

# Installation Manual for VMAC System

**VR70 V900121**

**2017 – 2019 Ford Super Duty F-450 – F-550  
6.8 L Gas V10**

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# Installation Manual for VMAC System V900121

2017 – 2019 Ford Super Duty F-450 – F-550  
6.8 L Gas V10

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## Additional Application Information

- V900121: 2017 – 2019 Ford Super Duty F-450 – F-550, 6.8 L V10

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## 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 mechanical work. Any grinding, bending or restructuring operations for correct fit in modified vehicles must follow standard shop practices.

## Notice

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# Safety

## Important Safety Notice

The information contained in this manual is based on sound engineering principles, research, extensive field experience and technical information. Information is constantly changing with the addition of new models, assemblies and service techniques. If a discrepancy is noted in this manual, contact VMAC prior to initiating or proceeding with installation, service or repair. Current information may clarify the issue. Any person with knowledge of such discrepancies who performs service and repair assumes all risks.

Only proven service procedures are recommended. Anyone who departs from the specific instructions provided in this manual must first assure that their safety and that of others is not being compromised and that there will be no adverse effects on performance or the operational safety of the equipment.

VMAC will not be held responsible for any liability, consequential damages, injuries, loss or damage to individuals or to equipment as a result of the failure of any person to properly adhere to the procedures set out in this manual or standard safety practices. Safety should be your first consideration in performing service operations. If you have any questions concerning the procedures in this manual or require any more information on details that are not included in this manual, please contact VMAC before beginning repairs.

## Safety Messages

This manual contains various warnings, cautions and notices that must be observed to reduce the risk of personal injury during installation, service or repair and the possibility that improper installation, service or repair may damage the equipment or render it unsafe.



This symbol is used to call your attention to instructions concerning your personal safety. Watch for this symbol; it points out important safety precautions, it means, "Attention, become alert! Your personal safety is involved". Read the message that follows and be alert to the possibility of personal injury or death. Be alert; your safety is involved. As it is impossible to warn about every conceivable hazard, let good common sense be your guide.



This symbol is used to call your attention to instructions on a specific procedure that if not followed may damage or reduce the useful life of the compressor or other equipment.



This symbol is used to call your attention to additional instructions or special emphasis on a specific procedure.

# Warranty

## Standard Product Warranty

For complete warranty information, including both our standard Product Warranty and Limited Lifetime Warranty requirements, please refer to our current published warranty located at:

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



If you do not have access to a computer, please contact us and we will be happy to send you our warranty.

VMAC's warranty is subject to change without notice.

## Limited Lifetime Warranty

**Effective 1 October 2015** - The Compressor Assembly (excluding Inlet and Clutch, where applicable) is warranted against manufacturer defects in materials and workmanship for the lifetime of the Compressor Assembly. Restrictions apply – refer to VMAC Warranty Policy and VMAC Limited Lifetime Warranty for full details.



## Warranty Registration

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

There are 4 ways warranty forms can be submitted to VMAC:

### Online

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

### Email

[tech@vmacair.com](mailto:tech@vmacair.com)

### Fax

(250) 740-3201

### Mail

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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 engine models and different situations that are listed in the manual. Open the package, unpack the components and identify them.

## Torque Specifications

All fasteners must be torqued to specifications. Use manufacturers' torque values for OEM fasteners. **Apply Loctite 242 (blue) 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	M6	M8	M10	M12	M14	M16
Foot-pounds (ft•lb)	4.5	19	41	69	104	174
Newton meter (N•m)	6	25	55	93	141	236

Table 1 – Torque Table

## Special Tools Required

- Pneumatic fan wrench removal set (such as Lisle® 43300) or a manual fan pulley holder (such as KD Tool® KD3900)

## 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 VMAC 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.

## Ordering Parts

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 1-877-912-6605 or online at [www.vmacair.com](http://www.vmacair.com).

# System Identification, Warranty and Warnings

Preparation for installation is very important. Missing a step or an item can cause problems in the installation or damage to components.

- ☒ ***Check off each item as it is completed so that you do not miss any steps.***
- ☐ Check through the illustrated parts list to ensure that all components are present and that they are in the correct quantity. If any components are missing, have the system ID ready and call VMAC technical support at (888) 241-2289.
- ☐ Complete the warranty form. The VMAC warranty form is located at the back of this manual, as well as online at:

**<http://vmacair.com/warranty/>**

This warranty form must be completed and returned to VMAC at the time of installation for any subsequent warranty claim to be considered valid.



***The System Identification Number Plate must be attached to the vehicle at the time of installation. This plate provides information that allows VMAC to assist with parts and repairs.***

- ☐ Mark and drill 2 x 7/64 in holes in the top of the cross member in front of the hood support. Secure the plate with supplied self- tapping screws (Figure 1).



**Figure 1 - System Identification Plate**



- ☐ As part of the installation process, ensure that the operating instruction label is affixed in an obvious location so that it can be seen by vehicle operators. A good spot for this is usually on the inside of the door or on the panel underneath the steering wheel (Figure 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 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)

4401158-A



### **WARNING**

**Always allow system to  
depressurize before restarting**

**Figure 2 - Operating Instruction Label**

- ☐ To alert any technicians that may service the vehicle, affix the warning label in the engine compartment near the hood latch in a visible location. Thoroughly clean the selected area before affixing the label (Figure 3).



**Figure 3 - Warning Label**

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# Preparing for Installation



***Do not use a test light to probe for power on vehicle circuits, the increased current draw of the test light may damage components.***



***Ensure that you have filled out the VMAC Warranty Registration. Install the System Identification Number Plate and operating instruction label. (Please see page 6 for details).***

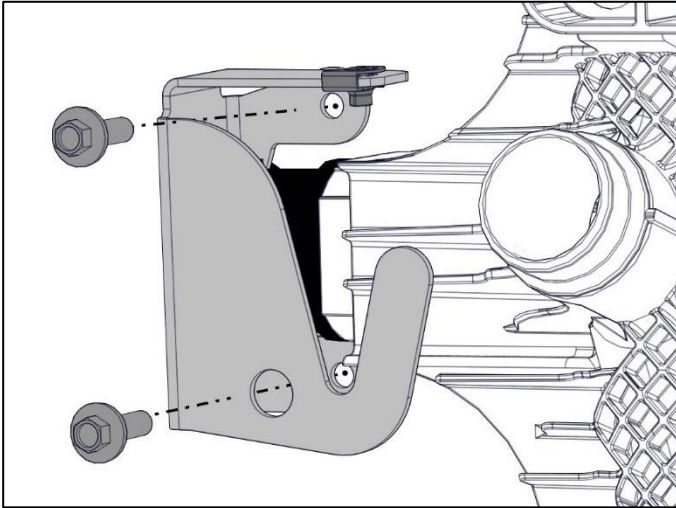
- ☐ Locate the blunt-cut OEM SEIC wire harness, on the passenger side in the foot well. You will need to find the transmission park signal, (Grey wire with Brown stripe).
- ☐ Use a multi-meter to verify the transmission park signal. Turn the key to the IGN2 position, (do not start the truck), so as to supply power to the dash display. The resistance to ground should read close to 0-ohms in park and open circuit in all other gears. If this is correct, put the vehicle in park and turn the key to the off position.
- ☐ Mark the transmission park signal wire for connection later in installing control components section.
- ☐ Disconnect the battery (or both batteries if equipped with dual batteries).
- ☐ Drain the coolant into a clean container and set aside for use later.
- ☐ Remove the upper radiator hose and set aside as this will be modified in a later chapter.
- ☐ Remove the coolant overflow hose from the upper fan shroud.
- ☐ Remove the power steering reservoir from the driver side of the fan shroud, keeping the power steering lines connected.
- ☐ Temporarily tie the reservoir up and out of the way of the shroud.



***The power steering reservoir cap will leak if the reservoir is not kept upright.***

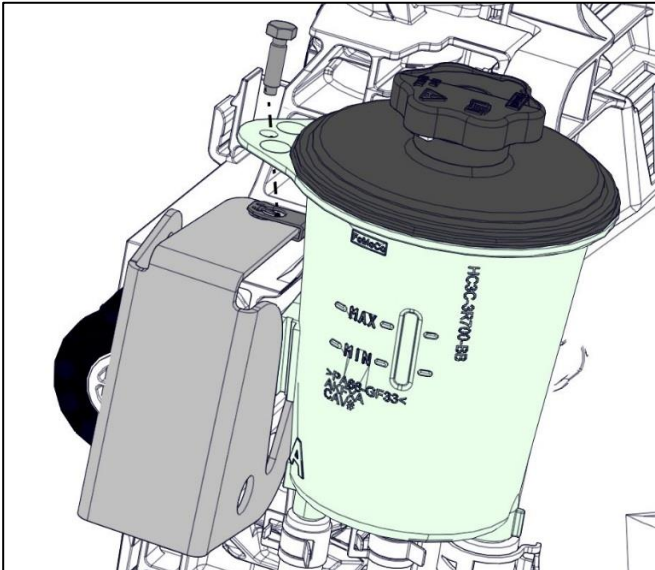
- ☐ Remove the clip nut that the power steering reservoir was fastened to and attach it to the VMAC power steering reservoir bracket.
- ☐ Remove the bolts securing the strap from the upper driver side radiator support but leave the strap in place.

- ☐ Using the OEM radiator strap bolts, fasten the VMAC power steering reservoir bracket over the radiator strap and support (Figure 4).



**Figure 4 – Power steering reservoir relocation**

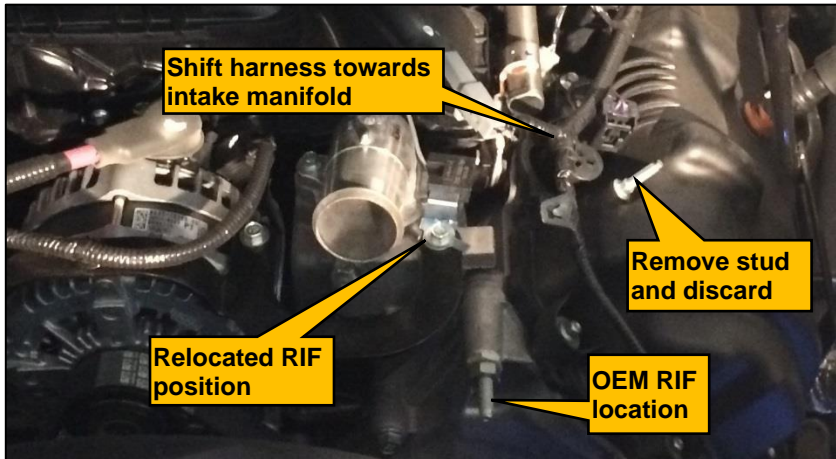
- ☐ Slide the power steering fluid reservoir into the bracket and secure with the OEM bolt (Figure 5).



