

## INSTALLATION PROCEDURE

# Installing a 2008 CDS Unit into a Ford Van

Issue No: 308

Part Numbers Affected: Various

Date Changes Take Affect: 2008

\*\*\*COMPLETELY READ ALL INSTRUCTIONS BEFORE STARTING INSTALLATION!\*\*\*

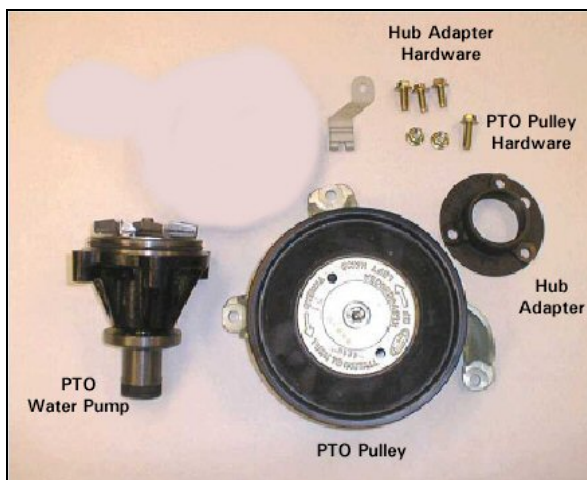
Special Tools and Supplies needed:

1-1/4" Wrench – EGR Tube, F-250 only  
 3-1/4" Hole Saw  
 1-7/16" Wrench –Production Fan Clutch  
 Wire Strippers/Crimpers  
 1-7/8" Wrench –New PTO Fan Clutch  
 Loctite 242® or equivalent  
 Motorcraft Premium Gold Antifreeze

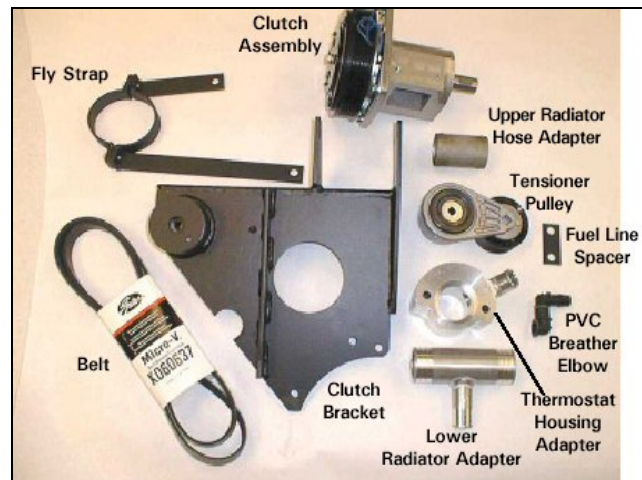
Common Metric & Standard  
 Reciprocating Saw  
 Wrenches/ Sockets  
 Long 3/8" Drill Bit  
 Torque Wrench  
 Harmonic Pulley Puller  
 JB Weld or equivalent

**Note: Always check clearance under the van before drilling any holes!**

- 1) Completely read all instructions before starting installation
- 2) Check and compare all parts received in kits with **Figures 1 – 4** before starting the installation.



