

LINGENFELTER

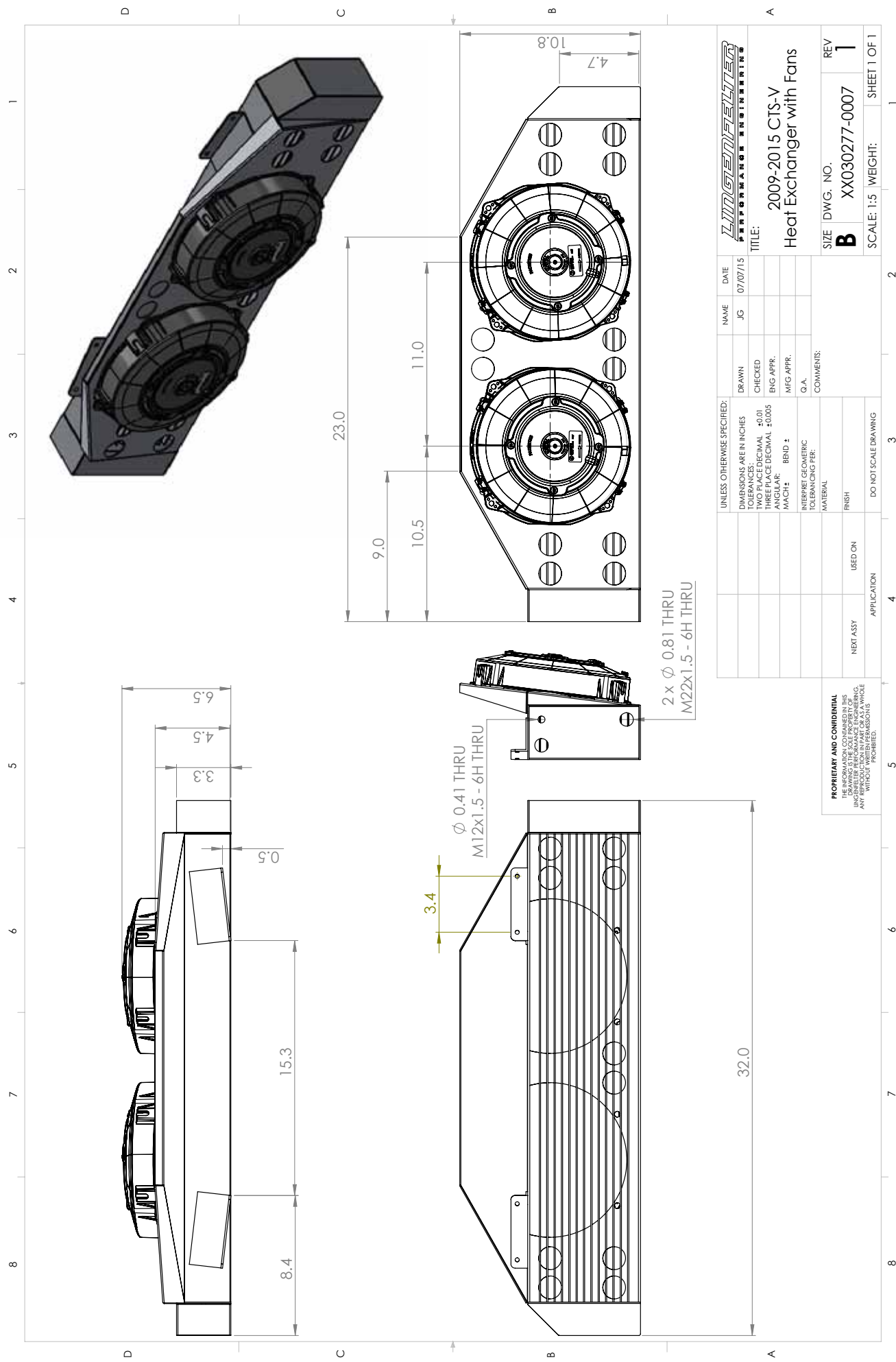
P E R F O R M A N C E E N G I N E E R I N G

Cadillac CTS-V Intercooler Radiator Kit With Temperature Controlled Auxiliary Fans 2009-2015 Model Year (6.2L LSA engine)



PN: L320030709

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Release Date: 21 December 2015



UNLESS OTHERWISE SPECIFIED:				NAME	DATE
DIMENSIONS ARE IN INCHES				JG	07/07/15
TOLERANCES:					
TWO PLACE DECIMAL ±0.01					
THREE PLACE DECIMAL ±0.005					
MACH: BEND ±					
INTERPRET GEOMETRIC TOLERANCING PER:					
MATERIAL					
FINISH					
DO NOT SCALE DRAWING					

PROPRIETARY AND CONFIDENTIAL			
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NEXT ASSY		USED ON	
APPLICATION		APPLICATION	

LINGENFELTER ENGINEERING			
TITLE:			
2009-2015 CTS-V			
Heat Exchanger with Fans			
SIZE	DWG. NO.	REV	
B	XX030277-0007	1	
SCALE: 1:5	WEIGHT:	SHEET 1 OF 1	

Parts List

High Capacity Intercooler radiator for 2009-2015 CTS-V (PN: L320030709)

#	Description	Part number
1	CTS-V heat exchanger with fans	XX03277-0007
2	90 degree swivel push to lock 3/4" hose fitting, M22	SET22-M22PL12-90
1	Intercooler fan wiring harness with relays and fuse holders	XX05636-0002
1	Temperature Based Relay Controller	TBRC-001
1	Coolant temperature sensor	12608814
3	Fuse, 15 amp	782-2184
1	3/4" x 40" heater hose with 90 degree bend	9820
3	1" black braided split loom, per foot	TFX-F6N1.00BK
1	3/4" hose joiner	9905
1	5/8" hose joiner	9904
2	27.1 mm Oetiker clamp	52545K75
2	25.6 mm Oetiker clamp	52545K74
4	Black triple wall heat shrink, 2-4/0 gauge, 2" section	DC980845
3	1/4-20x1-1/4" SS socket head cap screw	63520
3	1/4-20 SS Nylon insert lock nut	30634
4	1/4-20x3/4" thread forming screw	1132408
1	Carbide drill bit, #2	30634
3	Christmas tree fastener	MP1026
8	Zip-Tie, 7.5", black	BARNES-23-923X
2	Hook and loop tape, per inch	06483
1	LPE technician's screwdriver	L950050000
1	CTS-V HD power steering cooler kit	L320050709
1	Instruction manual	

HD Power Steering Cooler Kit for 2009-2015 CTS-V (PN: L320050709)

1	Heat exchanger, 10 row, 9 series	SET50-910-7612
2	PS cooler bracket, CTS-V	XX03277-0009
2	90 degree swivel push to lock 3/8" hose fitting, M22	SET-22M22PL06-90
4	1/4-20x3/4" SS button top socket cap screw	93107
4	1/4-20 SS Nylon insert lock nut	30634
4	3/8" hose, per ft	H1937
2	1/4-20x3/4" thread forming screw	1132408
4	17mm Oetiker clamp	52545K55
2	3/8" hose joiner	LN-TT23
4	Black triple wall heat shrink, 2-4/0 gauge, 2" section	DC980845
2	Zip-Tie, 7.5", black	BARNES-23-923X
4	3/4" black braided split loom, per foot	20343K

Optional Items

#	Description	Part number
1	CTS-V Varimax high flow intercooler pump kit	L330030709
1	Bosch & ZR1 intercooler pump manual override harness	L480400000
1	Manual Fan and Pump Manual Override Kit	L300180000
1	Stewart EMP high output intercooler fluid pump, 9A	ST-E2512A
1	Stewart EMP high output intercooler fluid pump, high flow program, 25A	ST-1030002107

Tools & Materials Required

- Flat head screw driver
- 7 mm socket
- 10 mm socket
- 13 mm socket
- 3/8" socket
- 7/16" socket
- Ratchet
- 3/8" extension
- Universal joint socket adapter
- Torque wrench
- 7/16" wrench
- 3/4" wrench
- 1-1/16" (27 mm) wrench
- 1-1/4" (32 mm) wrench
- 5/32" Allen wrench
- Oetiker clamp crimping tool
- Hose clamp pliers
- Hose cutters
- Heat gun
- Wire strippers
- Wire crimping tool
- Drill
- 1/4" drill bit
- Fork tool
- Jack & jack stands (or vehicle hoist)
- Drain pan for P/S fluid
- Drain pan for intercooler fluid
- Marking pen (silver Sharpie or equivalent)
- Center Punch
- Assorted rubber vacuum caps or similar
- 50/50 DEX-COOL
- 10-5030 Power steering fluid
- Brake clean or equivalent



Parts specifications and content subject to change.

Thank you for purchasing the Lingenfelter Performance Engineering (LPE) Cadillac CTS-V High Capacity Intercooler Radiator system. This kit is designed to improve the performance of the engine by reducing the charge air temperature at all RPM ranges and duty cycles.

This system features a heat exchanger with a back to front double pass coolant flow configuration designed to optimize heat transfer by maintaining the highest temperature difference between the incoming airflow and the intercooler fluid across the entire fluid path. The system also includes two temperature controlled puller type fans to increase air flow across the intercooler, especially when stopped or under low speed conditions. These fans feature low and high speed mode and are temperature controlled based on the intercooler fluid temperature itself. This reduces fan noise when they are not needed and increases fan durability.

