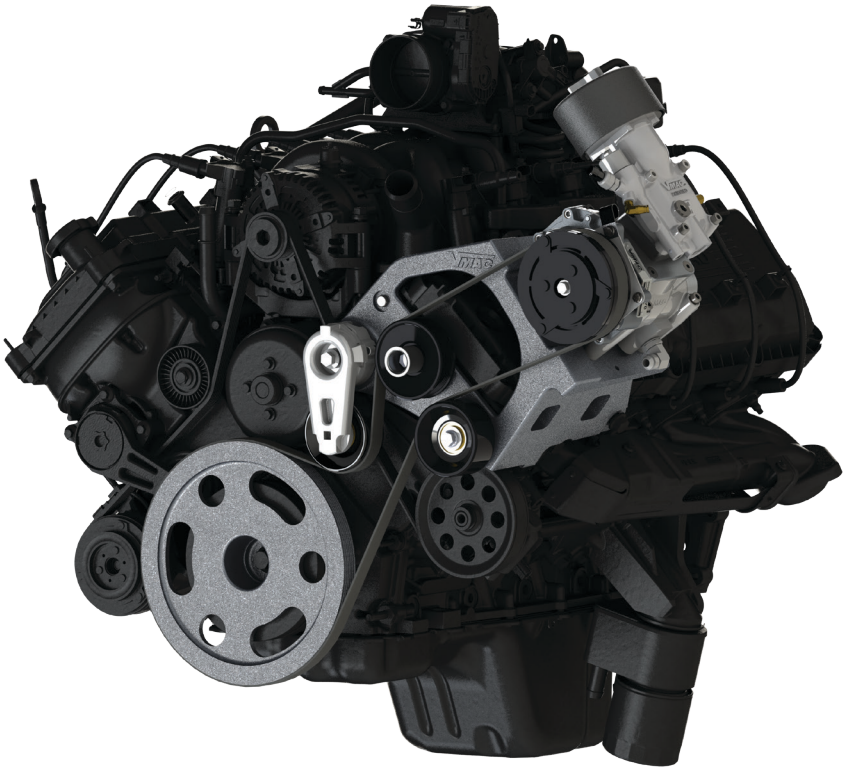
UNDERHOOD™ 70
AIR COMPRESSORS



Installation Manual for VMAC System

V900131

2020 – 2022 Ford Super Duty F250 – F550, F600
7.3 L Gas

www.vmacair.com

Table of Contents

Revision	Revision Details	Revised by	Checked by				Implemented
			Eng.		Tech.	Qual.	
			Mech.	Elec.			
E	ECN: 22-044 Update cover and app data to include F600	MSP	MRH	N/A	MSP	N/A	4 Mar. 2022
F	ECN: 22-102 Update OBD II connection locations	MSP	N/A	ASE	MSP	LPH	14 Jun. 2022
G	ECN: 23-082 Cap model year	MSP	N/A	N/A	MSP	N/A	18 Apr. 2023

Additional Application Information

- 2020 – 2022 Ford Super Duty F250 – F550, F600, 7.3 L Gas.
- Single alternator application only. See VMAC knowledge base article: EXT-UH-002. Dual alternator vehicles will require single alternator belt, VMAC P/N: 1610101 (Ford P/N:JK6-805/LC3Z-8620-C or Gates P/N: K060802).

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Important Information

The information in this manual is intended for certified VMAC installers who have been trained in installation and service procedures and/or for anyone with mechanical trade certification who has the tools and equipment to properly and safely perform the installation or service. Do not attempt installation or service without the appropriate mechanical training, knowledge and experience.

Follow all safety precautions. Any fabrication for correct fit in modified vehicles must follow industry standard "best practices".

Notice

Printed in Canada

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, service techniques and running OEM changes. If a discrepancy is found in this manual, contact VMAC Technical Support prior to initiating or proceeding with installation, service or repair. Current information may clarify the issue. Anyone with knowledge of such discrepancies, who proceeds to perform 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 ensure that their safety and that of others is not being compromised, and that there will be no adverse effects on the operational safety or performance 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 anyone to properly adhere to the procedures set out in this manual or standard safety practices.

Safety should be the first consideration when performing any service operations. If there are any questions concerning the procedures in this manual, or more information is required, please contact VMAC Technical Support prior to beginning work.

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 attention to instructions concerning 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 aware of the possibility of personal injury or death. As it is impossible to warn of every conceivable hazard, common sense and industry standard safety practices must be observed.

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

Warranty

VMAC Standard Warranty (Limited)

For complete warranty information, including both VMAC Standard Warranty (Limited) and VMAC Lifetime Warranty (Limited) requirements, please refer to our current published warranty located at: **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.

VMAC Lifetime Warranty (Limited)

A VMAC Lifetime Limited Warranty is offered on the base air compressor only and only on UNDERHOOD™, Hydraulic Driven, Transmission Mounted, Gas and Diesel Engine Driven Air Compressors, Multifunction Power Systems, and other products as defined by VMAC, provided that (i) the purchaser fully completes and submits a warranty registration form within 3 months of purchase, or 200 hours of operation, whichever occurs first; (ii) services are completed in accordance with the Owner's Manual; (iii) proof of purchase of applicable service kits are made available to VMAC upon request.

The VMAC Lifetime Warranty is applicable to new products shipped on or after 1 October, 2015.

Warranty Registration

The VMAC warranty registration form is located near the back of this manual. This warranty registration 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 the warranty can be registered with VMAC:

www.vmacair.com/warranty

warranty@vmacair.com

(877) 740-3202

VMAC - Vehicle Mounted Air Compressors
1333 Kipp Road, Nanaimo, BC, Canada V9X 1R3

VMAC Warranty Claim Process

VMAC warranty work must be pre-authorized by VMAC. Claims are processed via our dealer network. If you are not a VMAC dealer, please select one to work with via our Dealer Locator:
https://www.vmacair.com/dealer-locator/

1. Communicate with VMAC Technical Support at 1-888-241-2289 or tech@vmacair.com to help diagnose/troubleshoot the problem prior to repair. VMAC technical support will require the VMAC System ID, and hours on the compressor.
2. VMAC will provide direction for repair or replacement of the failed components.
3. If requested, failed parts must be returned to VMAC for evaluation.
4. Dealers may login to the VMAC website to view the "VMAC Labour Time Guide" (under "Agreements") to see the allowable warranty labour times.
5. Warranty invoices must include the Service Ticket number, VMAC System ID#, hours on the compressor, and a detailed description of the work performed.
6. VMAC Warranty does not cover consequential damages, overtime charges, mileage, travel time, towing/recovery, cleaning or shop supplies.
7. Dealers submit warranty claims on behalf of the Vehicle Owner/End User affected by the defective part(s). The dealer ensures that all warranty credits are refunded back to the Vehicle Owner/End User who made the initial warranty claim.

