

Installation Manual for VMAC System V900086

International 2005 – 2007 4300-4400
DT466 Diesel

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Installation Manual for VMAC System V900086

International 2005 – 2006 4300-4400 DT466 Diesel

Changes and Revisions

Version	Revision Details	Revised by/date	Approved	Implemented
00	New format	IB 16 Mar 2005	BC/SM 31 Mar 2005	1 Apr 2005
a	Coolant tube change	IB 22 Apr 2005	BC/SM 25 Apr 2005	28 Apr 2005
b	bracket mounting spacers	IB 16 Jun 2005	BC/SM 20 Jun 2005	22 Jun 2005
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d	ECN 06-151	IB 12 July 2006	SC 18 July 2006	21 Jul 2006

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 vehicles must follow standard shop practices.

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.

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 1-800-738-8622.

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VMAC – Vehicle Mounted Air Compressors

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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 vehicle. 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 Coding

Different frame designations will affect the tank mounting position. If you have to move the tank, the lines may be too short. Measure the hose shortfall and order a *Hose Extender Kit*. The following table shows the color code used by VMAC to identify hose diameters.

Hose Diameter	Colour-Coded Label
1/4 inch	Yellow
5/16 inch	Orange
1/2 inch	Blue
5/8 inch	Blue
3/4 inch	Green
1 inch	Green



This system will fit a 215 hp engine with a Borg Warner fan clutch. If your truck has a 245 hp engine and a Horton fan clutch order adaptor pack # A900005.

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Part 1: Preparing for Installation

1.1 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.

- Disconnect the batteries.
- Drain the coolant.
- Remove the front wheel mud shields from the frame and the hood.
- Cut off the molded plastic locking rings securing the lower radiator hose to the radiator and the engine on the passenger side, remove and discard the lower hose.
- Cut off the molded plastic locking ring securing the upper coolant hose on the driver side of the radiator. Disconnect the hose from the radiator.
- Remove the fasteners securing the coolant tube to the timing cover. Remove the coolant tube with the hose attached. Cut off the plastic molded locking ring securing the hose to the tube and remove the hose.
- Cut the OEM hose as shown in Figure 1.1
- Remove the two bolts from upper coolant tube thermostat flange and discard the fasteners. Remove the coolant tube and hose from the timing cover. Replace the OEM bolts.
- Remove the fan (left hand thread).
- If the truck has a fan shroud mounted to the engine, remove it along with all mounting brackets.

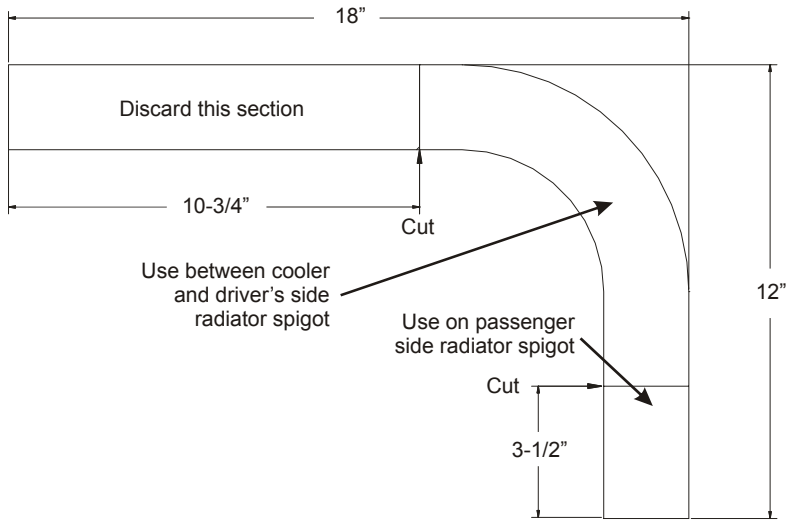


Figure 1.1

- Remove the following four OEM 8 mm bolts from the left side of the timing cover (Figure 1.2):
- one with a small L-bracket for the coolant fill hose
 - one directly above
 - two below and inboard

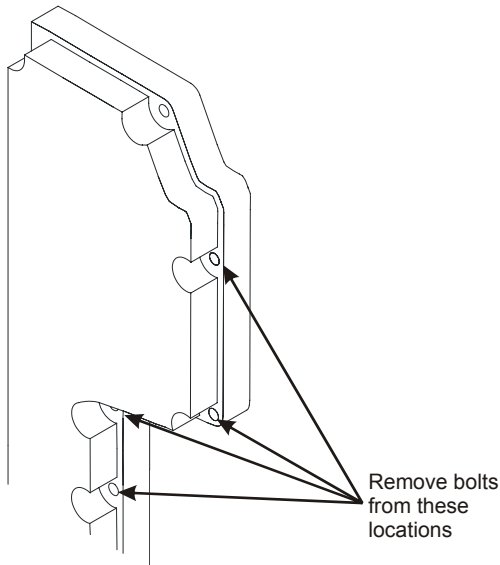


Figure 1.2

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There may be a heat shield installed over the timing cover fastened with the highest inboard fastener at the bottom of the cover.