The LPE intercooler radiator has been designed and tested to make sure it is compatible with the stock as well as aftermarket intercooler pumps. This intercooler radiator provides increased surface area and coolant volume yet has the same coolant flow restriction as the OEM radiator so as not to hurt pump performance.

This kit is designed for 2009-2015 Cadillac CTS-V's with the LSA engine and replaces the OEM intercooler radiator. Additional improvements in charge-air temperatures can be obtained if you also install the optional LPE CTS-V Varimax high flow intercooler pump kit (PN L330030709). This kit is designed to be a direct replacement for the stock CTS-V and includes a high flow DC brushless intercooler pump that provides roughly 25% more flow than the stock CTS-V pump, bringing the CTS-V up to the same intercooler pump flow as the ZL1 Camaro.

For applications that require an even higher flowing intercooler fluid circulation pump we recommend the Stewart-EMP WP29 pumps (PN: ST-E2512A or ST-1030002107).

WARNING: Due to the high flow rate of the Stewart EMP WP29 water pumps (PN: ST-E2512A or ST-1030002107), changes to the circulation system must be made in order to reduce pump inlet restriction if you want to use one of these pumps. A custom reservoir must be made with 1" fittings and hose going from the reservoir to the pump inlet. The reservoir must be mounted above and close to the pump and have as few bends as possible in the hose from the reservoir to the inlet of the pump. Failure to perform these changes will result in significantly reduced pump flow and potential pump failure. Due to the engine compartment configuration of the CTS-V such a coolant reservoir would likely need to be mounted in the trunk (along with the pump being mounted in the back of the vehicle).

Notes:

- Read all the instructions before beginning the installation process in order to make sure you have all of the tools and equipment needed and that you feel comfortable performing the installation.
- Be careful on the torque specifications. Some torque specifications are in pound feet (LB-FT) and others are in pound inches (LB-IN).
- Be sure to save all of the parts you remove from the vehicle. Many components will be re-used during the installation of this system.
- Be careful not to damage any components while removing them from the vehicle. Some parts cannot be purchased by themselves from GM and must be purchased as part of an entire assembly.
- Some steps will require two people.
- Estimated installation time is 4 to 6 hours.



1. If you have been using the vehicle, allow the vehicle to cool before beginning this installation.



2. Raise and properly support the vehicle, either on a hoist or with a jack and jack stands, using the GM specified lift locations for the vehicle.

Consult your owner's manual for details on the proper jacking/lifting points.



3. Disconnect the ground terminal from the vehicle's battery using a 10 mm wrench. The battery is located in the trunk on the passenger side of the vehicle.

WARNING: be careful not to short the wrench across the terminals. We recommend using an insulated wrench for safety reasons.



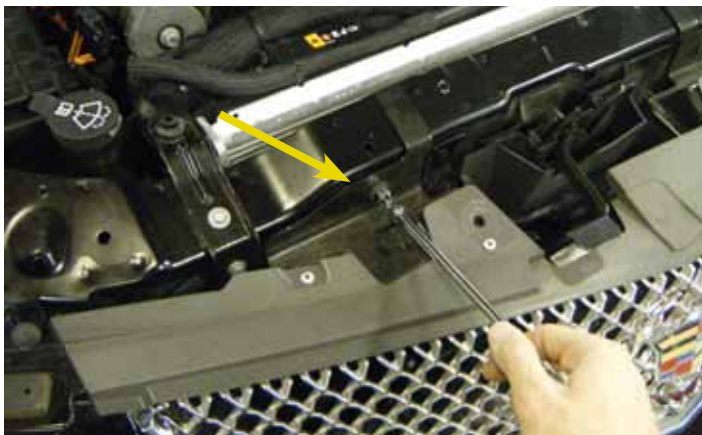
4. Remove the front wheels.



5. Open the hood and remove the six plastic retainer clips from the sight shield by turning the clips counterclockwise. Remove the sight shield



6. Using a fork tool, remove the two (2) push fasteners from each side (four total) that secure the front fascia to the vehicle.



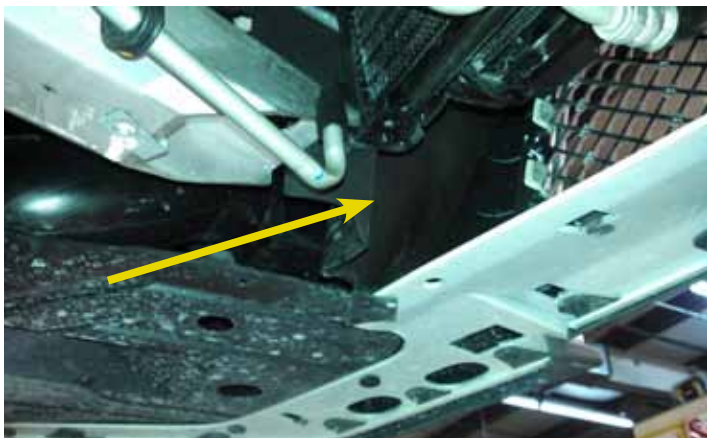
7. Remove the two M6x1.0 screws that secure the fascia to the bumper core support using a 10mm socket

TIP: It may be easier to access the screws using a universal joint socket adapter and an extension.

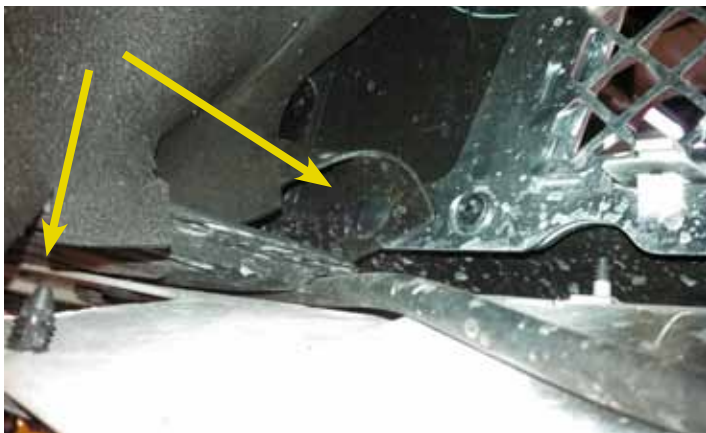


8. The front air deflector is located on the underside of the vehicle and is attached to the front fascia and the front portion of the frame. Remove the two (2) M6 bolts with a 10mm socket and then remove the 10 push pins and remove the cover.

Note: The foam insert may come loose from the panel. Be sure to retain the insert and note its location so that it gets put back in the correct location during re-assembly.



9. Locate the flexible rubber shrouds that are on either side of the radiator.



10. Using a fork tool, remove the Christmas tree fasteners that secure each rubber shroud to the front fascia on both sides of the radiator (two per side, four total).



11. In each wheel well, an engine splash shield exists. This felt-like material shield is secured to the wheel well liner with four push pins. Remove the four (4) push pins and remove the splash shield. Repeat this process for both the passenger and driver side splash shields.



12. Remove the eight push pins holding in the front part of the fender liner and remove the fender liner. Repeat this process for both the passenger and driver side front inner fender liners.



13. Using a 10 mm socket and extension, remove the four bumper fascia bolts (2 per side) that secure the front fascia to the bumper beam. Access these bolts from each front wheel well.



14. Disconnect the electrical connector from each fog light.



15. The washer fluid pump is located on the passenger side of the vehicle behind the fog light area. Remove the line from the washer fluid pump that is used for the headlight washers. A rubber vacuum cap may be used to prevent washer fluid from leaking out until reassembly.

16. With the help of an assistant, carefully remove the front bumper and set it somewhere safe so it won't be damaged.



17. Locate the power steering (PS) hose bracket that is found where the PS lines cross under the intercooler radiator and engine radiator on the driver side. Using hose clamp pliers to relieve the tension on the clamps, slide the hose with the attached clamps off of the metal lines and drain the fluid into a basin.

Note: Power steering systems are very sensitive to dirt. Do not re-use the fluid you have removed. Dispose of the fluid properly.



18. Using a 10 mm wrench undo the bolt holding the bracket for the PS hoses.



19. Using a 13mm wrench, remove the bolt on the passenger side power steering cooler bracket.



20. Remove the remaining bolt, located on the passenger side of the vehicle, that secures the OEM PS cooler to the front bumper impact bar.



21. Remove the OEM power steering cooler assembly.



22. In order to make it easier to drain the fluid from the system, remove the cap from the intercooler fluid reservoir. The reservoir is located at the back of the engine on the passenger side near the fire wall.

23. To drain the intercooler system of coolant, using a 3/8" square drive extension, remove the drain fitting from the passenger side of the intercooler radiator. Have a drain pan positioned to catch the fluid.

Inspect the fluid. If it is normal in appearance, it can be used again. If it is discolored then we recommend flushing the system of the old fluid and using all new intercooler fluid.

24. Using a pair of hose clamp pliers, release the tension on the hose clamps and remove both the in and out hoses from the stock intercooler radiator.

Note: You will be re-using the stock hose clamps and some of the stock hoses.

25. Using a 10 mm socket, remove the four (4) bolts that secure the intercooler radiator to the front of the A/C condenser.