In order to qualify for Lifetime Warranty (Limited), the completed warranty registration form must be received by VMAC within 3 months of the buyer receiving the Product(s), or 200 hours of operation, whichever occurs first.

If the completed warranty registration form has not been received by VMAC within 3 months of the buyer receiving the Product(s), or 200 hours of operation, the "Standard" warranty period will be deemed to commence 30 days from the date of shipment from VMAC.

Failure to follow the warranty claim process may result in denial of the warranty claim.

VMAC Product Warranty Policies & Warranty Registration can be found on the VMAC website (see previous page for URL).

General Information

Optional Equipment Compatibility

While VMAC strives to design systems compatible with optional OEM equipment (such as running boards), it is impractical to develop systems that accommodate every OEM and aftermarket option or add-on. Whenever possible, VMAC endeavors to advise of compatibility issues in the "Additional Application Information" section of the manual. Even when specific optional equipment is determined by VMAC to be incompatible, it does not preclude the vehicle upfitter or end user from modifying the optional equipment to make it compatible with the installed VMAC system. VMAC does not warranty or accept responsibility or liability for the fitment, function or safety of any products modified in any way not expressly outlined in the installation manual.

Before Starting

Note and label all parts that are removed from the vehicle as many of the OEM parts will be reused during the installation of the VMAC system.

Read this manual prior to beginning the installation to ensure familiarity with the components and how they will fit on the vehicle. Identify any variations from the application list such as vehicle model, engines, or optional equipment (e.g., dual alternator, active steering assist, etc.).

Open the package, unpack the components and identify them using the Illustrated Parts List (IPL) included in the Fastener Pack.

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 a VMAC dealer. The dealer will ask for the VMAC serial number, part number, description and quantity. Locate the nearest dealer online at www.vmacair.com/dealer-locator or call 1-877-912-6605.

Special Tools Required

- Pneumatic fan wrench removal set (such as Lisle® 43300) or a manual fan pulley holder (such as KD Tool® KD3900).
- Torque angle meter (such as Lisle® 28100 torque angle meter).

Torque Specifications

All fasteners must be torqued to specifications. Use manufacturers' torque values for OEM fasteners.

The torque values supplied in Table 1 are intended for VMAC supplied components, or for use as a guide in the absence of a torque value provided by an OEM.

Apply Loctite 242 (blue) to all fasteners (except nylon lock nuts) unless otherwise stated.

Torque values are with Loctite applied unless otherwise specified.

Standard Grade 8 National Coarse Thread								
Size (in)	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 (in)	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 (mm)	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

Preparing for Installation

Preparation for installation is very important. Missing a step or an item can cause problems in the installation or damage to components. Review the "Additional Application Information" section found at the beginning of the manual prior to proceeding.

☑ Check off each item as it is completed so that no steps are missed.

When dissembling engine components, cover the openings to prevent debris from entering the system.

Apply Loctite 242 (blue) to all fasteners (except nylon lock nuts) unless otherwise stated.

The VMAC system uses the OEM single alternator belt to run the OEM FEAD components. Vehicles converted from dual alternator systems will need to purchase this belt separately (Ford P/N: JK6-805/LC3Z-8620-C or Gates P/N: K060802).

☐ Review the contents of the system using the illustrated parts list to ensure all components are present and in the correct quantity. If any components are missing, have the system ID ready and call VMAC Technical Support.

☐ Disconnect the battery(s).

Dual battery vehicles only (Figure 1)*:

☐ *Remove driver side battery.

☐ *Remove the driver side battery cable run tray.

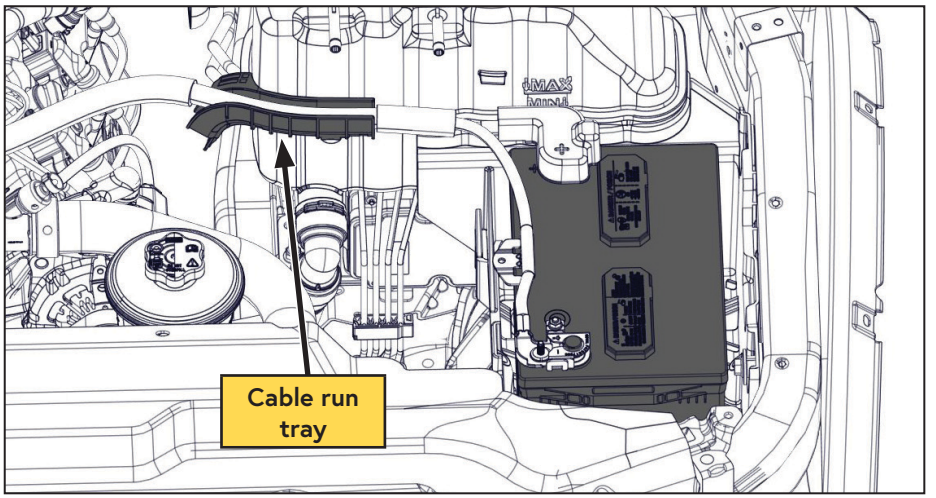


Figure 1 — Remove battery and cable run tray
(dual battery vehicle only)

If lifting the vehicle, ensure it is supported safely with appropriately rated jack stands.

- ☐ Remove the lower bumper/air dam, or lift vehicle to improve access.
- ☐ Drain the coolant into a clean container and set the coolant aside for use later.
- ☐ Remove the top radiator cross member cover.
- ☐ Remove the air intake tube and resonator assembly (Figure 2).

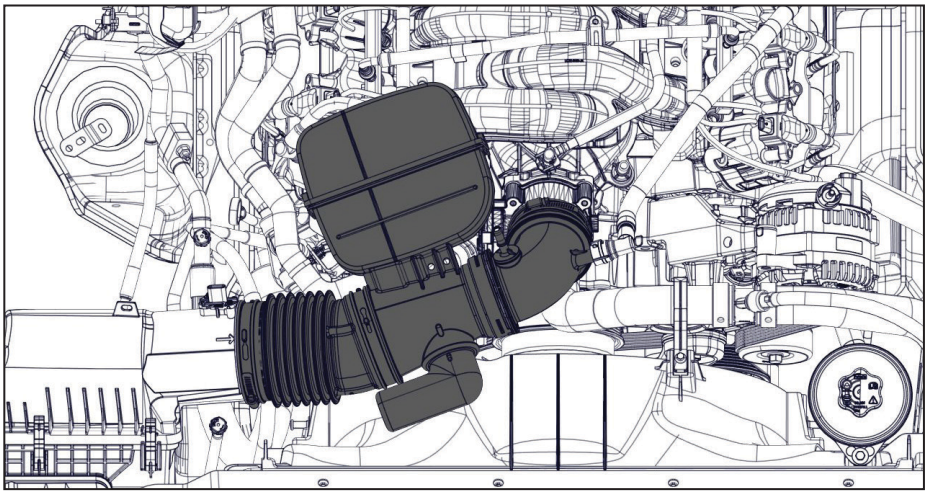


Figure 2 — Remove the air intake assembly

- ☐ Disconnect the upper hose assembly from the radiator and secure it out of the way toward the rear of the engine compartment (Figure 3).