**Figure 5 – Power steering reservoir relocation**

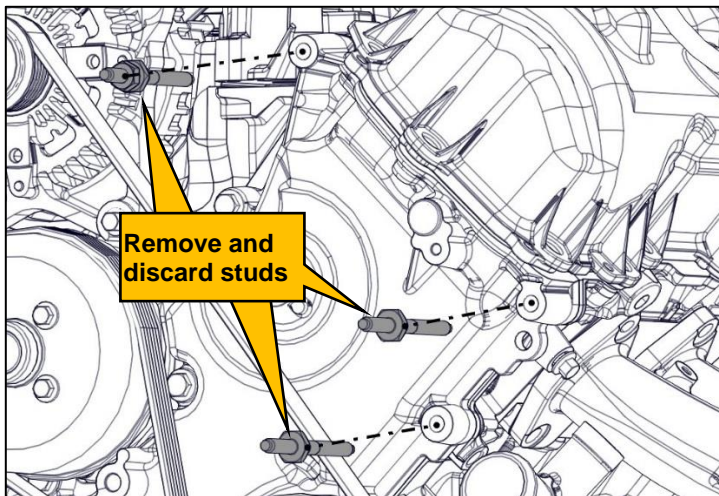
- ☐ Remove the fan using a pneumatic fan wrench (such as Lisle 43300).
- ☐ Unclip the large wire bundle and radiator hose from the lower fan shroud.

- ☐ Remove the entire fan shroud for easiest access.
- ☐ If the engine was equipped with a front lifting eye, remove it and discard as it will interfere with the VMAC main bracket.
- ☐ Remove the bolt securing the oil dip stick
- ☐ Relocate the Radio Interference Suppressor (RIS) to the driver side of the alternator bracket (Figure 6).
- ☐ Shift the harness into the valley between the intake manifold and the valve cover (Figure 6)



**Figure 6 – RIF relocation**

- ☐ Remove the power steering hose support clip and discard.
- ☐ Remove the 3 indicated studs and the power steering hose support clip from the front driver side of the engine and discard (Figure 7).



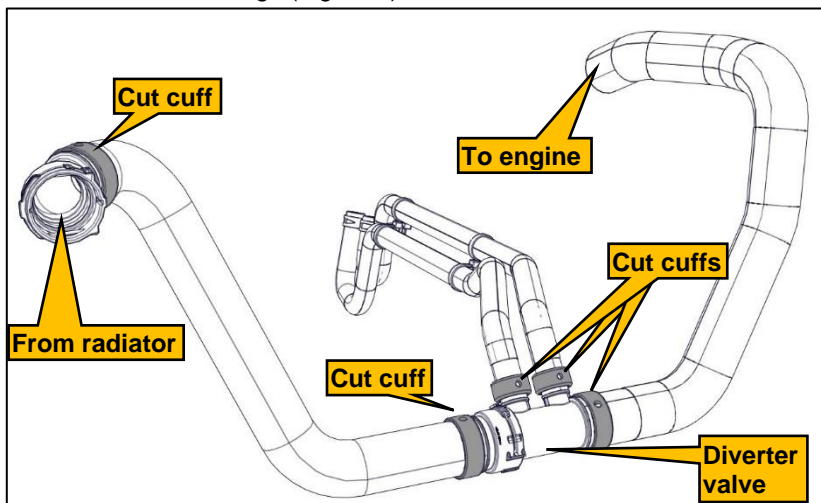
**Figure 7 – Remove accessory studs**

# Modifying the Hoses, Installing the Cooler



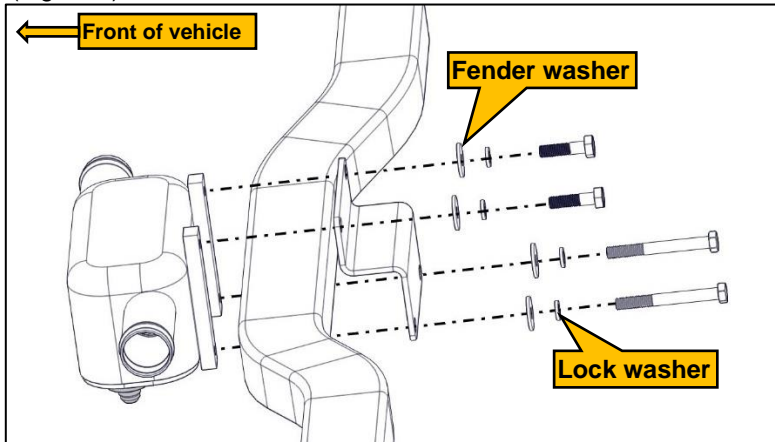
***Do not damage the diverter valve or the hoses as they will be re-used.***

- ☐ Uncouple the lower radiator hose assembly at the engine, radiator and engine oil cooler and remove the assembly from the engine bay.
- ☐ Carefully cut the 5 molded plastic cuffs clamping the lower radiator hose to the oil cooler diverter valve, the lines running to the OEM oil cooler, and the OEM quick connects. After removing the cuffs, separate the hoses from the fittings (Figure 8).



**Figure 8 – OEM coolant hose modifications**

- ☐ Position the cooler in the center of the black front crossmember, below the body coloured radiator support, with the oil ports facing down (Figure 9).

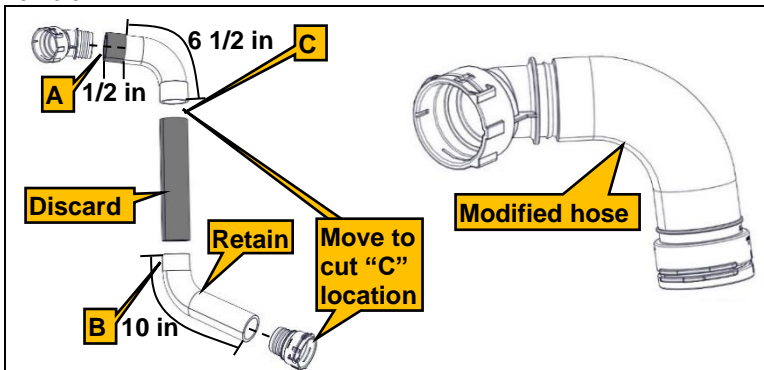


**Figure 9 – Installing the cooler**

- ☐ Apply Loctite 242 (blue) and insert the bolts and washers as shown. The longer bolts are used in the bottom of the cooler (Figure 9).

#### **Lower Radiator Hose Modification**

- ☐ With the radiator side quick connect removed, measure and cut 1/2 in of radiator hose. Re-insert the quick connect and loosely secure it with the supplied hose clamp (cut “A”) (Figure 10).
- ☐ With the diverter side quick connect removed, measure 10 in along the outside radius and cut the hose (cut “B”) (Figure 10).
- ☐ Measure 6 1/2 in from the newly cut “A” along the outside radius towards the center of the hose to remove the center which can be discarded.
- ☐ Move the quick connect removed from the diverter end quick connect to cut location “C”, and loosely secure using the supplied hose clamp (Figure 10).
- ☐ Insert the OEM diverter with the spigots facing towards the rear of the vehicle.



**Figure 10 – Radiator hose modification**

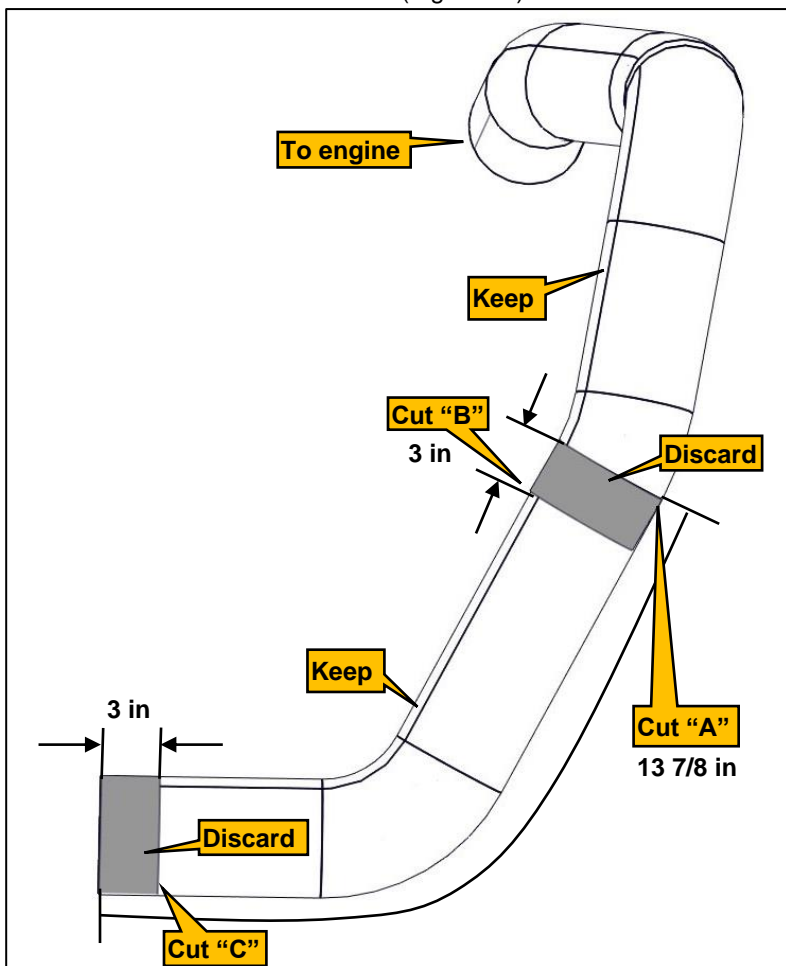
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## Oil Diverter to Engine Hose Modification

- ☐ Measure 13 7/8 in from the divert side of the hose towards the engine side of the hose and make cut "A" (Figure 11).



