### Parts included in the 6.0 Dual Alternator Supplemental Kit

<table>
<thead>
<tr>
<th>Parts</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation Manual</td>
<td></td>
</tr>
<tr>
<td>Installation Supplement 6.0 Dual Alternator</td>
<td></td>
</tr>
<tr>
<td>Owner’s Manual Including Warrantee Information</td>
<td></td>
</tr>
<tr>
<td>Mounting Bracket</td>
<td>With idlers</td>
</tr>
<tr>
<td>Bracket mounting bolts</td>
<td>3 @ M10 x 110 w/lock washers</td>
</tr>
<tr>
<td>Generator belt</td>
<td>NAPA 061045 (or equivalent)</td>
</tr>
<tr>
<td>Generator mounting bolts</td>
<td>(4) 3/8-16 x ¾” flat head socket</td>
</tr>
<tr>
<td>Generator Temporary alignment stud</td>
<td>3/8-16 x 1 ½”</td>
</tr>
<tr>
<td>Intercooler tube</td>
<td>Replacement for OEM tube</td>
</tr>
<tr>
<td>Intercooler elbow</td>
<td>Replacement for OEM straight tube connector</td>
</tr>
<tr>
<td>Elbow hose clamp</td>
<td>For Intercooler tube elbow</td>
</tr>
<tr>
<td>Replacement Glow Plug Relay bracket</td>
<td>Replacement for OEM bracket / Also holds Intercooler tube clamp</td>
</tr>
<tr>
<td>Fasteners (2)</td>
<td>¼ -20 x ½ “truss head with nylock nut &amp; flat washer</td>
</tr>
<tr>
<td>Relay power cable extension</td>
<td>#8AWG x 9” with connectors</td>
</tr>
<tr>
<td>Vacuum tank relocation bracket</td>
<td>Aluminum offset bracket</td>
</tr>
<tr>
<td>Vacuum hose</td>
<td>(2) 1/8” x 1’</td>
</tr>
<tr>
<td>Fan shroud screws (4)</td>
<td>1” x #8 stainless pan head screws</td>
</tr>
<tr>
<td>Modified windshield washer bottle</td>
<td>Please return stock bottle to Raven for refund</td>
</tr>
<tr>
<td>Fill tube mounting screw</td>
<td>Self drilling</td>
</tr>
<tr>
<td>Air Conditioning manifold jumper</td>
<td>Aluminum S-tube</td>
</tr>
<tr>
<td>Fasteners</td>
<td>(1) M8-30mm w/flat washer</td>
</tr>
<tr>
<td>Retainer Button-inner fender</td>
<td>3</td>
</tr>
<tr>
<td>Edge guard-fender gusset/battery</td>
<td>12”</td>
</tr>
<tr>
<td>Clutch</td>
<td>3” 6-groove electric</td>
</tr>
<tr>
<td>Clutch key</td>
<td>3/16” x 1 ¾”</td>
</tr>
<tr>
<td>Clutch bolt (1)</td>
<td>7/16”-20 x 2 1/4” Grade w/ lock washer</td>
</tr>
<tr>
<td>Electrical: Mechanical installers-</td>
<td>Forward these parts to the electrical</td>
</tr>
<tr>
<td></td>
<td>department</td>
</tr>
<tr>
<td>Fan Lock-up Harness</td>
<td>Vehicle fan harness to Command Module- blue conductor</td>
</tr>
<tr>
<td>Clutch Harness</td>
<td>Red/black with thermal sensor</td>
</tr>
<tr>
<td>243 Hz Command Module</td>
<td>Designated Frequency- 243 HZ</td>
</tr>
</tbody>
</table>
General Instructions

This manual supplements the Blackbird Wiring Manual with information specific to the 2003-6 F-Series truck and 6.0 diesel with dual alternators. Contact Raven (207-721-1044) if more documentation is needed.

This installation requires a minimum engine RPM of 1200 to deliver output. Below this engine RPM there will be no appreciable power generated. Between 1200 and approximately 3200 engine RPM, generator output will be unaffected by changes in engine speed. Arrangements must be made for the engine to go to at least 1200 RPM high idle when the generator is engaged.

- All installation steps must be completed before operating the system.
- Use Loctite 262 or equivalent on all engine and bracket mounted bolts, and refer to the torque chart for tightening.
- Save all surplus fasteners and OEM clipnuts for reuse later in the installation.
- All hoses and wires moved or relocated during installation must be secured to prevent chafing and exposure to hot surfaces. At no time should wiring be secured to fuel or exhaust system components.

(Note: There is some discrepancy in the distance from the engine block to the nose of the truck in these F-Series chassis. Depending on your chassis, the intercooler tube may seem too long or short fore-and-aft to properly mate with the upper turbo connection. To address this problem, the silicon elbow has extra leg length so that the installer may trim the elbow to get the best fit on the turbo connection.

