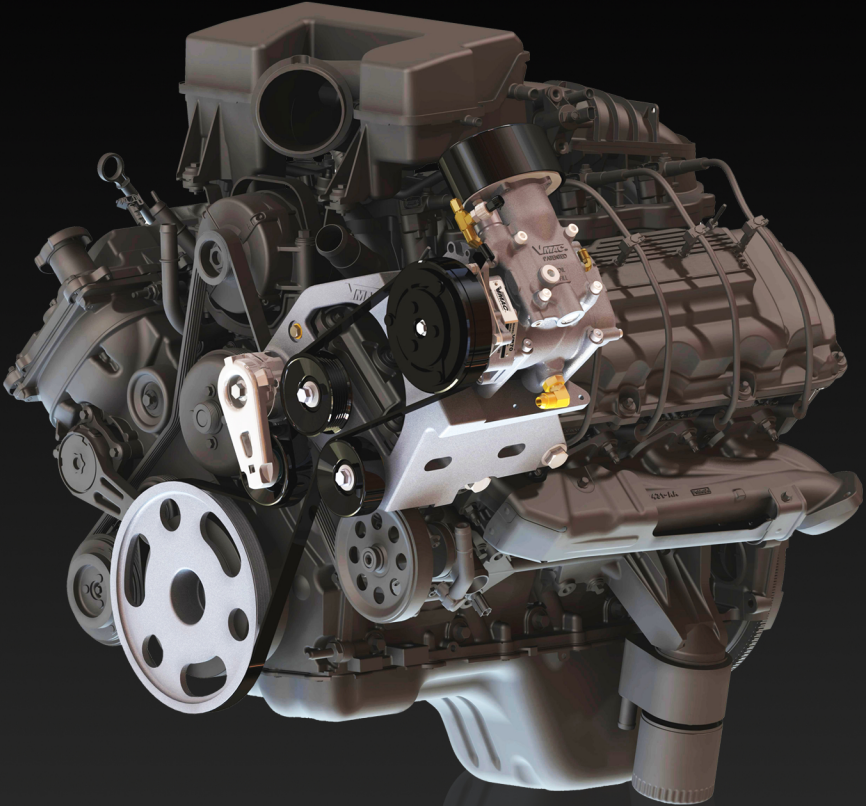




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# **VR70 UNDERHOOD AIR COMPRESSOR INSTALLATION MANUAL**

**System V900080**

**2007 – 2003.25 Ford F250-550 Super Duty**

**6.0L Power Stroke Diesel**

**Without Dual Alternators**

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# Installation Manual for VMAC System V900080

2007 – 2003.25 Ford F250-550 Super Duty  
6.0L Power Stroke Diesel  
Without Dual Alternators

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## Changes and Revisions

Version	Revision Details	Revised by/date	Approved by/date	Implemented
M	ECN 08-046	SL 12 Mar 2008	GP 14 Mar 2008	14 Mar 2008
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P	ECN 12-156	SAR 13Nov2012	MH 15 Nov 2012	28 Nov 2012
R	ECN 13-013	SH 16Jul2013	SM 26 Aug 2013	9 Sep 2013

## Important Information

The information in this manual is intended for certified VMAC installers who have been trained in installation procedures and for people with mechanical trade certification who have the tools and equipment to properly and safely perform the installation. Do not attempt this installation if you do not have the appropriate mechanical training, knowledge and experience.

Follow all safety precautions for underhood mechanical work. Any grinding, bending or restructuring operations for correct fit in modified trucks must follow standard shop practices.



***All hoses, tubes, and wires that are rerouted or shifted during installation must be secure so that they do not contact excessively hot areas or sharp edges. Where possible, use rubber coated P-clips. Follow the routing suggestions in this manual and cover all hoses with the supplied plastic loom.***

These instructions are a general guide for installing this system on standard production trucks and do not contain information for installation on non-standard trucks. This system may not fit special order models or those which have had other changes without additional modifications. If you have difficulty with the installation, contact VMAC.

The VMAC warranty form is located at the back of this manual. This warranty form must be completed and mailed or faxed to VMAC at the time of installation for any subsequent warranty claim to be considered valid.

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# General Information

## Before You Start

Read this manual before attempting installation so that you can familiarize yourself with the components and how they fit on the truck. Identify variations for different model years and different situations that are listed in the manual. Open the package, unpack the components and identify them.

All fasteners must be torqued to specifications. Use manufacturers torque values for OEM fasteners. Apply Loctite 242 or equivalent on all engine-mounted fasteners. Torque values are with Loctite applied unless otherwise specified.

STANDARD GRADE 8 NATIONAL COARSE THREAD								
Size	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4
Foot-pounds (ft-lb)	9	18	35	55	80	110	170	280
Newton meter (N•m)	12	24	47	74	108	149	230	379
STANDARD GRADE 8 NATIONAL FINE THREAD								
Size	3/8	7/16	1/2	5/8	3/4			
Foot-pounds (ft-lb)	40	60	90	180	320			
Newton meter (N•m)	54	81	122	244	434			
METRIC CLASS 10.9								
Size	M8	M10	M12	M14	M16			
Foot-pounds (ft-lb)	19	41	69	104	174			
Newton meter (N•m)	25	55	93	141	236			

## Hose Information



***Depending on other installed equipment, it might be necessary to move the air/oil separation tank from its intended location. The hoses used in VMAC compressor systems have a specific inner liner that is compatible with our compressor oil. Use of hoses other than those supplied or recommended by VMAC may cause compressor damage and may void your warranty. Please contact VMAC for replacement hoses and further information.***

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# Part 1: Warranty and System ID

- Complete the warranty form. The VMAC warranty form is located at the back of this manual. This warranty form must be completed and mailed or faxed to VMAC at the time of installation for any subsequent warranty claim to be considered valid.

## System Identification and Warnings

The System Identification Number Plate must be attached to the vehicle at the time of installation (Figure 1.1). This plate provides information that allows VMAC to assist in customer inquiries and the ordering of parts.

- Mark and drill two 7/64-inch holes in the top of the cross member in front of the OEM air filter box. Secure the plate with supplied self-tapping screws
- Clean cross member beside the number plate and stick the VMAC belt routing diagram to the cross member.

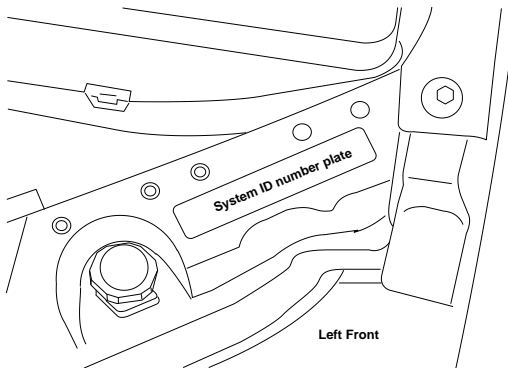



Figure 1.1

- As part of the installation process, ensure that the safety and operational instruction decal is affixed in an obvious location so that it can be seen by vehicle operators (Figure 1.2).



**This vehicle is equipped with a VMAC Air Compressor System.**

**OPERATING INSTRUCTIONS**

**Daily Pre Start Check:**

1. Check oil level in tank.
2. Check drive belt system.
3. Check for leaks.

**Start Up Procedure:**

1. Ensure air system is depressurized.
2. Ensure all air outlets are CLOSED.
3. Place vehicle in Neutral or Park and engage park brake.
4. Start engine and bring to operating temperature.
5. Turn ON compressor.

**Shutdown Procedure:**

1. Ensure discharge valve is CLOSED.
2. Allow engine to idle for 1 minute.
3. Turn OFF compressor.
4. Wait for system to depressurize before restarting.

For Technical Support/Parts contact your VMAC Dealer  
To locate your nearest dealer call 1-800-738-8622 (250-740-3200)

4400644-A


 **WARNING**  
**Always allow system to depressurize before restarting**

Figure 1.2

- To alert any technicians that may service the vehicle, affix the servicing caution/contact label in the engine compartment near the hood latch in a visible location. Thoroughly clean the selected area before affixing the label (figure 1.3)



Figure 1.3

To order parts, contact your VMAC dealer. Your dealer will ask for the VMAC serial number, part number, description and quantity. To locate your nearest dealer, call 1-888-241-2289.



# Part 2: Preparing for Installation

## 2.1 Preparing for Installation

Preparation for installation is very important. Missing an item can cause problems in the installation or even damage to components. Check off each item as it is completed so that you do not miss any preparation steps.

You should keep any parts that the instructions tell you to discard if you intend to return the vehicle to original condition.



***This manual contains installation instructions that are specific to different model years. Make sure that you read these instructions before beginning installation to identify the sections that apply to your truck.***

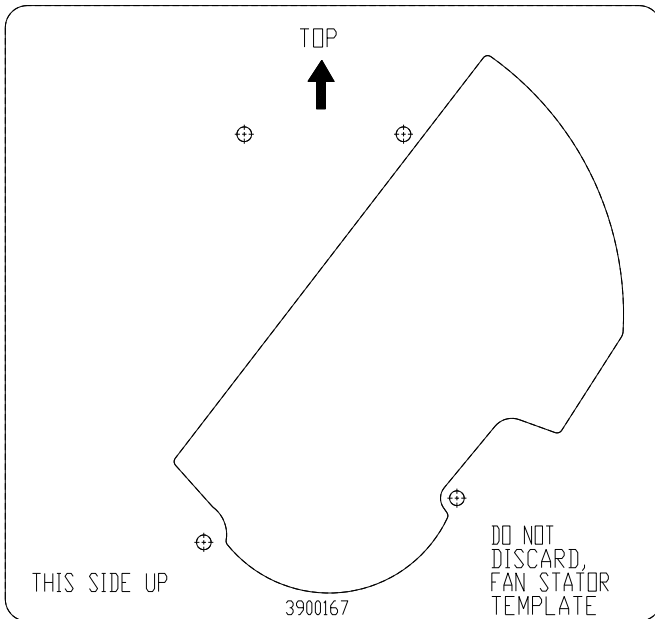
- Disconnect the ground cables from the batteries.
- Drain the engine coolant.
- Remove the intercooler tube from the passenger side of the cooler and the turbocharger, complete with clamps, rubber elbow and rubber bellows connector. Discard the tube.
- Disconnect the upper and lower radiator hoses from the radiator.
- Disconnect the coolant tank expansion hose from the top of the radiator.