**Figure 1**



**Figure 2**

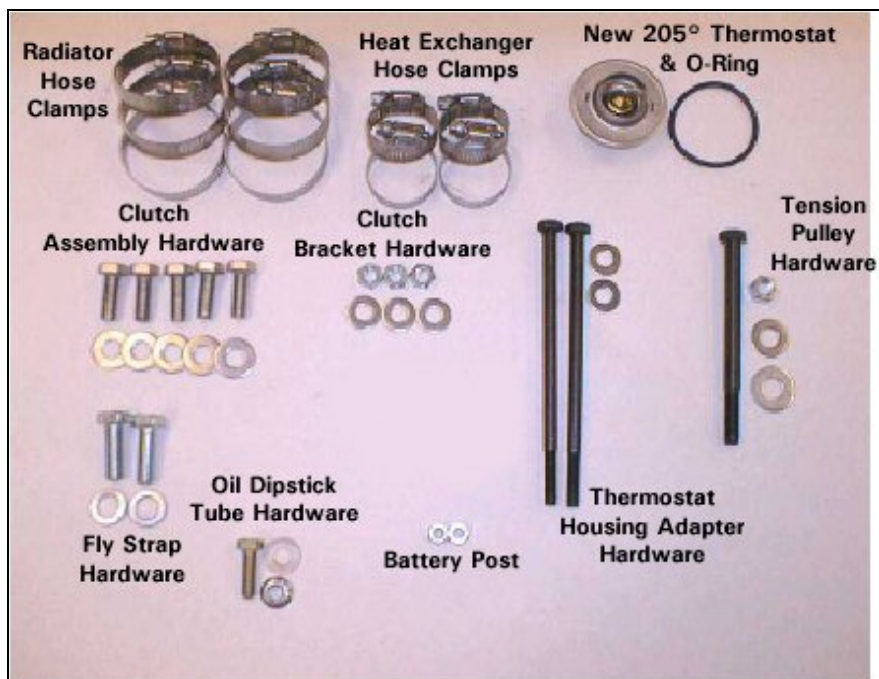


Figure 3

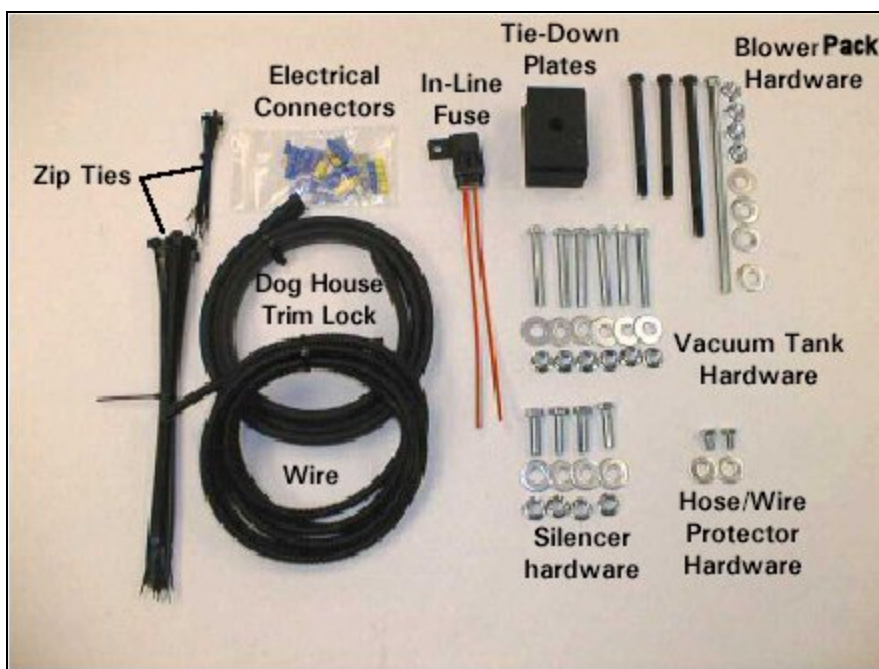


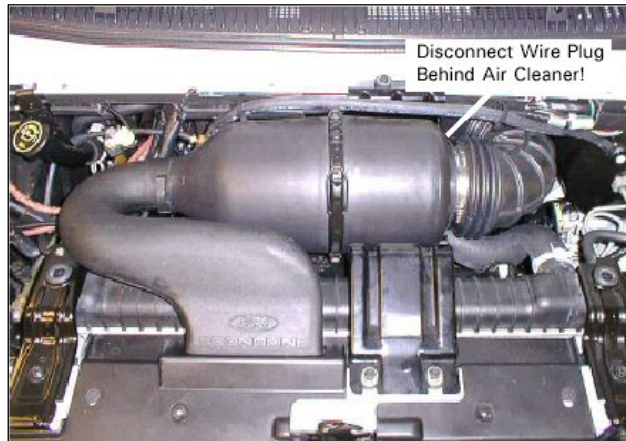
Figure 4

- 3) Use Loctite 242® or equivalent on all engine mounted fasteners
- 4) Torque all nuts & bolts as noted.
- 5) All hoses and wires that are installed or re-routed during installation must be secured away from all rotating parts, sharp edges and excessively hot areas. Quality of the fit and finish during installation is up to the installer, please follow sound, standard shop practices.
- 6) These installation instructions are to be used as a guideline. In some cases, due to prior vehicle modification, it may be necessary to modify vehicle to continue installation.

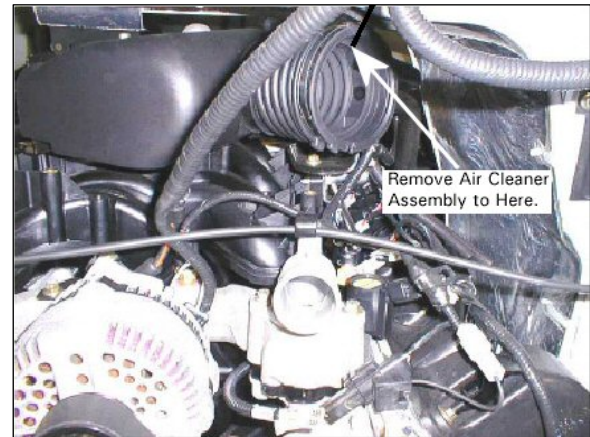
- 7) Please call HydraMaster Service Department if vehicle has been modified from an OEM cargo van.
- 8) **On Ford F-250 and some California E-350 model vans only**, the EGR tube needs to be removed due to interference with the CDS driveline. This EGR tube needs to be sent back to HydraMaster. We have supplied a new modified tube that will be used. Contact the HydraMaster Service Department for details.

## I. INSTALLING THE FORD POWER TAKE-OFF UNIT

- 1) Open hood and disconnect negative battery cable.
- 2) Remove air cleaner assembly (disconnect wire plug on backside). See **Figures 5 & 6**.



**Figure 5**



**Figure 6**

- 3) Drain antifreeze from bottom of radiator on the driver's side into a clean five-gallon bucket.

**Note:** Connect a hose to the nipple of the drain valve, if done carefully the coolant can be reused.

- 4) Remove driver and passenger seats and lower dash panels (at knee level.)
- 5) Remove plastic cup holder, (lift up and out) and remove engine cover.
- 6) Remove upper radiator hose and save it to be used later.
- 7) The fan shroud and fan clutch need to be removed together. First, unhook the plastic clamp on lower radiator hose from the underside of the fan shroud and the 'push in' plastic rivet located on the driver side of shroud. Second, using a 1 7/16" wrench, remove the fan clutch by turning it counter-clockwise. Now both items can be removed at once.
- 8) Remove the drive belt by loosening the belt tension pulley.
- 9) Refer to Ford's installation instruction (attached) for procedure and torque specs to install the PTO kit.

**Note:** The drive belt must be re-installed before PTO pulley is installed.

- 10) The new transmission cooling line clip must be installed behind pulley bracket. The original transmission cooling line clip can be reused, bend the tab and mount to the outside of bracket.

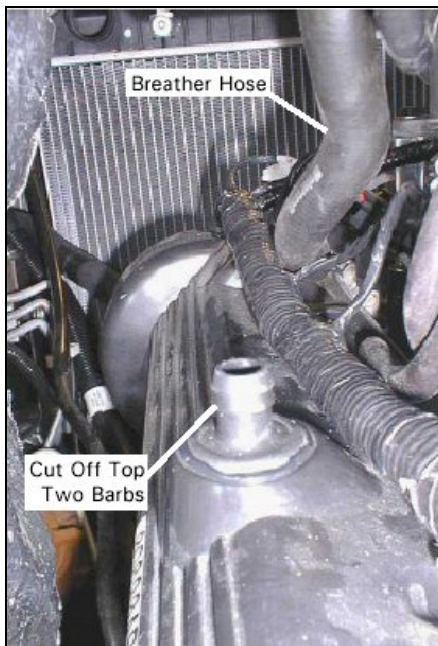
**Note:** Do not install the fan assembly now this will be done later.