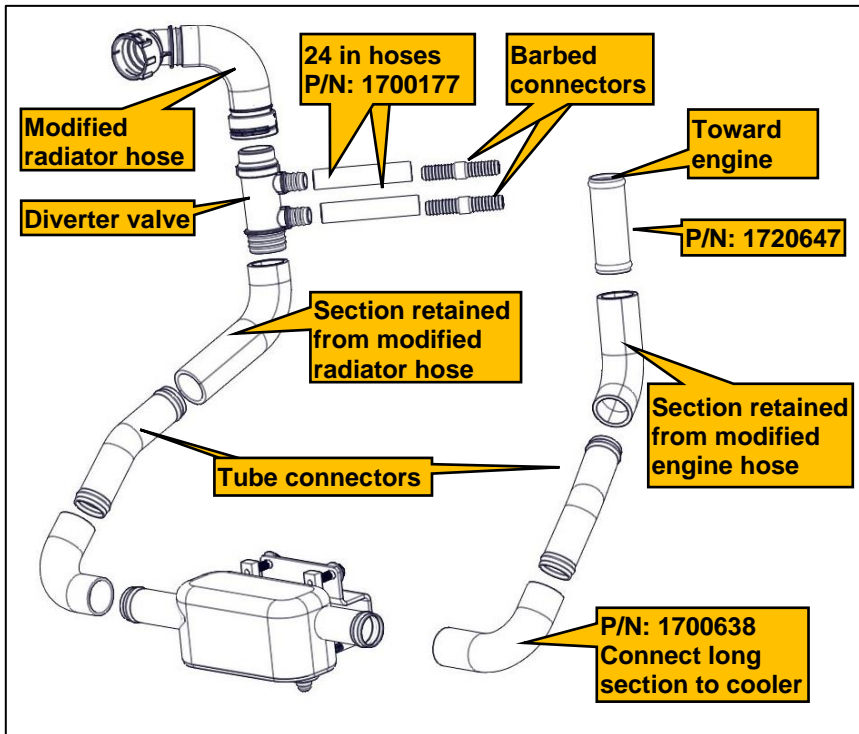
**Figure 11 – Modifying the lower engine coolant hose**

- ☐ From the freshly cut "A", measure 3 in toward the diverter side of the hose and perform cut "B", discarding the 3 in section (Figure 11).
- ☐ From the diverter side of the hose, measure 3 in toward the engine side and perform cut "C", discarding the 3 in section (Figure 11).



- ☐ Install the modified lower radiator hose assembly onto the cooler and adjust the quick connect and hose alignments to remove any twists from the hoses. Once hoses are properly aligned, tighten the hose clamps. (Figure 12).
- ☐ Cut the oil cooler hoses 8 in from the diverter cuffs and extend them with the provided 3/4 in hoses and barbed fittings. When pushing the oil cooler hoses onto the 3/4 in hose barb do not push on the entire way, 1 in of hose barb should be left showing in the centre of the barb. Ensure the hose routing is clear of the crank pulley and secure with hose clamps (Figure 12).

**NOTE** *Apply the mesh loom to the hoses where they pass between the cross member and the radiator support.*



**Figure 12 – Cooler assembly**



## Upper radiator hose Modification

- ☐ Place the upper radiator hose on a bench with the center portion against a flat surface and the quick connect facing away from the flat surface (Figure 13).
- ☐ Measure  $4 \frac{5}{8}$  in towards the quick connect and mark with tape or a grease pen (Figure 13).



**Figure 13 – Modifying the top radiator hose**

- ☐ Rotate the hose so that the engine side of the hose is facing away from the flat surface. Measure  $5 \frac{1}{16}$  in towards the end of the hose and mark with tape or a grease pen (Figure 14).



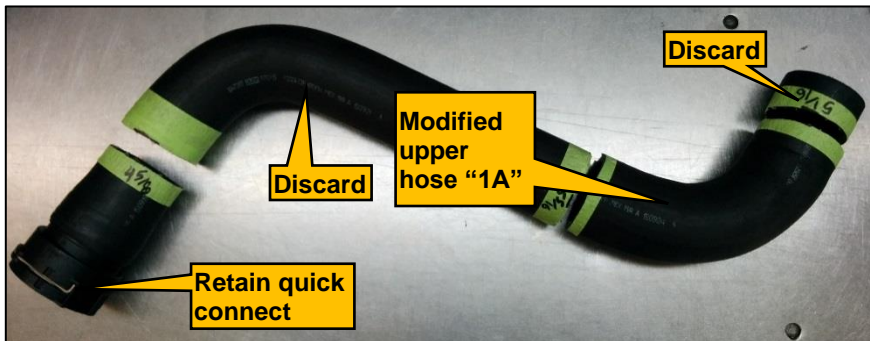
**Figure 14 – Modifying the top radiator hose**

- ☐ Rotate the hose so that the short edge of the engine side of the hose is against the flat surface. Measure 5 5/16 in towards the end of the hose and mark with tape or a grease pen (Figure 15).



**Figure 15 – Modifying the top radiator hose**

- ☐ Cut the hose at the 3 marked locations (Figure 16).



**Figure 16 – Modifying the top radiator hose**

- ☐ Remove the cuff of the quick connect and separate it from the short piece of hose, retaining the quick connect and discarding the short piece of hose.
- ☐ Attach the quick connect to the supplied hose (P/N: 1710873) and secure loosely with a hose clamp. The orientation of the quick connect index will need to be adjusted on the vehicle.
- ☐ The short 90° hose will be referred to later as “hose B” (Figure 16).

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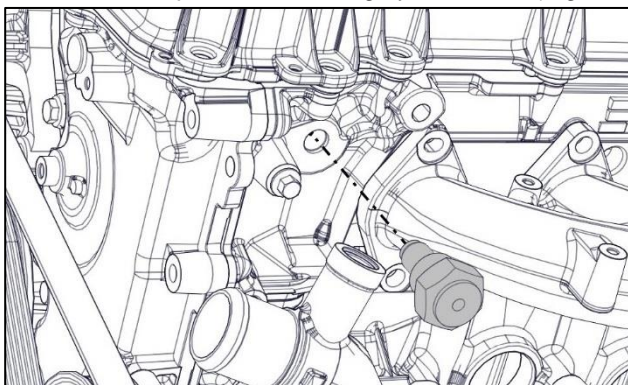
# Installing the Main Bracket and Compressor



*Apply Loctite 242 (blue) to all engine mounted fasteners.*

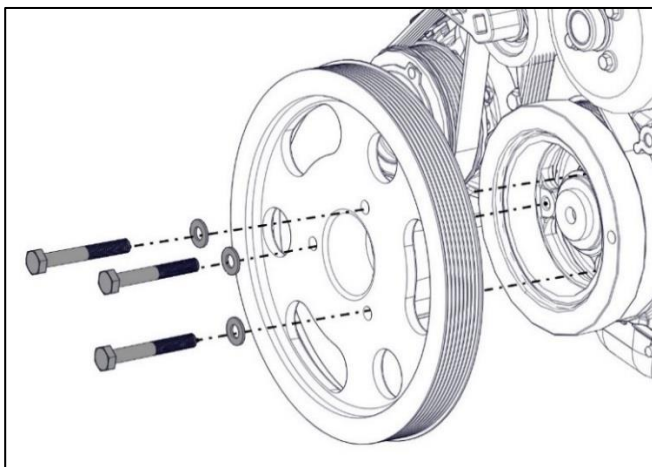
## Main bracket installation

- ☐ Install the 16 mm adaptor into the lifting eye bolt hole (Figure 17).



**Figure 17 – Install adaptor**

- ☐ Clean the face of the OEM pulley, place the VR pulley in position, align the bolt holes and ensure that the pulley is correctly centered on the locating boss (Figure 18).
- ☐ Apply Loctite 242 (blue) and install three supplied M10 x 75 mm bolts and flat washers and torque to specification (Figure 18).



**Figure 18 – Install VMAC crank pulley**

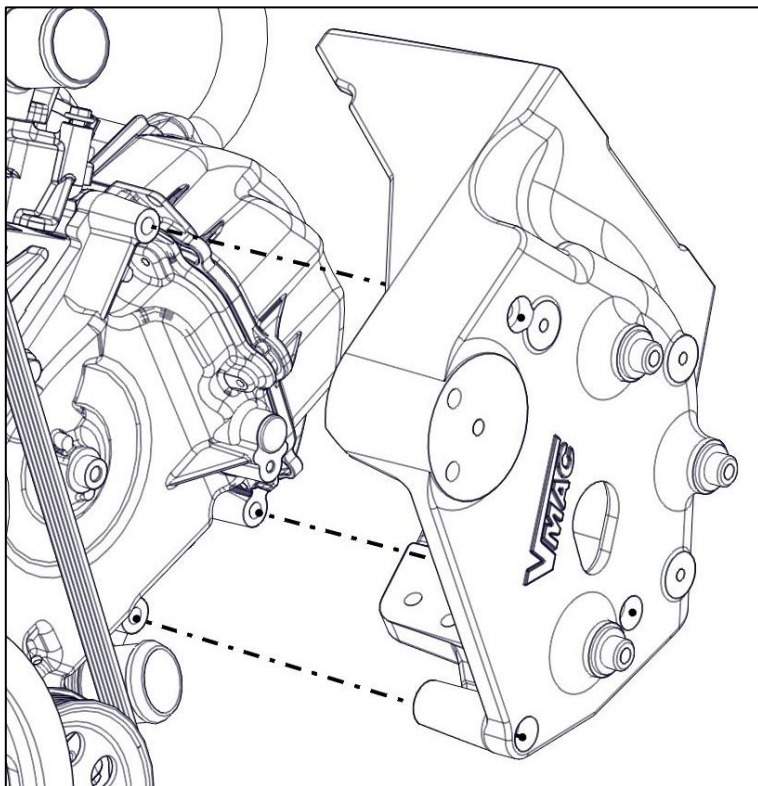
- ☐ Remove the tensioner and idlers from the main bracket and set aside.

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- ☐ Install the main bracket onto the engine over the mounting bosses that the studs were removed from (Figure 19).



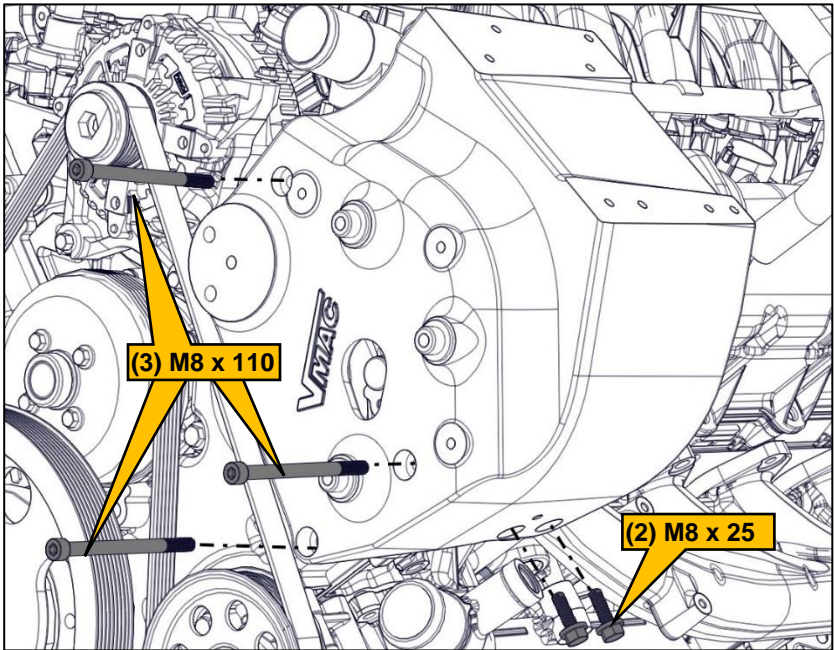
**Figure 19 – installing the main bracket**

- ☐ Position the bracket securely against the engine and install all 5 bolts finger tight (Figure 20).
- ☐ Confirm that the bracket is positioned correctly, is tight against the engine and that no wires are pinched (Figure 20).