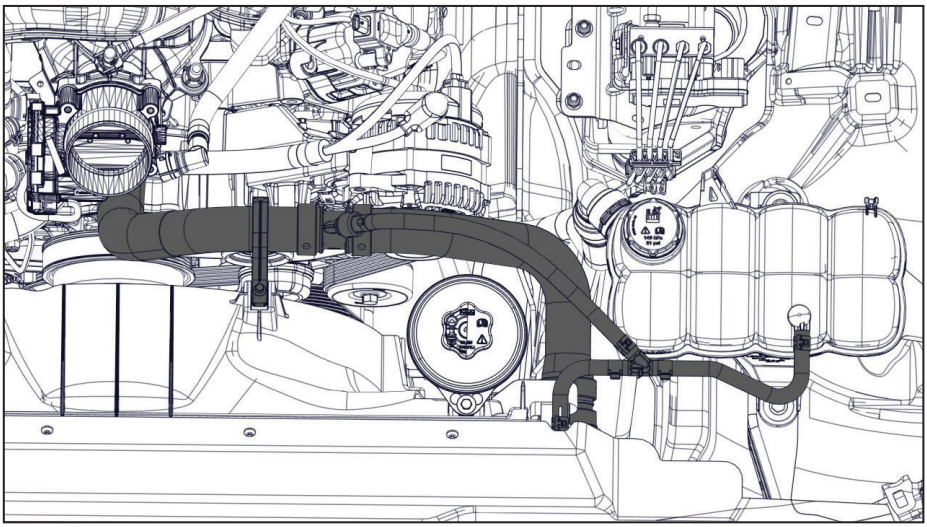


Figure 3 — Shift coolant hose assembly
(single battery degas bottle shown)

☐ Disconnect the vacuum system components, and hoses from the degas bottle.
☐ Remove the degas bottle or degas bottle and battery tray assembly.
☐ Keeping the power steering lines connected, remove the power steering reservoir from the driver side of the fan shroud.
☐ Temporarily tie the power steering 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 lower fan shroud.
☐ Disconnect the radiator fan harness and mounting bracket.
☐ Disconnect the harness mounted to the underside of the fan shroud.
☐ Remove fan (left hand/CCW thread) and fan shroud as an assembly.
☐ Remove the OEM FEAD belt.
☐ Remove the idler from the alternator bracket.

Single alternator vehicles*:
- ☐ *Disconnect and remove the alternator.

Dual alternator vehicles*:
- ☐ *Disconnect and remove the upper alternator (this alternator will not be reused).
- ☐ *Disconnect and remove the lower alternator (this alternator will be reused).
- ☐ *Remove the support bracket (Figure 4).

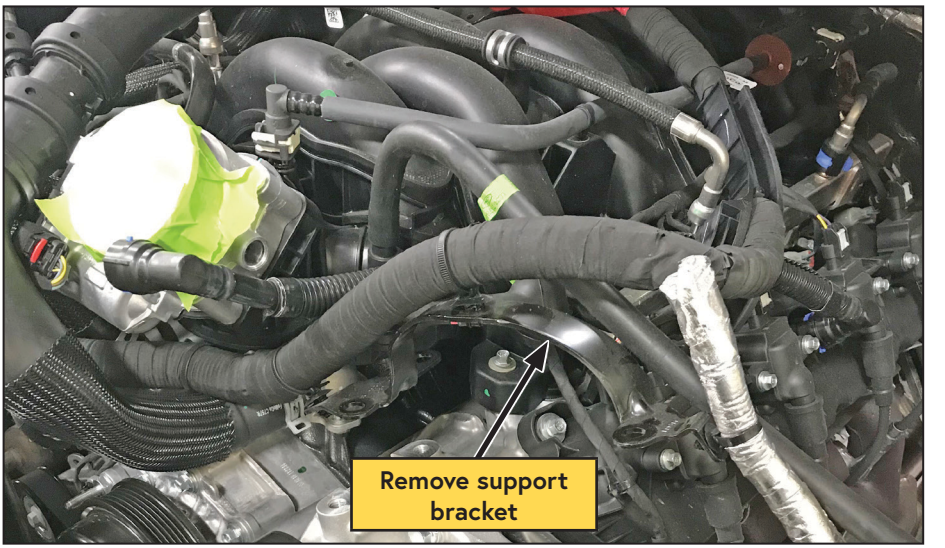


Figure 4 — Remove mounting bracket
(dual alternator only)

☐ Remove the alternator mounting bracket.

☐ Remove the upper coolant hose assembly (Figure 5).

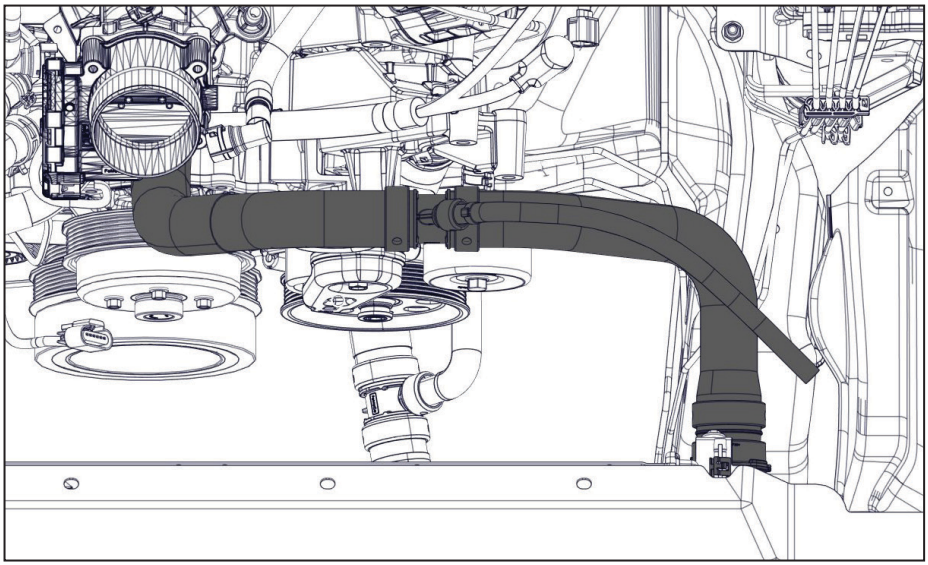


Figure 5 — Removing upper coolant hose
(The Tee may not be present on some trim levels)

☐ Remove the lower coolant hose support brackets (Figure 6).