- Drain the power steering reservoir, disconnect the hoses, remove it from the frame and remove the OEM mount bracket.
- Remove the coolant expansion tank from the radiator.
- Remove the small coolant fill hose L-bracket from the cross-beam under the engine.
- Remove the air intake tube between the Intercooler and the engine.
- Remove and discard the six OEM bolts from the crank pulley. Clean the front surface of the pulley and install the compressor pulley in front of the OEM pulley using the M10 x 40 bolts and washers

Part 2: Installing the Tank



The tank can be mounted using existing locations on the frame or by using the backing strap and bolt method. Depending on your mounting location requirements, you may need a hose extender kit.

2.1 Installing the Tank

2.1.1 Existing Location Method

- Remove the two 1/2 inch bolts on the drivers side that fasten the front of the brake relay valve to the inside of the frame and mount the bracket stamped “FRONT” in this position with the M12 x 45 bolts, washers and nuts (Figure 2.1).
- Measure back 11-1/2 inches from the front bracket bolts and mount the rear tank mount bracket in the two holes in the frame using the M10 x 35 bolts, washers and nuts.

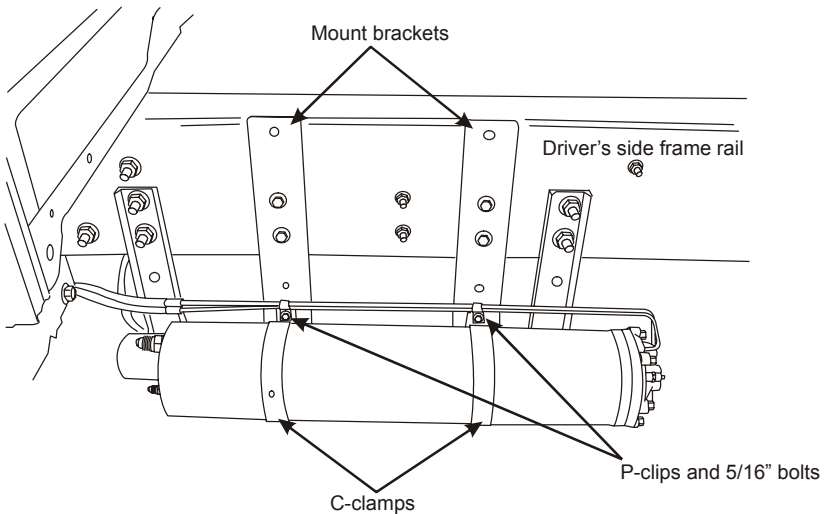


Figure 2.1

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2.1.2 Frame Clamp Method

- Place the mount bracket stamped “Front” in the same approximate position as for the “Existing Location” method.
- Place an inner frame backing strap in position inside the frame, Insert a bolt through the top hole in the bracket, through the backing strap and install washers and a nut (Figure 2.2).
- Install another bolt, nut and washer through the lower holes and tighten securely.
- Repeat this procedure for the rear mount, locating it approximately 11-1/2 inches back from the front mount.

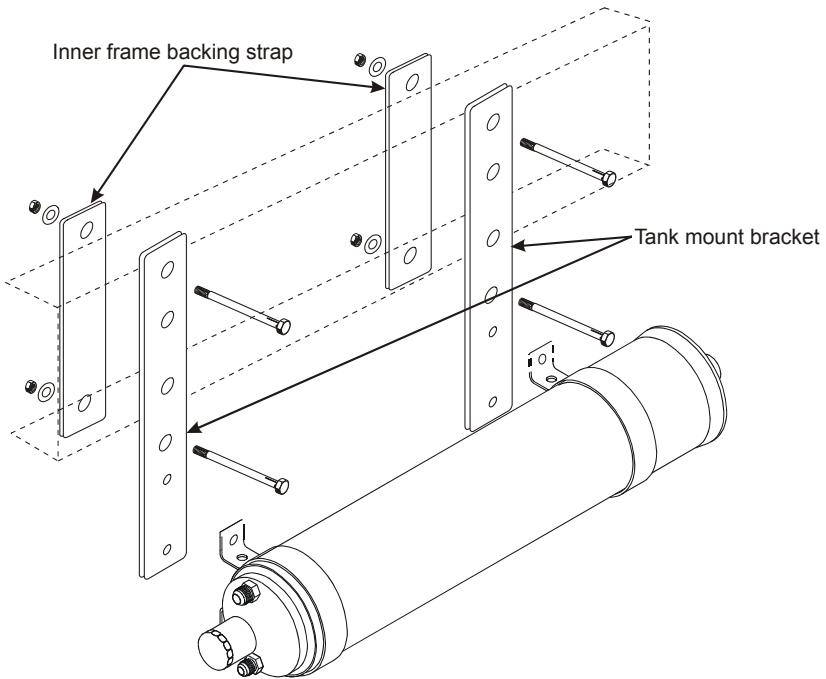


Figure 2.2

- Remove the pinch bolts from the two C-clamps, spread them slightly and slide them over the tank. Install the pinch bolts but do not tighten.