***Removing the air cleaner unit will make removing the fan shroud easier.***

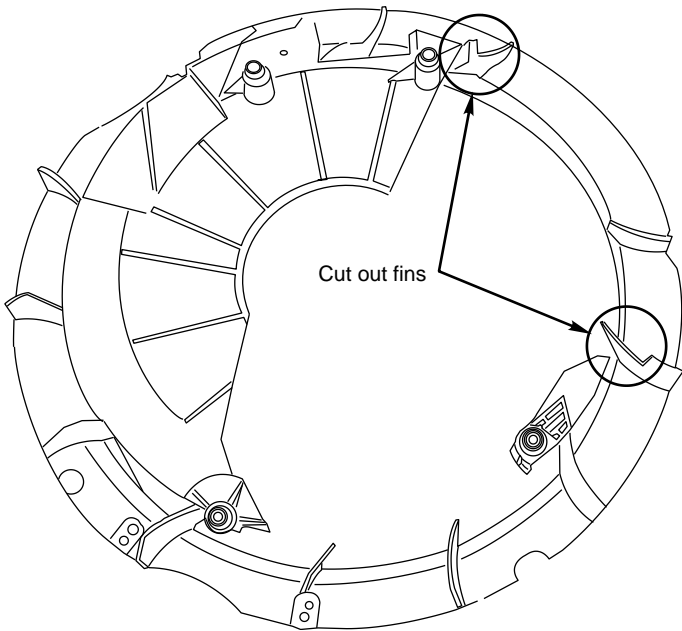
- Remove the two upper fan shroud bolts. Carefully pry the fan shroud past the top radiator hose spigot and the fan hub. Remove the fan shroud and immediately place a piece of cardboard against the radiator to protect the cooling fins.
- Remove the four M10 bolts securing the rear fan stator (large plastic section with fins behind the fan) to the front of the engine.

- Pry out the clip holding the lower radiator hose to the fan stator.
- Release the plastic locating clip holding the fan clutch wiring harness on the fan stator and disconnect the wiring.
- Remove the fan (right hand thread) and lift out the fan and stator together.
- Place the fan stator front side down and place the supplied template on the stator with the four holes in the template over the four stator mounting bosses (Figure 2.1). Make sure the template has "This side up" facing you and mark around the inside of the template onto the fan stator.



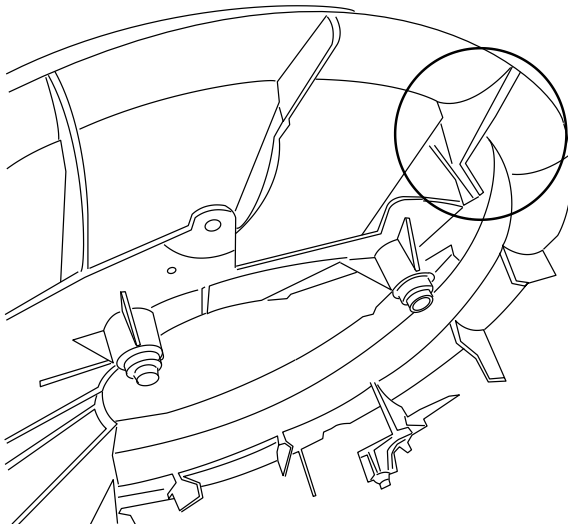
**Figure 2.1**

- Cut out the marked area of the fan stator clockwise from the top to provide clearance for the VR70 belt and drive components (see Figures 2.2, 2.3 and 2.4 for details). When cutting, try to leave as much of the fins in place as possible.



**Figure 2.2**

- Cut out a section from the top right-hand fin to retain rigidity for the mounting point. Remove the next right-hand fin completely.



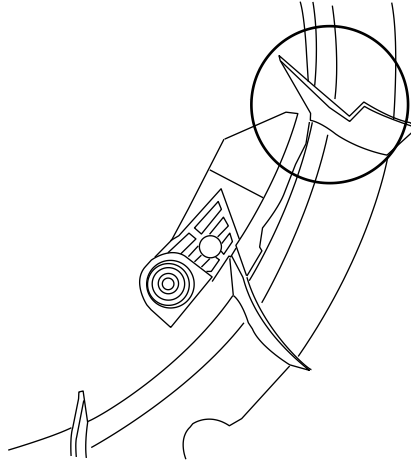
**Figure 2.3**

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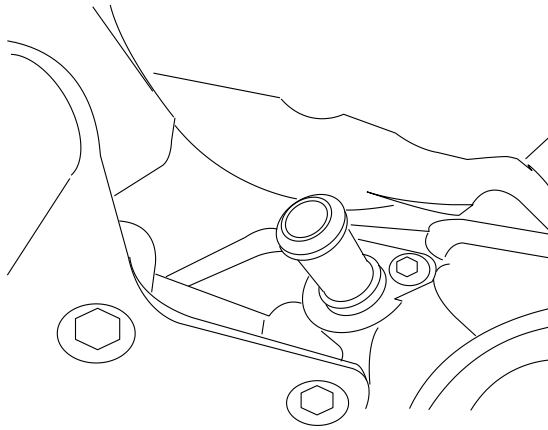
- Cut the third right-hand fin cut down to height of 1-1/4 inches. Cut out a section of the fourth right-hand fin to clear the idler. Remove the two lower fins completely.



**Figure 2.4**

- Remove the OEM belt and the belt tensioner-idler assembly.
- Remove the four nuts holding the glow plug relay bracket to the passenger side valve cover, remove the glow plug relay from the bracket and discard the bracket.
- Free the wire harnesses on the passenger side valve cover by removing all of the plastic retainers from the valve cover studs so that the harnesses can be relocated. Carefully cut back some of the harness wrapping so that the glow-plug relay harnesses can be relocated.
- Mount the glow plug module on the passenger side of the supplied bracket using the two 6mm bolts and OEM nuts; then install the assembly on the two inner valve cover studs behind the engine oil fill tube. Use two OEM nuts to secure the bracket.
- Disconnect the heater hose from the steel heater return pipe attached to the alternator support bracket. Remove the pipe, remove the rubber O-ring and discard the pipe.

- Put the O-ring on the replacement hose barb fitting and install it in place of the steel return pipe (Figure 2.5).



**Figure 2.5**

- Cut about 3 inches of the supplied heater hose and install on the replacement hose barb fitting. Position the clamp with the tightening mechanism to the driver's side and tighten the clamp.
- Install the replacement metal heater tube into the short length of hose with the short end on the passenger side of the alternator pointing toward the firewall. Do not tighten the second clamp until the tube has been mounted to the brace bracket.
- Remove the combined bolt/stud on the front of the valve cover and the one directly below the alternator. Cut off the threaded upper sections and install the modified bolts.
- If equipped, remove the padded sound-proofing liner on the underside of the engine hood and the rubber deflector from the underside of the front radiator mount cross-member.
- On trucks built before 2005, remove the cross-member under the radiator immediately behind the front air dam.
- On trucks built before 2005, remove the passenger side battery and bend the horizontal tab on the passenger side battery tray upward to the vertical position (Figure 2.6). Install the battery.

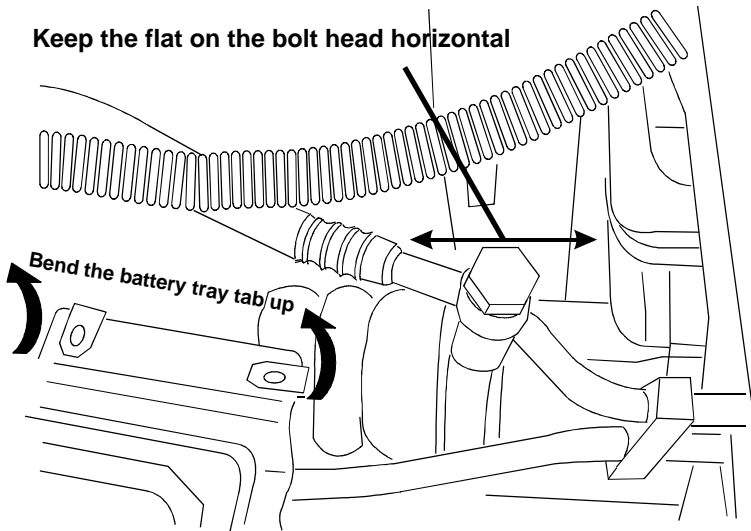


Figure 2.6

- On trucks built after 2004.25, remove the ICP sensor from the passenger side valve cover.



***Check the rubber seal in the valve cover for damage and replace if necessary.***

- Install the sensor in the supplied banjo fitting and torque to 9 foot-lbs.
- Install the banjo, with copper seal, into the valve cover. Attach the electrical connector, position the fitting so that the sensor points toward the turbo (towards the rear of the truck and up at about a 45° angle), and torque the banjo fitting bolt to 20 ft-lbs.



***Make sure that the OEM O-ring is on the sensor and do not lose the copper sealing gasket on the supplied banjo fitting. Make sure that the ICP sensor is properly sealed and tightened to prevent oil leaks, as improper installation and sealing can void OEM warranty.***

- Ensure that the top and bottom flats on the ICP bolt are horizontal. If required, tighten the bolt slightly to make them horizontal.

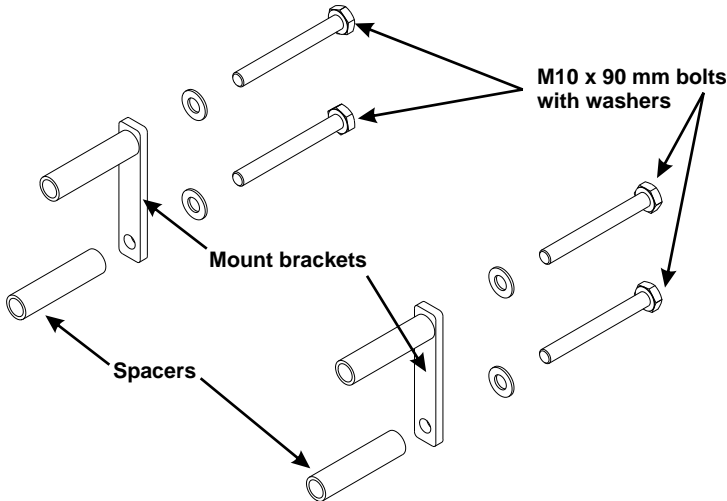
- Remove the three nuts from under the passenger side fender liner and move the plastic vacuum reservoir out of the way.
- Remove the two passenger-side retaining bolts from the alternator.

