



BLACKBIRD INSTALLATION SUPPLEMENT



FOR 2011 FORD 6.7 LITER DIESEL
F-SERIES VERSION 12/10



Blackbird Installation Manual for Ford 6.7 Liter - Version 1/10/11

Parts		
	Blackbird Wiring Manual	5 or 7kW
	Installation Supplement Ford 6.7Liter Diesel	Including Ford Stationary Elevated Idle Control (SEIC) instructions
	Owner's Manual	Includes Warrantee Registration
	Engine mounting plate	3-hole steel
Bag 1	Plate fasteners	(3) M8 x 150 mm bolt w/ flatwasher
	Generator Bracket	3/8" steel with idlers and tensioner
Bag 1	Generator bracket standoffs	(2) 1 1/2" x 1.84" aluminum
Bag 1	Fasteners	(2) M10 x 80mm studs w/ flat washer and nut
Bag 1	Alternator Standoffs	(2) 1.0" diameter x 2.44" aluminum
Bag 1	Fasteners	M10 x 175 mm stud, flatwasher, nut
		M10 x 125mm stud, flatwasher, nut
Bag 2	ABS Pump Relocation Shim	
Bag 2	ABS Pump Relocation Link	
Bag 2	Fastener	M8 x 16mm w/ flatwasher
Bag 2	Cooling Fan Spacers	(4) Aluminum, with shoulders
Bag 2	Spacer fasteners	(4) M6 x 45mm
Bag 2	Locknuts	Optional, for stud removal, (2) M6
Assembly	Crankshaft Pulley	8"
Assembly	Pulley Adapter	Aluminum
Assembly	Fasteners	(4) M12 x 100 bolts w/ flatwashers
Assembly		(3) M10 x 45mm bolts w/ flatwashers
	Header tank support rod	
	Rod fasteners	(2) M8 x 45mm bolt w/ fender washer
		(2) 1/4 -20 x 1" w fender washers & locknuts
	Generator Belt	NAPA 25-060858 or equivalent
	Generator Clutch	3" 6-groove electric
Bag 3	Generator mounting bolts	(4) 3/8-16 x 3/4" flat head socket
Bag 3	Generator Temporary Alignment Stud	3/8-16 x 1 1/4"
Bag 3	Clutch Key	3/16" x 1/8 x 2 1/2"
Bag 3	Clutch bolt (1)	7/16"-20 x 2 1/4" Grade w/ lock washer
	CHARGE AIR COOLER (CAC) RELOCATION	
	Charge Air Cooler (CAC) relocation plate	Aluminum
		1/4 x 1 1/8" diameter aluminum
Bag 3	Plate Spacer Assembly	M8 x 30mm w/ fender washer
		Threaded Sleeve
Bag 3	Plate Standoff	1" diameter x 2" aluminum
Bag 3	Fastener	M8 x 70mm bolt w/ fender washer
	CAC forward support rod assembly	Formed rod w/ fixture
	CAC PLUMBING	
Bag 4	CAC inlet tube extension (upper hose)	3" diameter x 7" steel
Bag 4	Tube coupling	3" diameter x 6" silicon w/ (2) clamps
	CAC outlet extension tube	'S' pipe with sensor flange



Bag 4	Upper coupling	3" diameter x 4" silicon
Bag 4	Clamps	Use OEM
Bag 4	Lower coupling	3" diameter x 4" silicon
Bag 4	Clamps	(1) standard
Bag 4		(1) modified with welded rib inside clamp
Bag 4	CAC Coolant extension hose	90° hose, 3/4" x 12" w / chafe guard, trim to fit
Bag 4	Hose clamps	(1) 3/4" spring type
Bag 4		(1) 1" spring type
Bag 4	Quick connect hose coupling	
Bag 4	Connector hose	90° hose, 3/4 x 4" x 5", trim to fit
	Electrical:	
	SoftStart Module	
	Clutch harness	AWG16 x 16' black/red
	SEIC engage resistor assembly	20KΩ, for OEM Stationary Elevated Idle Control

General Instructions

This document supplements the Blackbird Wiring Manual with information specific to the 2011 F-Series truck with the 6.7 liter diesel engine. Contact Raven (207-721-1044) if more documentation is needed.