***Failure to follow the procedure below may cause excessive stress to the bracket and fasteners which could lead to failure.***

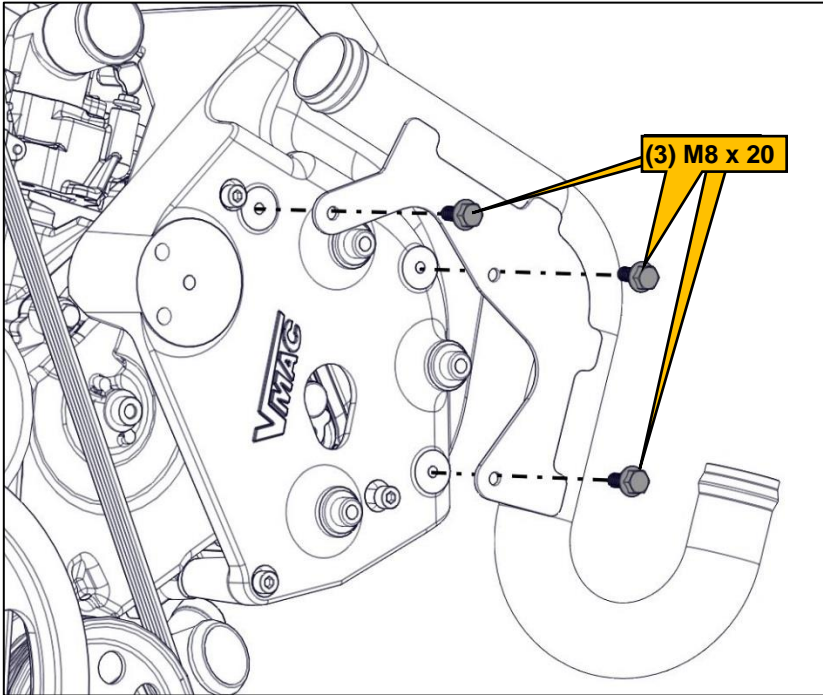
- ☐ Torque the (2) M8 bolts on the side of the engine to specification followed by the (3) M8 bolts on the front (Figure 20).



**Figure 20 – Installing the main bracket**

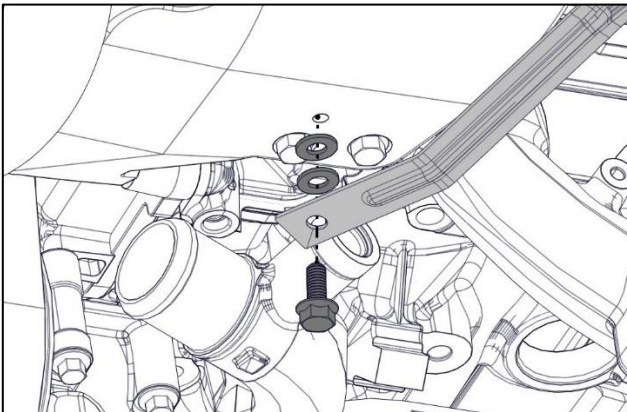


- ☐ Install the radiator tube bracket onto the main bracket using (3) M8 x 20 bolts from the main bracket fastener pack (Figure 21).



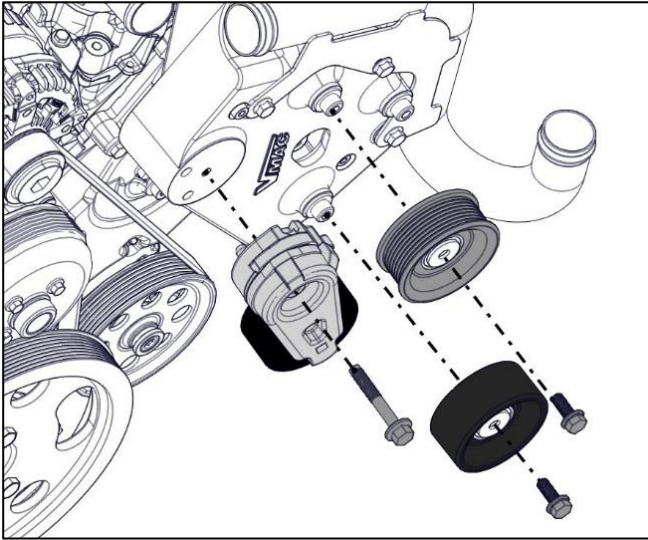
**Figure 21 – Installing the radiator tube bracket**

Attach the oil dipstick brace on the driver side of the main bracket with the remaining M8 x 20 bolt and 2 5/16 in washers from the main bracket fastener pack (The washers will sit in the cavity on the main bracket) (Figure 22).



**Figure 22 – Attaching the oil dipstick brace**

- ☐ Install the idlers and tensioner onto the main bracket (Figure 23).



**Figure 23 – Install the idlers and tensioner**

- ☐ Install the supplied hose (P/N: 171873) with the retained quick connect onto the radiator. Adjust the hose on the quick connect to ensure that the hose is not twisted or kinked and tighten the hose clamp to secure (Figure 24).



**Figure 24 – Installing the upper radiator hose**

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- ☐ Install the modified upper radiator hose “B” between the upper portion of the radiator tube and the vehicle thermostat (Figure 25).



**Figure 25 – Installing the upper radiator hose**



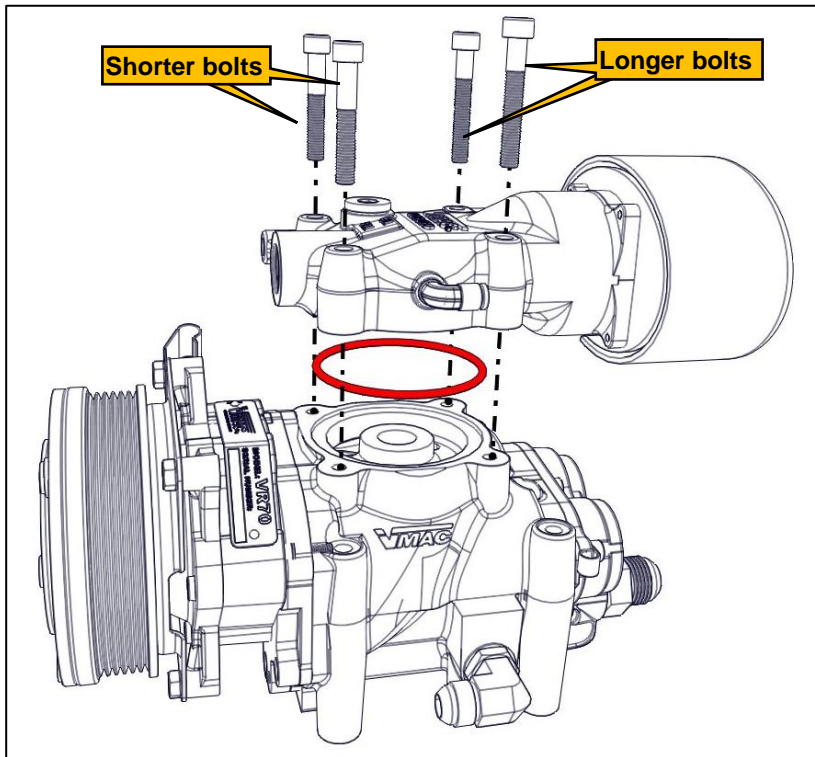
## Installing the Compressor

- ☐ Remove the inlet valve from the compressor and cover the opening to prevent debris entering the compressor.
- ☐ Position the compressor on the mounting bracket and secure with the 4 supplied bolts. Torque to specification.



***The inlet valve is secured with bolts of 2 different lengths. Install the longer bolts nearest to the air filter. Installing the bolts in the wrong location will damage the compressor housing when tightened.***

- ☐ Remove the protective cover from the compressor, re-install the Viton O-ring, and the inlet onto the compressor. Torque to specification (Figure 26).



**Figure 26 – Inlet installation**

- ☐ Install the VMAC drive belt (Figure 27).

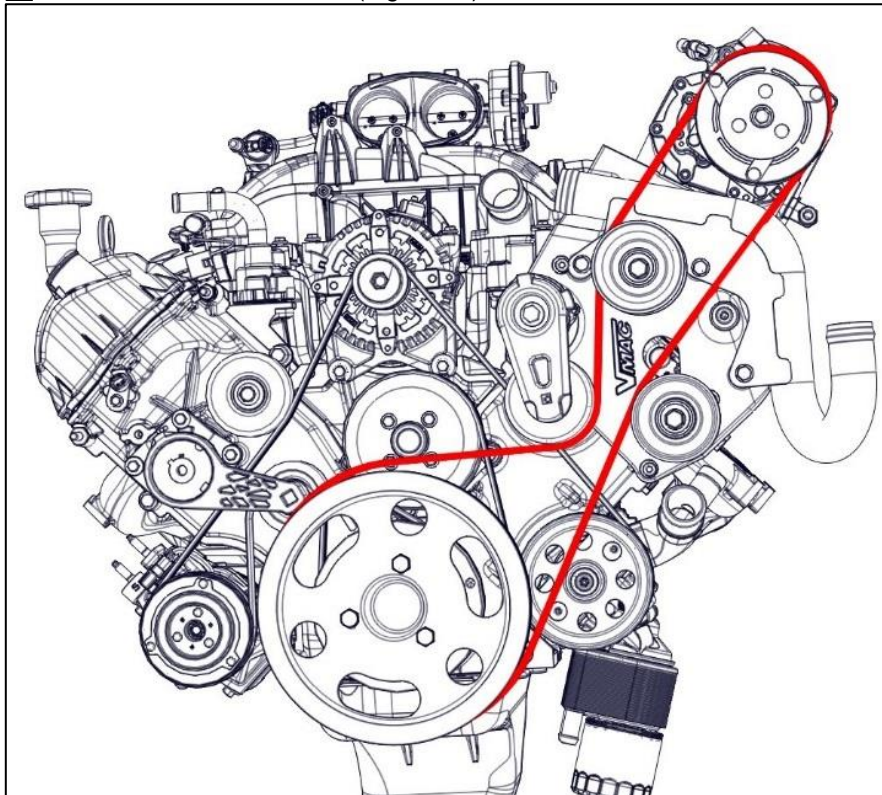


Figure 27 – VMAC belt routing

# Installing the Air Oil Separator Tank (AOST) and Hoses



*Depending on other installed equipment, it may be necessary to move the AOST 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 the warranty.*

*Please contact VMAC for replacement hoses and further information.*



*When installing the AOST tank mounts, care must be used to ensure the harness running along the top of the frame is not pinched.*

The AOST will mount to the passenger side frame rail behind the suspension radius arm mount (Figure 28).