# Part 3: Installing the Cooler, Bracket and Compressor

## 3.1 Installing the Oil Cooler

### 3.1.1 2005 - 2007 Model Year

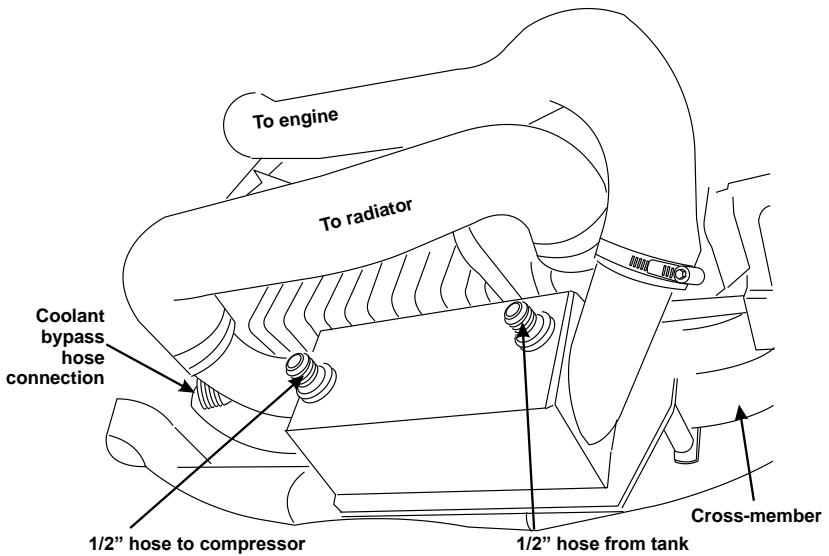
- Apply Loctite, insert M10 x 90 mm bolts into the top and bottom holes of the two mount brackets (Figure 3.1) and install the spacers on the lower bolts. Fit the brackets over the cross-member that runs under the radiator with the top tubes and bolts between the cross-member and the rubber strip on top of the cross-member.



**Figure 3.1**

- Place the cooler in position behind the cross member with the threaded fittings facing to the rear of the truck (Figure 3.2). Position it so that the hose attached to the cooler can be easily installed on the lower radiator spigot. Thread the two top bolts into the cooler bracket and install the nuts on the bottom bolts of the cooler but leave them loose enough so that the cooler position can be adjusted.





**Figure 3.2: 2005 – 2007**

- Loosen the clamp on the cooler hose and connect the other end to the lower radiator spigot. Adjust the hose for best fit and tighten the clamps.
- Connect the OEM hose from the engine to the fitting on the cooler and tighten the clamp.

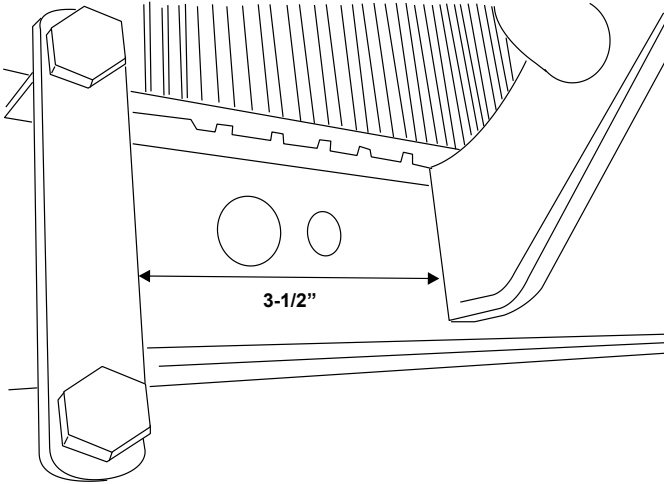


***An extender tube with clamps is included in the kit. If the hose does not fit properly or will not adequately clear the steering linkage or power steering pulley, insert the tube in a suitable location on the hose.***

- Adjust the cooler as required to provide a good fit with all hoses and tighten the mounting bolts.
- Connect the long piece of heater hose to the coolant bypass fitting on the cooler. Route the hose up the driver side of the radiator, under the air cleaner assembly and across the engine to the passenger side. Secure the hose as necessary with tie-straps.

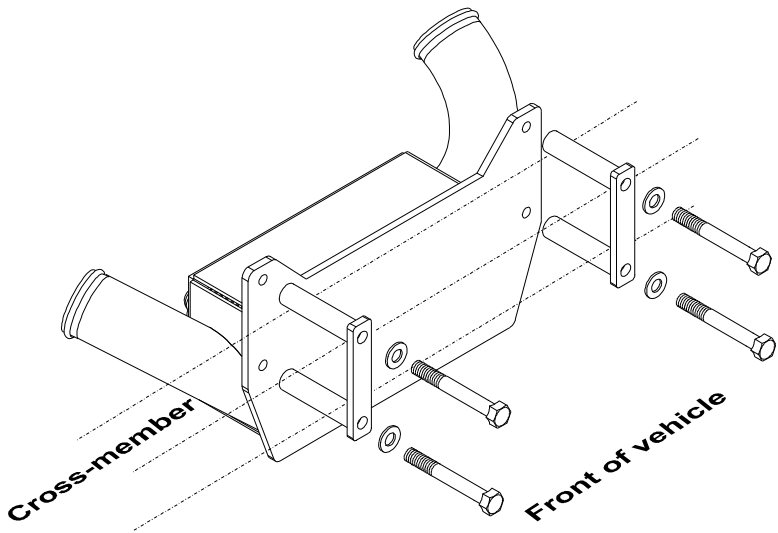
### 3.1.2 2003.25 to 2004 Model Years

- Measure 3-1/2 inches towards the passenger side of the cross beam from the passenger side power steering cooler support bracket and place the first bracket at this location (Figure 3.3).



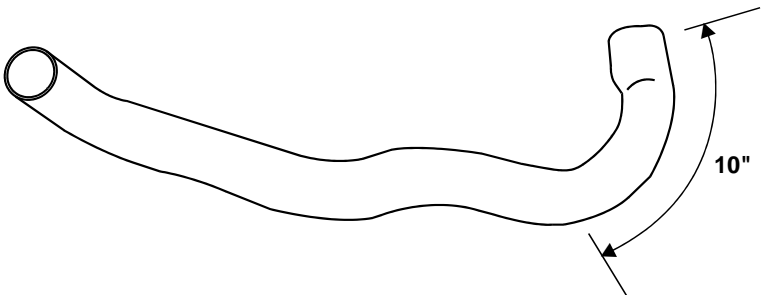
**Figure 3.3**

- Measure approximately 11 inches from the first bracket towards the driver side on the cross beam and install the second bracket.
- Place the oil cooler in position with the two threaded hose fittings facing towards the rear of the truck (Figure 3.4).



**Figure 3.4**

- Apply Loctite and thread M10 x 90mm bolts with 3/8 inch flat washers into the top and bottom mounting holes of the cooler.
- Measure 10 inches from the engine end of the lower radiator hose around the longest side of the bend (Figure 3.5). Cut the hose and discard the end that attached to the engine.



**Figure 3.5**

- Install the hose so that the end that previously connected to the radiator connects to the engine and install the other end on the cooler (Figure 3.6). Tighten the clamps.



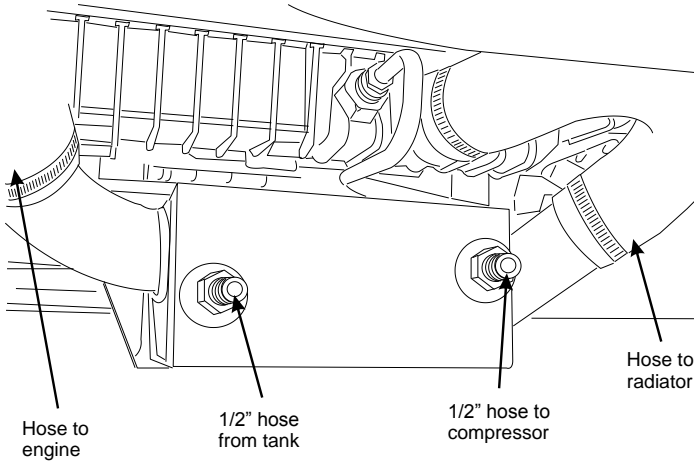
***The hose must be installed in the reverse position from the OEM installation.***

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- Place hose clamps on the supplied “U” shaped radiator hose and install it between the oil cooler and the lower radiator connection (Figure 3.6). Tighten the clamps.
- Connect one end of the longest supplied heater hose to the fitting on the passenger side of the cooler and secure the hose with a clamp. Route the hose up the front right side of the radiator, toward the back of the truck, behind the compressor up to the top of the engine. Secure the hose in place with tie-straps.
- Check for adequate clearance between the steering arm and the cooler hose with the steering in a full right-hand lock. Adjust the cooler or hoses for clearance if required. Tighten the cooler mounting bolts.
- If removed, install the cross-member.



**Figure 3.6: 2003.25 - 2004**

## **3.2 Installing the Main Bracket and Compressor**

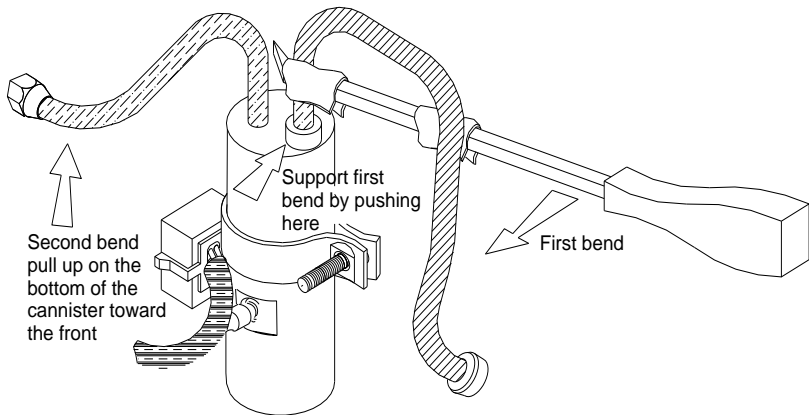
- Carefully bend the forward facing top larger air conditioning line out towards the inner fender until parallel to the fender. Twist on the vertical section while supporting the receiver/dryer canister and push inwards. This can be accomplished using a long pry bar protected where it rests between the two vertical sections of the lines (Figure 3.7).

- Bend the other line by pulling upward and forward on the receiver/dryer canister to provide adequate clearance.