- Place the tank in position on the mount brackets and attach them with the 5/16 inch bolts and flat washers, but do not tighten.
- Position the tank so that the front C-clamp is about 6 inches back from the front of the tank and rotate the tank so that the “UP” arrow points upward.
- Thread the 5/16 and 1/4 inch fittings on the combination steel line/hose assemblies into the matching fittings on the back of the tank, but do not tighten them.
- Place the two P-clips over the steel lines and attach them to the C-clamps using two of the 5/16 inch mounting bolts so that they are parallel to the tank and supported.
- Check the direction of the “UP” arrow and the position of the tank, tighten the pinch bolts securely, then tighten the four 5/16 inch bolts.

2.2 Connecting the Hoses

- Install an outlet fitting in the back of the tank (not supplied).
- Remove the oil filter and the protective cardboard.
- Thread the straight end of the longest 1/2 inch hose to the matching fitting on the tank and tighten.
- Thread the 45 degree end of the 3/4 inch hose to the matching fitting on the tank. Position the fitting so the hose will clear the edge of the battery box and tighten.
- Route all the hoses along the inside of the frame rail and into the driver’s side of the engine compartment.
- Pour some compressor oil into the filter, lubricate the gasket and install the filter. Tighten 1/2-3/4 turn after the gasket contacts the base.

Part 3: Installing the Cooler, Bracket and Compressor

3.1 Installing the Cooler and Coolant Hoses



Coolant flow through the radiator will be reversed once the compressor cooler is installed. Engine cooling will not be affected as the truck uses a cross-flow radiator.

- Remove the horn assemblies from the cross-member under the engine and drill the two 8 mm mounting holes to 13/32 inches.
- Bolt the cooler back plate to the front side of the cross-member with two M10 x 30 mm bolts, washers and nuts through the horn mounting holes.
- Install the horns into the holes at each end of the rear of cooler back plate using the OEM bolts.
- Connect the hose on the passenger side of the cooler to the engine water pump spigot.
- Install the short end of the 90 degree hose (cut from the lower radiator hose) on the driver's side fitting on the cooler and the long end on the radiator fitting.
- At the rear of the water pump, measure 3 inches from the water pump fitting along the 3/4 heater hose, cut the hose and install the 3/4 inch plastic tee.
- Connect one end of the 40 x 3/4 inch hose to the tee. Route the hose down and under the engine behind the engine cross beam and connect the other end to the spigot on the driver side of the cooler. Secure the hose with ties.
- Install the short piece of hose (cut from the end of the lower radiator hose) on the passenger side radiator fitting, then insert the steel 90 degree elbow into this hose and angle it upwards (Figure 3.1).

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- Check the thermostat housing location to make sure that the sealing gasket is in place. Install the dual-diameter hose onto the steel elbow and fasten the flange to the thermostat housing with two M8 x 30 socket head bolts.

- Place the large rubber-insulated tube clamps around the elbow and the coolant tube above and below the reducer hose. Fasten them to the coolant tube bracket and fasten the coolant tube bracket in place to support them (Figure 3.1).

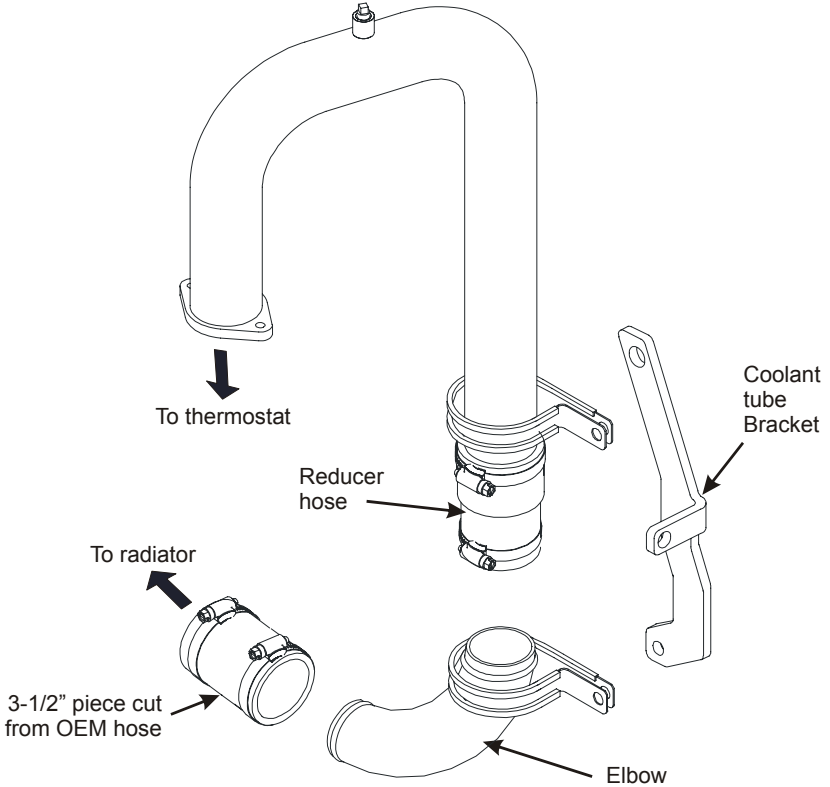


Figure 3.1

3.2 Installing the Bracket and Compressor

- Remove the idlers and the belt tensioner from the mounting bracket (Figure 3.2).
- Check the mounting locations on the timing cover to make sure that they are clean, flat and free of protrusions or rough spots.