If the engine in your truck is one of the close ones, the distance from the Generator clutch to the passenger’s-side battery may be quite small. This condition can be corrected by trimming the fender gusset lightly to allow the battery to move away from the clutch.

Preparing for Installation

1. Disconnect both battery negative terminals.
2. Evacuate air conditioning system using approved methods. Disconnect the lines at the accumulator and install the supplied manifold re-positioner on the accumulator. Attach the OEM lines to the re-positioner, and recharge system. Figure 3.
3. Remove passenger side battery.
4. Drain radiator sufficiently, and remove the upper radiator hose, radiator end, and the coolant expansion tank hose at both ends. (The radiator nipple for this hose is subject to breaking when shroud is wiggled out. Careful!)
5. Remove air filter assembly: unplug the MASS air sensor plug from the air inlet housing, and remove the air filter restriction gauge. Loosen the hose clamp at the accordion hose to the engine. Pull the air filter and accordion hose assembly off the engine by wiggling the entire assembly.
upward and backward. The bottom of the assembly is nested in rubber grommets, and the assembly will swing out once they release.

6. Remove and discard the turbo intercooler pipe. Temporarily plug the intercooler inlet and turbo outlet. Retain the turbo-end silicone connector tube and the OEM clamps.

7. Unplug the fan clutch harness at the upper fan shroud, driver’s side.

8. Cut both sides of fan shroud at pre-cast parting lines as shown in Figure 2. A hacksaw blade, hot utility knife, or linoleum knife works well.

9. Pry the upper fan shroud away from the stator and gasket, and remove. Shroud will be reconnected later.

10. Remove the gasket from the upper fan shroud.

11. Tape protective cardboard to the inside of the radiator.

12. Unclip the fan-side wire harness from the fan stator.

13. Remove and discard the secondary alternator serpentine belt. This belt train will be reconfigured to drive both the Ford secondary (lower) alternator and the Blackbird™.

14. Remove the vacuum canister. Retain two of the “t” bolts in the canister for re-use later.

15. Plug the three resulting holes with the supplied retaining plugs.

16. Remove the Glow Plug Relay and bracket from the passenger side valve cover. See Figure 3.

17. Separate the relay from the bracket and discard the bracket.

18. Install the glow plug relay on the supplied bracket using two truss head screws with flat washers and nylock nuts. Mount the bracket on two OEM alternator bolts. See position in Figure 4.

19. Remove the glow plug power cable from the passenger side battery positive terminal, cut the eye terminal from the end, and extend the cable using the supplied wire and terminals. Reconnect.

20. Remove the passenger side battery tray.

21. Remove the window washer reservoir. Set aside for return to Raven for core-charge refund.

22. Remove the idler stand-off assembly for the secondary alternator belt. (located on the upper driver’s side of the front of the engine- See Idler C on Figure 5.

23. Remove and discard the three 10mm bolts securing the OEM secondary alternator.

Installing the Raven Bracket

24. On the bench, test fit the idler standoff (removed in step 22) in the floating idler plate hole shown in Figure 7. The idler should have a “slip fit” through the floating plate on the rear side of the bracket. If it is too tight, use emery paper to achieve a proper snug fit.

25. Place the Raven bracket over the secondary alternator. Align the 3 mounting bolt holes with the alternator mounting holes. Install and finger tighten the three supplied M10x110 bracket mounting bolts and lock washers. See Figure 6.

26. Assure the floating idler plate bolts are slightly loose and that the plate can move relative to the main bracket. Reinstall the Ford idler stand-off assembly through the floating idler support plate on the Raven bracket. Fully tighten the idler bolt to 65 ft. lb. (easiest way is to reach through the fan.) Leave the floating plate bolts loose until after step 27.

27. Tighten the three M10 x 110mm bracket bolts through the secondary alternator to 65 ft. lb. Be sure to tighten these bolts before tightening the floating idler plate to ensure proper alignment.

28. Tighten the two 3/8-16 x 1” bolts securing the floating idler plate to 65 ft. lb.
Mounting the Generator
29. Before mounting the Generator, bench-fit the clutch and key to the Generator shaft. Dress as necessary for a slip fit.
30. Ensure that the Generator electrical junction box cover is securely in place.
31. Position the generator above the bracket and slip the generator down into the notch in the bracket.
32. Assure that the large Generator alignment ring machined into the bearing plate is seated fully in the large bracket hole. Depending on the configuration of your particular chassis, the Generator junction box can be oriented either at 11 o’clock, or at 1 o’clock, depending on hood clearance. (if it needs to be at 1 o’clock, it may be desirous to wire the junction box before bolting the Generator to the bracket. See the Wiring Manual.)
33. Fasten the generator to the bracket using the four flat head bolts. Do not Loctite!