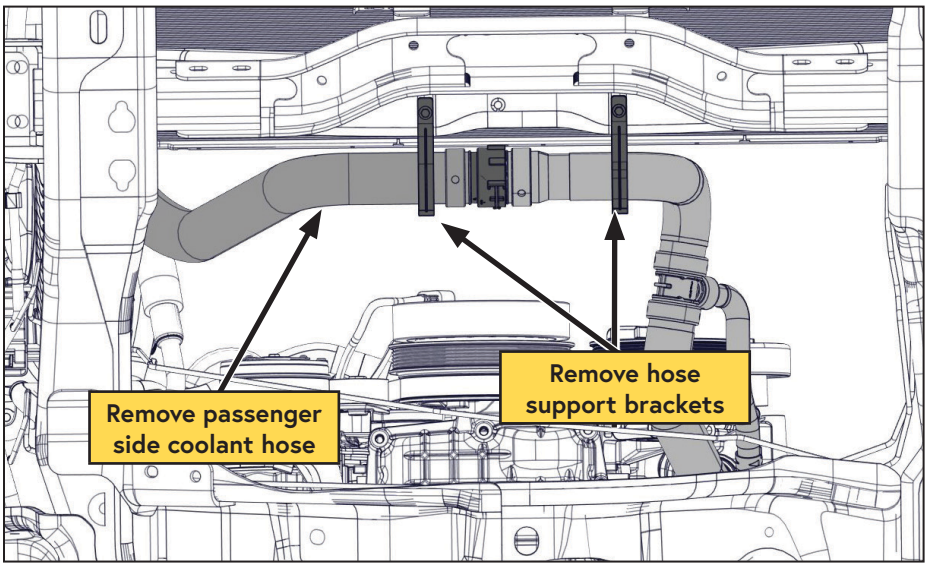


Figure 6 — Removing lower coolant hoses
(viewed from under vehicle)

☐ Disconnect and remove the passenger side lower coolant hose (Figure 6).

☐ Disconnect the bypass cooling circuit hose (Figure 7).

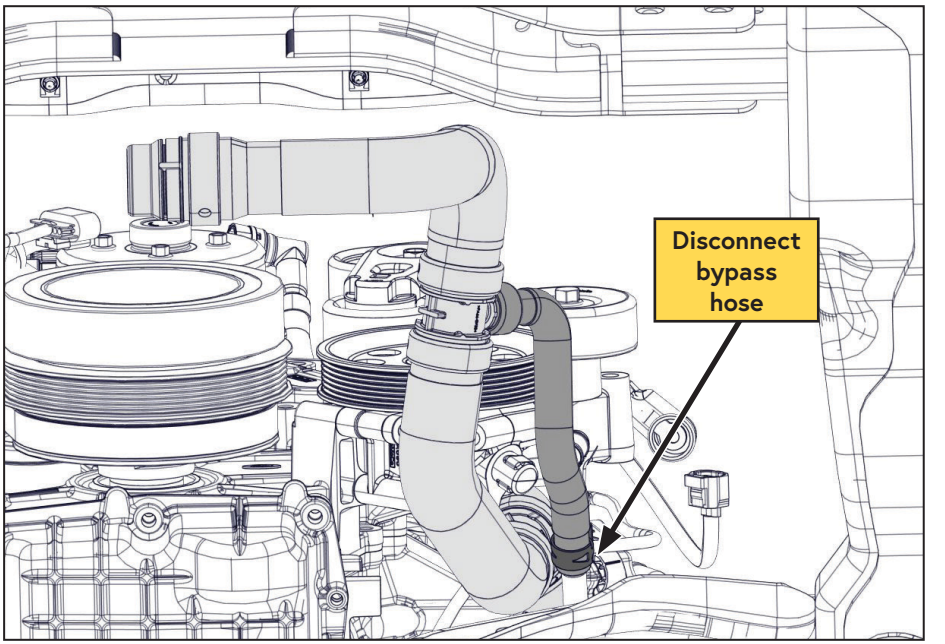


Figure 7 — Removing driver side lower coolant hose

☐ Cut the hose 1/4 in behind the molded cuff and remove the bypass Tee assembly (Figure 8).

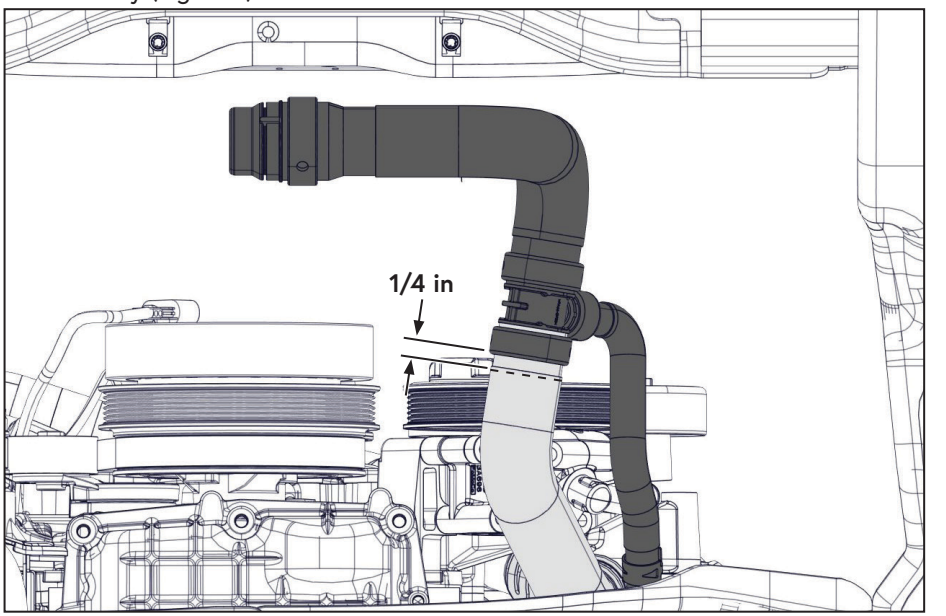


Figure 8 — Removing driver side lower coolant hose

Modifying the Hoses, Installing the Cooler

☐ Measure 11 1/4 in from the female quick connect and cut the hose (Figure 9).