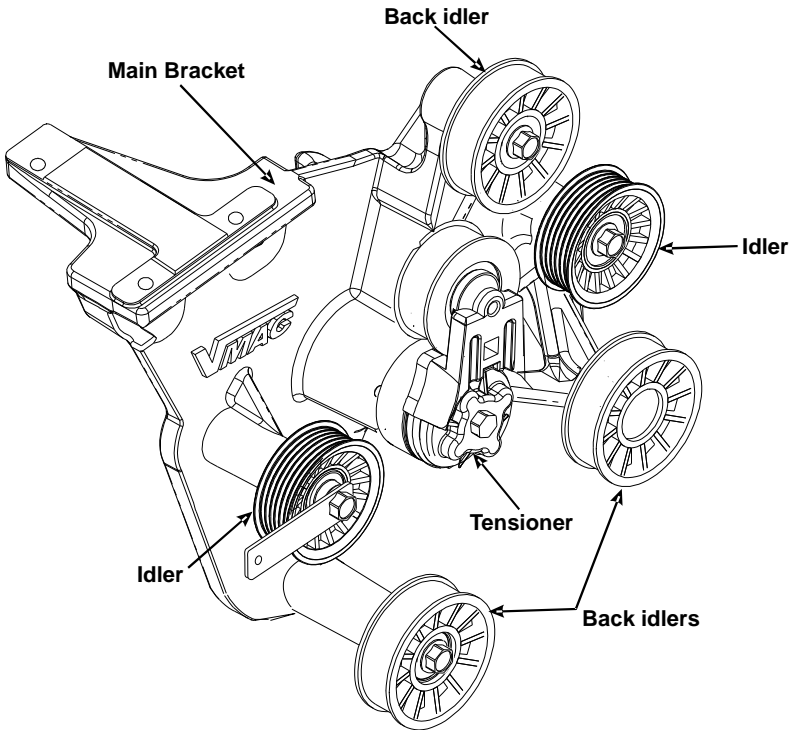


***To prevent crimping or fracture of the pipe, use a pipe bending tool or bend the pipe in small increments. Do not allow the base of the pipe to twist in the canister.***

- Additional adjustment of the air conditioning lines may be required to provide adequate clearance for the compressor.
- Remove the idlers and belt tensioner assembly from the bracket (Figure 3.8).



**Figure 3.7**



**Figure 3.8**

- Route the air conditioning compressor wire harness under the oil line fitting on the front of the engine and around the raised, threaded mounting pad so that it is tight against the casting.
- Place the bracket on the front of the right-hand cylinder head and loosely install one bolt. Push the bracket against the front of the engine and make sure that it sits flat on the front of the engine.



***Check the air conditioning wiring harness to make sure it is not trapped between the engine and the bracket. Also make sure that there is no interference at the valve cover or at the heater hose barb.***

- Install three supplied M10 x 55mm flange lock bolts and secure the bracket in place, two at the top and one at the outer lower hole.

- Install the M10 x 35mm flange head bolt to the lower inner-most attachment point. Hand-tighten all fasteners and check clearance again. Make any adjustments as required; then torque all fasteners to specifications.
- Install the OEM belt tensioner and install the OEM belt before installing the VR pulley to make installation easier.
- Install the modified stator.
- Clean the face of the OEM crankshaft pulley. Place the VR pulley over the OEM pulley, align the bolt holes and make sure that the pulley is sitting flush.
- Apply Loctite, install three M10 x 70mm bolts and flat washers and torque to specifications.
- Remove the two socket head bolts and remove the support bracket from the inlet control valve.
- Rest the compressor on top of the mounting bracket.



***Remove any casting flashing from the alternator mounting bracket if it interferes with the compressor.***

- Thread the 90 degree elbow fitting of the shorter 1/2 inch oil return hose onto the elbow fitting on the side of the compressor, facing forward, but do not tighten.
- Route the straight end of the 3/4 inch hose over the valve cover and down the back of the engine. Thread the 45 degree end onto the fitting on the back of the compressor, but do not tighten.
- Insert the compressor mounting studs into the mounting bracket, with the 1/2 inch hose under the side of the alternator mount.
- Position the hose so that it clears the alternator. Lift the compressor sufficiently to allow access to the fitting. When tightening the fitting, allow the hose end to jam up against the alternator. When tightened, the oil hose should route tightly over the compressor directly in front of the compressor inlet control valve (Figure 3.9).

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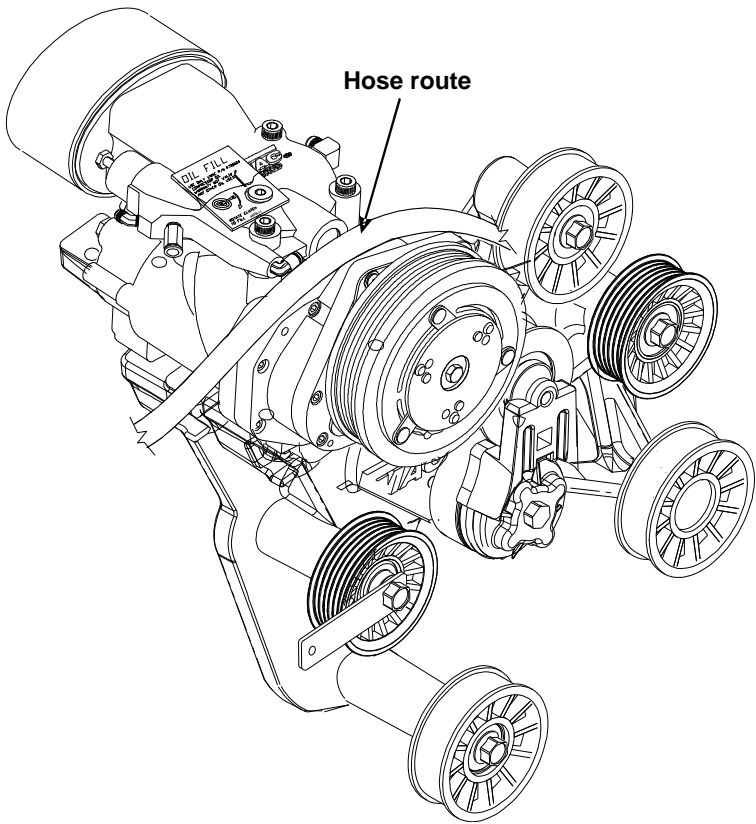
- Apply Loctite, thread nuts onto the compressor studs and torque to specifications.
- Route the 1/2 inch hose across the top of the compressor, down the fender and under the truck to the cooler. Adjust the hose for best fit and tighten the fitting.
- Connect the other end of the 1/2 inch hose to the connection on the cooler according to the following:
  - 2005-2007 – driver side fitting (Figure 3.2)
  - 2003.25-2004 – passenger side fitting (Figure 3.6)
- Tighten the fitting and secure the hose as required with tie-straps to prevent it from contacting any moving parts.
- Angle the connector on the 3/4 inch hose upward as necessary to clear the oil dipstick and the oil fill tube. Tighten the fitting.



***Slight adjustment of the dipstick tube may be required to clear the main air discharge hose.***

- Install the plastic vacuum reservoir on the fender and tighten the nuts.





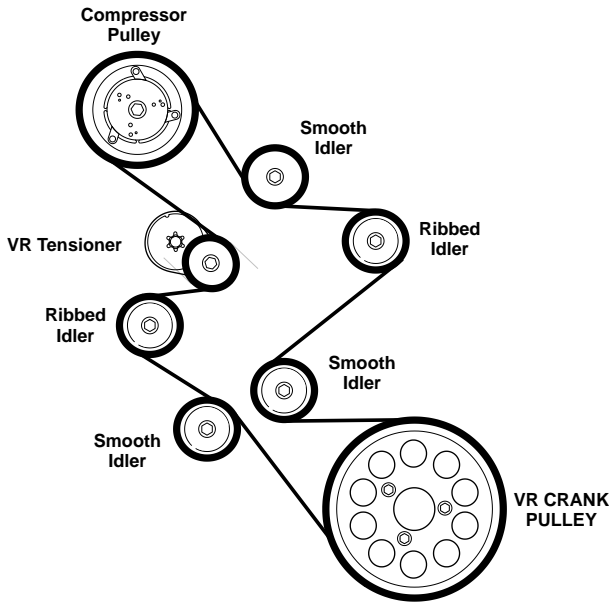
**Figure 3.9**

- Install the VR belt tensioner and attach each idler to the correct location (Figure 3.7). Use Loctite and torque the fasteners to specifications.



***When installing the lower-outer idler, make sure that the turbocharger support bracket is installed between the bolt and the idler, pointing toward the passenger side and slightly upward when the bolt is tightened.***

- Install the VR compressor belt (Figure 3.10).



**Figure 3.10**

- Lower the fan past the compressor drive components and radiator into position, thread it onto the fan hub and tighten.
- Slide the fan shroud down past the radiator into position. Attach the shroud to the radiator using the original OEM bolts and reconnect the fan wiring.

# Part 4: Installing the Tank and Hoses

## 4.1 Assembling the Tank and Brackets

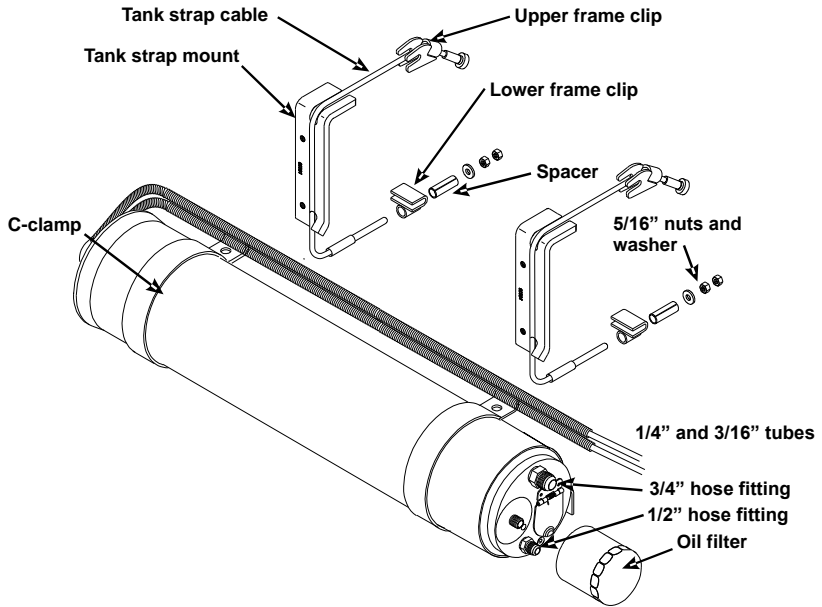


Figure 4.1

- Place the tank on a work bench with the front (oil filter end) of the tank to your left and remove the oil filter.
- Remove the two 1/4 inch pinch bolts from the C-clamps. Expand the clamps slightly and slide them over the front of the tank.
- Install the 1/4 inch pinch bolts into the C-clamps so that the heads of the bolts face toward you, apply Loctite and install the nuts. Leave the C-clamps loose enough so that they can be repositioned on the tank.
- Place the two L-shaped tank strap mounts under the C-clamps with the right-angle ends facing you and hanging over the edge of the work bench.