## II. INSTALLING THE FRONT END KIT

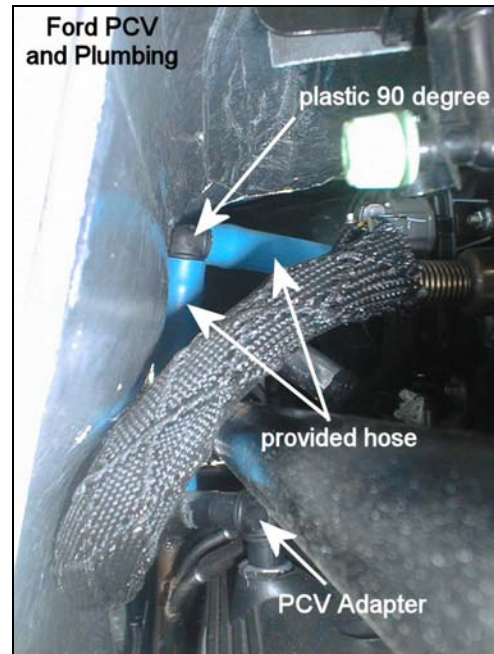
- 1) Locate and pull the breather hose off of the plastic nipple in center of the driver side valve cover. Using a hacksaw blade and a shop vacuum to collect shavings, cut below the bulge of the nipple (at the base of the quick connect connection).

**Note:** *Make sure to leave enough material to epoxy new breather adapter barb.*

Lightly sand the outside of the breather nipple and the inside of the new PVC elbow (included in kit). Use J-B weld® or equivalent epoxy to join the two pieces together. Install the modified elbow so that it points towards the driver's side of the vehicle. See **Figures 7-8**. Reattach the hose after the epoxy cures.



**Figure 7**



**Figure 8**

- 2) **On F-250 (and some California E-350) vans ONLY:** the old EGR tube needs to be removed and the new modified tube installed. The EGR tube is located on driver's side and is routed from the exhaust manifold up over the valve cover to the EGR valve.

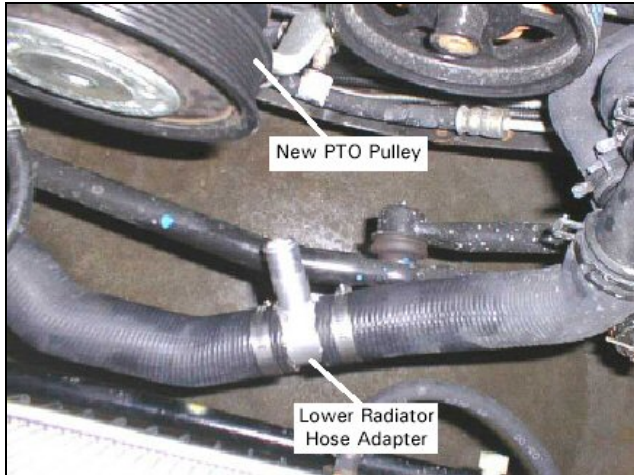
**To remove the EGR tube:** First, use a 1¼" wrench to loosen each side of the EGR tube. Second, remove the two black hi-temp sensor hoses. Now the old EGR tube can be removed from the engine.

**Note:** *The two hoses are different sizes as are the barbs on the EGR tube, be careful not to mix them up, doing this will set off the "check engine" light.*

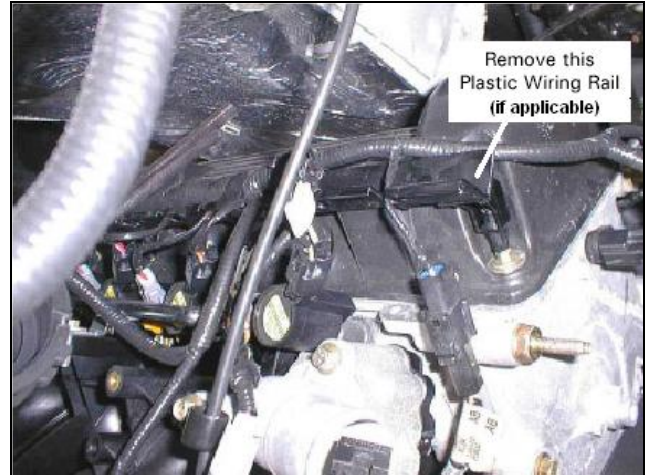
- 3) Unbolt the thermostat housing; discard bolts and original thermostat. Save the o-ring, as you will need it to install the new thermostat assembly. Install the new thermostat assembly in the following order: manifold, o-ring, thermostat housing adapter, 205° degree thermostat, o-ring, Ford housing.

**Note:** *Dip the o-rings in antifreeze before installing.*

- 4) Cut lower radiator hose and install aluminum adapter tee. See **Figure 9**.
- 5) **Note: If Needed:** On the driver side valve cover, locate the plastic wiring rail. A wire harness is taped to this rail, cut tape and lift up on plastic rail to remove. Use caution not to damage the wire harness. Leave wire harness in place. See **Figure 10**.



**Figure 9**



**Figure 10**

- 6) Route the 1" green stripe coolant hose between the passenger and driver seats. Route the hose over passenger side valve cover.

**◆ Caution ◆**

Do not cut hose in half until vacuum tank is installed. Connect one end to the thermostat-housing adapter.

Route the other end down the front passenger side of motor to the lower radiator hose adapter. Hoses should be routed away from all moving parts and hot areas. Be cautious of the A/C compressor (if equipped) when routing down to lower radiator hose, the coolant hose can be tied off of the transmission cooler line bracket.

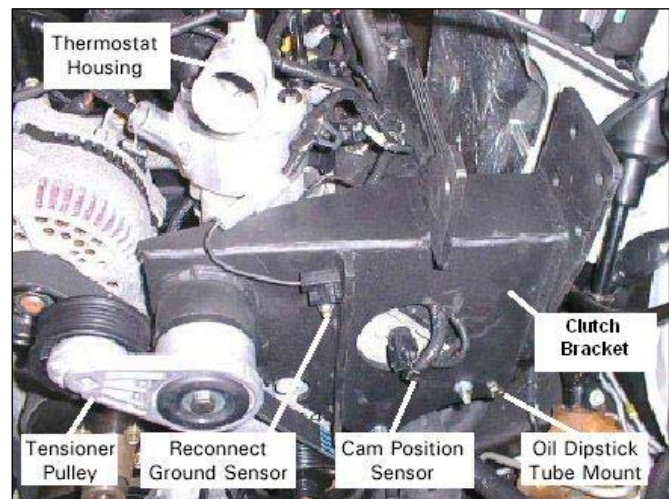
- 7) On the engine, locate 3 gold colored studs on front of driver's side head. Remove the ground sensor and the two nuts. Slide oil dipstick tube off the stud, this will be re-attached to the clutch bracket.
- 8) Bolt the new pulley tensioner to clutch bracket. Slide clutch bracket onto the studs.