26. Remove the stock intercooler radiator from the vehicle. Be careful not to contact the A/C condenser core as this can damage the fins and affect cooling.



27. Hold the LPE CTS-V intercooler radiator (PN: XX03277-0007) up to the impact bar and center it. The mounting tabs should be resting against the OEM bracket that is welded to the bottom of the impact bar.

Optional - place cardboard on the front of the intercooler radiator to protect the heat exchanger fins during the installation process.

28. Using a scribe or marker pen and the new intercooler radiator as a template, mark the location of the four (4) holes that will need to be drilled into the bumper beam/impact bar.



29. Remove the intercooler radiator and center punch the hole locations you marked in the previous step. Drill the four (4) mounting holes using the supplied #2 carbide drill bit.



30. Hold the intercooler radiator back up into place and attach it to the vehicle using the four (4) supplied 1/4-20x3/4" thread forming screws (PN: 1132408). Tighten the screws in place using a 3/8" socket and wrench. Torque to 5 lb-ft (7 Nm).



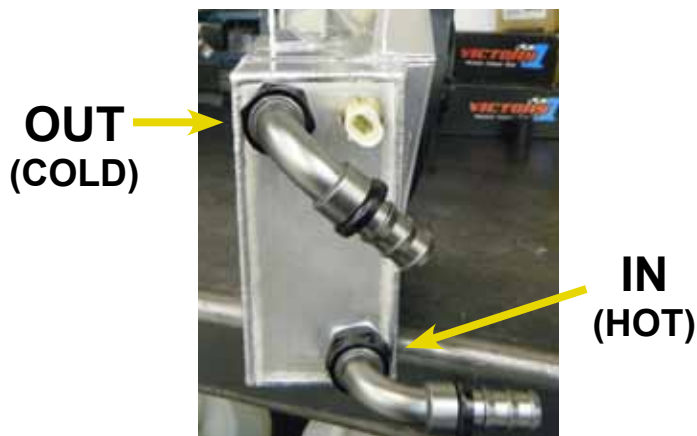
31. Using a 3/4" wrench, install the coolant temperature sensor (PN: 12608814) into the top rear hole on the driver's side of the intercooler radiator. Tighten to 14 lb-ft (20 Nm).



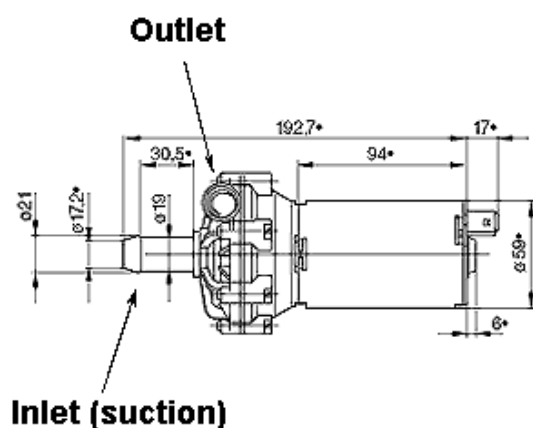
32. Apply a light coating of oil or o-ring safe assembly lubricant to the threads of the 3/4" push to lock 90 degree fittings (PN: SET22-M22PL12-90). Install the two fittings into the intercooler radiator.



33. The recommended positions for the two fittings is pointing down and back towards the engine compartment. Once the fittings are clocked properly use a 1-1/4" inch (32 mm) wrench to tighten the fittings. Tighten to 30 lb-ft (40 Nm).



34. Use the image to the left as a reference for the inlet and outlet of the new intercooler radiator.



35. Use the image to the left as a reference for the inlet and outlet fitting locations of the intercooler pump.

OUT from the intercooler radiator goes to the INLET (suction) side of the pump. The OUTLET of the pump goes to the charge air cooler in the supercharger assembly on the engine.



36. Locate the intercooler pump and use the hose clamp pliers to release the tension on the inlet hose (suction side) clamp and remove the hose from the pump.

NOTE: If you are installing the optional high flow intercooler pump kit now is a good time to perform that process.



37. Take the hose you removed from the intercooler pump in the previous step. It should look like the image on the left. Remove or roll back the mesh sleeve.



38. Use a silver or white marking pen to mark the hose as shown on the left.



39. Cut the hose as marked. Now take the portion with the tight 90 degree bend on it (the side that was connected to the intercooler pump) and slide one of the 27.1 mm (PN: 52545K75) Oetiker clamps over the hose and then insert the 3/4" joiner (PN: 9905) into the hose as shown. Tighten the Oetiker clamp in place with Oetiker pliers.



40. Using hose clamp pliers, release the tension on the constant tension hose clamp and attach the end of the above hose and joiner assembly to the outlet (upper) 90 degree fitting on the side of the intercooler radiator as shown (the fitting has been clocked to give better visibility for the picture).



41. Locate the supplied 3/4" hose with a 90 degree bend (PN: 9820). Using hose clamp pliers to release the tension on the clamp, slide one of the stock constant tension hose clamps onto the end of the hose closest to the 90 degree bend. Connect this end to the pump inlet and then use hose clamp pliers to secure the hose with the hose clamp.



42. Route the hose from the inlet of the pump over to the hose joiner (in the hose assembly you connected to the intercooler radiator outlet in an earlier step). Determine the correct length of hose needed and then mark the hose in the correct location as shown. Cut the hose in the marked location. You should need to remove roughly 1 foot of hose.



43. Install two pieces of the supplied heat shrink tubing over the hose. Then slide one of the 27.1 mm (PN: 52545K75) Oetiker clamps over the hose and then slide the hose (coming from the intercooler pump) over the hose joiner assembly. Once you have the hose assembly in place and clocked correctly, check to make sure the hoses are not bent or kinked. Tighten the clamps using Oetiker pliers.



44. Slide the heat shrink tubing to each end of the hose assembly and then install the 1" mesh loom (PN: TFX-F6N1.00BK) over the inlet hose and cut to length.

45. Position the shrink tube so it overlaps the end of the loom and some of the hose as well and then use a heat gun to secure the loom to the hose. Be sure not to melt the braided loom with the heat gun. Perform this step on both ends of the hose.



46. The following steps are done to allow you to re-clock the bend in the OEM hose in order for it to attach properly to the new intercooler radiator. You are sectioning the hose and placing a hose joiner in between the two sections of the OEM hose.

Take the OEM 5/8" hose that comes from the fill reservoir and connects to the inlet of the intercooler and mark it as shown with a marking pen.



47. Cut the hose where you marked it in the previous step.

48. Place a piece of the supplied heat shrink tube over then hose and then slide one of the 25.6 mm Oetiker clamps (PN: 52545K74) over the OEM hose and then insert the 5/8" hose joiner (PN: 9904) into the hose (into one of the ends you just cut in the previous step). Slide the remaining 25.6 mm Oetiker clamp (PN: 52545K74) over the other section of hose and then insert the other end of the hose joiner into the hose.



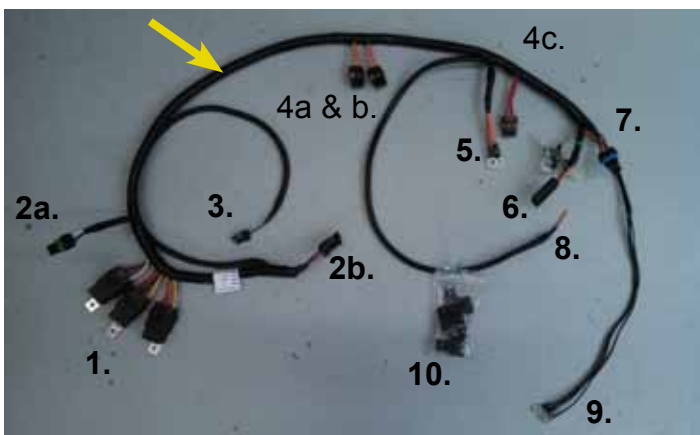
49. Using hose clamp pliers, release the tension on the stock constant tension hose clamp that should already be on the hose end. Install the hose onto the lower rear (inlet) 90 degree fitting of the intercooler radiator. Once the hoses are clocked properly without any kinks or improper bends, tighten the Oetiker clamps in place with Oetiker pliers.



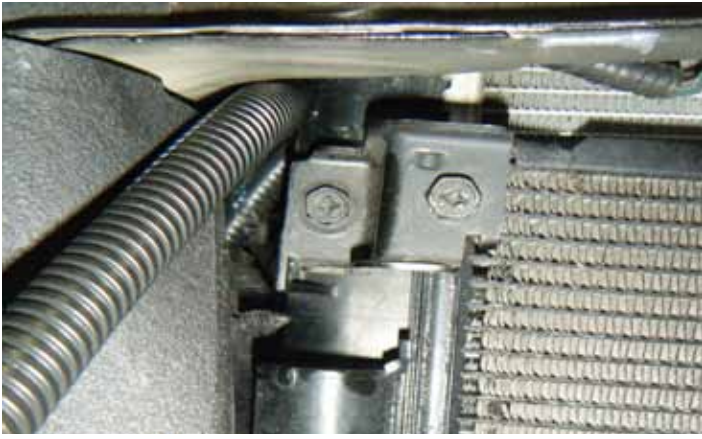
50. Slide the mesh sleeve over the exposed portions of the hose and joiner assembly and cut to length. Secure the end with the supplied shrink tubing as before, being careful not to melt the braided hose.