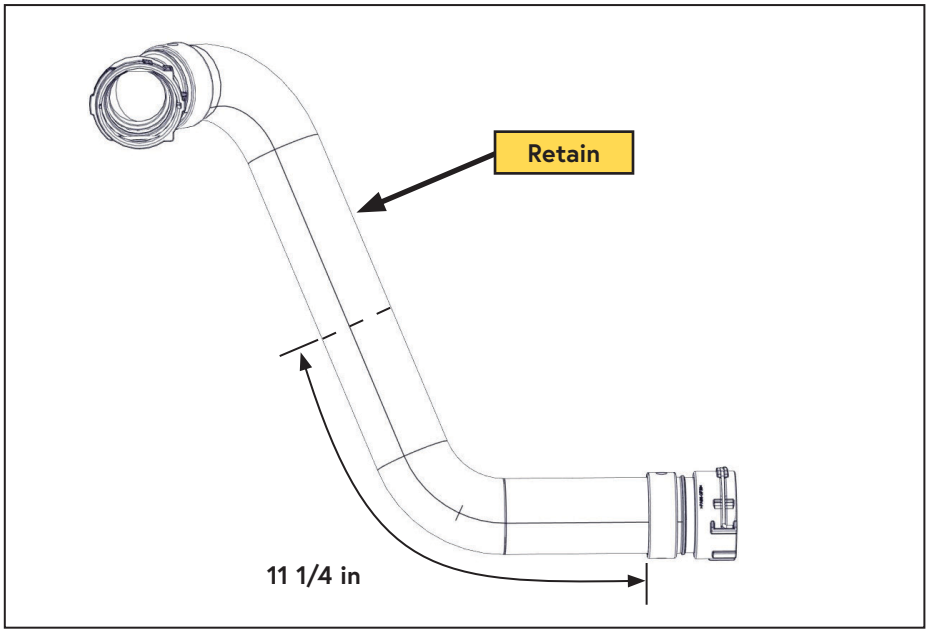


Figure 9 — Coolant hose modification

☐ Using the supplied fasteners, install the cooler bracket onto the black front crossmember, below the body coloured radiator support (leave the fasteners finger tight to allow for adjustment later) (Figure 10).

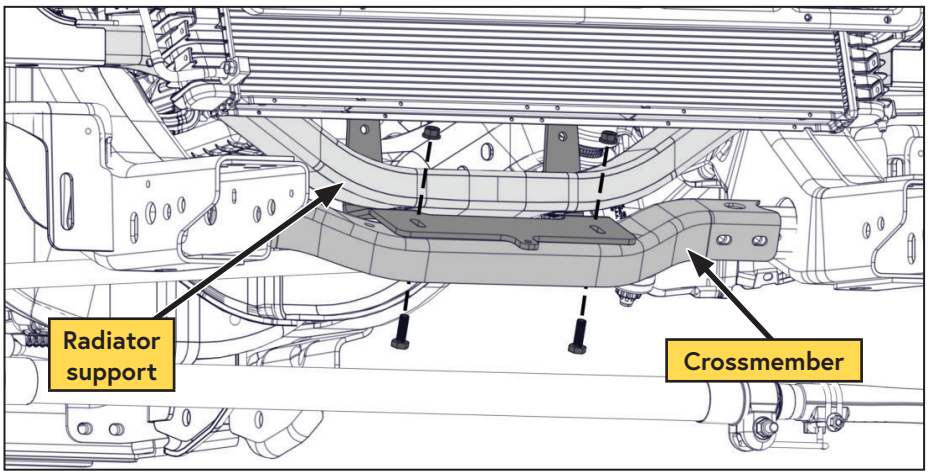


Figure 10 — Install cooler

☐ Using the supplied fasteners, mount the cooler to the cooler bracket (leave the fasteners finger tight to allow for adjustment later) (Figure 11).

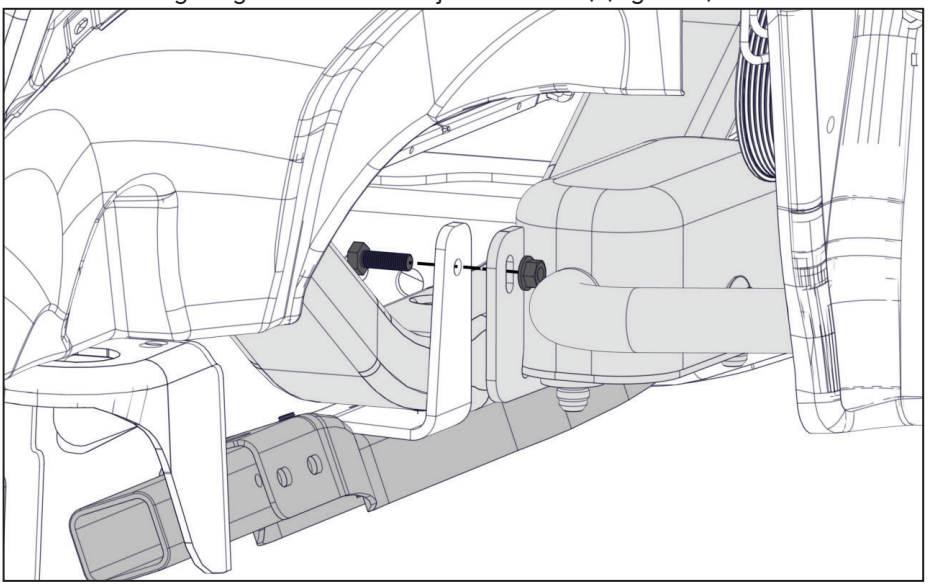


Figure 11 — Install cooler
(viewed through driver side wheel well)

☐ Connect the driver side radiator hose to the VMAC cooler (Figure 12).

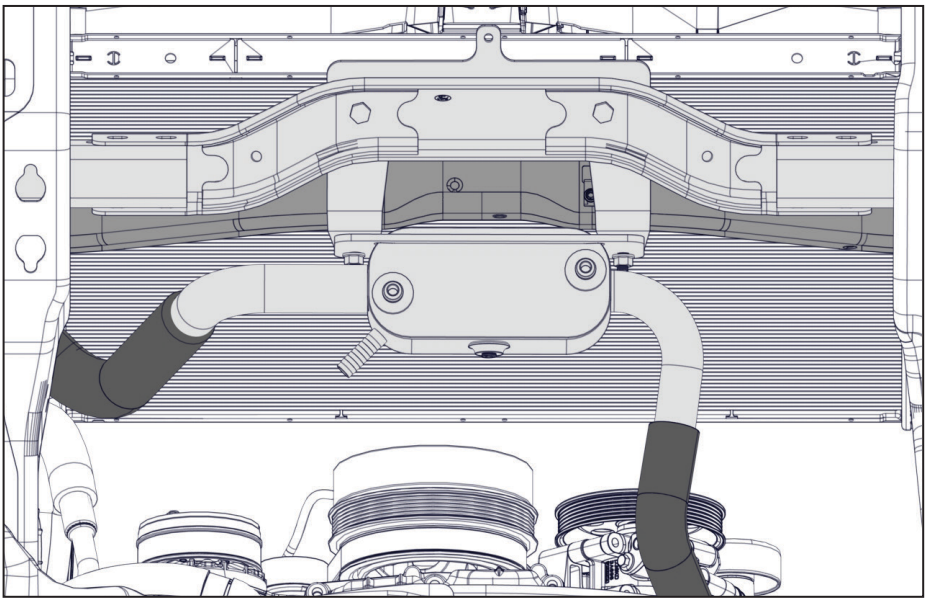


Figure 12 — Install coolant hoses assembly

☐ Connect the modified passenger side radiator hose to the VMAC cooler and radiator (Figure 12).