**◆ Caution ◆**

When sliding the bracket on **use caution** not to pinch the wire harness on the cam position sensor **and the wire harness between the bracket and valve cover.**

Bend the tab on ground sensor and attach it to the top left-hand stud. Loctite® and torque all nuts to 15 – 17 ft-lbs. See **Figure 11**.

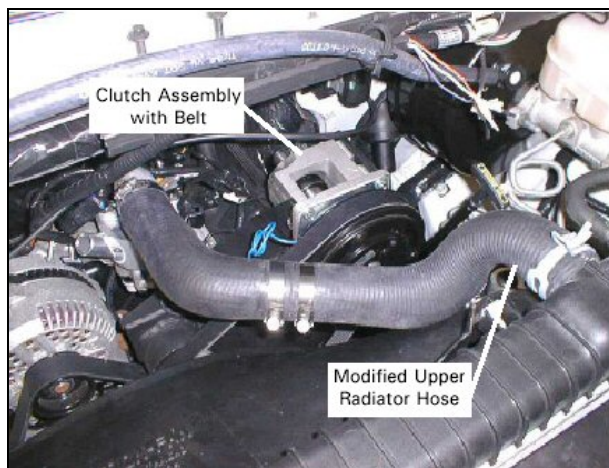
- 9) Bolt the oil dipstick tube to the hole in the clutch bracket. See **Figure 11**.
- 10) Install fan shroud and fan clutch. Apply Loctite® to the threads and tighten fan clutch using a 17/8" wrench.  
10.1) route the wire harness to the main computer under the clutch housing. Secure it with cable ties away from the knuckle of the drive shaft.
- 11) It may be necessary to push the bracket that mounts the computer over away from the HM clutch housing and bracket. Giving the engine room to flex with out touching the computer.



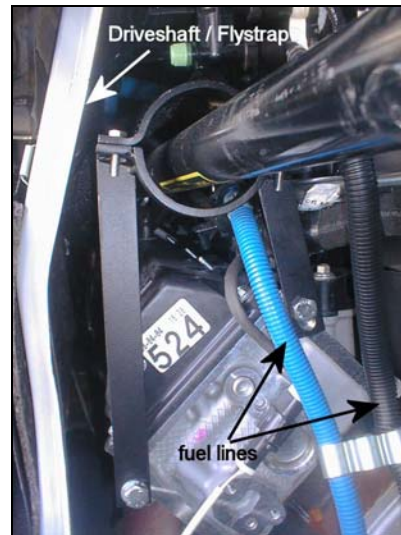
**Figure 11**

- 12) Install clutch assembly to the clutch bracket using the 5 bolts provided in the kit. Loctite® and torque all bolts to 25-30 ft-lb. The opening in clutch housing will face up. Install the new CDS drive belt. See **Figure 12**.
- 13) In the center of the straight section of the upper radiator hose, cut the hose in half. The end that attached to the radiator will go on the same way. The other end that attached to the thermostat housing needs to be flipped over so the cut end is facing the thermostat housing. See **Figure 12**. (Use the adapter and clamps provided).
- 14) Bolt fly strap to back of driver side head with metric bolts provided.

**Note:** Fuel lines should not touch fly strap. See **Figure 13**.



**Figure 12**



**Figure 13**

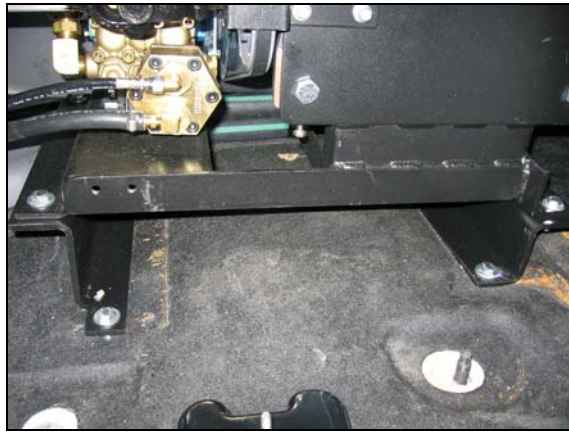
- 15) Install driveshaft onto the clutch housing shaft. The inside bore of the yoke should be flush with the end of the shaft.

**Note:** The splined end of the drive shaft goes towards the blower power pack. Torque bolt to 40 ft-lb.

### III. INSTALLING THE FINISH KIT AND BLOWER POWER PACK

- 1) Read steps 2 – 5 before starting.
- 2) Position power pack between seats, towards driver side. Fully compress the driveline. Move power pack jackshaft within a ¼” of the end of the drive line yoke. Set spacers under the power pack (see **Figure 14**). The length of the elbe shaft determines the power pack position when the yoke is flush with the end of the jack shaft.

**Note:** The exposed spline of the elbe shaft should be no longer than 5”.



**Figure 14**

- 3) Slide the yoke onto the blower shaft.

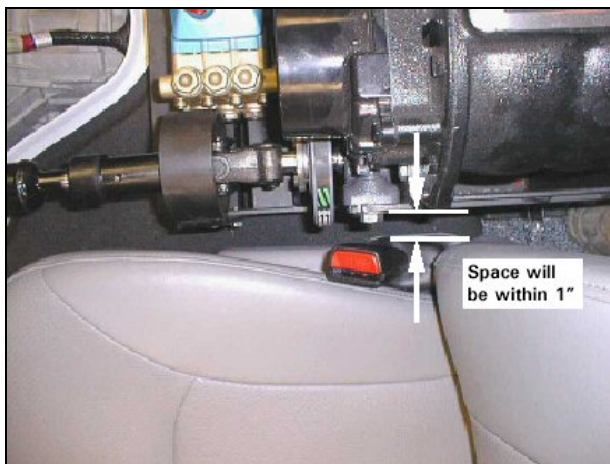
**Note:** Make sure the inside bore of the yoke is flush with the end of the jackshaft.

- 4) Carefully position the power pack front to back and side to side.