51. Secure the hoses with the supplied Zip-Ties. Be sure not to over tighten the Zip-Ties as you risk collapsing the hoses and causing a flow restriction.



52. Identify the fan control wiring harness (PN: XX05636-0002) connections:
1. Relays (3x)
 2. Fan connector (2x)
 3. Fluid temperature sensor connector
 4. Fuse holders (3x)
 5. Main power (3 wires/2 eyelets)
 6. Optional time delay module connector (mating connector in plastic bag)
 7. TBRC 6-pin connector
 8. TBRC power
 9. Grounds (3x)
 10. Fuse covers (3x in a bag)



53. From the front of the vehicle, feed the end of the fan harness with the ground eyelets through the gap between the radiator and support rails on the passenger side of the vehicle. Feed the harness until the fuse holders are inside the engine compartment and the relays, fan connectors and temperature sensor connector are in front of the radiator (roughly to the yellow arrow in the image in step 52).

54. Feed the end of the harness with the coolant temperature sensor connector behind the impact bar and position the relays behind the passenger side diagonal brace.

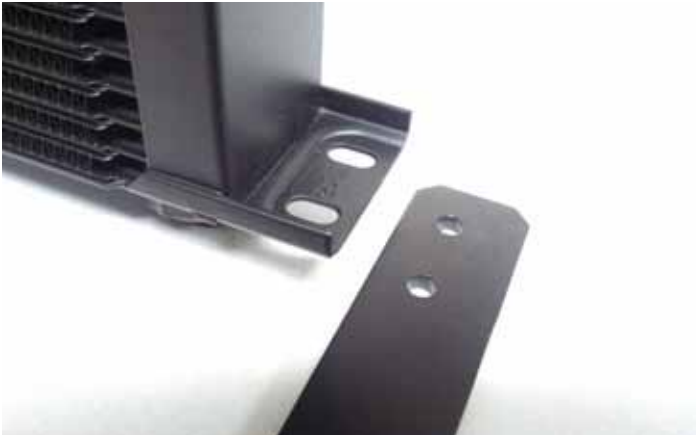


55. Connect the two fan connectors on the harness to the fans mounted to the intercooler radiator.

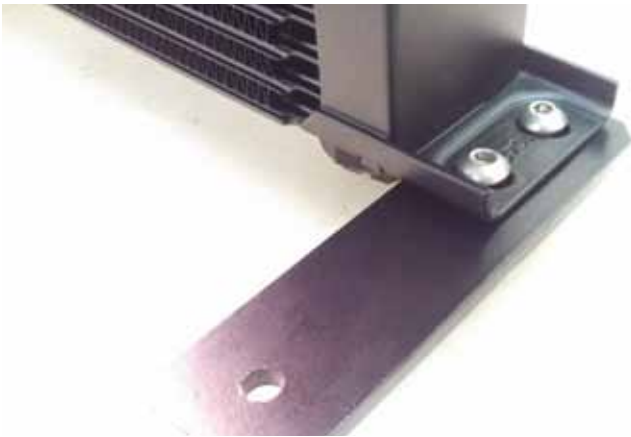
The fan connectors on the harness are interchangeable. It does not matter which connector goes to which fan.



56. Connect the coolant temperature sensor connector of the fan harness to the temperature sensor installed in the intercooler radiator.



57. Locate the two brackets (PN: XX03277-0009) and the supplied power steering cooler (PN: SET50-910-7612). The bolt holes on the brackets are offset, with the holes being closer to one edge. Be sure to position the brackets such that the side of the bracket with the holes closest to the edge is next to the cooler (as shown).



58. Attach the brackets to the cooler using the four (4) 1/4-20 Nylon insert lock nuts and 1/4-20x3/4" button head cap screws supplied with this kit. Using a 5/32" Allen wrench and 7/16" socket, tighten the bolts to 6 lb-ft (8 Nm).

NOTE: The brackets attach to the flanges on the bottom of the heat exchanger next to the hose fittings.



59. Place the power steering cooler in between the diagonal support braces on the front of the core support with the mounting brackets setting on top of the front bumper impact bar.

The power steering cooler may not fit completely between the diagonal support braces. You will address that in the following steps.

60. Find the three relays in the fan harness that you placed behind the passenger side support brace. Mark the positions on the back side of the brace where the relays should be mounted (leaving room for the OEM Christmas tree fasteners).



61. Using a 13mm socket, loosen the top bolts, one on each brace.

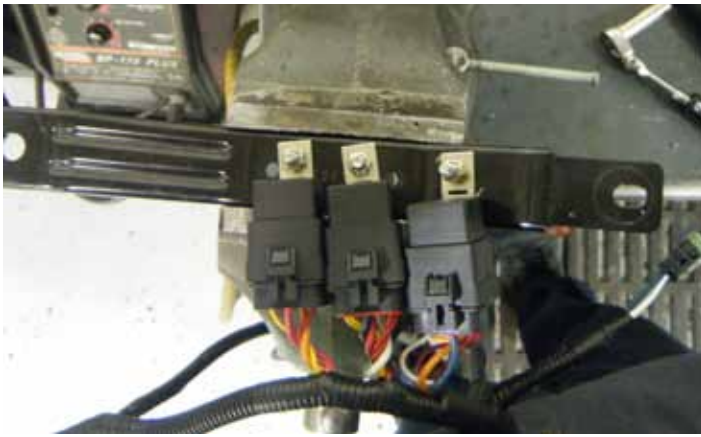


62. Then loosen the bottom bolts, these are located between the impact bar and AC condenser.



63. Remove the passenger side brace above the power steering cooler by removing the upper and lower bolts with a 13mm socket.

64. Using a 1/4" bit, drill three holes in the bracket with proper spacing for the relays to mount side by side. Also be sure to space the holes such that the existing holes for the plastic Christmas tree fasteners used for the OEM harness clips are also still able to be used.



65. Install the three relays from the supplied wiring harness as shown using the three supplied 1/4-20x1-1/4 stainless socket head cap screws and three of the 1/4-20 Nylon insert lock nuts.



66. Re-install the brace.



67. Tighten the top bolts, while pushing up and out on the brace to allow the most room for the power steering cooler.



68. Torque the four bolts to 20 lb-ft (27 Nm). using a 13mm socket.



69. Mark the locations for the holes for mounting the power steering cooler with a scribe or marker pen.



70. Make sure your hole locations do not line up with the two weld marks in the bumper beam (examples shown here).



71. Using a punch, mark the center of the holes. Now drill out the holes using the supplied #2 carbide drill bit.

Note: If you break or loose the supplied drill bit, it is recommended to use a carbide drill bit or have a few brand new drill bits as they will become dull quickly when trying to drill into the hardened steel.

72. Cut the supplied 3/8" hose (PN: H1937) into two sections of equal length (24" each).



73. Remove the plastic plugs from the supplied power steering heat exchanger. Apply a light coating of oil or o-ring safe assembly lubricant to the threads of the 3/8" push-to-lock 90 degree fittings (PN: SET22-M22PL06-90). Install the 90 degree hose end fittings into the power steering cooler as shown.



74. Slide the supplied 17mm Oetiker clamps (PN: 52545K55) over the 3/8 hoses from Step 72 and then push the hoses (PN: H1937) onto the barbed ends of the fittings. Using Oetiker pliers, crimp the clamps over the hoses to secure them onto the fittings. Install a piece of the supplied heat shrink tube over the hose.

75. Cut the supplied 3/4" mesh loom into two sections 2 feet long (each). Then slide each of the two sections onto the power steering hoses attached to the cooler.

Angle both of the fittings and hoses inwards (towards each other). Once the fittings are clocked properly use a 1-1/16" inch (27 mm) wrench to tighten the fittings. Tighten to 30 lb-ft (40 Nm).



76. Place the power steering cooler back into place on the impact bar. As indicated previously, it is recommended to have the hoses point inwards towards each other. This will help with the packaging of the hoses. Tighten the screws in place using a 3/8" socket and wrench. Torque to 5 lb-ft (7 Nm).



77. Insert one end of each of the two supplied brass barbed unions (PN: LN-TT23) into the ends of the power steering hoses that are attached to the power steering cooler.



78. Slide one piece of the supplied shrink tubing over each hose section and then install one 17mm Oetiker clamp (PN: 52545K55) onto each of the hoses. Use the Oetiker pliers to secure the brass barbs into place.



79. Connect the OEM power steering hoses, from the rack and P/S pump, to the brass barbs. Using a pair of hose clamp pliers, release the tension from clamps and slide the hose and clamps into place. These clamps are attached to the hose and cannot be moved or rotated.

Use a heat gun to secure the heat shrink tubing to the loom and hose as before.



80. Now route the fan harness inside the engine compartment to the driver side of the fuse block and windshield wiper fluid bottle fill neck.