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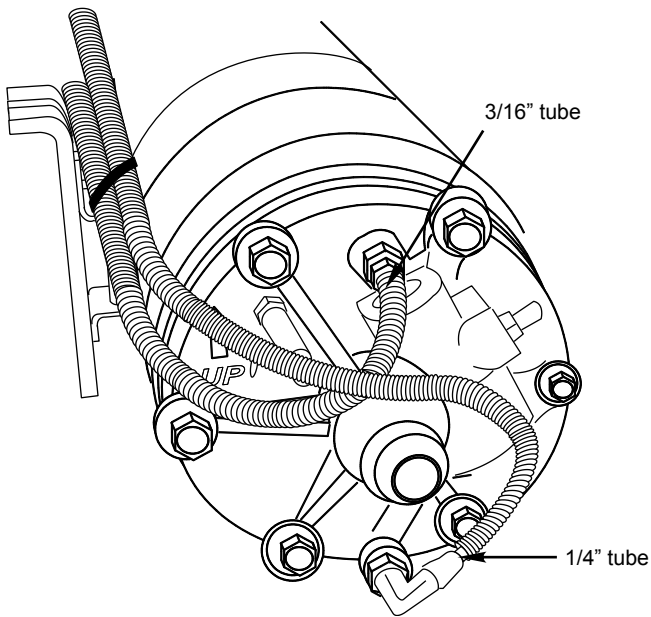
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- Thread 5/16 x 1/2 inch bolts into the holes on each bracket, but do not tighten.



***The tank will mount on the passenger side frame rail under the cab and must be level. Variations in frame design may affect the positioning of the brackets. Always check fit before tightening the fasteners.***

- Place the tank in position on the frame. Adjust the position of the clamps and brackets for best fit and to ensure that the tank will be level when mounted and to provide adequate clearance for hose connections and filter installation.
- Mark the position of the C-clamps on the tank and the position of the brackets on the frame. Remove the tank assembly and place it back on the workbench.
- Rotate the tank so that the directional arrow on the end of the tank is parallel to the work bench and faces toward you. The arrow must point upward when the tank is installed.
- Align the C-clamps with your marks and tighten the pinch bolts.
- Remove the 5/16 x 1/2 inch bolts from the C-clamps, apply Loctite and install the two bottom bolts with washers.
- Apply Loctite and insert 5/16 x 1/2 inch bolts through the C-clamp and thread them into the mount brackets. Adjust the C-clamps so they are at the same position on both mount brackets and tighten the mounting bolts.
- Install a 3/4 inch fitting (not supplied) in the back of the tank.



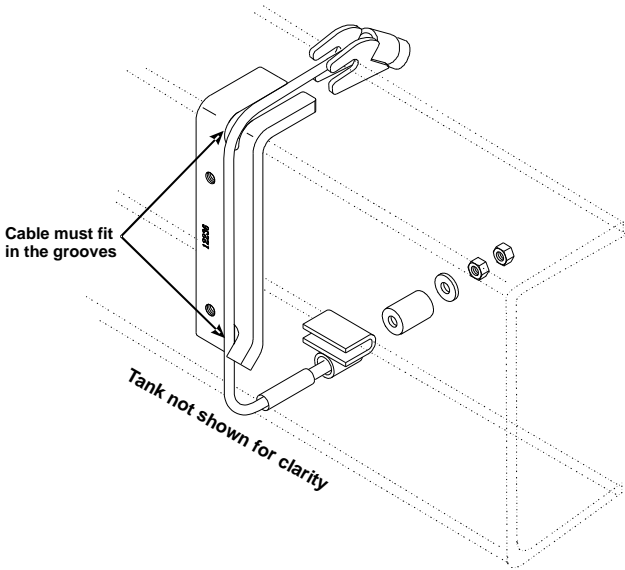
**Figure 4.2**

## 4.2 Installing the Tank

- Insert the cable straps through the tubes of the upper frame clips.
- Pass the cable strap upper frame clips over the passenger side frame from the inside. Position the straps at the marks on the frame.
- Support the tank and L-bracket assembly in place on the outside of the frame between the cab mounts, with the short part of the L-bracket over the top of the frame.
- Route the cable straps through the grooves on the tank mount brackets, behind the steel lines and under the frame (Figure 4.3).
- Install the frame clips, spacers (if necessary for narrow frames), flat washers and nuts. Tighten the nuts just enough to hold the tank in position between the two body mounts.



**A wider U-clip is provided to accommodate trucks where the tank must be mounted on a double frame section.**



**Figure 4.3**

- If necessary, reposition the tank on the frame to provide adequate clearance for hose connections and filter installation. When the tank is correctly positioned, tighten the securing cable retaining nuts until the cables pull tight and snug around the frame. Do not over-tighten.
- Install a second 5/16 inch nut and tighten it securely against the first to act as a locknut.

### **4.3 Connecting the Hoses**

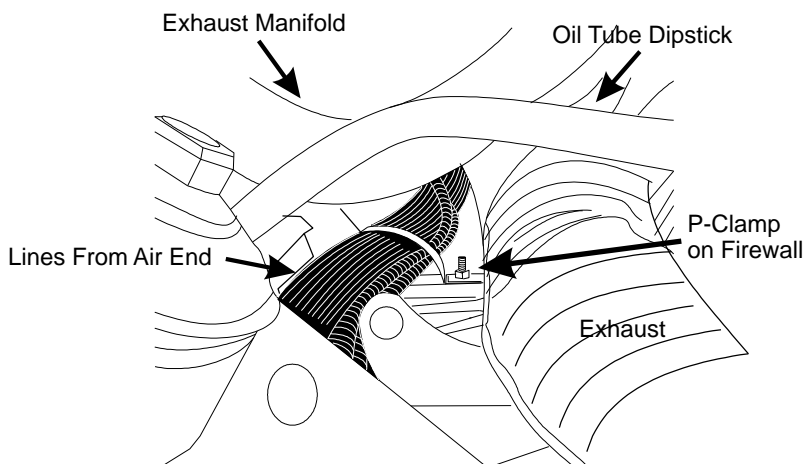


All hoses, tubes, and wires that are rerouted or shifted during installation must be secure so that they do not contact excessively hot areas or sharp edges. Where possible use rubber coated P-clips. Follow the routing suggestions in this manual and cover all hoses with the supplied plastic loom.

- Route the straight end of the 3/4 inch hose down from the engine, around the cab mount and connect it to the matching fitting on the compressor. Tighten the fitting.
- Connect the straight end of the longest 1/2 inch hose to the front tank fitting. Route this hose over the frame rail and around the steering components to the cooler.
- Connect the 1/2 inch hose to the connection on the cooler according to the following:
  - 2005-2007 – passenger side fitting (Figure 4.2)
  - 2003.25-2004 – driver side fitting (Figure 4.6)
- Tighten the fittings at both ends of the hose.
- Insert one end of each of the poly tubes into the matching fitting on the back of the tank. Cover them with protective loom and route them over the tank and, along with the 1 inch hose, up along the driver's side frame rail.



***Check the hose routing to make sure that the hoses do not contact exhaust components or interfere with moving components. Protect the hoses from abrasion and damage by securing them with nylon frame clamps or ties and protective plastic loom on contact points.***



**Figure 4.4 View from below**

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- Install the Supplied P-clamp on the firewall to hold the discharge hose and poly lines away from hot components (See Figure 4.4).
- Fill the filter with compressor oil and install it on the tank. Tighten the filter 3/4 turn after the gasket contacts the base.

## 4.4 Filling the System with Oil

- Remove the two remaining socket head bolts from the air inlet valve on the compressor and remove the inlet valve.
- Pour the supplied oil into the compressor. Turn the compressor clutch clockwise to speed oil flow to the tank.



***You must use the supplied VMAC compressor oil in this system. Failure to use this special oil will result in damage to the compressor and will void your warranty.***

- Allow a few minutes for the oil to drain into the tank, then check the level at the sight glass at the front of the tank. Continue adding oil until the level is correct.



***Do not overfill the system. Overfilling the system with oil can flood the sight glass window and make the system appear empty.***

## 4.5 Completing the Installation

- Replace the air inlet valve and install the two outside socket head bolts, but do not tighten.
- Connect the 1/4 and 3/16 inch tubes to the matching fittings on the air inlet valve.
- Install the compressor support bracket between the air inlet valve and the alternator mount. Fasten the heater return tube to the compressor support bracket with the supplied bolt and washer (into slot in support bracket). Adjust the position so that the heater return tube does not contact the OEM belt.



- Install the socket head bolts into the compressor and the OEM bolts into the alternator bracket. Torque the four air inlet bolts to specifications first, then the two alternator bolts.
- Install one end of the supplied T-connector in the OEM heater hose. Cut a suitable length of supplied heater hose and install onto the other end of the heater supply tube. Connect it to the other end of the T-connector.
- Cut the heater hose from the oil cooler to length for best fit and connect it to the T-connector. Tighten all clamps.

#### 4.5.1 Installing the Intercooler Tube

- Loosen the nut holding the positive wire on the back of the alternator. Rotate the wire so it is pointing down. Tighten the nut.
- Disconnect the 1/4 inch coolant hose from the engine beside the alternator. Cut 3/4 of an inch from the end of the hose and re-attach.
- Install the OEM intercooler tube bellows on the passenger side connection of the cooler. Push the bellows over the ribs on the cooler spigot as far as possible and tighten the clamp.
- Make sure that the elbow, the intercooler tube, the clamps and the turbocharger connections are clean and dry. Any oil on the components will cause the fittings to come apart.



***If the intercooler tube connections are not installed and tightened correctly, they will blow off during operation.***

- Prior to installing the VMAC supplied intercooler tube and OEM blue silicon elbow on the engine, fit the elbow to the VMAC tube and make sure that the internal rib of the elbow fits properly into the groove on the intercooler tube. Mark the position on the intercooler tube. Also mark the location of the internal rib on the outside of the elbow so you can accurately position the clamp.
- Remove the staples holding the clamp on the turbocharger end of the elbow. Install the intercooler tube and adjust the elbow for

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best fit. Mark this position on the elbow, intercooler tube and turbocharger. Also mark the new position for the clamp.