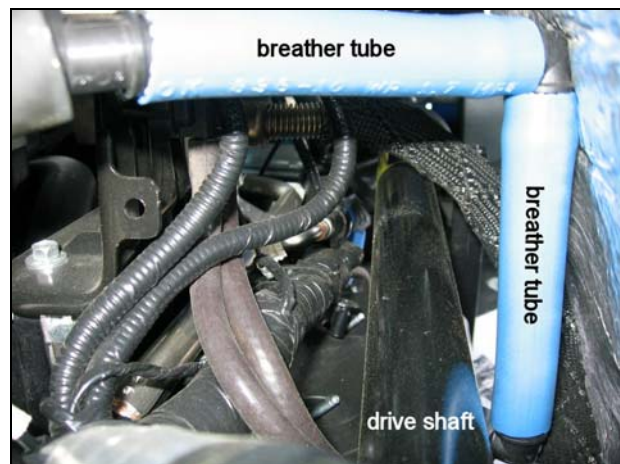
**Note:** The side of power pack should be approximately 1" from driver seat. See **Figure 16**.

The side to side measurement will be approximately between a ¼" to ½" inch from the chrome fuel line above the back end of the driver side valve cover. See **Figure 16**.

**Note:** Set drivers seat in place and test fit cowling before bolting power pack.



**Figure 15**



**Figure 16**

- 5) Front to back measurement of the power pack will be set by the measurement off of the driveshaft splines. Driveline should be centered in the safety ring. See **Figure 17**.



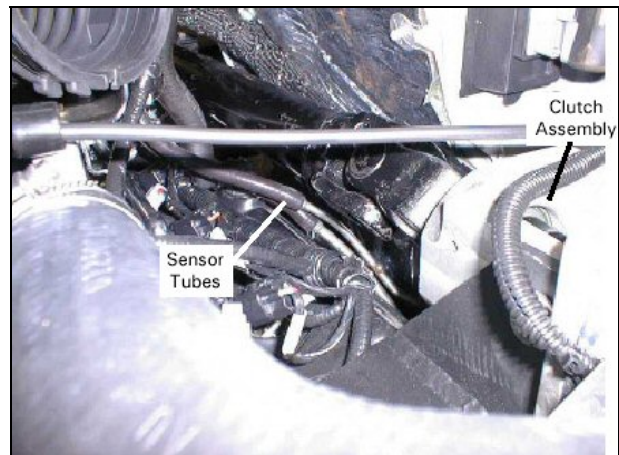
**Figure 17**

- 6) On F-250 vans install new EGR tube. HydraMaster supplies a modified tube with a piece of stainless flex that will loop over top of drive shaft See **Figure 18**.

**Note:** Sensor tubes may need to be slightly bent to clear the bottom of the drive shaft. Remember to re-install the sensor hoses onto the correct barbs, the hoses are different size. If mixed up it will set off the “check engine” light. See **Figure 19**.



**Figure 18**



**Figure 19**

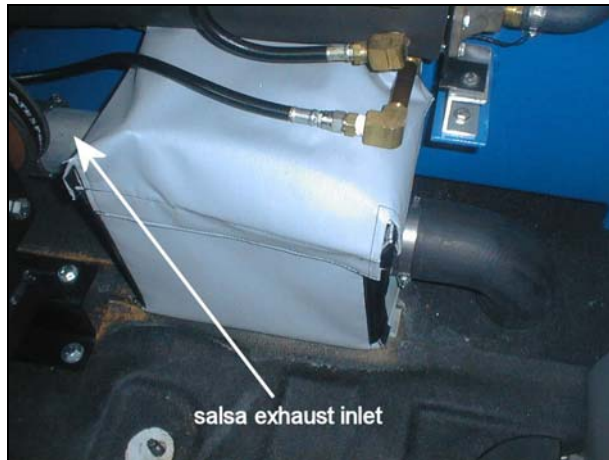
#### IV. INSTALLATION OF MINI SALSA AND SILENCER

**Note:** If CDS is purchased without a Salsa, install the hush silencer in the same manner and in same location.

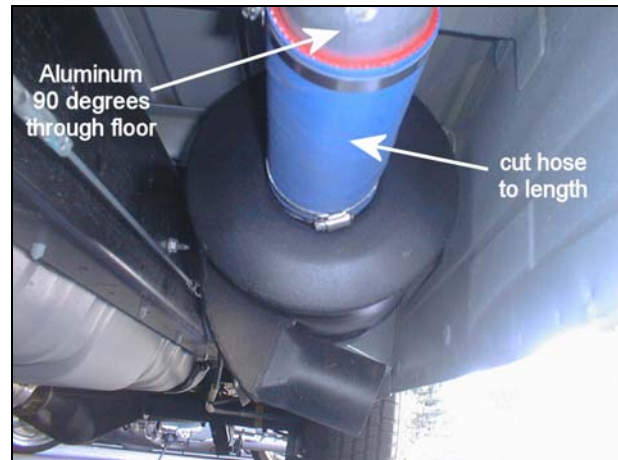
1. Attach the short end of the 90 degree 3” rubber elbow to blower outlet. Attach the long end of the 3” rubber elbow to the salsa inlet (see **Figure 20**).
2. If needed, cut the 3” rubber hose to an appropriate length to allow for clearance under the van.
3. Position the hose where it will go through the floor and outline this with a felt tip pen. Pilot drill a hole; make sure to check for clearance under the truck. Drill a 3.25” hole for the hose to pass through. The location of the hole depends on your van.
4. Slip fit the 3” aluminum elbow in the 3” rubber hose protruding through the floor.
5. Install external silencer under the van (**Figure 21**). Depending on the van model, silencer may span the “rib” of the



- floor or bolt directly to the van floor.
6. Direct the 3” aluminum elbow towards the silencer inlet. Tighten the clamp and measure the distance between the elbow and the inlet. Cut the 3” hose provided and install.
  - 7) Install throttle control kit. *See kit for instructions.*



**Figure 20**



**Figure 21**

## V. INSTALLING THE WIRING HARNESS

- 1) The wire harness will follow the same path as the heat exchanger coolant hoses. Feed the molded plug on harness from the front of the van, over top passenger side of motor. Feed harness till the two white ground wires with ring terminals are in line with the ground lug located on the power pack (passenger side). Attach wires to ground lug. See **Figure 22**.