81. Flip the cap open that is covering the positive terminal beside the fuse block.



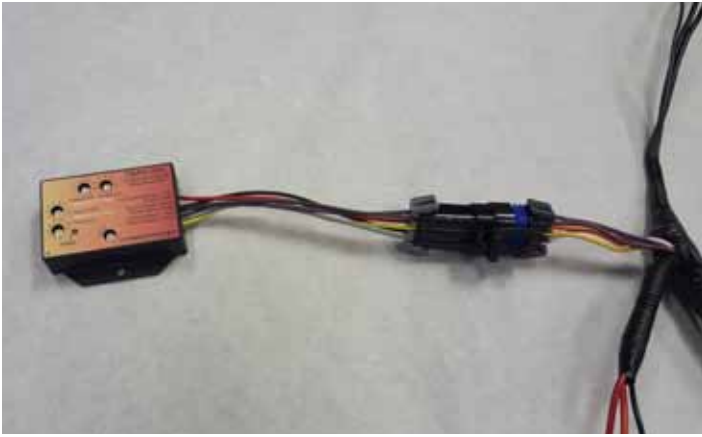
82. Using a 13mm wrench undo the nut on the stud.



83. Connect the main power wires with eyelets from the fan harness, two orange and one red, to the stud.



84. Route the 6 pin TBRC connector from the fan harness around the back side of the fuse block ending in the pocket of space just to the front of the strut tower.



85. Connect the TBRC-001 relay controller to the 6 pin connector.

Note: TBRC-001 and harness were removed from the vehicle for clarity.



86. Hold the TBRC-001 to a suitable location on the strut tower and clean that area well using brake clean or equivalent. The mounting area should be a flat surface in order for the hook and loop tape to secure properly to the surface and to the TBRC-001 module.

87. Stick one side of the hook and loop tape to the TBRC-001.

88. Stick the other side to the recently cleaned area on the car.



89. Replace the TBRC-001 and make sure the two sides of the tape are engaged.

90. Find the fuse holders in the supplied fan harness and insert the three 15 amp fuses in the fuse holders and then install the fuse covers over them.



91. Position the fuse holders on the vertical surface of the passenger side OEM plastic cover. Using a marking pen, mark the locations for drilling the mounting holes.



92. Remove the OEM plastic cover and drill three 1/4" holes in the marked locations.



93. Re-install the OEM plastic cover and install the fuse holders using the three (3) supplied Christmas tree style push fasteners (PN MP1026).



94. On the passenger side of the vehicle near the headlight, locate the ground bolt that is behind the rubber flap as shown in the image to the left.



95. Bring the three (3) ground eyelets from the wiring harness forward to this location and, using a 10mm wrench or socket, undo the ground bolt.



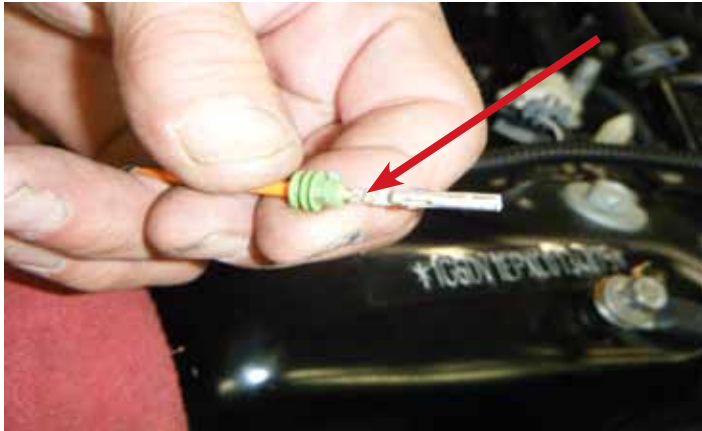
96. Place the three ground eyelets from the fan harness over the hole, reinstall the bolt, and torque to 11 lb-ft (15 Nm).



97. LPE strongly recommends that the LPE CTS-V Varimax intercooler pump kit (PN: L330030709) be used to maximize the effectiveness of the high capacity intercooler radiator. If you are not using the Varimax pump, LPE also recommends using the Bosch & ZR1 intercooler pump manual override harness (PN: L480400000) to simplify the wiring process. Steps 98 to 104 apply when using this intercooler pump upgrade kit or the override harness. If you are using the stock intercooler pump without the harness, skip to step 106.



98. Strip the end of the un-terminated orange wire.



99. Slide the green weather pack seal over the wire, and crimp the female terminal onto the wire.



100. Push the seal up till it is under the long tabs, crimp the long tabs around the seal.



101. Insert the terminal into the single pin connector and push firmly to seat it. Snap the terminal position assurance (TPA) clip down over the seal, locking it into position.



102. Route the orange wire down between the OEM wiring harness and the frame, so that it ends up underneath by the intercooler pump.



103. If you are using the override harness, disconnect the connector indicated by the arrow from the stock intercooler pump. Connect one end of the override harness to the stock intercooler pump and connect the other end to the connector that you just disconnected.



104. Connect the single pin connector to the Varimax coolant pump jumper harness or the override harness.

105. If you are retaining the stock intercooler pump without the override harness you will need to connect the orange wire to a switched +12V power source (for example, at the intercooler pump connector or under the fuse block). Be sure to use sealed connectors or heat shrink over the splice in order to make sure it is sealed from the environment. Do NOT use unsealed connectors.



106. The 3-pin Weatherpack connector located near the TBRC connector is for an optional manual fan and pump override switch. When activated this will operate the fans and intercooler pump on a timer with the ignition off. If the manual fan and pump override switch is not going to be used, the connector should be plugged. Install the green cavity seals into the mating 3-pin connector and snap the terminal position assurance clip down over the end. Connect the 3 pin connector plug to the wiring harness.

If you are not using the LPE manual fan and pump override switch, you can still override the intercooler fans. The terminal descriptions are listed below.

Terminal Description:

Terminal +12V: Supplies power to the LPE Manual Fan and Pump Override Switch (Red)

Terminal L: Input to activate intercooler fans (Orange)

Terminal G: Ground to the LPE Manual Fan and Pump Override Switch (Black)

107. Fill the power steering system (approximately 240 mL). Be sure to replace the fluid cap on the reservoir so that no dirt or moisture enters the system.

- 108. Optional:** To further improve fluid cooling, before filling the intercooler system, swap the locations of the hoses at the back of the supercharger housing so the one on the bottom goes to the one on top and the one on top goes to the one on the bottom.

To confirm the order, the one on the top of the supercharger assembly should now be coming from the pump and the one on the bottom connected to the intercooler radiator.



- 109.** Re-connect the battery.



- 110.** Fill the intercooler system. Run the pump to prime and get the bubbles out, being sure to keep the reservoir filled.

Use a 12 volt battery jumper pack or jumper harness to the battery to power the pump.

NOTE - if the pump sound level changes or is erratic, you likely have air trapped in the system and need to bleed the system and make sure it is properly filled with coolant. It is very important to get all of the air out of the system.

- 111.** Check the power steering fluid level, top off the reservoir.

112. Turn the steering wheel lock to lock 20 times and check the level again. If the level went down or there are air bubbles, repeat this step until there are no more bubbles, and the level remains constant.

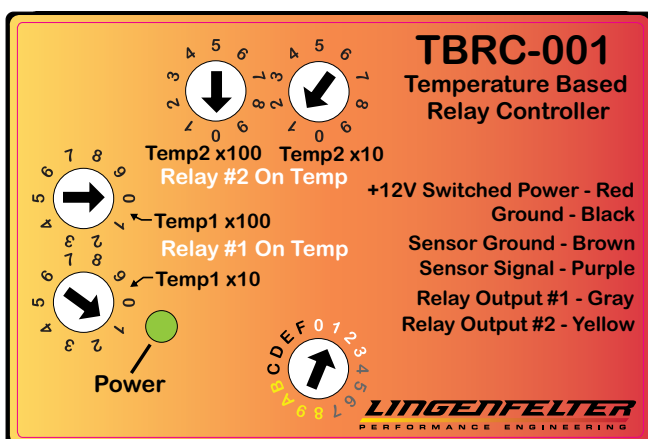
113. Make sure everything is clear of the engine accessory drive and of the electric fans.

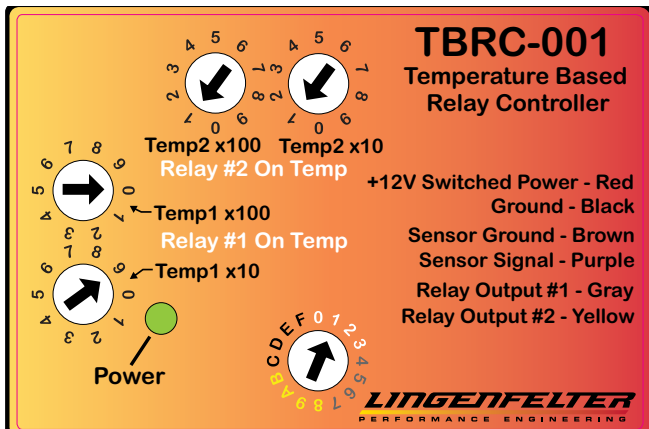
Start the engine and repeat step 112 with the engine running.

114. Shut off the vehicle and check the power steering system and intercooler fluid system for leaks. Check all hoses and attachment points for leaks.

Note: It is recommended to do this step before re-installing the fascia and other components in case a leak is found and to make it easier to identify a leak quickly.

115. You can test the fans by setting the TBRC-001 to a lower than ambient temperature or by using jumpers in place of the relays.





116. Set the activation temperatures and sensor type. Recommended temperatures are 90 degrees F for fans on low and 110 degrees F for fans on high with a 10 degree hysteresis as shown in the picture to the left.