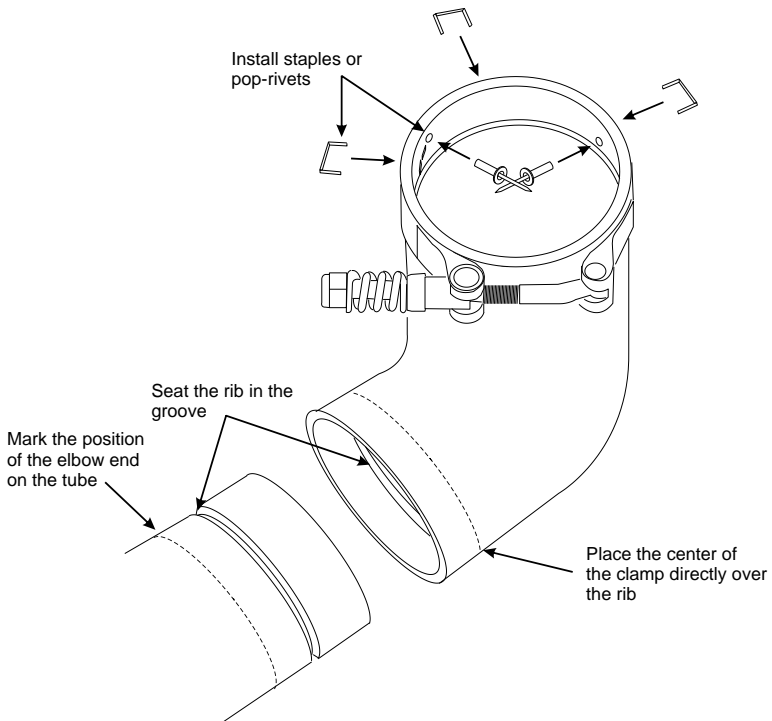
- Position the clamps so that the center of the clamp is directly over the internal rib. The OEM blue silicon elbow has a white line on one end to indicate clamp position. Note the location of this line in reference to the bead.
- Fasten both clamps to the elbow using staples or small pop-rivets (Figure 4.5). This will ensure that the elbow will not slip out from under the clamps during high turbo pressures.

If you use staples:

1. Use the existing holes in the OEM clamp or drill small holes through the clamp to match the width of a standard 1/2 inch staple. Drill three locations around the clamp.
2. Insert the staples into the clamp and press them through the blue silicon elbow using needle-nose pliers. If you have difficulty pushing the staples through, make a pilot hole using a small sharp object, such as a nail or pick.
3. Securely crimp the staple on the inside of the elbow so that it begins to embed in the material of the duct

If you use pop-rivets:

1. Drill two holes in the clamp and elbow opposite the T-bolt.
2. Remove the nut and spring; open the clamp to permit access for a pop-rivet tool.
3. Insert the pop-rivets from the inside and fasten them in place. The pop-rivet head should embed slightly in the material of the duct.

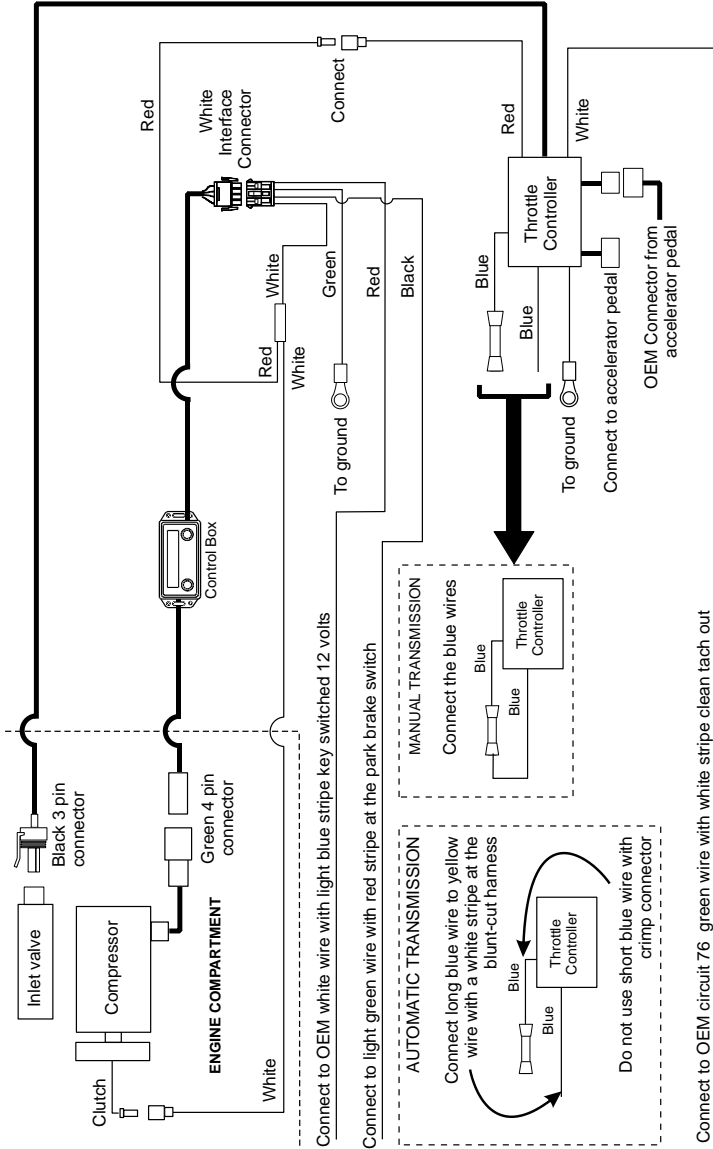


**Figure 4.5**

#### 4.4.2 Tightening Spring-loaded T-bolt Clamps

- Tighten the nut until all of the coils on the spring are in contact, then torque the nut to 12 N.m (106 in-lbs). Check torque again when the clamp and duct are hot.
- Secure the intercooler tube in position using the supplied clamp and fasteners to the support bracket located on the idler of the main bracket. Make sure that the intercooler tube clears the compressor clutch and all other engine and body components.
- Connect the upper radiator hose and expansion hose to the fittings on the radiator and secure them with clamps.
- Fill the cooling system with the recommended coolant.
- Replace any other OEM parts or fasteners removed during installation.

# Part 5: Installing the Control Components



2005 - 2007 Model Year Wiring

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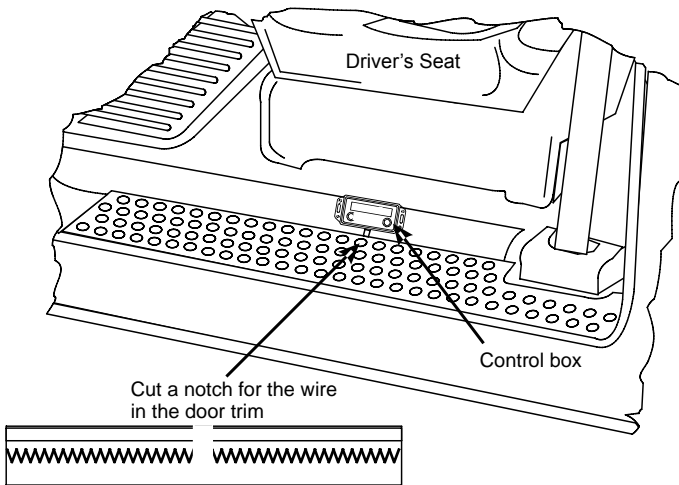


## 5.1 Installing the Components

- Remove the driver-side plastic door frame base panel and the plastic molding ahead of the base panel. Mount the control box to the floor using the supplied sheet metal screws (Figure 5.1).
- Route the wire harness under the floor covering, along the inside of the door where it will be covered by the trim piece and up under the dash. Place the floor covering back into position and replace the inside left kick panel.



**Keep wires away from the park brake mechanism. Route wires clear of the steering column and pedals so they do not contact moving parts.**



**Figure 5.1**

- Cut a notch in the edge of the trim piece through the saw-tooth section just inside the edge of the trim so that the wire is not cut when the trim is installed. Replace the door trim piece.
- Remove the trim panel from under the dash.
- Tie-strap the throttle control box to the dash support bracket on the right of the steering column, behind the diagnostic connector or to the bottom metal dash frame just behind the removable panel, with the adjusting screws facing out

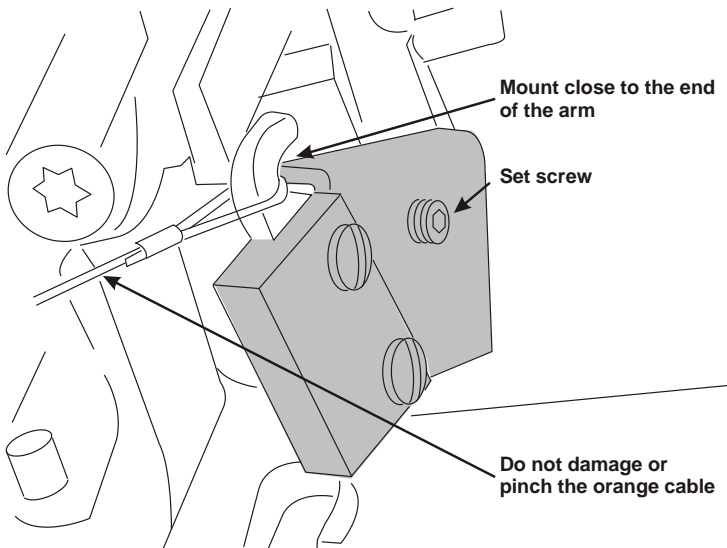
### 5.1.1 2003-2004 Model Years with Automatic Transmission

- Apply the park brake and shift the transmission into the lowest forward gear.
- Apply Loctite to the set-screw and mount the magnetic actuator to the transmission arm under the dash (Figure 5.2).