This installation requires a minimum engine RPM of 1200 to deliver full electrical output. Beyond 1200 RPM output will be unaffected by changes in engine speed. Arrangements must be made for engine high idle when the generator is engaged. Ford OEM Stationary Elevated Idle Control (SEIC) instructions are included.

	Torque- Ft-lbs		
Grade	5	8	8.8
Bolt Size			
1/4	9	12	
5/16	18	27	
3/8	35	40	
7/16	55	60	
1/2	80	90	
5/8	150	180	
8mm			19
10mm			41
12mm			69
14mm			104

- All installation steps must be completed before operating the system.
- Use Loctite 262 on all engine and bracket mounted bolts, except as noted.
- Refer to torque chart for torque specifications
- 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.
- Care must be taken that any grounding straps, battery cables and battery feeds are reconnected in an appropriate manner if moved during installation. Cover or plug any engine or cooler pipes to protect from foreign material.
- **Fully acquaint yourself with this manual before beginning installation.** Refer questions to Andy Bertocci at 207.721.1044 or abertocci@raventechpower.com.

Special Tools (Helpful, not required)

T-27 x 1/4" drive torx driver

Hose quick release tool

Special Note: In designing this installation, we employed the time-honored Sixty-Foot-Fit method we learned in repowering boats. The generator was dropped into position from 60 feet, and we repaired or moved everything that was damaged. We do not recommend you try this at home.



Preparing for Installation (note: save all fasteners for possible reuse)

1. Before you do anything else, move the hood light switch located above and beside the upper radiator hose. Otherwise it will break by just looking at it sideways.
2. Disconnect all battery terminals and remove the driver's-side battery for relocation.
3. Drain the radiator coolant:
 - a. Main Radiator drain tube, driver's side
 - b. Charge Air Coolant radiator drain tube, passenger's side.
4. Disconnect the upper radiator hose and small vent hose from the main radiator and fold back out of the way.
5. Disconnect the Charge Air Cooler (CAC) hoses. Unplug the temperature sensor in the lower pipe section for installation in the replacement hose.
6. Unbolt the CAC and lift it out for relocation.
7. Remove the driver's battery tray/radiator header tank support casting. The battery tray portion of this casting will be removed, and the header tank portion will be reused **See Figure 5 and Step 38**. If your chassis has automatic vacuum assist four-wheel-drive engage, the back of the tank holds the vacuum controls. These controls and the vacuum tank cast in the housing will be retained.
8. Remove and discard the battery tray support from the inner fender and the forward support beam.
9. Remove the air filter cover and air intake pipe at the engine.
10. Unbolt the power steering reservoir (driver's side) and the CAC header tank (passenger's side) from the upper radiator shroud. Leave the power steering reservoir to dangle and completely remove the CAC header tank.
11. Unbolt and remove the upper fan shroud (5 bolts).
12. Install protective cardboard behind radiator.
13. Remove the cooling fan (four nuts, 10mm wrench) and remove the fan, leaving the fan clutch in place.
14. Remove the fan stator, rotating to clear the bottom flap.
15. Unbolt the ABS pump and transfer it to the rear set of mounts in its bracket. Place the supplied tapered shim over the studs, thick end forward, moving the pump rearward and tilting it back. Refasten the pump using the OEM nuts and the supplied connector link for the side bracket mount (most easily reached from the wheel well) **Figure 4**. The new position of the ABS pump creates slight tension on hoses and lines. Slightly loosen the tubes at master cylinder and rotate to relieve any tension and retighten.
16. Reroute the driver's side battery cables out of the engine compartment.

Installing the Bracket and Generator

17. Slacken the OEM serpentine belt to reduce side load on the crankshaft pulley. Remove the 4 crankshaft pulley bolts (18mm 12-point socket). Check pulley face for debris or dirt.
18. Using the supplied bolts, install the crankshaft pulley adapter over the OEM pulley, and install the supplied generator pulley (see torque table). **Figure 1**.
19. Install the engine mounting plate using 3 M8 x 150mm bolts. The plate will rest on top of and on the face of the fan harness bracket. **Figures 1 & 2**.
20. Install (4) generator bracket mounting studs and spacers (**numbered**). Loctite and adjust studs for 7/8" protrusion from the spacers. **Figure 1, 2, & 3**.