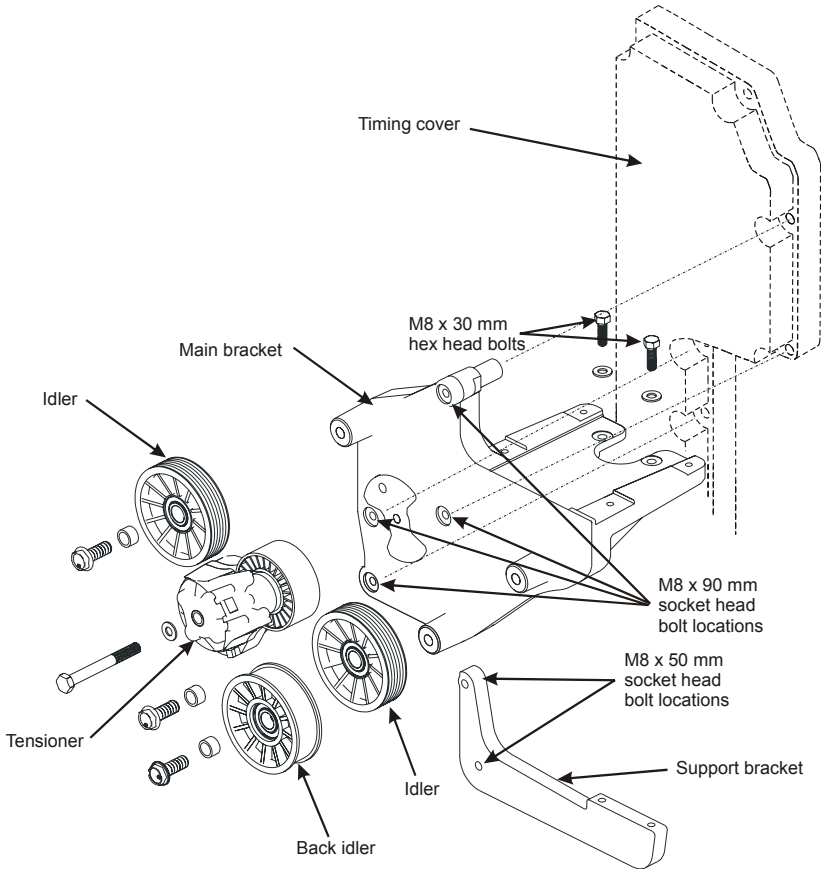


Figure 3.2

- If the timing cover does not have a heat shield, install the thickest supplied spacer onto the shorter mounting post which matches with the upper inboard fastener position. If the timing cover has a heat shield, insert the thinnest spacer between the timing cover and the heat shield.

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- Place the bracket in position and install four M8 x 90 mm socket head bolts through the bracket and into the timing cover. Apply Loctite and thread the serrated 8mm nuts to the bolts at the rear of the timing cover. Torque the fasteners to specifications.
- Remove and discard the two OEM 8 mm bolts holding the fuel delivery pump to the rear timing cover.
- Install the rear compressor support bracket to this location, apply Loctite and install two M8 x 50 mm socket head bolts through the support bracket, delivery pump and into the timing cover, but do not tighten (Figure 3.3).
- Align the support bracket with the two holes in the compressor bracket base plate. Apply Loctite and insert two M8 x 30 mm hex head bolts with washers through the base plate and into the threaded holes in the support bracket. Hand-tighten the two bolts and make sure that the support bracket fits properly under the base plate (you will need a mirror to check the fit).