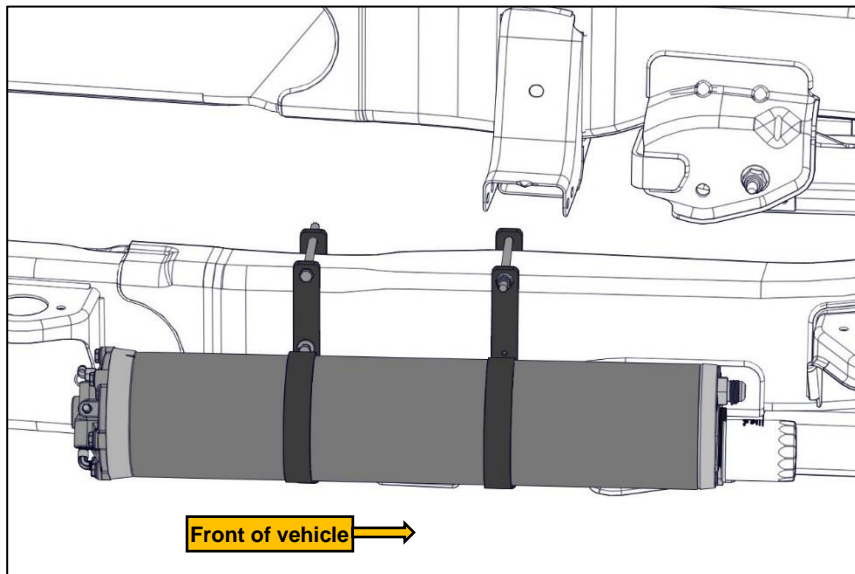
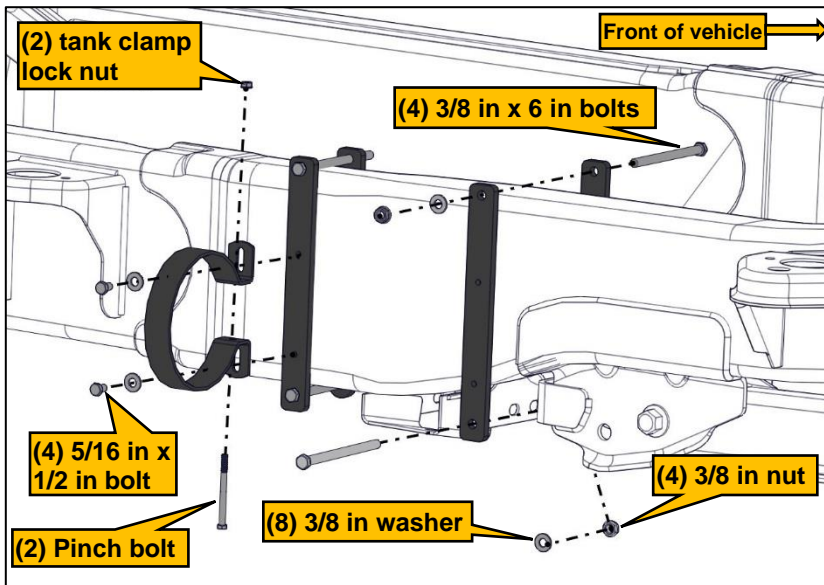


Figure 28 – AOST installed

- ☐ Apply Loctite 242 (blue) to the (2) 3/8 in x 6 in bolts and install the front tank and rear backing strap between the radius arm mount and the transmission crossmember. Leave the bolts finger tight to allow minor adjustment (Figure 28)
- ☐ Apply Loctite 242 (blue) to the (2) 3/8 in x 6 in bolts and install the rear tank mount and backing strap approximately 10 in ahead of the rear cab mount. Leave the bolts finger tight to allow minor adjustment (Figure 28).
- ☐ Remove the tank clamp pinch bolts.
- ☐ Install the tank clamps over front of tank and slide towards center of the tank.
- ☐ Install the tank onto the tank mounts (Figure 29).
  - Adjust the tank in the straps to bring the rear of the tank close to (but not touching) the rear cab mount.
  - Apply Loctite 242 (blue) to the 2 x 3 in x 1/4 in pinch bolts and install them into the mounting clamp.

**NOTE** *The top bolt on the forward tank mount will need to be installed from the inside of the frame.*



**Figure 29 – Installing the AOST**  
(Front tank clamp not shown for clarity)

## Installing the hoses



*When routing hoses, ensure cap-plugs are installed so that contaminants do not get into the line. Take care when routing hoses as a hose failure can damage the compressor and/or cause injury.*



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

- ☐ Route the discharge hose from the compressor down and in between the steering column and brake reservoir (Figure 30).

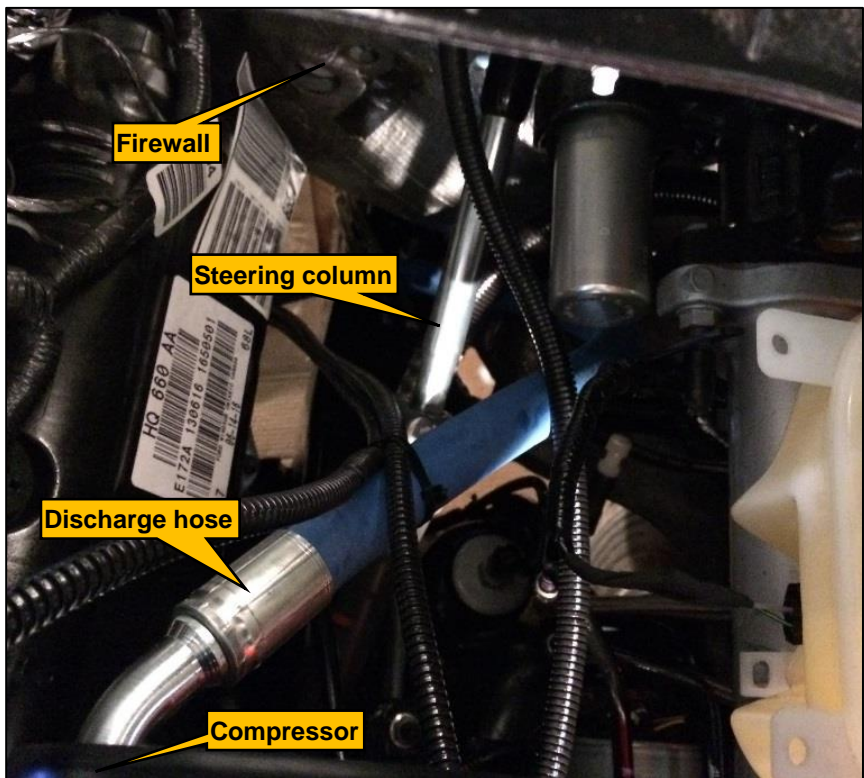
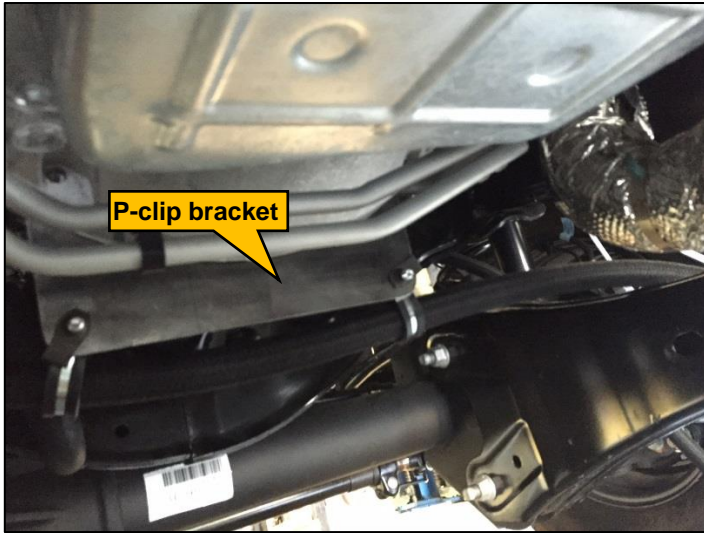


Figure 30 – Routing the hoses

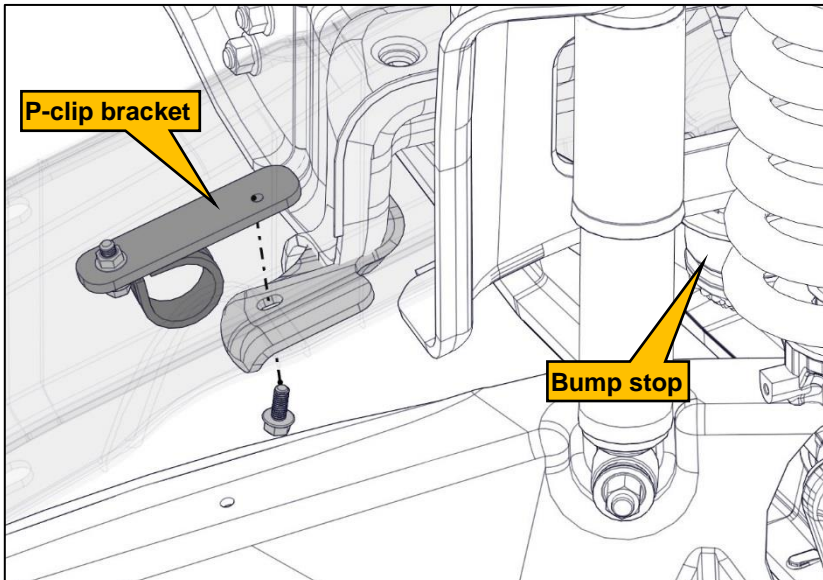


- ☐ Install the bellhousing P-clip bracket (P/N: 1200939) and P-clips on the transmission bell housing. The P-clips should be mounted to the transmission side of the bracket.
- ☐ Route the hose across the underside of the truck through the P-clips (Figure 31).