21. Place the generator bracket over the 4 studs and spacers. Check that the bracket plate rests square and true to all spacers, and that sufficient clearance exists between plate and engine components. If spacer discrepancies occur, do not cut or shim. Contact Raven Product Support.
22. Fasten the generator bracket using the supplied nuts and washers.
23. Before mounting the Generator, bench-fit the clutch and key to the Generator shaft. Dress as necessary for a slip fit.
24. Ensure that the Generator electrical junction box cover is securely in place. Insert the 3/8" temporary alignment stud finger tight in one threaded hole of the Generator bearing plate (shaft end.) Orient the electrical box at roughly the 10 o'clock position, and lower the generator into the bracket inserting the temporary alignment stud into one of the four countersunk fastener holes. Assure that the large Generator alignment ring machined into the bearing plate is seated fully in the bracket slot. Do not apply any undue force or pressure to the electrical junction box.
25. Secure the Generator to the bracket using the 4 flat head bolts provided. Torque the 4 bolts to 25 ft. lbs. Do not loctite these bolts!
26. Place the generator belt over the generator shaft.
27. Install the electric clutch on the generator shaft with the belt **INSIDE** the coil retaining pin. Insure that the key aligns with the shaft keyway and that the coil retaining pin engages the slot in the clutch coil retainer plate. Insure that the clutch is 'home' on the shaft and fasten with the clutch retaining bolt. Do not press the clutch onto the shaft with the bolt and do not Loctite the shaft bolt.
28. Install the generator belt according to **Figure 1**. Roll the engine by hand to allow the belt to settle in position on the idlers.

Re-assembly:

29. Remove the 4 bolts (T27 head) from the fan clutch and replace with the supplied M6 x 45mm bolts. If no Torx tool is available, the bolts can be backed out by double nutting the bolts (Two M6 nuts for this purpose are supplied with the fan spacers). Replace them with the four provided hex bolts.
30. Trim fan stator vanes according to **Figure 6** and/or as needed to clear the generator belt.
31. Install the trimmed fan stator by rolling it into place.
32. Check for belt clearance with fan stator and all engine components, and re-trim as necessary.
33. Check fit of the cooling fan spacers, and reinstall fan over the replacement bolts using the OEM jam nuts.
34. Remove protective cardboard and reinstall the upper fan shroud.
35. Reinstall the CAC coolant tank (passenger's side), connect hoses (including vent), and wire clips.
36. Reinstall the air filter cover and intake hose.
37. Reinstall the power steering reservoir on fan shroud.
38. Manual engage four wheel drive chassis: Trim the battery tray off of the header tank bracket. Trim the remaining header tank bracket to accommodate the supplied header tank support rod (Take care to retain the tank bracket upper mounting boss and flange portion.). **Figure 5A**. You will not reuse the vacuum tank or battery tray portions of this casting. Remove the CAC mounting grommet from the battery tray and discard the tray.
39. **Vacuum engage four wheel drive chassis:** You will retain the header tank bracket and the vacuum tank. Trim the battery tray off of the header tank bracket. Carefully separate the vacuum tank from the bracket and tray for relocation. Discard the battery tray portion. **Figure 5A&5B**.



40. **All chassis:** Drill one new upper mounting hole and two lower mounting holes in the modified tank bracket to accommodate the replacement support rod. Fasten support rod with the supplied fasteners. **Figure 5.**

CAC remounting:

41. Starting with the supplied aluminum relocation plate, locate 2 existing holes in the inner fender support beam (under hood flange) which line up with the holes in the plate. **Figure 7.**
42. Drill these holes to 17/64" and tap them using the original battery tray self-tapping bolts.
43. Fasten the plate to the inner fender support beam with these bolts. The plate will just clear the soft inner fender at the bottom.
44. Locate the third mounting hole on the plate and drill a 17/64" hole in the beam (2" behind the plate). Thread this hole as before and fasten with the supplied 1 1/2 x 2" aluminum standoff and M8 x 70mm bolt.
45. Retrieve the rubber grommet removed from the battery tray, and locate the supplied aluminum plate spacer assembly. Press the metal sleeve out of the grommet and replace it with the M8 threaded sleeve from the plate spacer assembly.
46. Remove and set aside the M8 clip nut from the forward mounting ear on the CAC.
47. Slide the grommet and threaded sleeve into the keyhole slot in the mounting plate with the sleeve protruding toward the engine. Put the 1/4" x 1 1/8" diameter spacer from the assembly over the protruding sleeve. Set the M8 x 30mm bolt and washer aside for the present.
48. Locate the supplied CAC forward support rod (1/2" formed rod, threaded one end, flange on other), and the front CAC mounting ear. Attach the threaded end of the rod to the rubber grommet in the ear using the OEM bolt.
49. Locate 2 existing holes in the chassis beam that align with the 2 holes in the flange end of the rod. Drill these holes to 17/64" and tap using the OEM bolts as before.
50. The forward support rod is now attached to the CAC, and the mounting plate is installed on the inner fender. The CAC can be rolled into position and hooked into the slot in the plate (assure that the rubber fixture remains in the CAC and seats in the slot). All mounting bolts can be tightened. Assure that the CAC floats in its rubber mounts with no hard contact at any point. Adjust as necessary.

Note, it is easiest to wire the generator junction box at this point. You may want to include the clutch wiring harness in these wire runs. Refer to the Blackbird™ Wiring Manual.

Re-plumbing the CAC

51. Install the replacement charge air (CA) pipe ('S' shape) on the lower CAC hose connection using the supplied 3" x 4" silicon hose and ribbed hose clamp, aligning the rib in the clamp with the corresponding feature in the CAC pipe barb. Do not completely tighten to allow for final adjustment.
52. Use the other 3" x 4" coupling to connect the upper end of the CA 'S' pipe, using the OEM clamps.
53. Using the supplied 3" x 7" straight pipe and 6" coupling, and connect the CAC inlet to the OEM turbo outlet hose.
54. Plug the turbo temperature sensor into the CA "S" pipe.



55. Carefully cut the shrink-fit hose clamp from the 1" CAC radiator coolant hose at the tee leading to the CAC. Trim the hose in order to position the tee to the left (inboard) of the large radiator hose. **Figure 8.**
56. Remove the 3/4" elbow from the right (outboard) side of the tee. Using the supplied extended elbow, route the hose under the large radiator hose and connect it to the CAC, trimming as necessary. Use the supplied spring-type hose clamps. **Figure 8.**
57. Arrange all other small hoses to reconnect. Remove the short hose with the 90° quick-release connector. Replace with the supplied 90° hose (3/4" x 4" x 5") and straight quick-release connector. Use supplied spring-type hose clamp.
58. Connect upper radiator hoses and adjust turbo and radiator hoses for best clearances. Tighten all hoses.
59. Connect clutch wire harness and refill both cooling systems. Reinstall the hood light switch.
60. When appropriate, reconnect batteries.
61. Run engine at idle to observe belt tracking, clearance, and dynamics before engaging SEIC.

This completes the mechanical installation. Refer to the Blackbird Wiring Manual for wiring, run up, and troubleshooting instructions.

