petcock counterclockwise located on the bottom of the radiator.

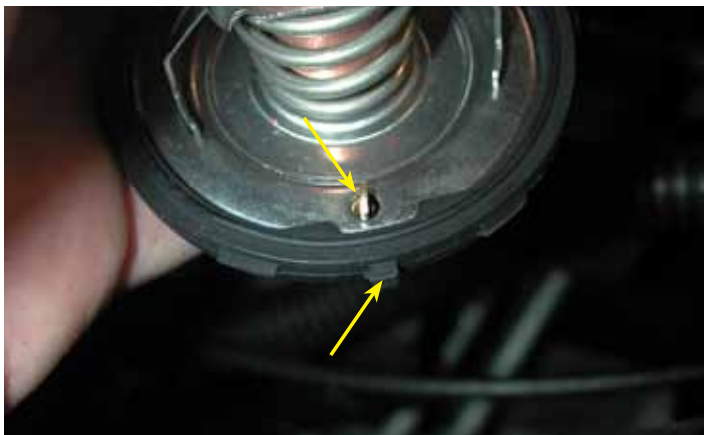
Remove the large radiator hose from the engine coolant inlet. There may be residual coolant in the system so have a drain pan or catch can ready to catch the residual coolant.



58. Using a 10 mm socket and extension, remove the two (2) bolts that hold the engine coolant inlet.



59. Remove the old thermostat from the inlet.



60. On the new thermostat, make sure that the small square tab is lined up with the check valve on the engine side of the thermostat.



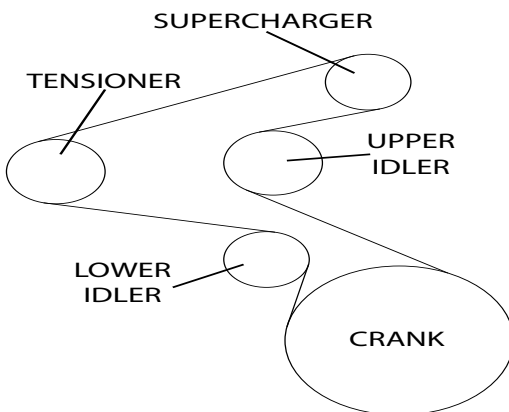
61. Insert the thermostat assembly in the inlet with the square tab aligned with the notched out portion of the inlet. Make sure to press down firmly to properly seat the thermostat and gasket in the housing.



62. Using a 10 mm socket and torque wrench, torque the inlet bolts to 89 lb-in.

63. Install your large radiator hose on your inlet.

64. Refill your coolant using the coolant that you removed or with DexCool 50/50 to the proper level.



Supercharger belt layout



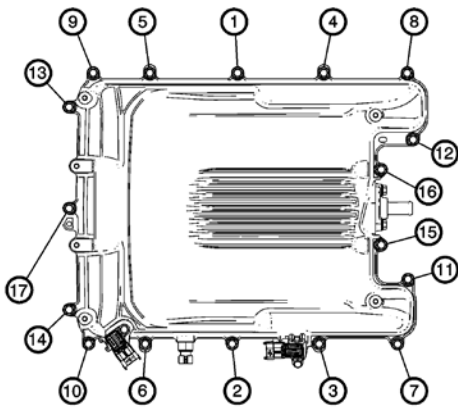
65. Using a breaker bar, release the tension on the tensioner by turning it counter-clockwise. While the tension is released install the LPE supplied belt (part # 8PK1655). See Table 1 on page 29 for recommended belt and idler sizes for the different supercharger pulley and damper diameter combinations.

CAUTION: Pinch Hazard! Do not place fingers in between belt and pulleys.



66. Replace the intercooler cover. Using a 10 mm socket torque each bolt down on the first pass to **44 lb in** (5 Nm) then on a final pass of **89 lb in** (10 Nm). Make certain to use the order shown below.