**Figure 31 – Routing the hoses**

- ☐ Install the frame mount P-clip bracket (P/N: 1200937) and P-clip into the slot in the frame above the radius arm and route the hose to the outside of the frame (Figure 32).



**Figure 32 – Routing the hoses**

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- ☐ The hose will gradually bend 90° to connect the fitting on the front of the AOST.
- ☐ PTFE lines will route back to the firewall, over the engine and meet up with the discharge hose to pass between the frame and the radius arm.
- ☐ Connect the 90° fitting on the longest 1/2 in hose to the driver side fitting of the cooler and route it along the frame to the AOST.
- ☐ Secure the hose to the suspension bump stop using the supplied cable ties.
- ☐ Connect the 90° fitting on the shorter 1/2 in hose to the passenger side of the cooler and run it up to the oil return fitting on the compressor.
- ☐ Adjust the hoses and/or the AOST to minimize sharp bends, contact with any hot, sharp or moving parts, then tighten all fittings and the tank mounts and straps.
- ☐ Bundle the hoses together and secure with cable ties.
- ☐ Move the steering between the left and right lock positions to confirm adequate clearance.

# Installing the Control Components

## Analog Throttle Control Wire Schematic

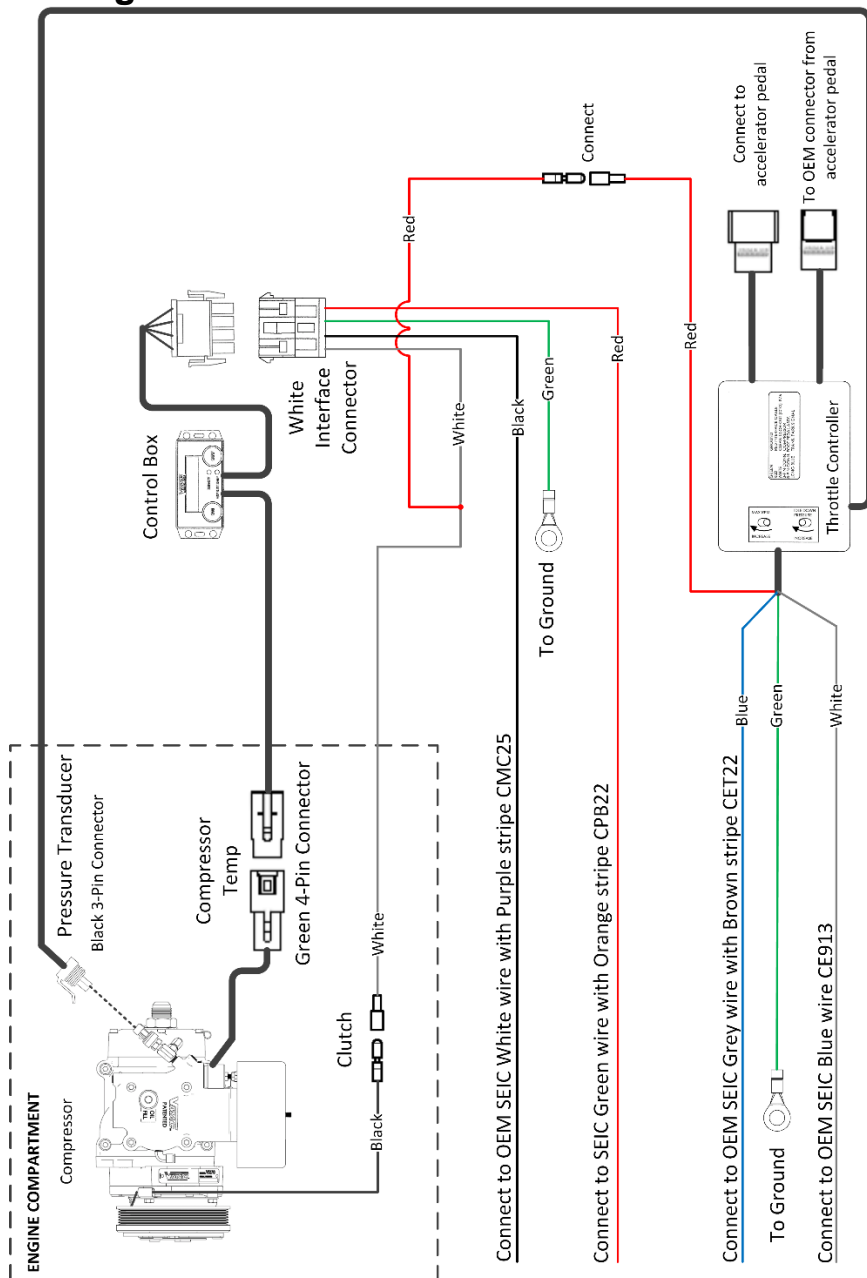


Figure 33 – Electrical schematic (analog throttle control)



# 1Digital Throttle Control Wire Schematic

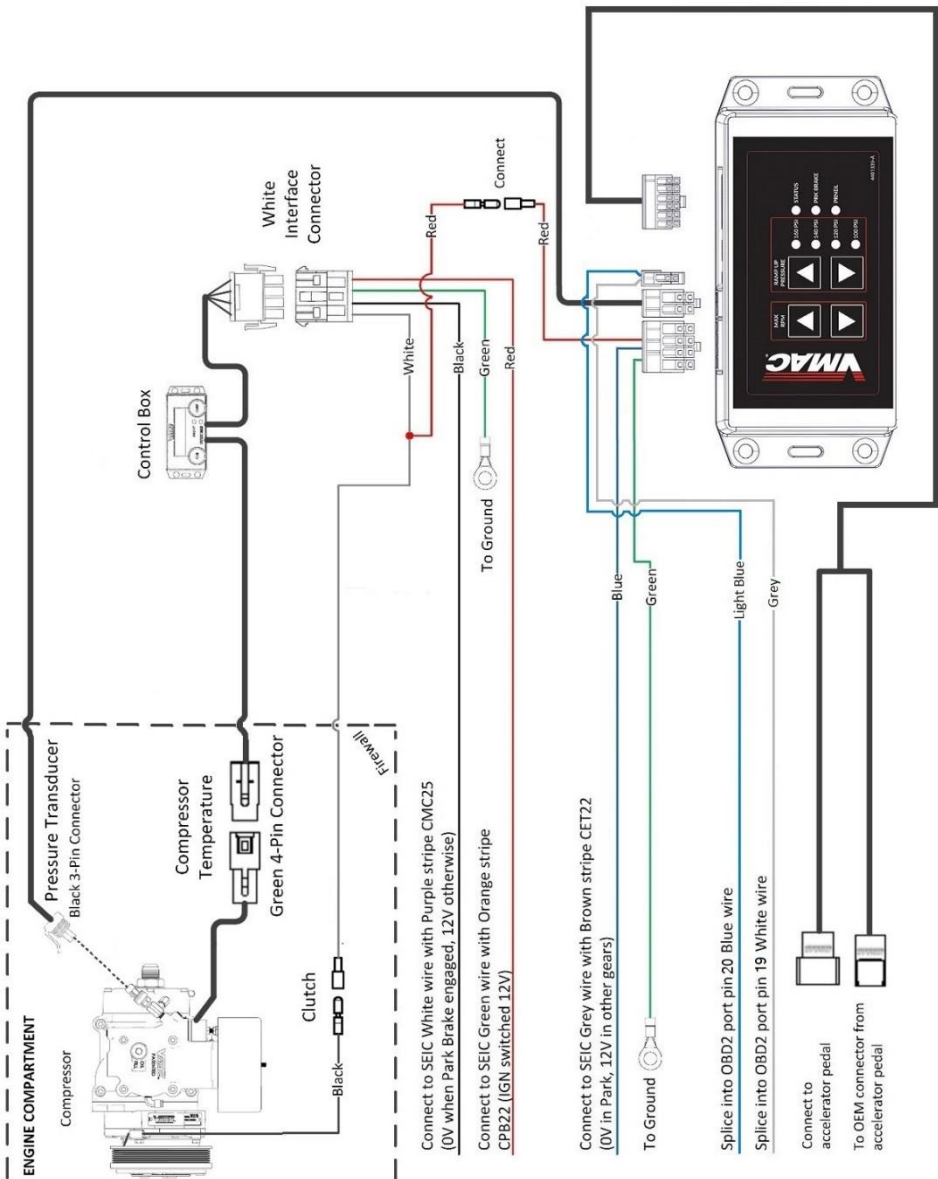


Figure 34 – Electrical schematic (digital throttle control)

**NOTE**

**VMAC recommends using only sealed crimp and solder butt connectors for all electrical connections.**

**To ensure a durable connection, use only good quality crimping tools.**

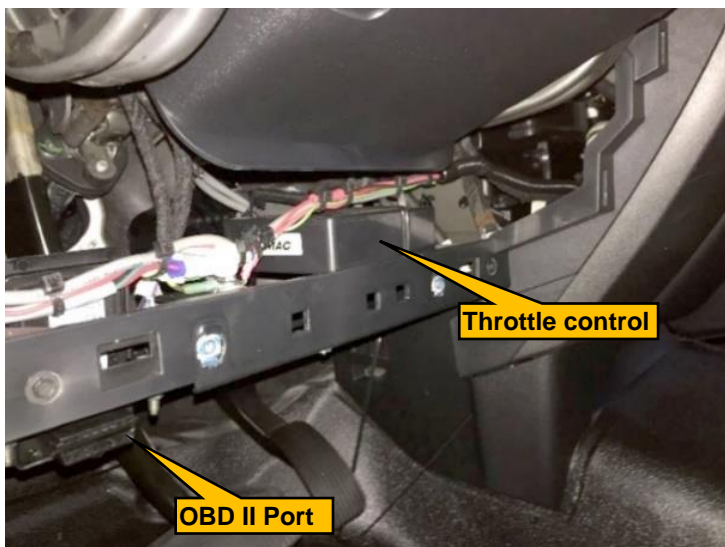


**Keep wires away from the park brake mechanism. Route wires clear of the steering column and pedals so they do not contact moving parts. Before drilling holes, ensure that there are no OEM wires, hoses, or components in the way.**



**Ensure all wires are protected and routed so that they do not contact hot, sharp or moving components.**

- ☐ Remove the plastic trim panel from the driver side doorsill and the kick panel.
- ☐ Install the control box in a convenient location in the cab, positioned so that the wire harness will reach the compressor. The preferred location is between the driver seat and the door.
- ☐ Using the preferred control box location, route the cables from the control box along the doorsill, under the trim panel, behind the kick panel and up under the dash.
- ☐ If routing the cables along the doorsill, a notch may need to be cut into the sill where the cable enters from the control box.
- ☐ Remove the dashboard panel below the steering wheel.
- ☐ Using cable ties, secure the throttle control under the dashboard, away from moving parts and positioned so that the adjusting screws, or the buttons and LED lights, are accessible (Figure 35).