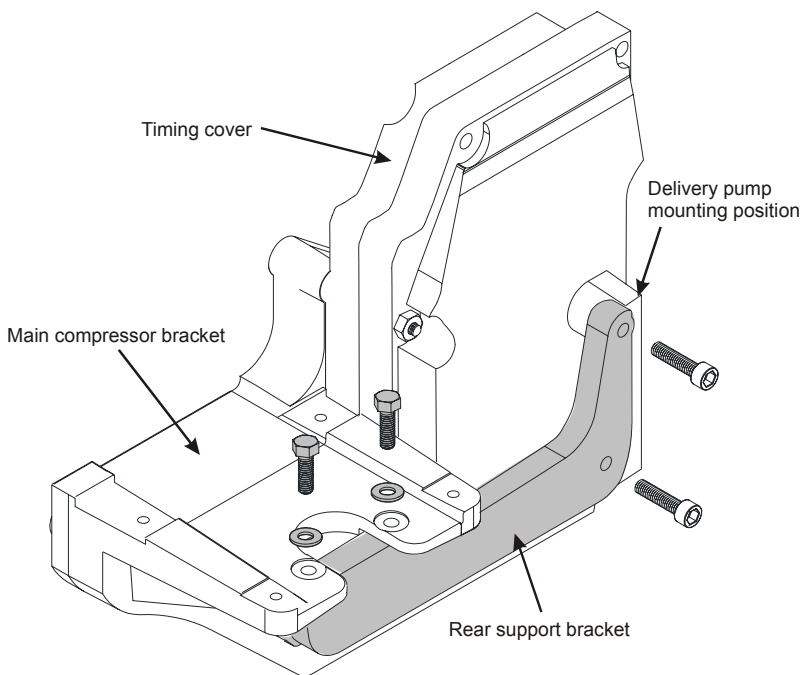


Figure 3.3

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- Torque the M8 x 50 socket head bolts first, then the two M8 x 30 hex head bolts.
- Apply Loctite and install the idlers and tensioner. Torque the fasteners to specifications.
- Remove the four socket head bolts and remove the inlet control valve from the compressor. Immediately cover the opening with a clean cloth or tape.
- Place the compressor on the mount bracket, apply Loctite, thread the four M8 x 120 mm socket head bolts into the base plate and hand-tighten them.
- Check the alignment of the compressor pulley with the crank pulley using a straight edge or laser alignment tool. Correct as necessary by moving the compressor, then torque the compressor bolts to specifications.
- Install the compressor belt (Figure 3.4).

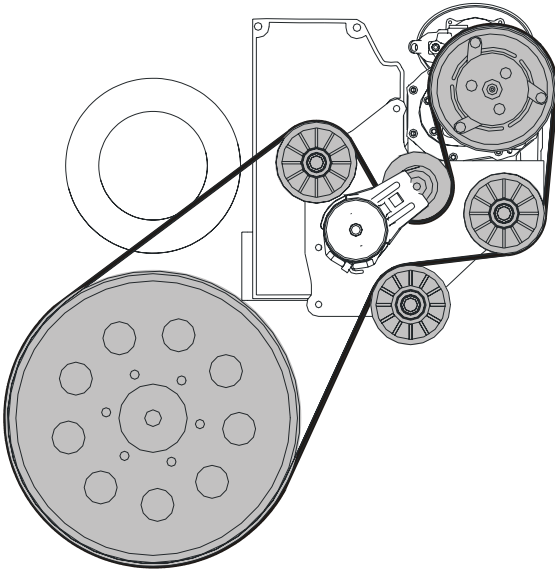


Figure 3.4

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3.3 Connecting the Hoses

- Connect the 3/4 inch hose from the tank to the matching fitting on the compressor.
- Connect the 1/2 inch hose from the tank to the driver's side fitting on the oil cooler.
- Connect the 90 degree end of the remaining 1/2 inch hose to the passenger side fitting on the oil cooler and the straight end to the fitting on the compressor. Route the hose around the steering box to the front, then under the frame to the cooler.
- Tighten all the hose fittings. Check the routing of the hoses to make sure that they are not near hot engine parts and do not contact any moving parts. Protect the hoses as necessary using plastic loom in areas where they might rub.

3.4 Adding Oil to the System



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

- Remove the cloth or tape from the air inlet control valve and pour oil into the compressor. Turn the compressor clutch clockwise to speed the fill process.
- Allow 5 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.
- Install the inlet control valve on the compressor and torque the fasteners to specifications. Connect the 1/4 and 5/16 inch hoses to the matching fittings on the compressor.



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

3.5 Completing the Installation

- Install the metal coolant tube support bracket and rubber clip to the threaded hole in the front passenger side of the timing cover just below the alternator. (This may be the top bolt locating the passenger side lower fan shroud mounting bracket on some models).
- Install the replacement bracket on the power steering reservoir and bolt it back to the original location using the OEM bolts
- Connect the hoses and route the small hose around the outside of the windshield washer bottle. Fill the reservoir.
- Install the fan and shroud.
- Install the OEM hose between the intercooler and the engine intake on the driver side and the intercooler tube on the passenger side of the engine.
- Install the coolant expansion bottle to the front of the radiator and secure the coolant fill hose under the engine using ties.
- Fill the cooling system to manufacturer's specifications.
- Install the front wheel mud shields.

Part 4: Installing the Control Components

4.1 Installing Components

- Remove the screws holding the plastic door sill trim in place on the floor inside the driver's door. Remove the plastic pin near the seat belt base and remove the trim.
- Remove the plastic cover from the Electrical System Controller on the driver's side kick panel to the left of the brake pedal.
- Remove the rear seat rail bolt and fasten the control box mount bracket to the floor (Figure 4.1).