Temp 1: 0 on the x100 and 9 on the x10
 Temp 2: 1 on the x100 and 1 on the x10
 Hysteresis: 1 on the 16 position switch.

117. Route the inlet hose of the intercooler behind the AC condenser, using the tab that originally held the power steering hoses in place to hold the coolant hose up.

118. Route the outlet hose, the hose from the intercooler to the pump, in front of the AC condenser.

119. Zip-Tie the inlet hose to the tab that used to hold the power steering lines.

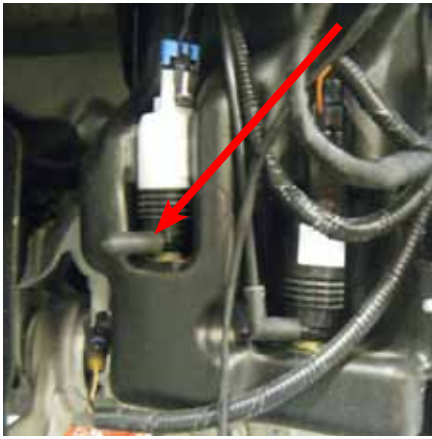
120. Zip-Tie the outlet hose to the fans on the back of the intercooler.



121. Zip-Tie the power steering lines to the bottom of the fans on the radiator.

122. Make sure the hoses are well secured and above the bottom of the intercooler to prevent the hoses from being snagged while driving.

123. Carefully place the facia on the car. Start the bolts accessed from the wheel well but do not tighten them at this time.



124. Connect the hose to the washer fluid pump.



125. Re-connect the fog lights.



126. Secure the rubber shrouds on either side of the radiator with the Christmas tree fasteners (two per side).



127. Install the M6x1.0 screws that secure the fascia to the bumper core support using a 10mm socket.



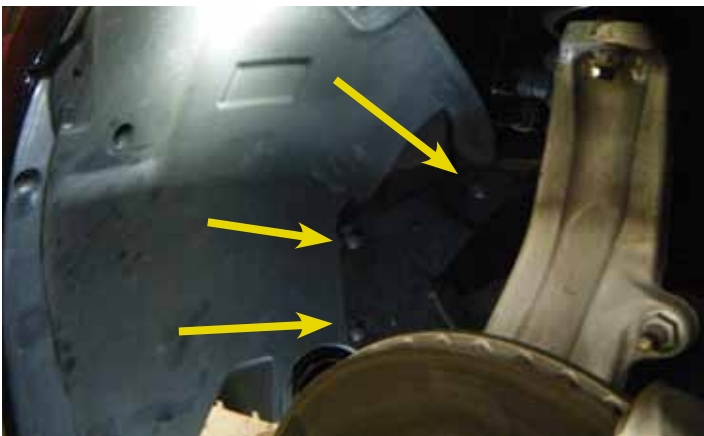
128. Install the two (2) push fasteners on each side of the fascia.



129. Check that the bumper is aligned with the body panels and now torque the side bolts, accessed from the wheel wells, to 18 lb-in (2 Nm).



130. Install the front fender liners, and secure with 8 push pins.



131. Install the engine splash shields and secure with four (4) push pins.

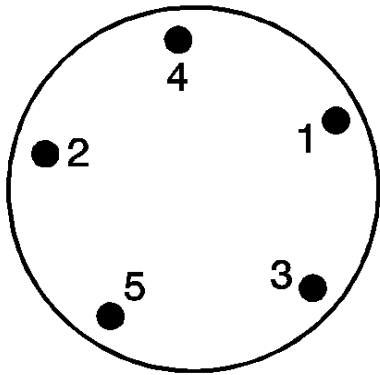


132. Install the front air deflector under the engine.

Note: The foam insert may have come loose from the panel. Be sure to place the insert in the same location it was in step 8 before the insert was removed.



133. Install the sight shield and secure in place with the six plastic retainer clips (clockwise to tighten).



134. Install the front wheels. Have an assistant hold the brakes or lower the vehicle to the ground while you torque the lug nuts. Use a star pattern to tighten.

2009-2013: 140 lb-ft (190 Nm).

2014-2015 Coupe/Wagon: 122 lb-ft (165 Nm).

2014-2015 Sedan: 111 lb-ft (150 Nm).

135. Lower the car back on the ground. Test drive the vehicle and then check the vehicle again for leaks.

Congratulations, the installation of your LPE High Capacity Intercooler Radiator is complete.

A note about the auxiliary fan operation: If you used the settings described in this instruction manual, your intercooler fans should operate as follows:

- As the fluid warms up, both fans turn on low speed at 90 degrees F intercooler fluid temperature.
- Both fans turn on high speed at 110 degrees F intercooler fluid temperature.
- As the fluid cools both fans should go back to low speed at 100 degrees F intercooler fluid temperature.
- Both fans should turn back off at 80 degrees F intercooler fluid temperature.

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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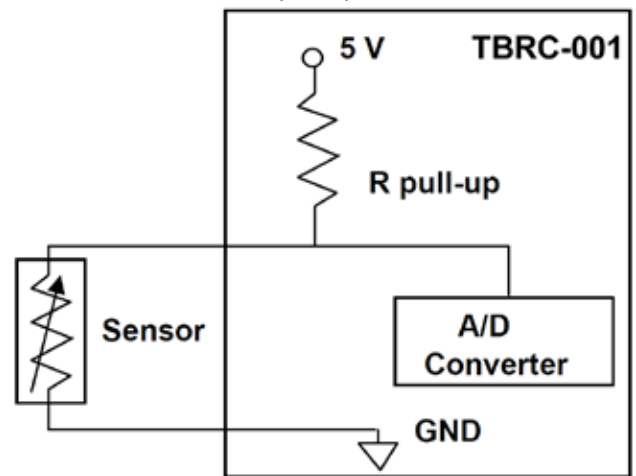
Lingenfelter TBRC-001 Temperature Based Relay Controller [Short Instructions]



Specifications:

- Works with OEM and aftermarket IAT, ECT, EGT, TFT sensors, including:
 - GM IAT (12160244/12614717)
 - ECT (12608814/12636612)
 - TFT (12458118)
 - Oil temperature sensors (15326388)
 - Bosch 2780071435, 2782569739, 2782650379, 2782610059, 2782412811, 2782334347, 0280130039
 - AEM 30-2012 and other similar fluid temperature sensors
- Works with OEM and aftermarket EGT sensors, including:
 - AEM 20-3050
 - GM 12636612
 - AC Delco 213-4695
 - Bosch PT 200E
 - Sensata TS200-A
 - PT200 RTD
- Built-in Output Cycling Mode.
 - Used in applications where the temperature sensor is installed in-line with the device.
 - 16 timer settings available.
- Reduces the audible noise created by auxiliary cooling system components (fans, pumps, etc...) while increasing their life due to the fact that the components are not in constant operation.
- Custom molded high temperature glass filled Nylon 6 enclosure.
- Fully encapsulated (potted) construction for increased durability.
- Both outputs can be used simultaneously
- Outputs have a self protect feature and will turn OFF in case of a direct short or over current condition.
- Operating voltage range: 9.0 to 18.0 volts.
- Input signal impedance: 100 k ohms.
- Outputs rated for up to 0.75 amps each.
- Current draw: 0.1 amp plus current draw of device being controlled (when active).
- Internal pull-up resistor value: 2.2 k ohms.
- 1 Year warranty (from date of purchase).

Figure 1: Sensor circuit with TBRC-001's internal pull-up resistor.



The TBRC-001 is designed to control two independent relays based on temperature sensor readings. This module can be used to:

- **Independently activate two relays in order to control fans, pumps, or other devices.**
 - **This module is used in the LPE intercooler radiator kits to control the two fans at high and low speeds, and also in the LPE differential cooler kits to control the fan and pump.**
- **Activate intercooler water spray based on air temperature or alcohol injection based on intercooler temperature.**
- **Activate a warning light based on exhaust gas temperature, transmission fluid temperature, oil temperature, or other temperature readings.**
- **These instructions are specifically for the Rev. "B" version of the product that added support for the Bosch ECT and IAT sensors**

Table 1 - Wiring (also labeled on module)

Wire color	Label	Notes
Red	+12V Switched Power	Connects to a switched and fused +12 volt DC source.
Black	Ground	Connects to a vehicle ground
Brown	Sensor Ground	This wire provides a ground path for the sensor.
Purple	Sensor Signal	This wire connects to the sensor signal output wire.
Gray	Relay Output #1	This wire should be connected to a relay used to control components such as an intercooler radiator fan or differential cooler fan. This output provides normally off ground activation.
Yellow	Relay Output #2	This wire should be connected to a relay used to control components such as an intercooler radiator fan or differential cooler fan. This output provides normally off ground activation. Use this output for Output Cycling Mode.