**Figure 35 – Installing the throttle control**

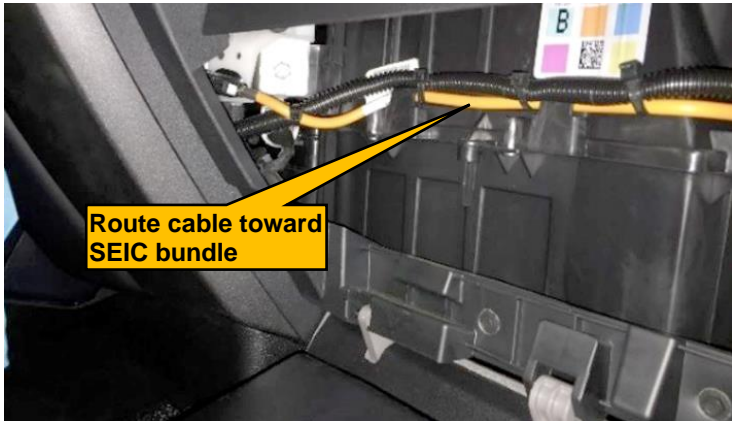
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## Connecting the in-cab wiring

- ☐ Unplug the OEM cable from the accelerator pedal and plug it into the matching connector from the VMAC throttle control. Plug the cable from the throttle control into the matching connector on the accelerator pedal.
- ☐ Connect the red wire from the throttle controller to the red wire with the bullet connector running from the white 4 pin interface connector.
- ☐ Connect the green wire from the VMAC interface cable, and the green wire from the throttle controller harness, to the OEM ground located on the dashboard support.
- ☐ Remove the glove box compartment to gain access to the wire run behind it (Figure 36).



**Figure 36 – SEIC pass through**

- ☐ Route the wires from the throttle control behind the glove compartment, to the SEIC interface located behind the kick panel in the passenger side footwell; secure the wires as necessary using cable ties.
- ☐ Unplug the SEIC pigtail from the SEIC interface plug.
- ☐ Connect the red wire with the butt connector from the interface connector to the green wire with orange stripe (CBP22).
- ☐ Strip approximately 3/8 in from the end of the black wire running from the VMAC 4 pin interface connector.
- ☐ Strip approximately 3/8 in from the end of the white wire with violet stripe (CMC25).
- ☐ Using the supplied butt connector, splice the black wire running from the VMAC 4 pin interface connector together with the white wire with violet stripe (CMC25) .
- ☐ Using the supplied butt connector, splice the blue wire from the throttle control to the grey wire with brown stripe (CET22).
- ☐ **Analog throttle control only:** Using the supplied butt connector, splice the white wire from the throttle control to the blue wire (CE913).
- ☐ Lightly tug the wires to ensure they are properly crimped.
- ☐ Using a heat gun, carefully apply heat to the butt connectors to seal the connection.

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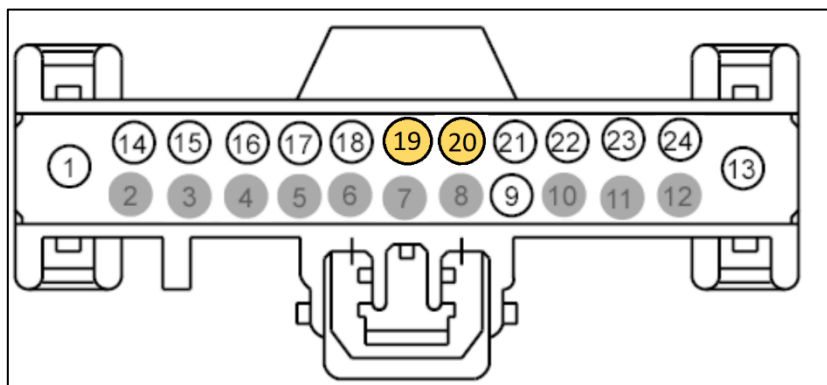
**The following instruction is intended for VMAC digital throttle controllers.**

- ☐ Locate the OBD II port below the steering wheel (Figure 35).
- ☐ Remove the fasteners securing the OBD II port to the dashboard; this provides easier access to the wires at the back.
- ☐ Peel back the tape on the harness a few inches.



**The wires populating pins 19 and 20 on the back of the OBD II are a twisted pair (white wire and blue wire).**

- ☐ Locate the blue wire connected to pin 20 on the back side of the OBD II port (Figure 37).



**Figure 37 – OBD II connector (back side)**

- ☐ Cut the blue wire approximately 2 in from the back of the OBD II connector.
- ☐ Strip approximately 3/8 in from the end of both wires.
- ☐ Twist the light blue wire from the throttle control together with the blue wire; using the supplied butt connector, splice these paired wires to the blue wire at pin 20.
- ☐ Locate the white wire connected to pin 19 on the back side of the OBD II port (Figure 37).
- ☐ Cut the white wire approximately 2 in from the back of the OBD II connector.
- ☐ Strip approximately 3/8 in from the end of both wires.
- ☐ Twist the grey wire from the throttle control together with the white wire; using the supplied butt connector, splice these paired wires to the white wire at pin 19.
- ☐ Lightly tug the wires to ensure they are properly crimped.
- ☐ Using a heat gun, carefully apply heat to the butt connectors to seal the connection.

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## Connecting the engine compartment wiring

- ☐ Cut a slit in the firewall plug on the driver side, under the firewall insulation and feed the following wires into the engine compartment:
  - grey cable with the green plug connector from the control box
  - grey cable with the black connector from the throttle controller
  - white wire with a bullet connector from the interface cable
- ☐ Connect the grey cable with the green plug connector to the corresponding connector coming from the rear of the compressor.
- ☐ Connect the grey cable with the black connector to the matching connector on the pressure transducer at the compressor.
- ☐ Connect the white wire with the bullet connector to the matching connector at the compressor clutch.
- ☐ Pull all excess wiring back into the cab.
- ☐ Cover all VMAC engine compartment wiring with high heat plastic loom. Secure the harness with cable ties as needed to avoid hot, sharp or moving components.
- ☐ Replace the dashboard panel and glove box (as well as any other panels that may have been removed during the installation).

# Completing and Testing the Installation

- ☐ Confirm that the 3/4 cooler lines running from the diverter valve are oriented toward the firewall and are secured away from the crank pulley and any hot, sharp or moving components.
- ☐ Install the fan spacer onto the water pump.
- ☐ Install the fan and shroud as one unit.
- ☐ Install the overflow hose, routing it over the power steering fluid reservoir (Figure 38).



Figure 38 – Overflow hose



***The VMAC supplied and approved compressor oil must be used in this system. Failure to use this special oil will result in damage to the compressor and will void warranty.***

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

- ☐ Remove the cap from the oil-fill port located on the Inlet valve.

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- ☐ Fill the system with the supplied oil (when dry, the system will take approximately 5 L (5.2 qt) of oil. Rotate the compressor clutch by hand while adding oil to speed the process. Do not use power tools to rotate the clutch.
- ☐ Allow a few minutes for the oil to drain into the AOST. Check the level at the sight glass at the front of the AOST. Continue adding oil until the level is correct.
- ☐ Replace the oil fill cap and tighten
- ☐ Fill the cooling system with the coolant saved earlier.
- ☐ Cover all VMAC under-hood wiring with high heat plastic loom (if not done previously). Secure the harness with cable ties as needed to avoid hot, sharp or moving components.
- ☐ Reconnect the battery / batteries.

## Testing the installation

- ☐ 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 it is illuminated. If it is not illuminated, there is no power to the control box.
- ☐ Press the "ON" button. The green light should come on and the compressor clutch will engage, this should be audible.
- ☐ Release the park brake. The green light should flash and the compressor clutch should disengage and flash "PARK BRAKE". Apply the park brake again and press the "ON" button. The light should come on and the clutch should engage.



***On systems equipped with VMAC's Digital Throttle Control, the "PRK BRAKE" LED will remain illuminated at all times, regardless of park brake position.***

- ☐ On automatic transmission 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".



***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.***



***If the truck fails the test, check the wiring to ensure that all the connections are correct and secure. If additional assistance is required, contact VMAC technical support at 1-888-241-2289 or 250-740-3200.***

## Before Starting the Engine Checklist

**Ensure that the following has been completed:**

- ☐ Check the coolant.
- ☐ Check the compressor oil level at the tank sight glass.
- ☐ Do a final inspection to ensure that everything has been completed and secured.
- ☐ Perform a final belt alignment check.
- ☐ Check all wiring for security and protection.
- ☐ Ensure all compressor outlet valves are closed.
- ☐ Ensure the parking brake is engaged and the transmission is in "PARK".
- ☐ Start the engine.



***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.***

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## After Starting the Engine Checklist

- ☐ Check for any leaks, confirm belt alignment and ensure the belts are rotating properly.
- ☐ Close and latch the hood.
- ☐ Allow the engine to reach normal operating temperature.
- ☐ Press the “ON” button on the display box to start the compressor.

### Analog Throttle Control

- ☐ When the VMAC system is first engaged, the engine speed should increase to between 1,800 rpm and 2,200 rpm and then drop down to VMAC base idle (approximately 1,000 rpm) once system pressure is reached.

### Digital Throttle Control



***The VMAC digital throttle is a “slow ramp” throttle. Each time the system is powered on, it will quickly increase engine speed to 1,500 rpm; then increase to maximum VMAC rpm over 8 seconds (provided the system has not reached full system pressure before maximum VMAC rpm is reached). After the initial slow ramp, the throttle will respond normally to air demand.***

- ☐ When the VMAC system is first engaged, the engine speed should increase to approximately 1,500 rpm and then drop down to VMAC base idle (approximately 1,000 rpm) once system pressure is reached.

With the system running, check for:

- ☐ Coolant leaks.
- ☐ Compressor oil leaks
- ☐ Allow the compressor to run until the system reaches full system pressure.
- ☐ Engine speed should reduce to between 900 rpm to 1,100 rpm.
- ☐ Turn off the compressor.
- ☐ Shut down the engine.
- ☐ Check the compressor oil level after the engine has been shut down and the oil level has had time to stabilize.