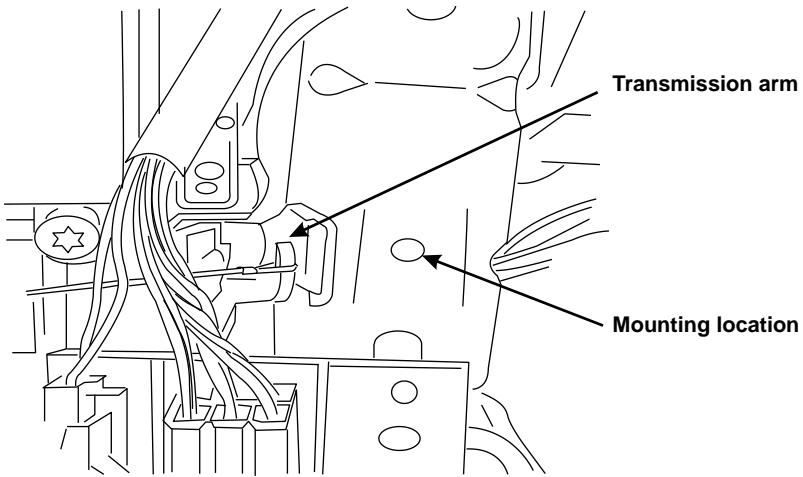


***Do not pinch or damage the orange shift indicator harness during installation.***

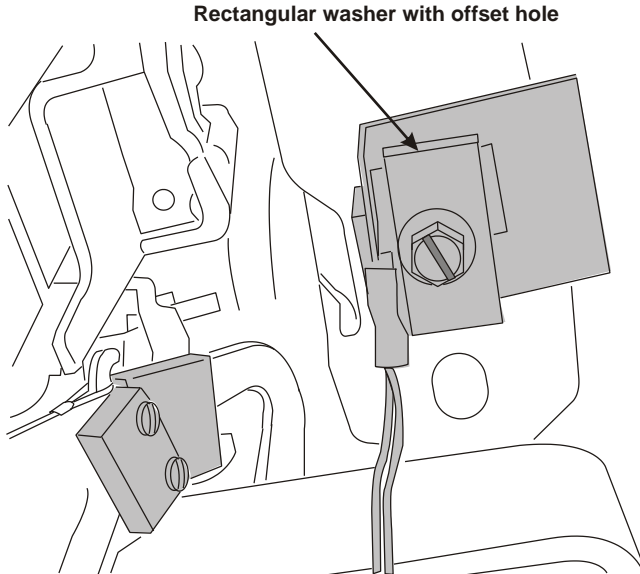
- Locate the OEM hole under the dash on the support near the transmission arm (Figure 5.3).
- Using a 1/2 inch socket wrench, install and remove the screw for the magnetic switch bracket in the hole to tap threads in the hole.
- Mount the switch bracket to the frame under the dash. Note the location of the rectangular washer, the hole is offset to provide more clearance (Figure 5.4).



**Figure 5.2**



**Figure 5.3**



**Figure 5.4**

- Slide the bracket all the way to the right. Use a screwdriver to hand-tighten the screw as a socket will push the bracket to the left.



- Shift the transmission back into park, being careful not to hit the switch.
- Slide the switch to the magnet and align the two pieces. This alignment does not need to be perfect and the magnet and switch should not quite touch (Figure 5.5). Tighten the screw with a screwdriver.

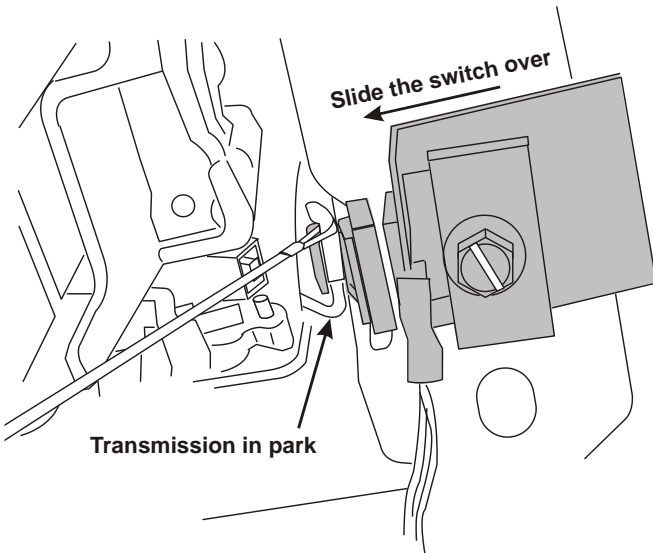


**To prevent damage to the switch, check the spacing between the magnet and switch while holding the shift lever as far past the PARK position as it will go.**

- Connect an Ohmmeter to the two black wires from the magnetic switch. In park, there should be less than 2 Ohms resistance. In all other gears, the resistance must be greater than 20 M-Ohms.
- If you do not have an Ohmmeter, connect 12 volts to one wire and a test light probe to the other. The light should be on in park and off in all other gears.



**An improperly operating safety interconnect (DDC) can result in inadvertent truck movement during operation.**



**Figure 5.5**

## 5.2 Connecting the Under-hood Wiring

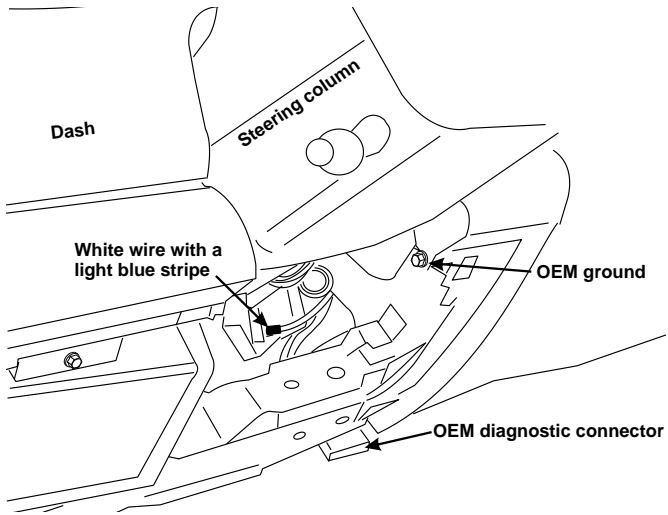
- Make a slit or cut a small cross in a harness boot or other firewall plug and pass the following wires from the cab into the engine compartment:
  - small gray harness with the green connector
  - small gray harness with the black connector
  - white wire with a bullet connector
  
- Route all of the wires along the engine and firewall to the compressor and connect them to the matching connectors on the compressor. Cover the wires with plastic loom and secure them to OEM harnesses and other objects with nylon ties.



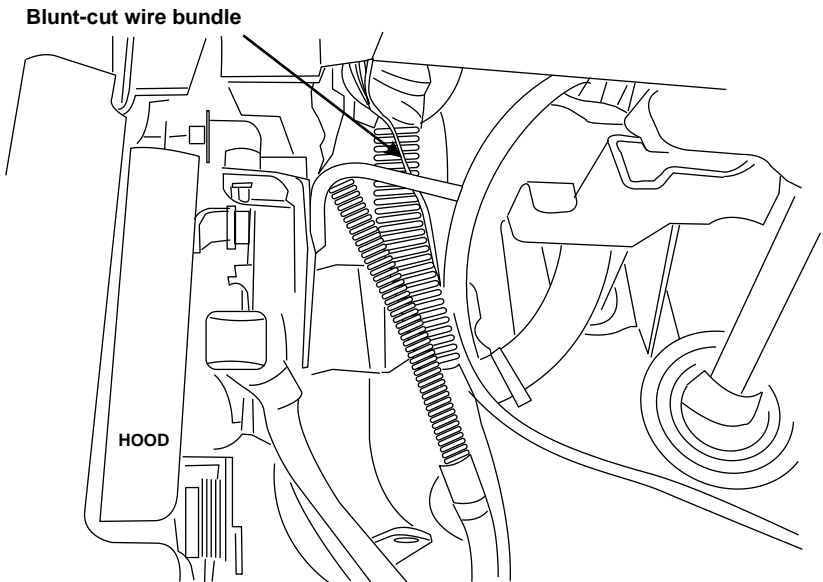
***Avoid the turbocharger and other hot or moving parts.***

## 5.3 Connecting the In-cab Wiring

- Unplug the cable from the throttle pedal assembly and connect it to the throttle control box; connect the throttle control box cable to the throttle pedal assembly.
  
- Connect the white four-wire interface connector to the matching white plug on the harness from the control unit.
  
- Connect the green “ground” wires from the throttle control box and the interface connector to the dashboard ground point above the diagnostic connector (Figure 5.6).
  
- Connect the red wire from the interface connector to the red wire with the matching connector from the throttle control box.
  
- Connect the red “key switched 12V” wire to the OEM white wire with a light blue stripe (CCT #294) under the dash above the OEM diagnostic connector (Figure 5.6) using a butt connector.
  
- Solder and seal the white “OEM Clean Tach out” wire from the throttle control box to the green wire with a white stripe (CTO – Ford CCT #76) in the bundle of blunt cut wires near the park brake (Figure 5.7).



**Figure 5.6**



**Figure 5.7**

### **5.3.1 2005 - 2007 Model Year Manual Transmission**

- Solder and seal the black wire from the interface connector to the green with red stripe wire at the park brake (Figure 5.8).
- Cut the long blue wire to approximately 6 inches, strip and crimp it to the short blue wire with the butt connector.

### **5.3.2 2005 - 2007 Model Year Automatic Transmission**

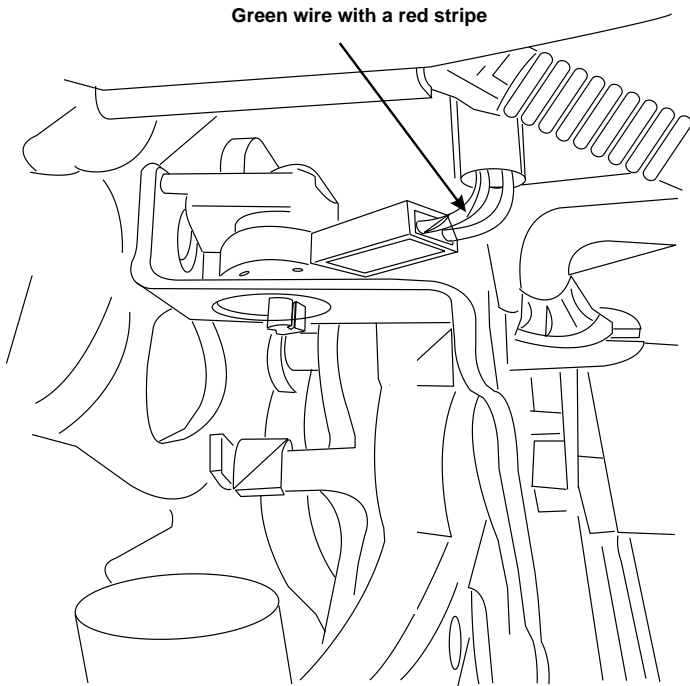
- Solder and seal the black wire from the interface connector to the green with red stripe wire at the park brake (Figure 5.8).
- Tie up the short blue wire at the throttle control box.
- Solder and seal the long blue wire from the throttle control box to the yellow wire with a white stripe in the blunt-cut bundle beside the park brake under the dash (Figure 5.7).