Settings:

- Controlled by four (4) ten position switches, one (1) sixteen position switch, and four (4) DIP switches
- Two (2) ten position switches for selecting the temperature settings for Relay #1
 - Degrees Fahrenheit (in hundreds of degrees)
 - Degrees Fahrenheit (in tens of degrees)
 - Possible temperature range of 0-990 degrees Fahrenheit in 10 degree increments
- Two (2) ten position switches for selecting the temperature settings for Relay #2
 - Degrees Fahrenheit (in hundreds of degrees)
 - Degrees Fahrenheit (in tens of degrees)
 - Possible temperature range of 0-990 degrees Fahrenheit in 10 degree increments
 - For EGT type sensors (sensor settings of 8, 9, A, or B on TBRC-001), 1000 degrees Fahrenheit is added to the selected temperature setting. For an EGT type sensor, the possible temperature range is 1000-1990 degrees Fahrenheit in 10 degree increments.
- One (1) sixteen position switch for selecting the sensor type and activation hysteresis

Table 2 - TBRC-001 Sensor and Hysteresis Settings

Type of sensor	Hysteresis (in F°)				
	5	10	15	25	
OEM GM IAT, ECT	0	1	2	3	Setting on 16 position switch
AEM / Autometer 1/8 NPT	4	5	6	7	
GM / AEM / Bosch / Sensata EGT platinum RTD	8	9	A	B	
Bosch IAT/ECT sensor	C	D	E	F	

- Four (4) DIP switches for activating and controlling **Output Cycling Mode**
 - Output Cycling Mode** is used in applications where the temperature sensor is not in the device that we are trying to measure, but instead in-line with the device. See the **Output Cycling Mode** section of the instructions on the next page for further explanation of function and settings.
 - DIP switches #1-4 are used to control this setting. DIP switch #5 is inactive and has no effect on the setting. Refer to the rear cover graphic on the next page, which shows the available configurations.
 - Output Cycling Mode is only available for relay output #2.



Operation LED Status:

- Solid RED when powered up with no temperature sensor detected or with no temperature sensor within the range of the accepted values.
 - 35°F to 350°F for IAT or ECT sensors.
 - 35°F to 2500°F for EGT sensors.
- Solid GREEN when the temperature sensor is detected and within the valid temperature range, but the temperature has not reached the user-defined activation point.
- Blinking GREEN when Relay Output #1 is active, but Relay Output #2 is inactive.
- Blinking RED when Relay Output #1 is inactive, but Relay Output #2 is active.
- Blinking GREEN+RED when both Relay Output #1 and Relay Output #2 are active.

Additional notes / warnings:

- **Changes to the settings on the TBRC-001 must be done with the ignition off.**
 - The switch positions are only read when the module is initially powered up.
- Do NOT submerge the module in liquid or directly wash the unit with liquid of any type! The switches on the TBRC-001 are sealed but are NOT rated for high pressure washing, use caution if power washing near the TBRC-001 module. Mount the module where it will not be exposed to constant water.
- Do NOT mount the TBRC-001 directly on top of the engine or near the exhaust manifolds due to heat concerns.
- Do NOT mount the TBRC-001 in the line of site of high temperature objects such as exhaust manifolds, turbine housings etc. If needed, put a heat shield in between the heat source and the module to protect the plastic case.
- Do NOT install within 6" of nitrous solenoids or other devices with strong magnetic fields.
- Do NOT install near the spark plugs or the spark plug wires (or other potential strong sources of electrical noise).
- LPE recommends the use of resistor type spark plugs and RFI (radio frequency interference) and EMI (electromagnetic interference) suppression spark plug wires on all EFI engines and any vehicle that has electronic control modules on board (including the TBRC-001). Failure to do so may result in erratic operation of electronic devices including the TBRC-001.
- Do NOT install the TBRC-001 to a sensor that is already being used by another device. This will cause the TBRC-001 and the other device to inaccurately read the temperature.

Output Cycling Mode

If it is desired to measure the temperature inside a device that does not have provisions for a temperature sensor, the only solution may be to put the temperature sensor inline with the device. If the temperature sensor must be installed in the fluid lines connected to the device, the TBRC-001's Output Cycling Mode can be used to circulate hot fluid past the sensor (i.e. you want to cycle the pump to get the hot fluid out of the differential or transmission and past the sensor so you can determine the temperature of the fluid in the differential or transmission). While in Output Cycling Mode, several cycle rate and duration settings are available.

To change cycle rate and duration settings:

- Use a #1 Phillips head screwdriver to remove the back cover of the unit.
- On the inside of the unit's back cover, there is a sticker that shows the possible cycle rate and duration settings, as well as the correct DIP switch configuration for each one. This graphic is shown on the right.
- Using a small flat head screwdriver, flip the correct DIP switches ON or OFF to select the desired cycle rate and duration.
 - Setting examples:
 - To deactivate Output Cycling Mode, set the DIP switches to setting #0 (↓↓↓↓↓)
 - In order to activate output #2 for 15 seconds every 5 minutes, set the DIP switches to setting #4 (↓↑↑↓↑).
 - In order to activate output #2 for 30 seconds every 10 minutes, set the DIP switches to setting #8 (↓↑↑↑↓).
 - In order to activate output #2 for 1 minute every 15 minutes, set the DIP switches to setting #12 (↓↑↑↑↑).
- Replace and secure the rear cover plate to the back of the TBRC-001.
- Power up the device to finalize the changes to the cycle rate and duration.

Figure 2: DIP switch settings

0-↓	1-↑	2-↓	3-↑	4-↓	5-↑	↑ON	↓OFF	0=TIMER OFF
1-↑	↑	↑	↑	↑	↑			1 MIN. DELAY, 5 SEC. ON
2-↓	↓	↓	↓	↓	↓			1 MIN. DELAY, 15 SEC. ON
3-↑	↑	↑	↑	↑	↑			5 MIN. DELAY, 5 SEC. ON
4-↓	↓	↓	↓	↓	↓			5 MIN. DELAY, 15 SEC. ON
5-↑	↑	↑	↑	↑	↑			5 MIN. DELAY, 30 SEC. ON
6-↓	↓	↓	↓	↓	↓			10 MIN. DELAY, 5 SEC. ON
7-↑	↑	↑	↑	↑	↑			10 MIN. DELAY, 15 SEC. ON
8-↓	↓	↓	↓	↓	↓			10 MIN. DELAY, 30 SEC. ON
9-↑	↑	↑	↑	↑	↑			15 MIN. DELAY, 5 SEC. ON
10-↓	↓	↓	↓	↓	↓			15 MIN. DELAY, 15 SEC. ON
11-↑	↑	↑	↑	↑	↑			15 MIN. DELAY, 30 SEC. ON
12-↓	↓	↓	↓	↓	↓			15 MIN. DELAY, 1 MIN. ON
13-↑	↑	↑	↑	↑	↑			20 MIN. DELAY, 15 SEC. ON
14-↓	↓	↓	↓	↓	↓			20 MIN. DELAY, 30 SEC. ON
15-↑	↑	↑	↑	↑	↑			20 MIN. DELAY, 1 MIN. ON

(This graphic can also be found under the back cover of the TBRC-001)

Troubleshooting

If you believe that the TBRC-001 is switching at an incorrect temperature, check the following:

- Use a multimeter to measure the sensor's resistance at a certain temperature. Then, compare the resistance to the resistance values on the sensor type versus sensor resistance chart on the next page.
- Check to verify that you have set the 16 position (sensor type and hysteresis) switch to the correct range for your sensor type.

NOTICES:

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

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

Lingenfelter Performance Engineering assumes no responsibility or liability for damages incurred from the use of products manufactured or sold by Lingenfelter Performance Engineering on vehicles used for competition racing.

It is the purchaser's responsibility to check the state and local laws and sanctioning body requirements pertaining to the use of this product for racing applications. Lingenfelter Performance Engineering does not recommend nor condone the use of its products for illegal street racing.

Limited Warranty:

LPE warrants the Lingenfelter TBRC-001 Temperature Based Relay Controller to be free from defects in material and workmanship under normal use and if properly installed for a period of 1 year from date of purchase. If the module is found to be defective as mentioned above, it will be replaced or repaired if returned prepaid along with proof of date of purchase. This shall constitute the sole remedy of the purchaser and the sole liability of LPE. To the extent permitted by law, the foregoing is exclusive and in lieu of all other warranties or representations whether expressed or implied, including any implied warranty of merchantability or fitness. In no event shall LPE be liable for special or consequential damages.