***Ensure any stored air is drained from the system prior to adding oil.***

- ☐ Add oil as necessary to bring the level to the “FULL” line in the sight glass and check for leaks.

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### **Analog Throttle Control:**

With the brake pedal firmly depressed, shift the truck into "REVERSE".

- ☐ \*The engine speed reduces to OEM base idle (Approximately 650 rpm).
- ☐ \*The green LED on the control box remains illuminated.
- ☐ Repeat these steps in all gear selector positions to ensure the engine speed does not increase unless the gear selector is in "PARK" or "NEUTRAL".

### **Digital Throttle Control:**

With the brake pedal firmly depressed, shift the truck into "REVERSE".

- ☐ \*The engine speed reduces to OEM base idle (Approximately 650 rpm).
- ☐ \*The green LED on the control box remains illuminated.
- ☐ \*The "STATUS" and "PRNDL" LED's on the digital throttle control will turn off and engine speed will reduce to base idle.
- ☐ \*Shift the vehicle back into "PARK".
- ☐ \*Cycle the compressor off, then on again to reset the safety parameters.
- ☐ Repeat these steps in all gear selector positions to ensure the engine speed does not increase unless the gear selector is in "PARK" or "NEUTRAL."
- ☐ Allow the compressor to run until the system reaches full system pressure.
- ☐ Confirm all air valves are closed and the system has no air leaks.
- ☐ Turn off the compressor.
- ☐ Ensure any stored air is drained from the system.

## **Final Testing**

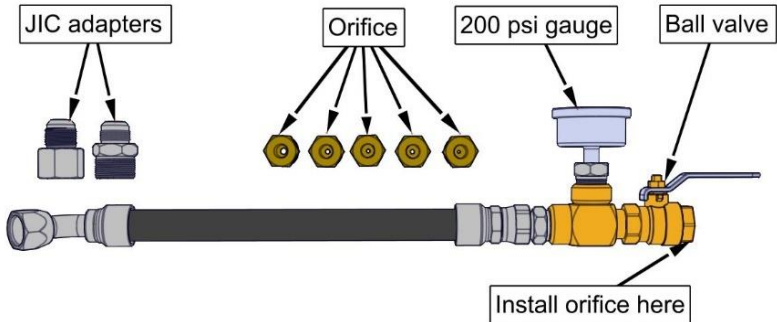
Ensure the following has been completed:

- ☐ Operate the system with an air tool (or the VMAC Air Test Tool with the appropriate orifice installed) for at least 1/2 hour (1 hour preferred).
- ☐ Road test the vehicle for approximately 14 miles (20 km).
- ☐ Observe the compressor operation to ensure that the belts rotate properly, pulleys rotate smoothly, and nothing is rubbing or contacting hot parts.
- ☐ Check all components, connections and fasteners once the engine is turned off and the system has cooled.
- ☐ Check the coolant level after the engine has been operated.
- ☐ Check the compressor oil level after the engine has been shut down and the oil level has had time to stabilize

# Performance Testing and Adjustments

This system requires minimal adjustment. The maximum system pressure is adjusted via the regulator on the inlet valve, and the output is adjusted with the throttle control. Refer to the owner's manual for specific instructions on how to adjust the system.

Test the system operation using the tools that will be operated by the system. Alternatively, the system can be tested using a 3/16 in orifice in the outlet to simulate tool use (Figure 39).



**Figure 39 - VMAC Air Test Tool (A700052)**

1. Install the test tool at the system outlet. If using the VMAC test tool, the appropriate orifice size is 3/16 in.
2. Ensure that the ball valve is closed.
3. Place the transmission in "PARK" and fully apply the park brake.
4. Allow the engine to run until it is at operating temperature.
5. Turn on the air compressor system and allow it to operate 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.
  - **Analog throttle control:** Engine speed should increase to approximately 2,000 rpm – 2,500 rpm.
  - **Digital throttle control:** Engine speed should increase to approximately 2,350 rpm.
8. Close the air valve slowly to allow the system pressure to rise.
9. Once 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 ramp when the pressure drops to approximately 140 psi.

# Digital Throttle Controller Adjustments

The throttle control is configured at the factory for optimum performance at maximum cfm. In applications where maximum cfm is not required, or noise is a concern, the throttle control can be adjusted to reduce the maximum VMAC rpm.

## Safety features

The throttle control has built in safety features that will disable the system if an unsafe condition is detected, or either of the lock out parameters is not met (the vehicle must be in "PARK" and the park brake must be engaged).

If an unsafe condition is detected, the "STATUS" LED will turn off, and engine speed will return to idle. Once all unsafe conditions have been removed, the system must be cycled off, then on again to reset it. Once the system powers up, the "STATUS" LED will illuminate, and the system will operate normally.

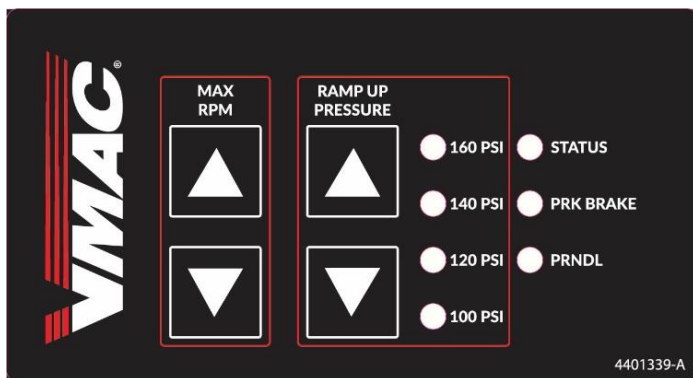


Figure 40 – Throttle control

**If the vehicle is placed into gear, the "STATUS" LED and the PRNDL LED will turn off and the throttle control will deactivate. This will reduce engine speed to base idle.**



**In order to activate the system again, re-engage the appropriate lockout and cycle the VMAC "OFF" then "ON" via the control box.**

## MAX RPM

The cfm produced by the system is directly related to engine speed; this system delivers 70 cfm at 2,350 rpm.

Maximum VMAC rpm can be adjusted between 1,000 rpm and 2,650 rpm (in 50 rpm increments) via the "▲" or "▼" buttons in the "MAX RPM" column.



**If the system is at full system pressure while the rpm is being adjusted, the engine speed will increase to the new value for 4 seconds, then return to base idle.**

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***The “PRK BRAKE” LED will remain illuminated at all times, regardless of park brake position.***

## **RAMP UP PRESSURE**

“RAMP UP PRESSURE” is the amount of pressure the system will drop before the engine speed is increased to generate air; as air continues to be used and the pressure drops, engine speed will increase until maximum VMAC rpm is achieved.

“RAMP UP PRESSURE” is set to 140 psi (10 psi below the factory default maximum system pressure of 150 psi). This allows for a small amount of air use without the need to increase engine speed.



***“RAMP UP PRESSURE” should only be adjusted if the maximum system pressure is changed (via the inlet regulator). To maintain proper performance, and rapid response to air demand, ensure the “RAMP UP PRESSURE” is set at no more than 20 psi below the maximum system pressure.***

The “RAMP UP PRESSURE” can be set to “100 PSI”, “120 PSI”, “140 PSI”, or “160 PSI” via the “▲” or “▼” buttons in the “RAMP UP PRESSURE” column; an LED will illuminate beside the setting that has been selected.

## **Factory Reset**

The throttle control can be reset to factory default values via a button inside the throttle control box.

To perform a factory reset, turn the system on and allow the engine speed to drop to VMAC base idle (approximately 1,000 rpm). Using a paperclip (or similar object), push and hold the factory reset button for 5 seconds. All of the LED lights will illuminate for several seconds while the settings revert to their defaults. Once the LED’s return to their normal state, the system is ready for use again.

# Air Receiver Tank



***Pressure in the air receiver tank will not be relieved when the compressor system blows down. This is normal operation. Prior to performing any service work on the system, relieve the pressure in the air receiver tank.***

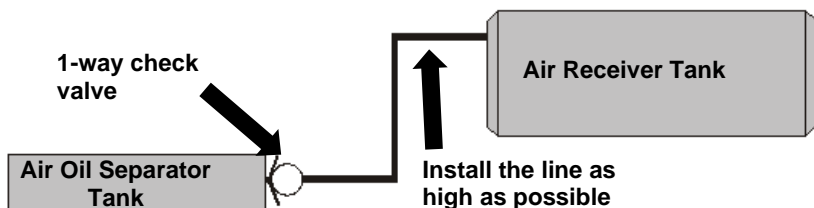
***If an air receiver tank will be used with this system, the following installation procedure must be used to prevent damage to the system.***

An air receiver tank provides a buffer as it gives the compressor time to react by increasing the engine speed and producing air before the tool stalls. It also has the advantage of lowering the duty cycle of the compressor system.

The VMAC compressor system will automatically depressurize when it is shut-down, therefore the line from the VMAC Air/Oil Separator Tank (AOST) to the air receiver tank must have a 1-way check valve installed. This prevents blow back and moisture from the receiver tank entering the AOST (Figure 41).



***The line to the receiver tank must be installed as high as possible to prevent water from entering the line.***



**Figure 41 – Air Receiver Tank**

# Accessory Products

These accessory products for your under-hood compressor system are available from VMAC. For more information or to order these products, call 1-877-912-6605 or email [sales@vmacair.com](mailto:sales@vmacair.com).

	<p><b>Eliminator Aftercooler</b> <b>Part Number A800070</b></p> <p>Removes up to 80% of moisture from compressed air. Quick installation, automatic drain and compact design</p>
	<p><b>Filter Regulator Lubricator</b> <b>Part Number A700151</b></p> <p>Removes lubricants, water and dirt from the air stream. Adds atomized tool oil to lubricate tools. Reduces pressure for longer tool life.</p>
	<p><b>Hose Reel</b> <b>Part Number A700007</b></p> <p>Secure, compact, retractable hose storage in a sturdy reel.</p>
	<p><b>Air Receiver Tank</b> <b>Part number A300047</b> 10 gallon capacity in a compact tank, complete with fittings and a gauge. <b>Part Number A300010</b> 35 gallon capacity in a compact tank, complete with fittings and a gauge. <b>3/4 in NPTF Check Valve not included</b> <b>Part number 3600117</b></p>
	<p><b>De-icer Kit</b> <b>Part Number A700031</b></p> <p>Insulated rope heater prevents freezing of lines and regulator.</p>
	<p><b>Service Kits</b> <b>VR70 200 hour Part Number A700019</b> <b>VR70 400 hour Part Number A700020</b></p> <p>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</p>

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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: <http://vmacair.com/support/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: \_\_\_\_\_

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Manufactured by



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