- ☐ Apply loom to the supplied 5/8 in hose.
- ☐ Using a gear clamp, secure the 5/8 in hose to the steel bypass line coming off of the engine. Route the hose between the body coloured radiator support and the black crossmember, to the front of the cooler bracket, and back between the radiator support and the crossmember (Figure 13).

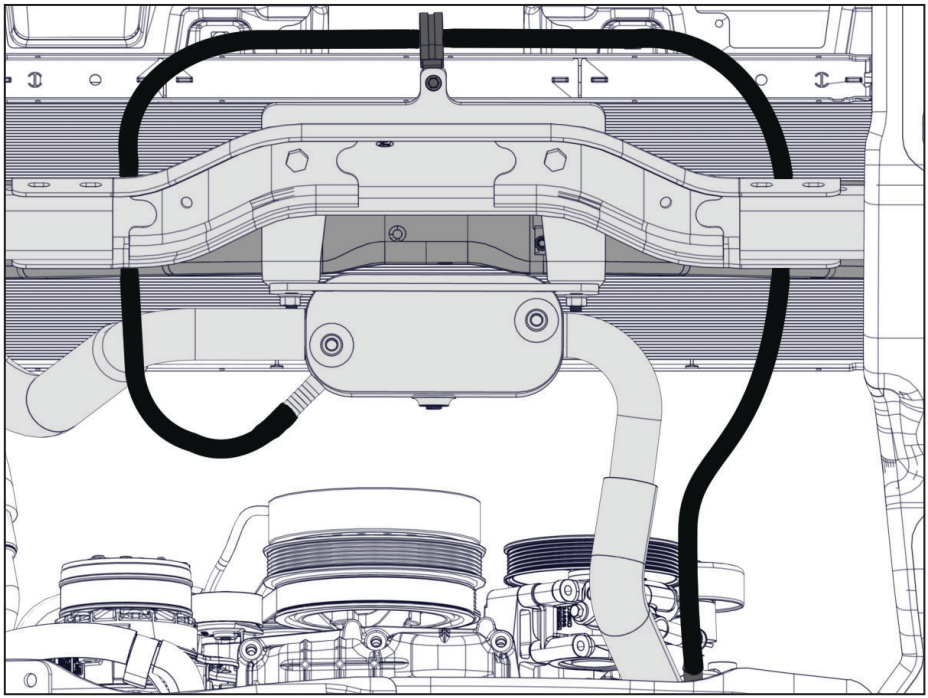


Figure 13 — Connect coolant bypass hose

- ☐ Connect the hose to the small spigot on the passenger side of the cooler using a hose clamp (Figure 13).
- ☐ Using the supplied P-clip and fasteners, secure the hose to the front of the cooler bracket (Figure 13).
- ☐ Adjust all connections as necessary to ensure the hose is not pinched, kinked, or twisted, and that all of the joints are engaged securely.
- ☐ Rotate the steering to the right hand lock and ensure there is adequate clearance to all of the installed components.
- ☐ Secure the cooler and cooler bracket fasteners.
- ☐ Secure all of the hose connections with the supplied hose clamps.

☐ Being careful not to damage the connector, cut the molded cuff from the hose and set the quick connect aside for use later (Figure 14).

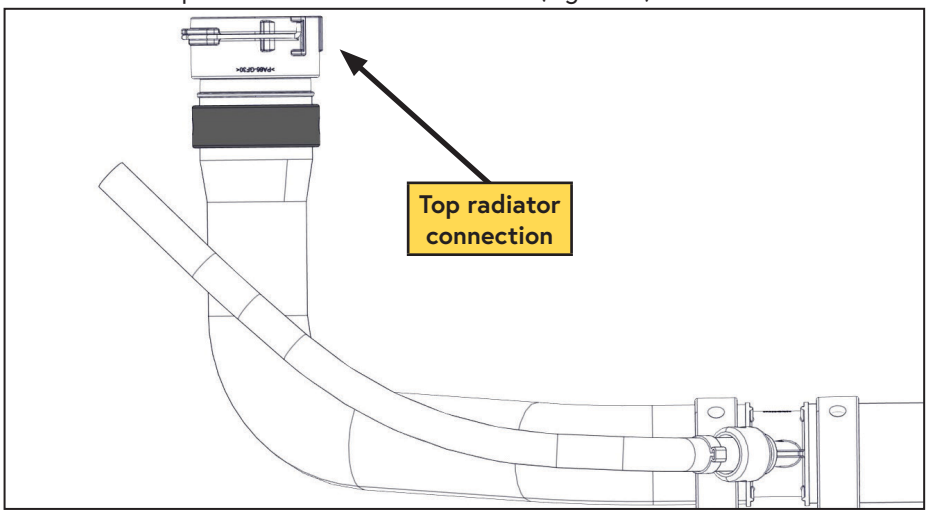


Figure 14 — Remove quick connect
(The Tee may not be present on some trim levels)

Hose Modification with Tee

☐ From the molded cuff on the radiator side of the Tee, measure 2 1/2 in along the outside radius and cut the hose square (Figure 15).

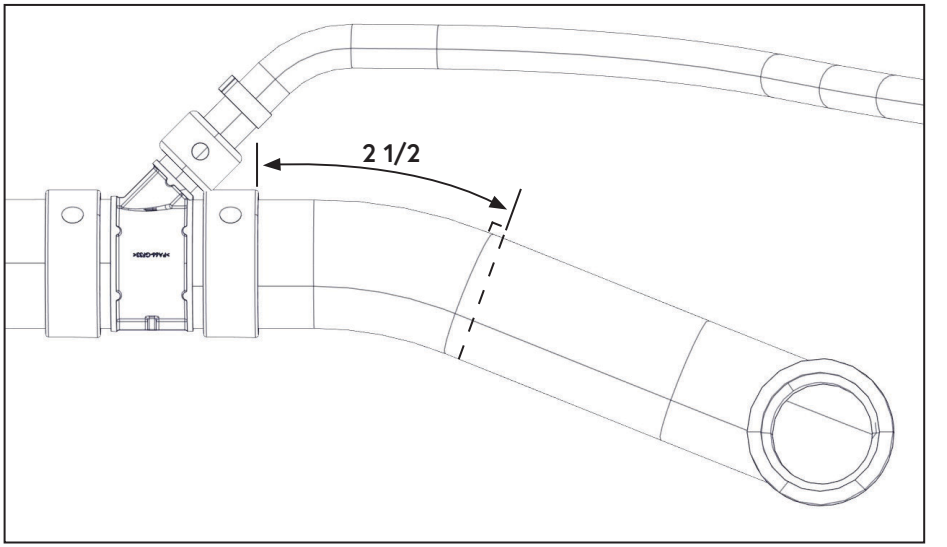


Figure 15 — Upper coolant hose modification

Hose Modification without Tee

☐ Measure 13 1/2 in along the outside radius and cut the hose square (Figure 16).