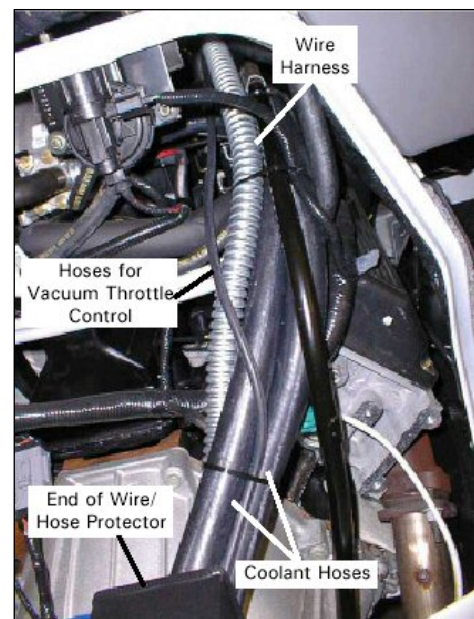
**On 4.6 models only**, the green wire will come out of wire harness next to the ground wires and will attach to the tachometer sensor on the back of the blower.

**On 4.8 models only**, the green wire will attach to a Ford supplied white wire with a red stripe labeled “CTO”. This wire is located just to the right of the air cleaner housing assembly.

- 1.1 **Red wire at base of power pack – Hook up to + on APO**  
**Blue wire at base of power pack – hook up to 3CP cat pump clutch**  
**White 12 gauge wires will be bolted to power pack base - Neg. Grounds**

- 2) Connect one black wire to the CDS clutch.
- 3) **Additional black wire will be taped off unless using a throttle switch for pods.**
- 4) The white ground wire will connect directly to the negative side of the battery.
- 5) The 25-amp fuse and fuse holder (supplied in finish kit) will connect between the red wire and the positive side of the battery.
- 6) Use the electrical connectors and small wire loom provided in finish kit to complete the wire harness.
- 7) Next to the molded plug on the wire harness (from the recovery tank side) there will be a white and a yellow wire. These wires are ground and power for an optional pump-in pump.

**Note:** *On 4.8 models the red wire is power to optional APO, black wire is Cat pump clutch.*



**Figure 22**

## VI. COMPLETING THE INSTALLATION

- 1) Install recovery tank.
  - a. **On 4.8 models**, the blower inlet and recovery tank nipple should be centered with each other. Push the tank up to the CDS cowling (making sure they are just touching) for proper distance. This will determine your tank location. Use the short hose (cut to fit 3" flex hose) between the blower inlet and recovery tank nipple.
  - b. **On 4.6 models**, use the 3" black hose between the blower inlet and the elbow on backside of the recovery tank.
- 2) **Connect the 1' hose to the intake of the pump guiding it along the bottom of the power pack. cut as needed. Connect the black high pressure throb hose to Cat pump.**
- 3) Connect the 5/32" vacuum hoses to the brass nipples on blower intake.
- 4) Route the 1" green stripe coolant hoses along passenger side of the blower assembly back to the CDS heat exchangers. Cut hose to fit.

**Note:** Hose from the thermostat housing connects to ball valve on dash panel.

- 5) The upper heat exchanger will return to the lower radiator hose adapter.  
Note: Leave enough extra hose incase hoses if ever need to be cut off the brass barbs.

- 6) Plug wire harness to the tank harness.

**Caution:** Keep harness away from any moving or hot parts.

- 7) The wire harness and coolant hoses should be zip tied together in a clean bundle from back of the blower assembly to the back of passenger side valve cover.
- 8) Every install is slightly different; take careful measurements of the wire/ hose pack and the drive shaft before cutting the engine cover. Use trim lock with bulb gasket on the engine cover where the wire/hose protector meet. Install the driveshaft seal to the engine cover using rivets to seal the drive shaft. See **Figures 23-25** for engine cover alteration. The plastic cup holder will have to be modified as well. See **Figures 26-28** for cup holder alteration.