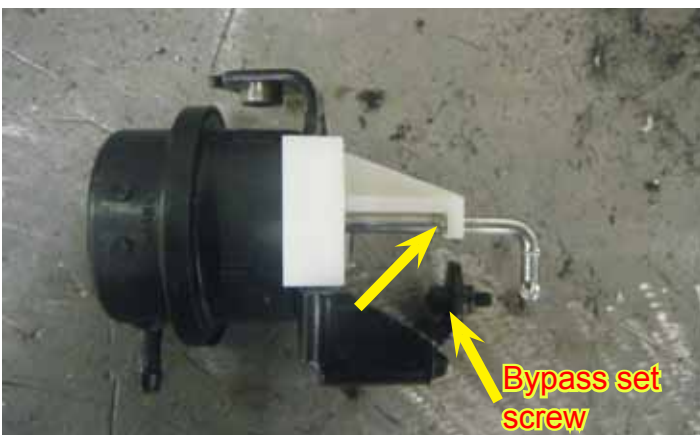
NOTE: Use caution when removing and installing cover and supercharger bolts. They have plastic Isolators in the bolt holes that can fall out. Isolators must be re-used.



67. (FASTENER TORQUE SEQUENCE)

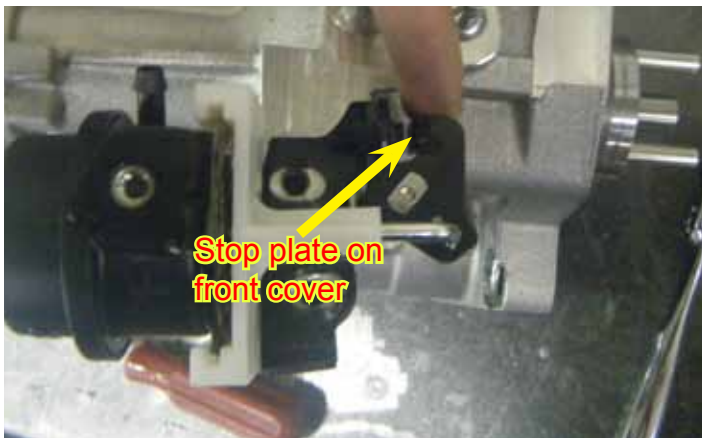


68. Insert the bypass actuator arm into the supercharger front cover bracket. Replace the PCV hose and correct vacuum hose as shown.

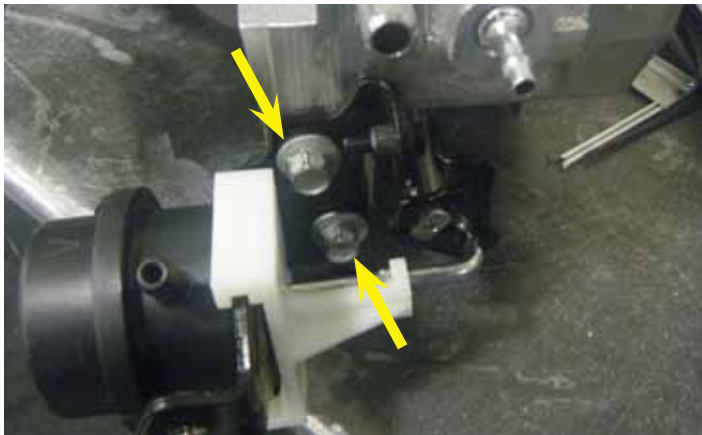


69. Use the set tool to set the actuator position [tool part # ETN86063]. Place the vacuum bypass positioning tool so that the actuator arm teeth are located in the position shown. Note the bypass set screw position.

NOTE: The front cover and bypass actuator are shown off of the vehicle for illustrative purposes only.



70. Hold the bypass stop plate back so that the bypass valve blade is in the closed position. The stop plate should not be touching the set screw on the bypass actuator. The set screw can be adjusted using a 3/32" Allen wrench.



71. Install the two (2) 10 mm bolts and torque them to 21 lb-ft (28.5 Nm).



72. Tighten the set screw so that it barely touches the stop plate on the front cover. After the initial contact, tighten the set screw 1/8 to 1/4 turn **more** to set the bypass valve blade into position. The set screw should now be touching the stop plate on the front cover. This will prevent the bypass valve blade from getting stuck on the front cover casting. Remove the bypass actuator set tool.