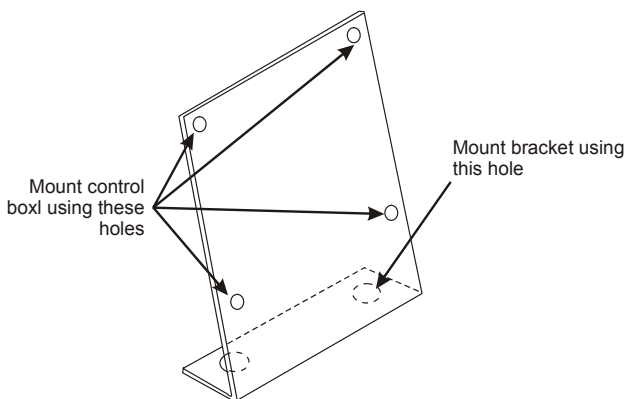


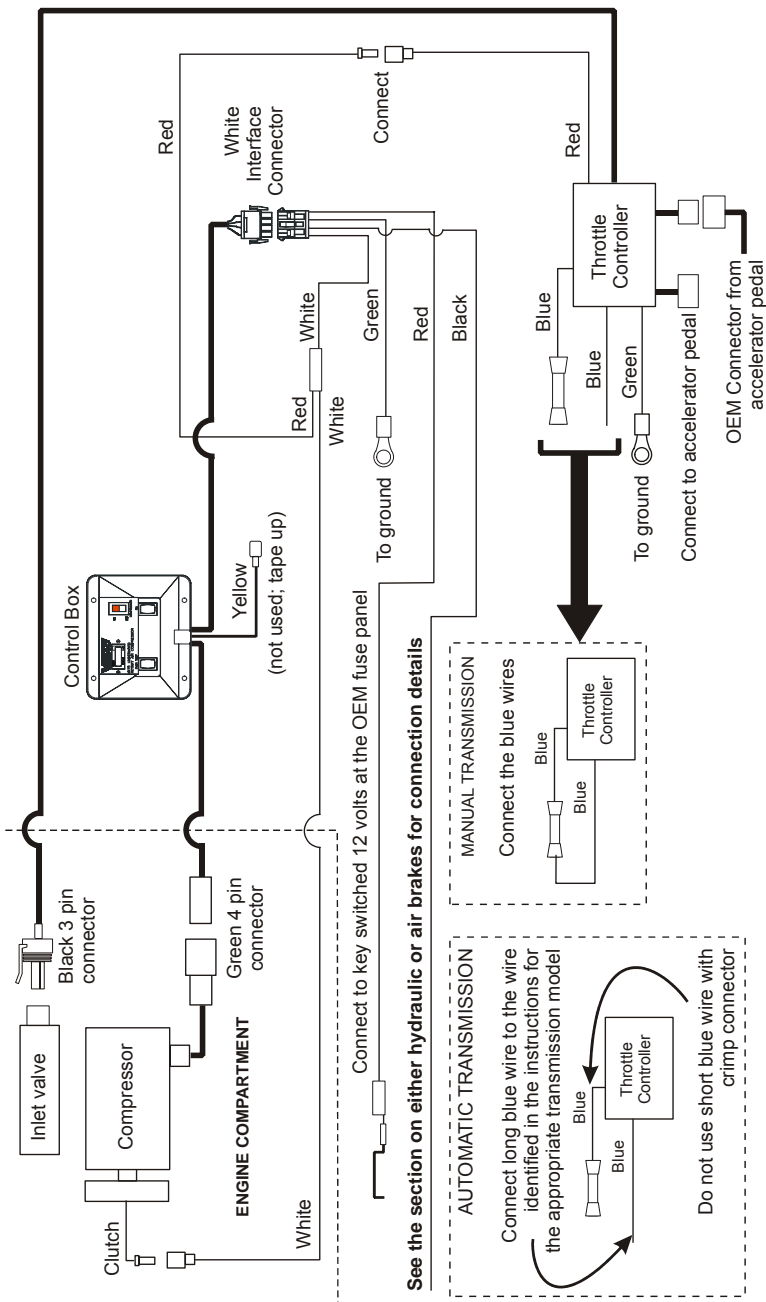
Figure 4.1

- Cut a small slot in the rubber floor mat below the control box mount and feed the wire harness from the control box under the floor mat, along the floor and under the dash.
- Attach the control box to the bracket using four machine screws, with the wire harness coming out from the bottom.
- Mount the throttle box under the dash near the accelerator pedal using nylon ties. Position it so that the adjusting screws are accessible. Avoid mounting it near heating ducts.

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Automatic transmissions with Third Generation Controls and Manual Transmissions

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4.2 Connecting the Wiring

- Connect the two interface cable connectors together.
- Attach the two green wires with the ring connectors to the ground block on the firewall above the Electrical System Controller.
- Disconnect the OEM connector at the accelerator pedal position sensor, and connect it to the connector on the throttle. Connect the black throttle connector to the accelerator pedal position sensor.
- Connect the red throttle wire to the red wire interface cable wire.
- Locate a suitable opening in the firewall and feed the following wires into the engine compartment:
 - white wire with the bullet connector
 - grey wire harness from the control box
 - grey wire harness from the throttle box
 - long blue wire with no connector (automatic transmission only)
- Connect the white wire and the two grey harnesses to the matching connectors at the compressor.
- Protect the wiring with plastic loom and fasten it away from hot or moving parts using plastic ties. Do not route the wiring near the turbocharger.

4.2.1 Identifying Automatic Transmission Controls

THIRD generation automatic transmission controls have one indicator (i.e. N for neutral), FOURTH generation controls have two indicators (i.e. NN for neutral).

4.2.2 Allison Automatic 2000 and 2400 Series with Third Generation Controls

- Route the long blue wire the driver's side of the transmission and solder it to the pink wire labeled "L17E" at pin "G" of the connector at the transmission (Figure 4.2).