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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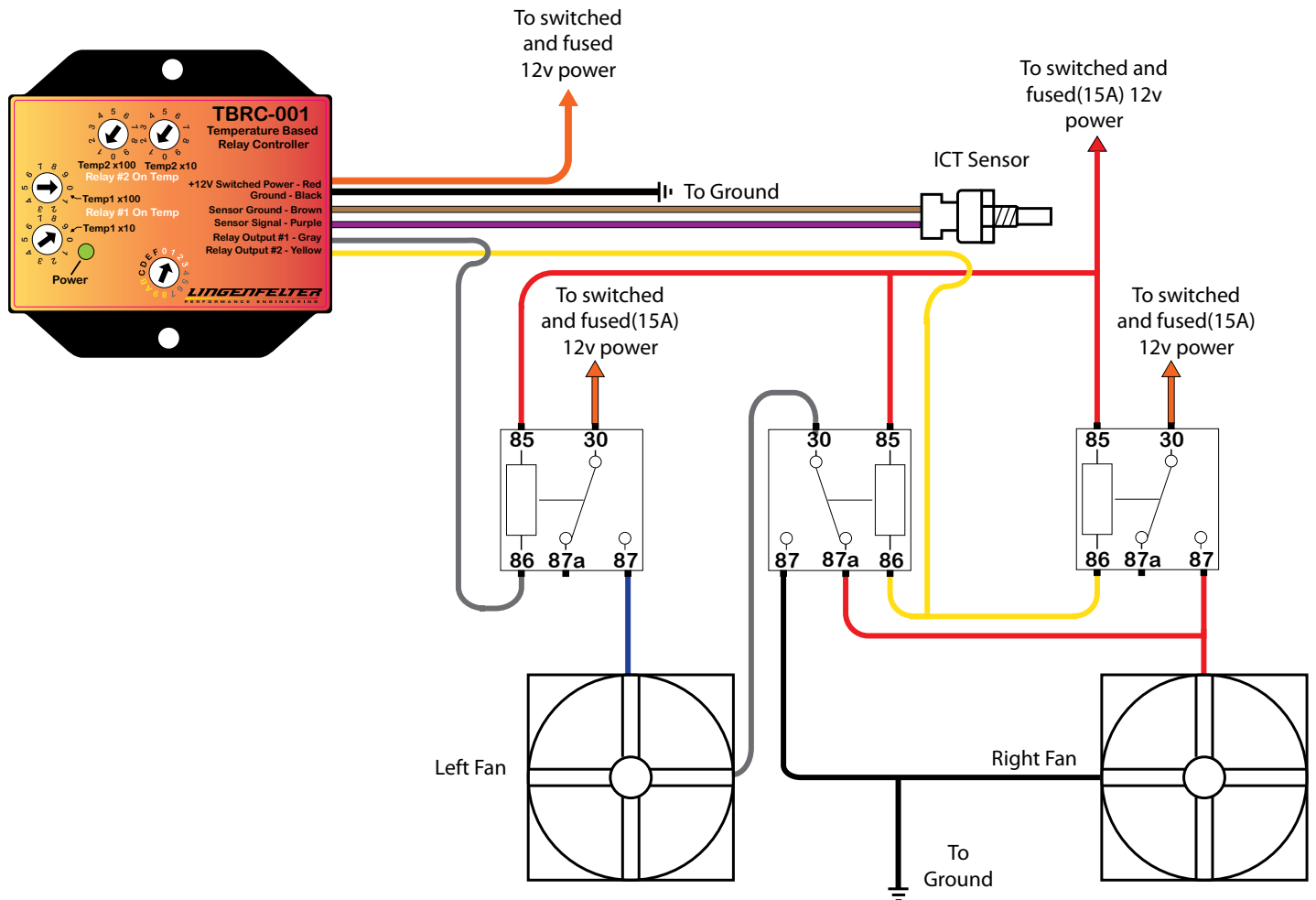
Table 3: Temperature Sensor Resistance vs. Temperature

Temperature		Temperature sensor type (settings group on TBRC-001)			
		GM ECT/IAT/TFT (use settings 0-3)	AEM / Autometer 1/8 NPT (use settings 4-7)	GM / AEM / Bosch / Sensata EGT Platinum RTD (use settings 8-B)	Bosch IAT/ECT Sensor Group (settings C-F)
°C	°F	Resistance values measured in Ohms			
-40	-40	100700	402000	170	45,313
-30	-22	52700	210000	178	26114
-20	-4	28680	114000	185	15462
-10	14	16180	64300	193	9397
0	32	9420	37500	201	5896
10	50	5670	22500	208	3792
20	68	3520	14000	216	2500
30	86	2238	8900	224	1707
40	104	1459	5800	231	1175
50	122	973	3900	239	834
60	140	667	2700	246	596
70	158	467	1900	254	436
80	176	332	1300	261	323
90	194	241	965	268	243
100	212	177	710	276	187
110	230	132	531	284	144
120	248	100	403	291	113
130	266	77	309	299	89
140	284	60	241	306	71
150	302	47	189	313	57
200	392	-	-	349	-
300	572	-	-	420	-
400	752	-	-	488	-
500	932	-	-	554	-
600	1112	-	-	618	-
700	1292	-	-	679	-
800	1472	-	-	738	-
900	1652	-	-	795	-
1000	1832	-	-	849	-

- All resistance values shown above are approximate and will be different based on which specific temperature sensor you use. Also keep in mind that most of these sensors are rated to within +/- 3% to 5% variation from sensor to sensor so the above tables are not exact.

Using the TBRC-001 to activate two fans at two speeds (LOW or HIGH) based on Intercooler Coolant Temperature (ICT) sensor output

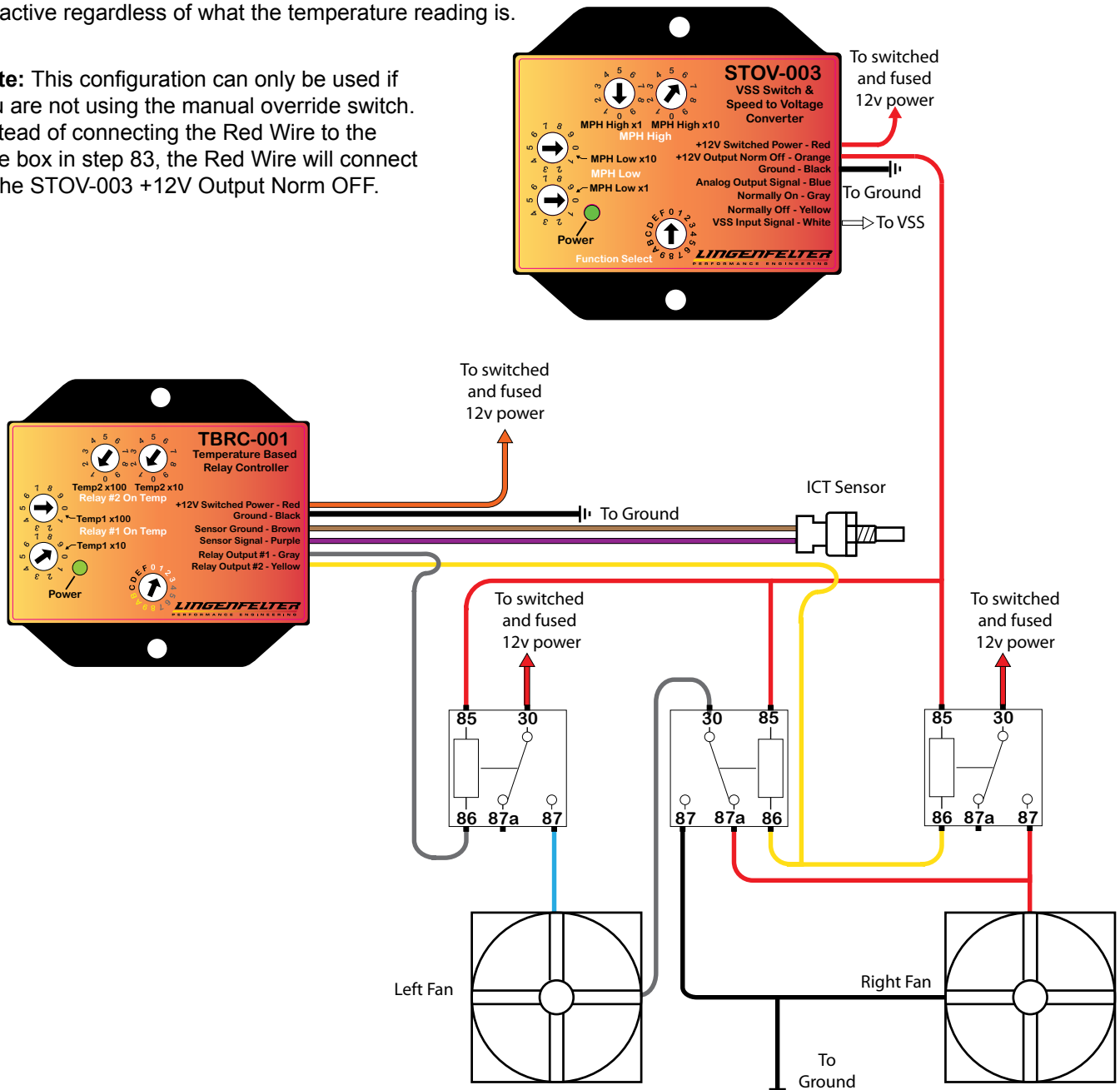
The wiring diagram shown below provides a visual representation of the path of the wires contained within the provided harness. **DO NOT** alter the harness.



Using the TBRC-001 and STOV-003 to activate two fans at two fan speeds (LOW or HIGH) on ICT and VSS sensor output

Using the wiring diagram below, the fans are active based on temperature as well as the speed of the vehicle. The STOV-003 in this diagram utilizes the +12V Output Normally ON function. What this does is switch the +12V Output Normally OFF to Normally ON, switch the ground output that is Normally OFF to Normally ON, and switch the ground output that is Normally ON to Normally OFF. To set the +12V output to be normally on, set both of the MPH Low rotary switches to 0 and then set the desired switch point speed using the MPH High rotary switches. The x1 switch controls the speed setting in 1 MPH increments and the x10 switch controls the speed setting in 10 MPH increments. In this example, the STOV-003 in the diagram is set to 60 MPH on MPH High. This means that if the MPH of the vehicle exceeds 60 MPH the fans will not be active regardless of what the temperature reading is.

Note: This configuration can only be used if you are not using the manual override switch. Instead of connecting the Red Wire to the fuse box in step 83, the Red Wire will connect to the STOV-003 +12V Output Norm OFF.



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