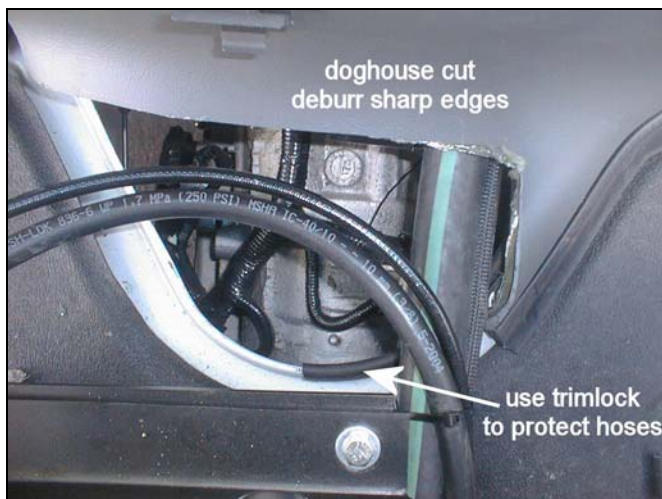


Figure 23

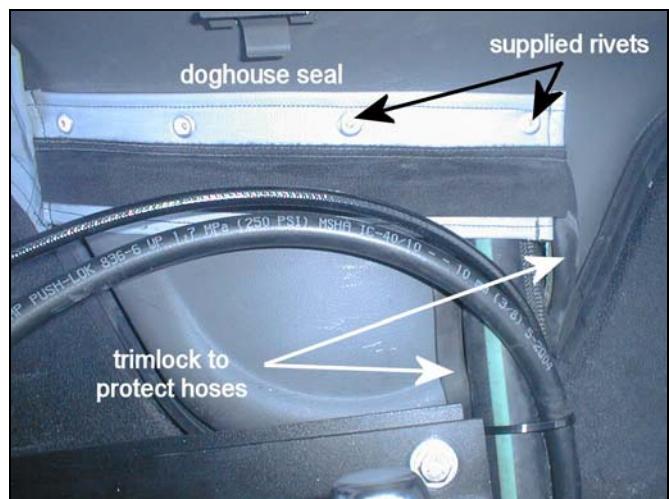


Figure 24



Figure 25

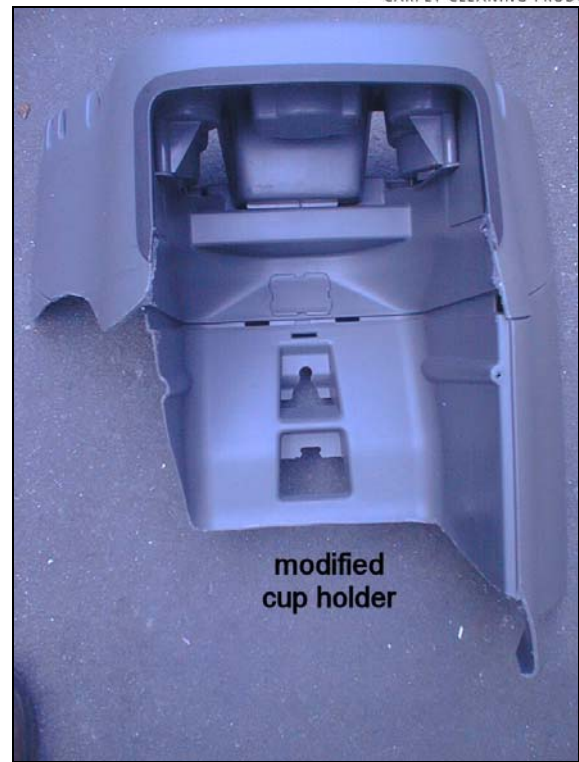


Figure 26

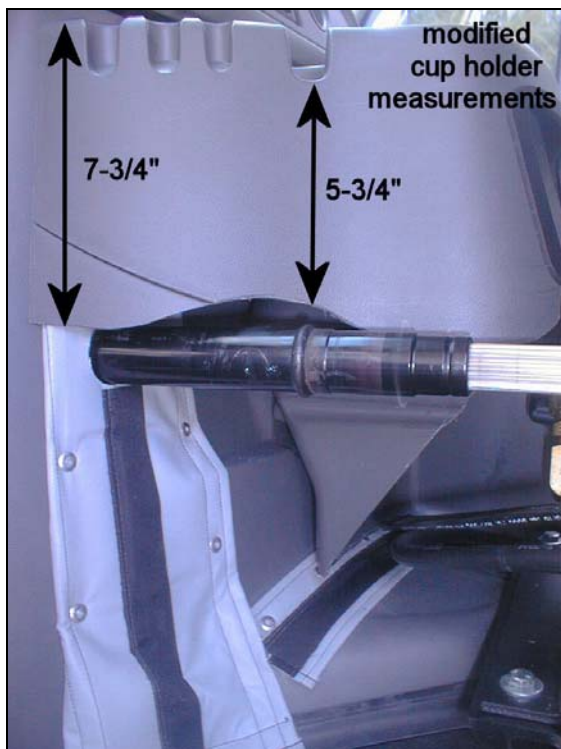


Figure 27

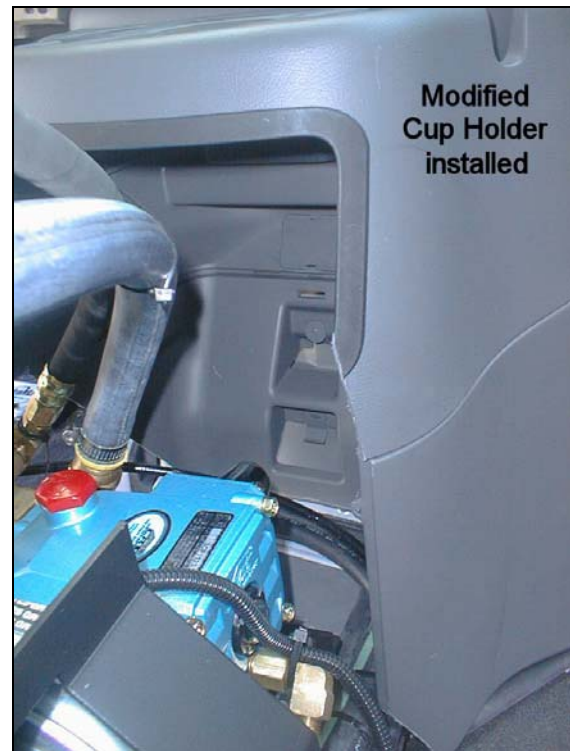


Figure 28

- 9) Reinstall seats and set the cowling over the blower assembly. Check clearances between the cowling and all rotating pulleys of the blower assembly. Cowling can be trimmed if necessary. The water box and cowling should just barely touch as shown in **Figure 29**.
- 10) Be sure recovery tank is located straight in van and that the lid can be opened to access the filter basket before bolting down.

**Note:** CDS unit can be tested before bolting down tank.



**Figure 29**

## VII. TESTING THE CDS

- 1) Install air cleaner assembly.
- 2) Run petcock hose to a small drain pan and open to allow air to vent.
- 3) Refill antifreeze, additional antifreeze will need to be added (use a 50/50 mix).
- 4) Allow the engine to sit until the antifreeze starts to bleed down.
- 5) Repeat this procedure until all the air is bled out of the pet cock and the engine is operating at the normal temperatures.

**Note:** This procedure could take up to 1-1.5 hours to complete.

- 6) Close pet cock and recheck that the engine is still operating at normal temperatures.
- 7) Be sure the CDS key switch is in the off position and the E-brake is set.
- 8) Reconnect the positive lead to battery.
- 9) Start and warm up vehicle.

**Note:** Keep eye on the antifreeze level as air bleeds out of system.

- 10) Check for antifreeze leaks around water pump.
- 11) Connect the garden hose or pump in pump hose to the inlet quick connect.
- 12) After van has warmed up, turn CDS on.