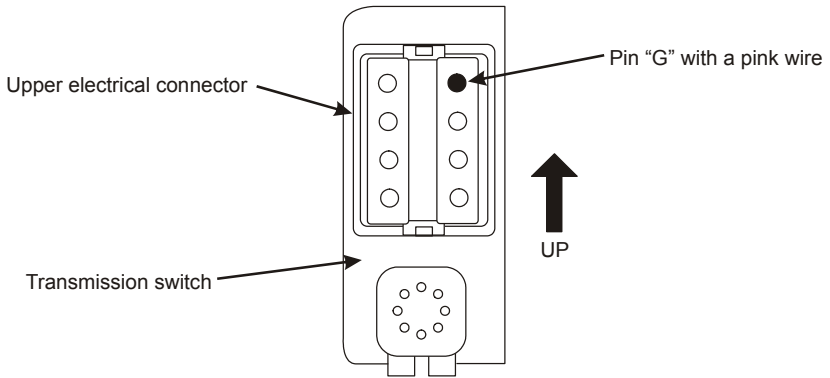


Figure 4.2

4.2.3 Allison Automatic 3000 and 3500 Series with Third Generation Controls

- Locate the transmission Electronic Control Module, usually mounted on a cross-member or on the frame above the transmission.
- Remove the cover. Locate the embossed label on the cast aluminum housing that says "GREY" that identifies a rectangular connector.
- Splice and seal the long blue wire to the tan wire labeled L92#123 at pin 6.



Temporarily connect the battery and probe to confirm 12 Volts in neutral and 0 Volts in all gears.

4.2.4 Allison Automatic 1000, 2000, 3000 and 4000 with Fourth Generation Controls

- Remove transmission harness tape at the transmission control module and locate wire 145.



Temporary connect the battery and probe wire 145. With the engine running, check for continuity to ground in Park and Neutral and an open in all other gears.

- Install DDC 3550675 according to the wire schematic for automatic transmission with FOURTH generation controls and connect the wires as follows:
 - yellow wire from the DDC to the yellow wire from the control box
 - solder and seal the blue wire to wire 145
 - black wire from the DDC to the black wire from the interface cable
 - black wire from the DDC to the park brake

4.2.5 Manual Transmissions

- Cut the long blue wire to about 6 inches, strip the end and connect it to the short blue wire with the butt connector.

4.2.4 Hydraulic brakes

- Remove the cover on the park brake.
- Route the black “Park Brake” wire from the interface connector under the floor mat to the park brake.
- Disconnect the OEM wiring at the park brake, plug it into the matching fitting on the park brake interface wire and plug the connector wire to the park brake switch wiring (Figure 4.3).
- Attach the “Park Brake” wire from the interface connector to the park brake interface wire.

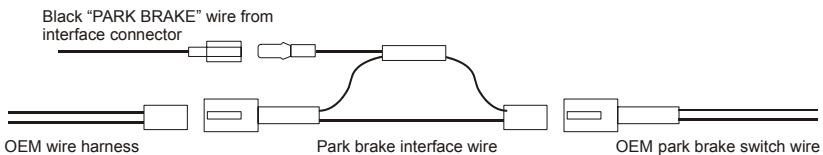


Figure 4.3

4.3 Completing the Wiring

- Connect the battery ground and the white battery lead to the ECM.
- Route the red wire with the fuse holder under the dash to the fuse panel and connect it to a fuse that will provide power only when the ignition switch is in the “ON” position (F15 is one possibility). Use the hot (right-hand) side of the fuse.
- 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.

Part 5: Finishing the Installation

5.1 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 completed and tightened.
- Perform a final belt alignment check.
- Check all wiring for security and protection.

5.2 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. Bring the engine to operating temperature and make sure that the valve on the compressor air tank is closed.

Make sure that the following have been completed:

5.2.1 Trucks with Manual Transmissions

- With the engine running, place the truck in neutral and apply the park brake.
- Place the control box switch in the “ON” position. The green LED should be illuminated and the compressor should be operating. The engine should rev up to 1800-2200 RPM and then idle down to approximately 900 RPM.
- Depress the brake pedal and release the park brake. The compressor should turn off and the green LED on the control box should be off. The engine will drop to idle speed.
- Switch the control box “OFF” and apply the parking brake.

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5.2.2 Trucks with Allison Third Generation Controls

- With the engine running, place truck in neutral and apply parkbrake.
- Place the control box switch in the “ON” position. The green LED should be illuminated and the compressor should be operating. The engine should rev up to 1800-2200 RPM and then idle down to approximately 900 RPM.
- Depress the brake pedal and release the park brake. The compressor should turn off and the green LED on the control box should be off. The engine will drop to idle speed.
- Switch the control box “OFF” and apply the parking brake.
- Shift the transmission into gear. Depress the brake pedal and place the control box switch in the “ON” position. The green LED should illuminate and the compressor should be operating, but engine speed will remain at idle.
- Switch the control box “OFF” and repeat the test in all gear selector locations. Engine speed should only increase in PARK and NEUTRAL.

5.2.3 Trucks with Allison Fourth Generation Controls and DDC

- With the engine, place the truck in NEUTRAL and apply the park brake.
- Place the control box switch in the “ON” position. The green LED should be illuminated and the compressor should be operating. The engine should rev up to 1800-2200 RPM and then idle down to approximately 900 RPM.
- Depress the brake pedal and release the park brake. The compressor should turn off and the green LED on the control box should be off. The engine will drop to idle speed.
- Switch the control box “OFF” and apply the parking brake.
- Shift the transmission into gear. Depress the brake pedal and place the control box switch in the “ON” position. The green LED

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should not illuminate and the compressor will not operate.
Engine speed will remain at idle.