### **5.3.3 2003-2004 Model Year Manual Transmission**

- Solder and seal the black wire from the interface connector to the green with red stripe wire at the park brake (Figure 5.8).

### **5.3.4 2003-2004 Model Year Automatic Transmission**

- Solder and seal the black wire from the DDC to the green with red stripe wire at the park brake (Figure 5.8).
- Connect the remaining black wire from the DDC to the black wire from the interface connector.



**Figure 5.8**

## **5.4 Completing and Testing the Installation**

- Check all wiring to ensure that it will not contact any hot or moving components and will not interfere with the operation of the truck. Secure all wiring with nylon ties and loom as required.
- Install and connect the batteries.

### **5.4.1 Safety Test**

- Place the automatic transmission in Park or manual transmission in neutral and apply the park brake. Turn the ignition key "ON" but do not start the engine.
- Check the control box to see if there is a number showing in the hour-meter. If there is no display, there is no power to the control box.

- Push the ON button on the control box. The green light will illuminate and the compressor clutch will engage.
- Release the Park brake. The green light will flash, "Park Brake" will show on the display and the compressor clutch will disengage. Apply the park brake. The green light will stop flashing and the compressor time will be displayed. After 20 seconds, press the ON button. The green light will illuminate and the compressor clutch will engage.
- On trucks up to 2005 with automatic transmissions, shift into Reverse from Park. The green light will flash, "Park Brake" will be displayed and the compressor clutch will disengage. Shift back to Park, wait 20 seconds and press the ON button. The green light will illuminate and the compressor clutch will engage. Repeat this test for all transmission selector positions.
- On 2005 - 2007 trucks, the engine must be running to complete the final step in the safety test. This will be done after the pre-start checks have been completed.
- Turn the ignition key "OFF".



***If the truck fails the test, check the wiring to make sure that all the connections are correct and secure. If you require additional assistance, contact your local VMAC dealer. Call 1-888-241-2289 or 250-740-3200.***

# Part 6: Finishing the Installation

## 6.1 Before Starting the Engine Checklist

Make sure that the following have been completed:

- Check the coolant.
- Check the compressor oil level.
- Do a final inspection to make sure that everything has been connected and tightened.
- Perform a final belt alignment check.
- Check all wiring for security and protection.
- Install a test tool into the tank outlet and close the ball valve. Place the automatic transmission in park or the standard transmission in neutral and apply the park brake.

## 6.2 After Starting the Engine Checklist



***Place the truck in a safe operating position and block the wheels. Ensure that there are no people around the truck before beginning the test.***

Make sure that the following have been completed:

### 6.2.1 2004 - 2007 Model Year

- Start the engine and allow it to reach operating temperature. Check the compressor system for leaks and proper clearance.
- Press the ON button on the control box. The compressor clutch will engage and engine speed will increase to 2200 RPM and then drop to 900 RPM.
- With the wheels blocked and brake pedal firmly depressed, release the park brake. The compressor clutch will disengage and engine speed should return to base idle. The display on the control box should read "Park Brake".

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- Apply the park brake and press the ON button. Engine speed will increase to 2200 RPM and then drop to 900 RPM.

### **6.2.2 2005-2007 Automatic Transmission**

- With the wheels blocked and brake pedal firmly depressed, switch the transmission from Park to Reverse. The compressor will stay on and engine speed will return to base idle. Repeat this test in all other gear selector positions. Engine speed will return to base idle in all gear selector positions other than park.

### **6.2.3 2004-2005 Automatic Transmission**

- With the wheels blocked and brake pedal firmly depressed switch the transmission from Park to Reverse. The compressor clutch will disengage and engine speed will return to base idle. The display on the control box should read "Park Brake". Place the gear selector in Park, apply the park brake and press the ON button. Engine speed will increase to 2200 RPM and then drop to 900 RPM. Repeat this test for all gear selector positions other than Park.

### **6.2.4 All Trucks**

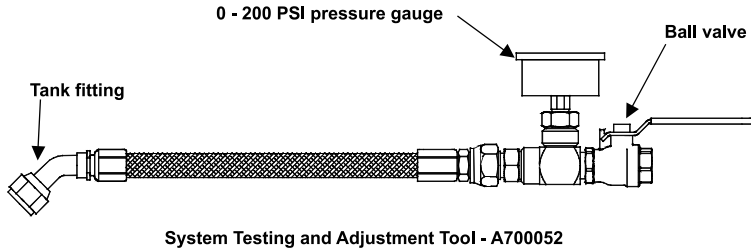
- Operate the system with an air tool for at least 1/2 hour (1 hour preferred).
- Road test the truck for approximately 14 miles (20 km)
- Watch the underhood operation to make sure that belts rotate properly and nothing is rubbing or contacting hot parts.
- Check all components once the engine is turned off and the system has cooled
- Check the coolant after the engine reaches operating temperature.
- Check the compressor oil level after the engine has been shut down and the oil level has had time to stabilize.



## 6.3 Setup, Performance Testing and Adjustments

This system has been adjusted at the factory for general operation. If your tests indicate that adjustment is necessary, refer to the owner's manual for specific instructions on how to adjust the system.

You can test the system operation using the tools that will be operated by the system or you can test operations using an orifice in the outlet to simulate tool use (Figure 6.1).



**Figure 6.1**

1. Install the test tool in the tank outlet fitting.
2. Make sure that the ball valve is closed.
3. Place the manual transmission in neutral or the automatic transmission in park and fully apply the park brake.
4. Allow the engine to run until it is at operating temperature.
5. Operate the air compressor system until the oil is warm.
6. Observe the pressure gauge. Pressure should be approximately 150 psi.
7. Open the ball valve on the test tool and observe the engine tachometer. Engine speed should increase to about 1,800 to 2,200 RPM.
8. Close the air valve slowly to allow the system pressure to rise.
9. Once the system pressure is at maximum, slowly open the ball valve on the test tool until the pressure on the gauge begins to drop. Engine speed should start to ramp-up when air pressure drops to approximately 140 PSI.

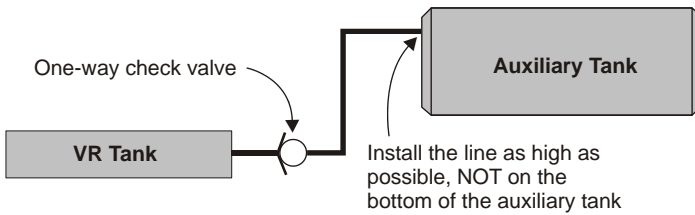
## 6.4 Auxiliary Air Receiver



***If you intend to use an auxiliary air receiver with this system you must observe the following installation procedure to prevent damage to the system.***

The line from the VMAC tank to the auxiliary air receiver must have a one-way check valve installed (part #3600078) to prevent blow back from the auxiliary tank to stop moisture from entering the VMAC tank (Figure 6.2).

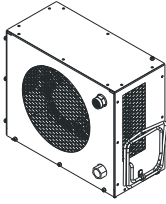
The line to the auxiliary tank must not be installed in the bottom of the tank, but must be installed as high as possible to prevent water from entering the line.



**Figure 6.2**

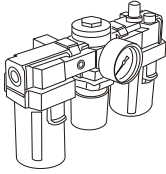
# Accessory Products from VMAC

The following accessory products for your VR compressor system are available from VMAC. For more information or to order these products, call 1-888-241-2289.



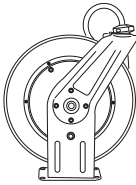
## Eliminator Aftercooler Part Number A800070

Removes up to 80% of moisture from compressed air. Quick installation, automatic drain and compact design



## Filter Regulator Lubricator Part Number A700151

Removes lubricants, water and dirt from the air stream. Adds atomized tool oil to lubricate tools. Reduces pressure for longer tool life.



## Hose Reel Part Number A700007

Secure, compact, retractable hose storage in a sturdy reel.



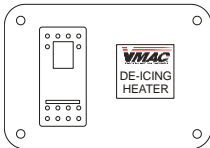
## Air Receiver Tank Part Number A300010

Thirty-five gallon capacity in a compact tank, complete with fittings and a gauge.



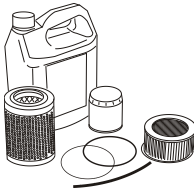
## De-icer Kit Part Number A700031

Insulated rope heater prevents freezing of lines and regulator.



## Service Kits

**VR150 200 hour Part Number A700059**  
**VR150 400 hour Part Number A700060**  
**VR70 200 hour Part Number A700019**  
**VR70 400 hour Part Number A700020**



Using OEM service products will extend the life of your system. Includes oil, filters, seals and O-rings. 200 hour and 400 hour service interval kits are available

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# Warranty Registration

This form must be **fully** completed and returned to VMAC at the time of installation. Warranty may be void if this form is not received by VMAC within **30 days** of installation.



VMAC's Warranty policy and registration can be viewed online at: [www.vmacair.com/warranty](http://www.vmacair.com/warranty)

## VMAC Dealer Information

Company Name: \_\_\_\_\_

City: \_\_\_\_\_ State / Province: \_\_\_\_\_

## Installer Information

Company Name: \_\_\_\_\_

City: \_\_\_\_\_ State / Province: \_\_\_\_\_

Installation Date: \_\_\_\_/\_\_\_\_/\_\_\_\_  
Day Month Year

## Owner Information

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State / Province: \_\_\_\_\_

Zip/Postal: \_\_\_\_\_ Phone #: (\_\_\_\_) \_\_\_\_ - \_\_\_\_

Email Address: \_\_\_\_\_

## Vehicle Information

Year: \_\_\_\_\_ Make: \_\_\_\_\_

Vehicle Identification Number: \_\_\_\_\_

Unit #: \_\_\_\_\_

## Product Information

System Identification Number: **V** \_\_\_\_\_

Compressor Serial Number: **P** \_\_\_\_\_

Throttle Control Serial Number: \_\_\_\_\_

AOST Serial Number: \_\_\_\_\_

## Submitted by

Name: \_\_\_\_\_ Contact: \_\_\_\_\_



Manufactured by



**PH** 250-740-3200  
**FX** 250-740-3201  
**TF** 1-800-738-8622

1333 Kipp Road, Nanaimo, BC, V9X 1R3 Canada

[www.vmacair.com](http://www.vmacair.com)