73. Install the boost solenoid bracket onto the bypass valve actuator. Torque the bolt down to 89 lb-in (10Nm).



74. Reconnect the vacuum hose from the bypass valve actuator to the supercharger.



75. Using a 10 mm socket, replace the inlet air pressure sensor and torque down to 89 lb-in (10 Nm).



76. Replace the inlet air pressure electrical connector.



77. Install the purge solenoid onto the front cover. Using a 10 mm socket, torque the fastener to 10 Nm (89 lb-in).



78. Replace the PCV hose on the purge solenoid.



79. Replace the electrical connector to the purge solenoid.



80. Replace the electrical connector to the MAP sensor.



81. Replace the electrical connector to the IAT2 sensor.



82. Replace the electrical connector to the BARO sensor.



83. Re-connect the brake booster hose on the top of the supercharger front cover.



84. Place the throttle body on the end of the supercharger front cover. Using a 10 mm socket, torque down the four (4) bolts to 89 lb-in (10 Nm).



85. Replace the throttle actuator electrical connector to the throttle body.

86. Follow the supplied instructions to install the supplied air intake duct kit and air filter.



87. Program the vehicle's engine control module (ECM).



88. You can purchase vehicle programming hardware and software from LPE, you can send in your ECM for us to calibrate or you can have a local tuning shop calibrate your vehicle.

NOTE - some pulley combinations require ignition timing changes in order to operate with pump gas. The increased boost levels risk damaging your engine if the correct calibration changes are not made.



89. DLC port cover kit installation.



90. Install the supplied diagnostic port (DLC port) cover onto the DLC port in the driver foot well. Secure the strap that retains the DLC cover to the vehicle.

This cover is meant to notify dealerships and other service facilities that this vehicle has custom programming installed for new supercharger pulley ratio and it should not be programmed with the stock GM calibration files when being serviced.

91. Start your vehicle and listen for any leaks. If there are any problems check all the sensors and vacuum lines for proper hook up and position.

LINGENFELTER

PERFORMANCE ENGINEERING

Table 1 - belt length and idler pulley diameters required for different LSA supercharger pulley and damper pulley combinations.