- Switch the control box “OFF” and repeat the test in all gear selector locations. Engine speed should only increase in PARK and NEUTRAL.

5.2.4 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.

5.3 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 5.1).

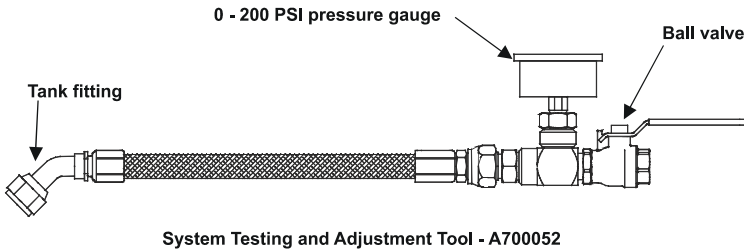


Figure 5.1

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 vehicle to run until the engine 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 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.

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5.4 System Identification and Warnings

The System Identification Number Plate must be attached to the vehicle firewall at the time of installation (Figure 5.2). This plate provides information which allows VMAC to assist in customer inquiries and the ordering of parts. Mark and drill two 7/64 inch holes, then secure the plate under the hood near the driver's door with self-tapping screws.

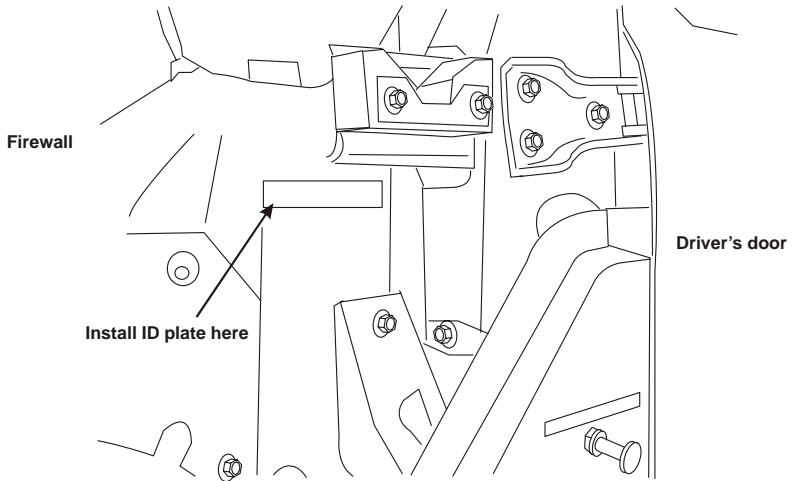


Figure 5.2

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 5.3).

VMAC – Vehicle Mounted Air Compressors

Toll Free: 1-800-738-8622

Fax: 1-250-740-3201



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
3. Check for Leaks

Start Up Procedure

1. Ensure Compressor is OFF
2. Ensure discharge valve is CLOSED
3. Ensure air system is discharged
4. Place vehicle in Neutral or Park and engage vehicle safety features - park brake
5. Start engine and bring up to operating temperature
6. Turn ON compressor

Shutdown Procedure

1. Allow engine to idle for 1 minute
2. Turn OFF compressor
3. Wait for system to discharge for 1 minute before restarting

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



WARNING

Always allow system pressure to discharge before restarting

Figure 5.3

5.5 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 5.4).

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.

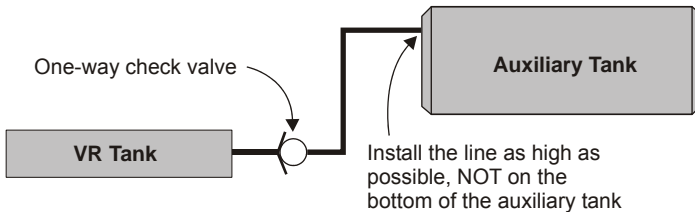


Figure 5.4

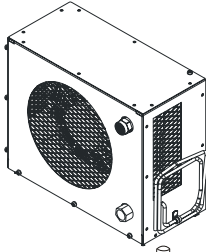
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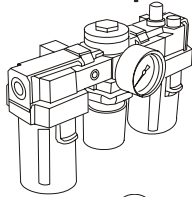
Accessory Products from VMAC

The following accessory products for your VR compressor system are available from VMAC. For more information or to order these products, call 1-800-738-8622.



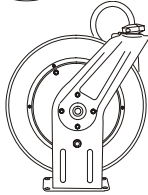
Eliminator Aftercooler

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



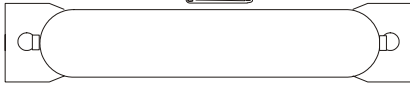
Filter Regulator Lubricator

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



Hose Reel

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



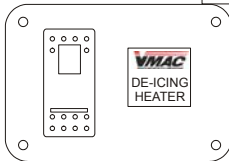
Air Receiver Tank

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



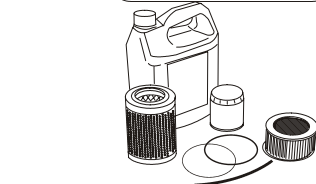
De-icer Kit

Insulated rope heater prevents freezing of lines and regulator.



Service Kits

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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