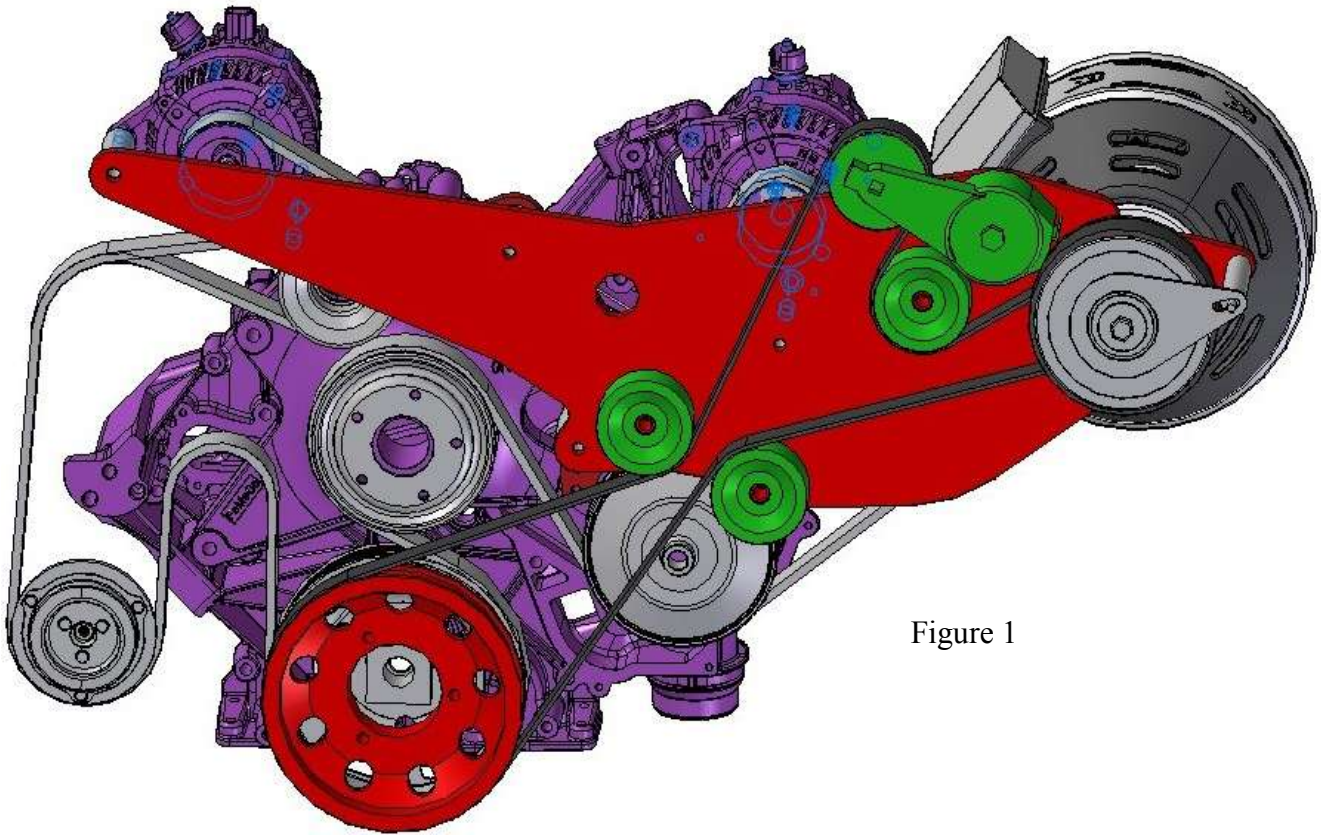


Figure 1

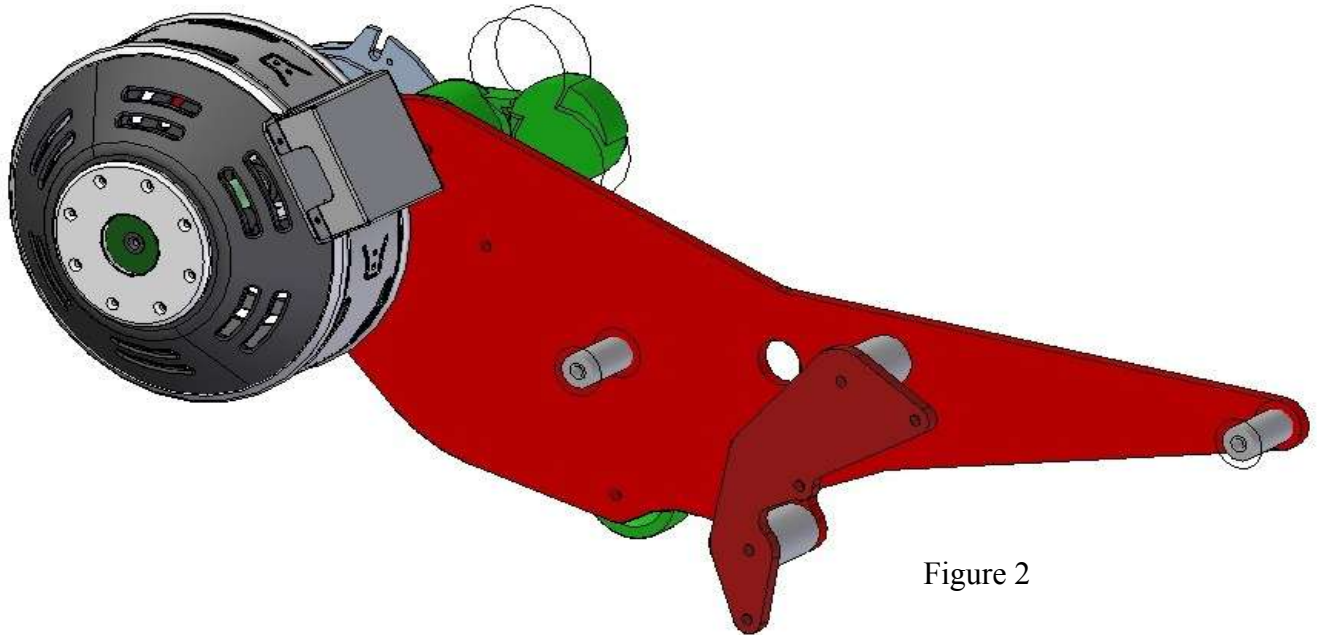


Figure 2

Engine Mounting Plate

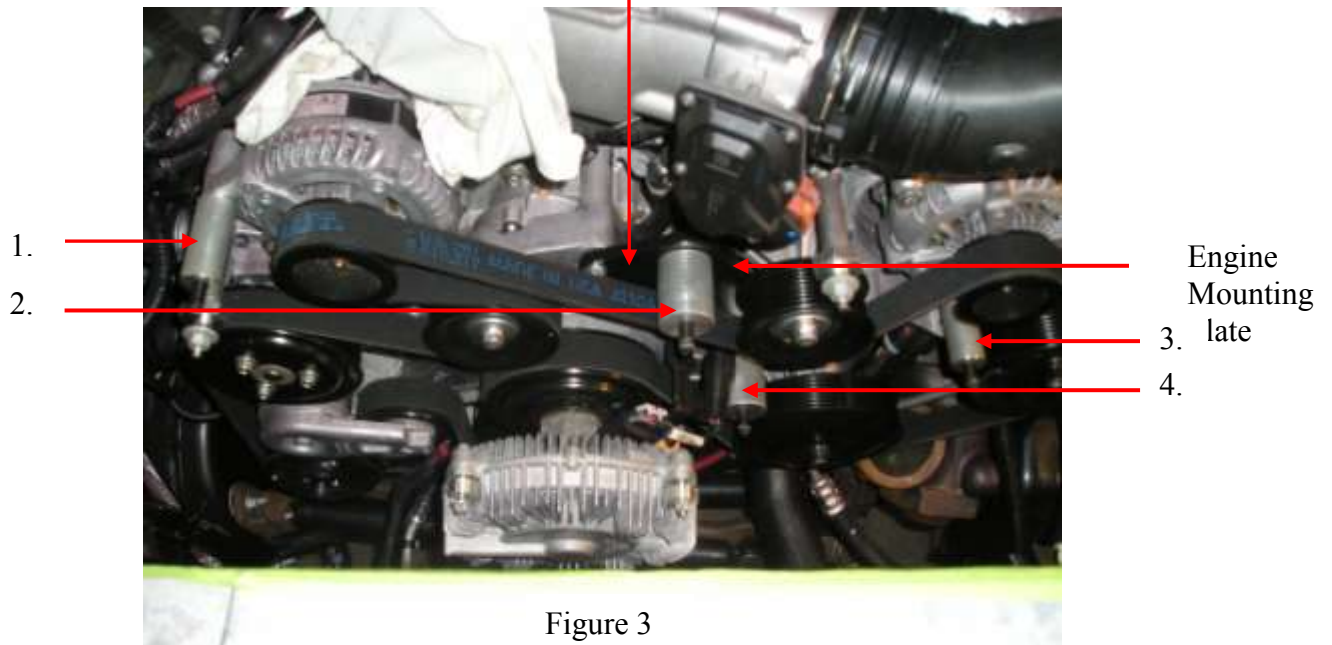


Figure 3

#1: M10 x 125mm stud, 2.444" standoff

#2: M10 x 80mm stud, 1.84" standoff

#3: M10 x 175mm stud, 2.444" standoff

#4: M10 x 80mm stud, 1.84" standoff

All studs should be set to protrude 7/8" from spacers



Figure 4



Figure 5A



Figure 5B



Figure 5C



Vacuum Tank
Trucks with
automatic 4WD
engage only



Figure 6



Figure 7



Figure 8



Before



Generator

After (Red Paint Optional)