Installing the Clutch and Belt
34. Pass the supplied serpentine belt over the clutch pulley and install the electric clutch on the generator shaft insuring that the key aligns with the shaft keyway and the cutout in the outer hub.
35. Engage the open slot or the oblong hole (your preference) in the clutch flange with the coil retaining standoff. Install the 7/16-20 bolt and lockwasher.
36. Route and install the belt according to Figure 5. This belt will turn both the Ford secondary alternator and the Blackbird. Tip: route the belt around points A,B,C,D,E., Then retract the tensioner and slip the belt on Idler H last.
37. Check belt clearances. At the top run of the belt, you should note slight interference with a plastic fan shroud support bracket. Trim the bracket with a hacksaw blade as needed to improve belt clearance.

Reinstalling the Battery and Windshield Washer Bottle (note: check the overall distance from the clutch to the diagonal fender gusset. In some cases, this gusset requires light trimming to allow sufficient clearance between the clutch and the battery.)
38. Modify existing battery tray by drilling out spot welds using a 3/8” drill bit as shown in Figure 9. This will separate the angle bracket from the tray. This angle bracket will be reinstalled at the other end of the tray in the final step of this procedure.
39. Insert the modified Windshield Washer bottle in its original position below Battery tray. Mount the modified filler neck as shown in Figure 10 using the supplied self-drilling screw.
40. Temporarily reinstall the angle bracket (removed in step 39) back on the inner fender using the original bolts. Keep the bracket as low as the slotted holes allow.
41. Remove the three clipnuts from the lower battery tray bracket and set aside. Place the battery tray angled approx 45 degrees to locate the battery in line with the corner gusset between the fender and the radiator cross member. This will require bending the inboard corner of the tray slightly to accommodate its new position on the battery tray bracket See Figure 10. Note tray has been rotated 180 degrees to position the battery hold-down on the inboard side. Temporarily insert two original tray bolts to hold the tray in place, one in the lower bracket and one in the angled bracket and set the battery on the tray. The battery should be parallel with and close to the fender gusset. See Figure10. Continue trying combinations of the numerous holes in the tray until two line up with the lower bracket and angled bracket when the battery is in position.
Secure the tray to the angled bracket with an OEM bolt and a supplied flange nut under the bracket. Maintain the position of the bracket to the tray and remove the assembly from the inner fender. The angled bracket has a second hole in its flange. Drill the tray at this point to locate a second mounting bolt and flange nut in the angled bracket. Reinstall the entire tray assembly and check final fit for the battery. Install rubber edge guard to protect the fender gusset from chafing the edge of the battery.

**Final Assembly**
42. Remove cardboard from radiator.
43. Reinstall the upper fan shroud and fasten at the cut lines with the sheet metal screws supplied.
44. Reinstall the upper radiator hose, and the expansion tank hose. Refill radiator.
45. Install the replacement intercooler tube. *There is some discrepancy in the distance from the engine block to the nose of the truck in these F-Series chassis. Depending on your chassis, the intercooler tube may seem too long or short fore-and-aft to properly mate with the upper turbo connection. If so, the lower elbow can be adjusted or trimmed to assure proper alignment.*
   - Use the elbow and large clamp supplied in place of the straight connector hose at the intercooler end. Thoroughly clean the turbo outlet nipple and the intercooler inlet nipple with acetone or alcohol until they are completely void of oil or residue.
   - Clean the interior of the replacement elbow and upper connector with acetone or alcohol until the rubber feels tacky.
   - Lightly sand the mating areas of the tube and clean with solvent.
   - Place the replacement lower tube clamps on the elbow. Install the tube elbow on the nipple until it contacts the cast-in stops on the nipple. Do not tighten the clamp at this time.
   - Install the intercooler tube in the elbow. Do not tighten.
   - Install the upper hose and clamps, assuring that the ridges cast inside the hose mate properly with the reverse features on the pipe and nipple. Assure that the clamps are in position as indicated on the hose.
   - Adjust the tube position relative to engine compartment interferences and tighten all hose clamps to 9 foot pounds. **DO NOT OVERTIGHTEN.**
46. The following wiring step is most easily performed before step 49. If this is not possible, it may be accomplished later: Locate the blue wire exiting the fan clutch plug, engine side. Carefully remove a small amount of insulation and solder one end of the Fan Lockup Harness to the fan wire. This wire will route to the Command Module in the cab. (See Blackbird Wiring Manual). Reconnect the fan clutch wiring harness.
47. Replace the air filter assembly, the air filter restriction gauge, and replug the MASS air sensor harness.
48. Remove the long leg from the Ford vacuum canister and relocate the vacuum canister on inner fender as shown in the cover photo using the supplied Raven bracket, the two clip nuts and bolts from the battery tray modification (step 42), and two “t” bolts saved from the canister removal.
49. Reconnect vacuum hoses using supplied extension tubing.
50. Reinstall passenger-side battery on modified bracket.
51. Trim upper air deflector as shown in Figure 11 and reinstall.

**This completes the vehicle specific instructions.**
Refer to the Blackbird Wiring Manual for wiring, run up, and troubleshooting instructions.
Blackbird Installation Supplement for Ford 6.0 Liter Dual Alternator

Figure 7

Figure 8

Figure 9

Figure 10

Figure 11