| Crank Pulley PN (Crank only OD%) | Supercharger Pulley | Supercharger Pulley PN | Belt length | Belt PN (imperial) | Belt PN (metric) | Upper Idler | Lower Idler | Idler Bracket (PN) | Pulley Ratio | Total OD% | SC Speed @ 6500 RPM Engine Speed |
|---|------------------------|---|------------------------|-----------------------|---------------------|---|---|-----------------------|-----------------|--------------|--|
| stock 7.8" (L220646509) (0%) | stock 3.0" | * | stock 1680mm | 12628026 (GM) | | stock 90 mm | stock 70 mm | stock | 2.6 | N/A | 16,900 |
| | 2.55" press-on | L220030709 | 1655mm/65.2" | K080653 | 8PK1655 | | | | 3.1 | 18% | 19,900 |
| | 2.55" 10 bolt | L220300709 | 1643mm/64.5" | K080645 | 8PK1643 | | | | 3.3 | 26% | 21,300 |
| | 2.38" 10 bolt | L220310709 | stock 1680mm | 12628026 (GM) | | stock 90 mm | stock 70 mm | stock | 2.8 | 6% | 17,900 |
| 8.25" L220060709 (6%) | stock 3.0" | * | 66.0" | K080660 | 8PK1676 | | | | 3.2 | 25% | 21,000 |
| | 2.55" press-on | L220030709 | stock 1680mm | 12628026 (GM) | | LPE 100 mm, 0.350" spacer, M10x1.5x60mm cap head screw | | | 3.5 | 34% | 22,500 |
| | 2.55" 10 bolt | L220300709 | | | | | | | | | |
| | 2.38" 10 bolt | L220310709 | | | | | | | | | |
| 8.66" L220070709 (11%) | stock 3.0" | * | 67.5" | K080675 | 8PK1715 | | | | 2.9 | 11% | 18,800 |
| | 2.55" press-on | L220030709 | 67.0" | K080670 | 8PK1702 | | | stock | 3.4 | 31% | 22,100 |
| | 2.55" 10 bolt | L220300709 | 67.0" | K080670 | 8PK1702 | | | | 3.6 | 40% | 23,700 |
| | 2.38" 10 bolt | L220310709 | 68.0" | K080680 | 8PK1727 | | | | 3.1 | 18% | 19,900 |
| 9.17" L220170709 (18%) | stock 3.0" | * | 67.5" | K080675 | 8PK1715 | | | LPE (L220636509) | 3.6 | 38% | 23,400 |
| | 2.55" press-on | L220030709 | 67.5" | K080675 | 8PK1715 | | | | 3.9 | 48% | 25,000 |
| | 2.55" 10 bolt | L220300709 | 67.5" 67.0" (tight) | K080675 K080670 | 8PK1715 8PK1702 | | | | 3.2 | 23% | 20,700 |
| | 2.38" 10 bolt | L220310709 | 69.0" | K080690 | 8PK1753 | | | LPE (L220636509) | 3.8 | 44% | 24,300 |
| 9.55" L220290709 (23%) | stock 3.0" | * | 68.0" | K080680 | 8PK1727 | | | | 4.0 | 54% | 26,000 |
| | 2.55" press-on | L220030709 | 68.5" | K080685 | 8PK1742 | | | | 3.3 | 28% | 21,700 |
| | 2.55" 10 bolt | L220300709 | 68.0" (tight) | K080680 | 8PK1727 | | | | 3.9 | 51% | 25,500 |
| | 2.38" 10 bolt | L220310709 | 68.0" | K080680 | 8PK1727 | | | LPE (L220636509) | 4.2 | 62% | 27,300 |
| 10.0" L220380709 (28%) | stock 3.0" | * | 70.8" 70.0" (tight) | K080708 K080700 | 8PK1797 8PK1775 | | | | | | |
| | 2.55" press-on | L220030709 | 69.6" | K080696 | (-) 8PK1753 | | | | | | |
| | 2.55" 10 bolt | L220300709 | 69.0" (tight) | K080690 | 8PK1753 | | | | | | |
| | 2.38" 10 bolt | L220310709 | 69.0" | K080690 | 8PK1753 | | | | | | |
| 9.73" 10 rib L220450709 (requires 10 rib tensioner pulley) | 2.70" 10 rib | XX03873-0004 (tensioner pulley PN L220620709) | 67.5" | K100675 | 10PK1715 | LPE 76 mm, 0.200 spacer, M10x1.5x60mm cap head screw | LPE 76 mm, 0.200 spacer, M10x1.5x60mm cap head screw | LPE (L220636509) | 3.5 | 35% | 22,800 |
| | 2.95" 8 rib | Included with Magnuson LSA TVS2300 Heartbeat Kit | 68.0" | K080680 | 8PK1727 | | | LPE (L220636509) | 3.1 | N/A | 20,100 |

Supercharger speeds above 23,000 RPM are not recommended. To calculate supercharger speed, multiply your maximum engine speed by the pulley ratio value listed above.

Pulley ratios above 35% should only be used in applications with proportionally lower maximum engine speeds (below 6500 RPM).

For applications where the crank pulley diameter is greater than or equal to 9.17", LPE idler relocation bracket (PN: L220636509) is required in order to provide enough clearance between the crank pulley and the lower idler pulley. For bearing durability reasons LPE does not recommend using idler pulleys smaller than 70mm.

An LPE idler pulley is required for these pulley/belt combinations.

*A stock diameter 10 bolt pulley is also available from LPE, PN L220600709

Many other items are available from LPE for your Cadillac CTS-V including low temperature thermostats, camshafts, ported throttle bodies and much more. Contact LPE, visit our web site, or contact your LPE distributor for information about our other products.

For additional product installation information and technical support, contact LPE or your LPE products distributor. You can also find technical support and usage discussions regarding this product and many other LPE products in our Internet forums:

<http://www.lingenfelter.com/LPEforumfiles>



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