**Note:** CDS 4.8 tachometers should be set at 1500 rpm under a 14" load and no load.

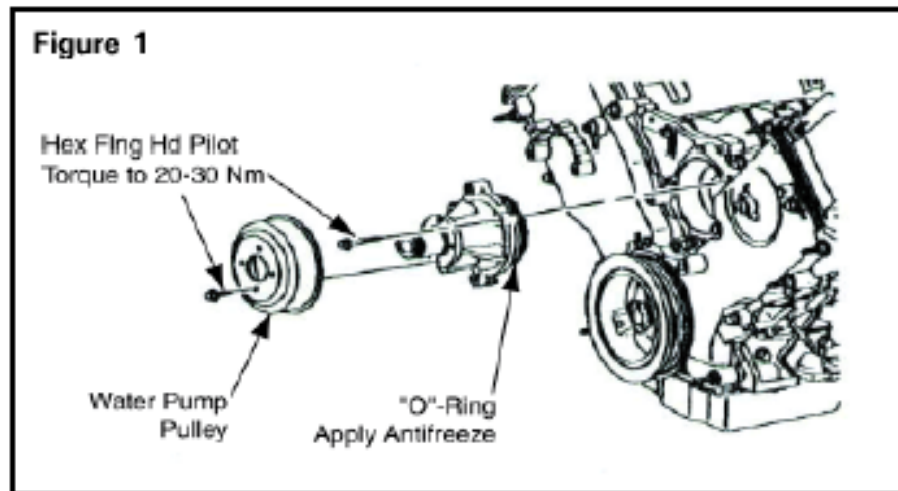
CDS 4.6 tachometers should be set at 2750 rpm under a 14" load and no load.

- 13) After setting rpm, set vacuum relief valve to 14" lift on the vacuum gauge.
- 14) Turn power on to the Cat pump and check the water pressure and look for any leaks in the system.
- 15) Run and test CDS for approximately 2 hours.

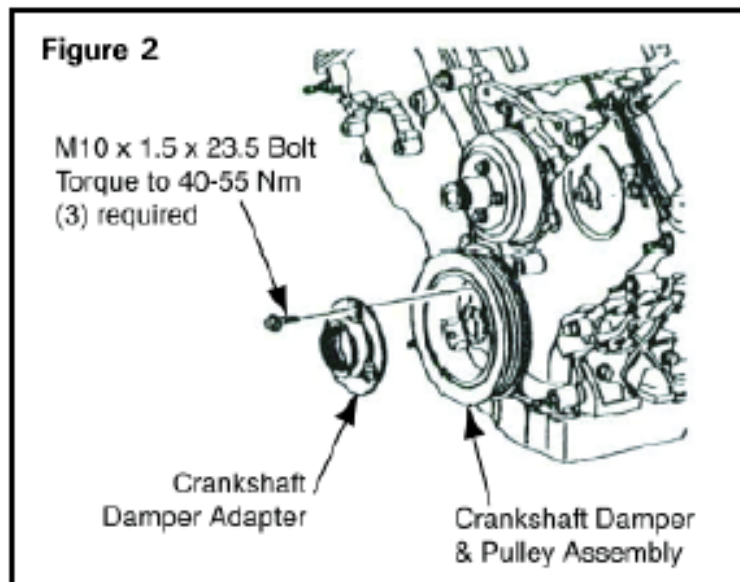
- 16) Test all equipment and accessories to the CDS.
- 17) After testing is complete, pull air cleaner assembly off and visually inspect all components of the installation.  
Retighten all the hose clamps installed. Reinstall air cleaner.
- 18) Fill out “Truckmount Document Package” and return to HydraMaster before delivering van.
- 19) Spend time with customer and show how all features of the CDS operate. Explain all safety features.

## Installation Instructions for Power Take-Off Unit (-7275)

(5.4L installation shown, 6.8L process is identical except where noted)



1. Remove and discard the Production Water Pump
2. Install the PTO Water Pump with Extended Hub
3. Re-attach the Water Pump Pulley, to the Water Pump Assembly with 4 bolts. Torque to 20-30 Nm



4. Install the Crankshaft Damper Adapter to the Crankshaft Damper with (3) Bolts. Torque to 40-56 Nm.
5. Coat threads of adapter with high temp nickel anti-seize lubricant such as Ford Part No. F6AZ-9L49-AA. Specification ESE-M12A4-A or equivalent.

## Installation Instructions for Power Take-Off Unit (-7275)

(5.4L installation shown, 6.8L process is identical except where noted)

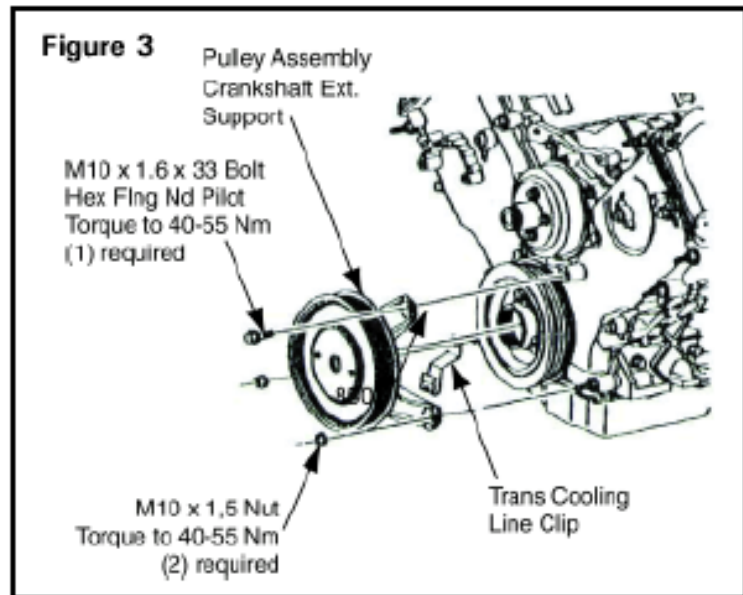
6. Attach the Trans Cooling Line Clip to the stud at the front of the engine, passenger side, bottom of block.

7. Retain the crankshaft with a Ford Rotunda tool  
*-to be announced.*

8. Install the Crankshaft Ext. Support Pulley assembly by turning the pulley counter-clockwise into the Crankshaft Adapter. Torque to 95-105 Nm.

9. Place the legs of the Crankshaft Ext. Support Pulley assembly on (2) studs located at the front of the engine, bottom of the block.

10. Secure (2) legs with (2) Nuts, M10x 1.5. Torque to 40-56 Nm. Attach other brackets to stud above legs of the Crankshaft Ext. Support Pulley assembly and secure.



**NOTE:** Processes 12 and 13 apply only to 5.4L equipped vehicles, correct clutch exits on 6.8L equipped vehicles)

12. Remove and discard 5.4L Fan Clutch assembly.

13. Attach the Fan to the new Fan Clutch assembly with (4) screws.  
Torque to 14.8-20.2 Nm.

14. Install the Fan and Fan Clutch assembly to Water Pump Hub. Torque to 113-153 Nm