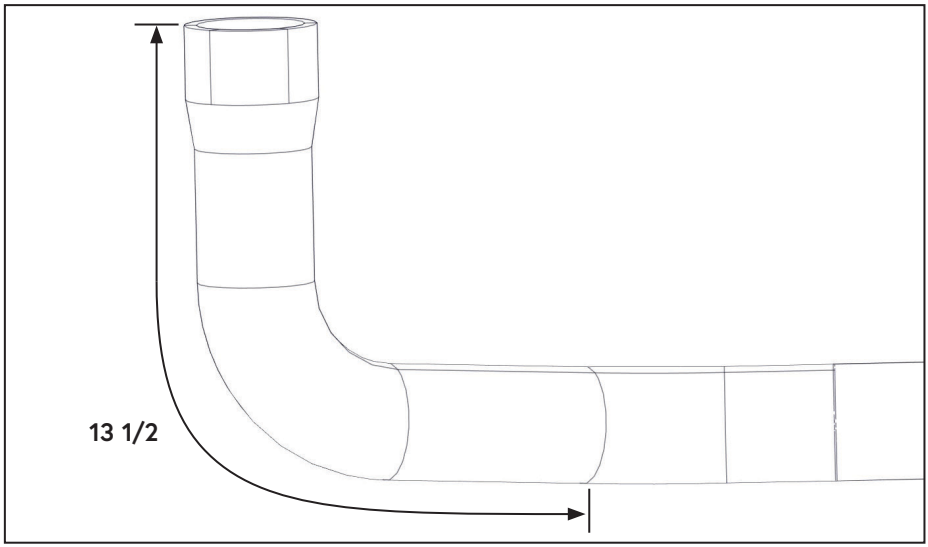


Figure 16 — Upper coolant hose modification

☐ Slide the supplied abrasion mesh up to the plastic cuff at the Tee and secure it in place using cable ties (or to the approximate location of the cuff) (Figure 17).

☐ Reinstall the engine side of the modified upper coolant hose (Figure 17).

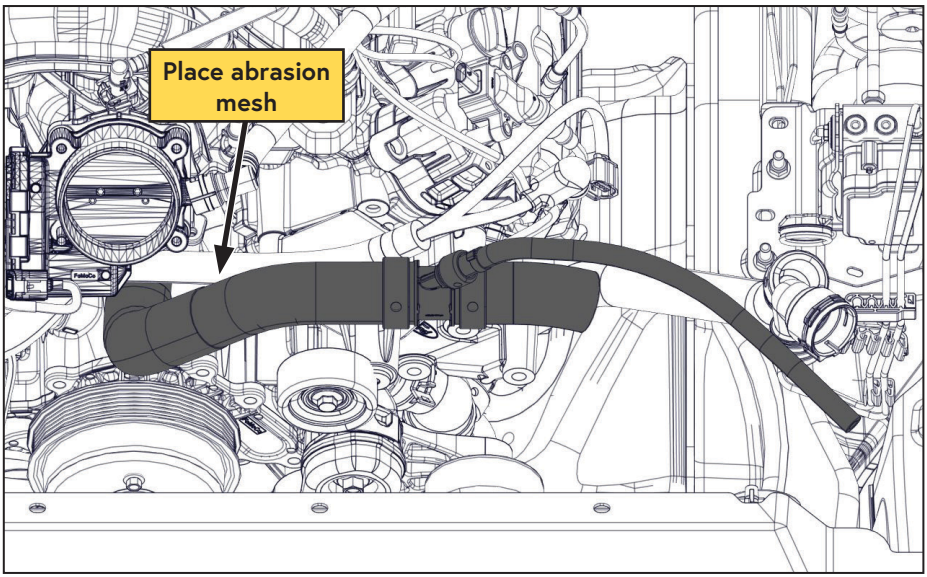


Figure 17 — Upper coolant hose modification

☐ Secure the upper coolant hose toward the rear of the engine bay out of the way.

Modifying the Fan Shroud

Due to manufacturing variances, it may be necessary to remove more material from the fan shroud. After the vehicle is assembled inspect the area to ensure there is enough clearance.

Upper Coolant Hose Modification

☐ Remove the shaded portion of the shroud to provide clearance for the upper coolant hose (Figure 18, Figure 19).

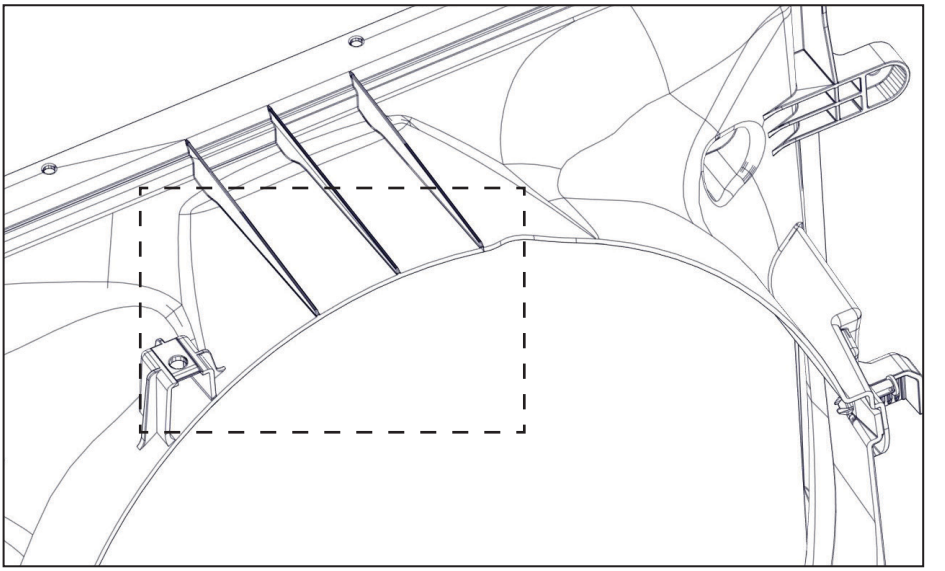


Figure 18 — Fan shroud modification

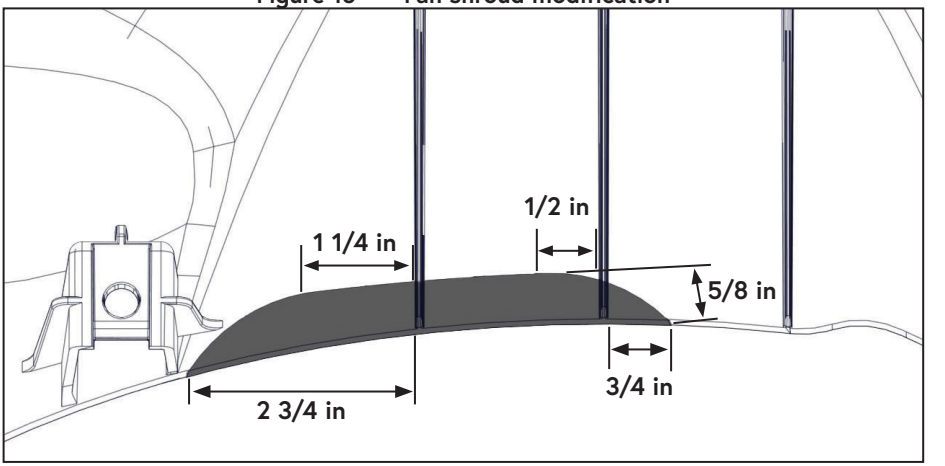


Figure 19 — Fan shroud modification

☐ Grind the shaded portion of the rib (Figure 20, Figure 21).

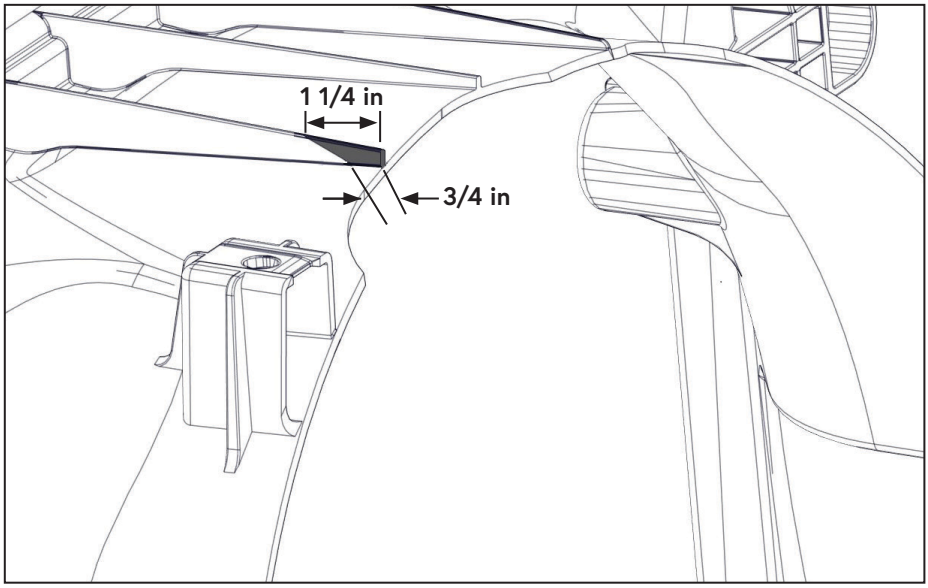


Figure 20 — Fan shroud modification

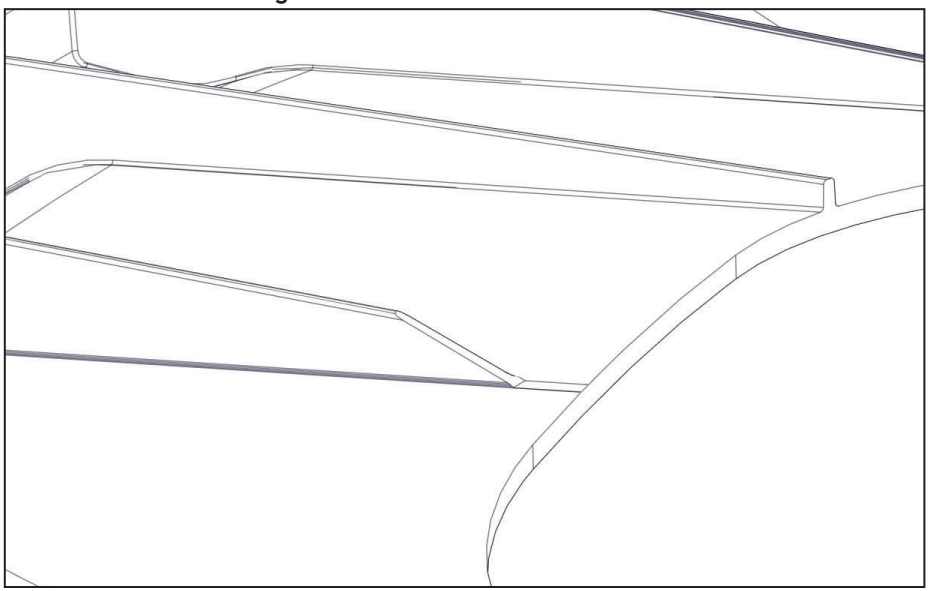


Figure 21 — Fan shroud modification
(rib modified)

☐ Remove the shaded portion of clip nut mount (Figure 22, Figure 23).

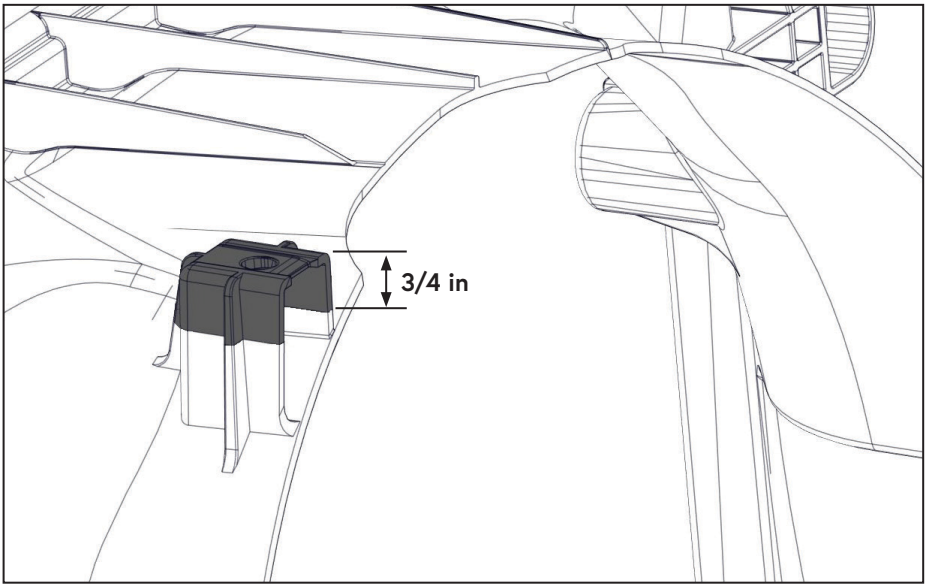


Figure 22 — Fan shroud modification

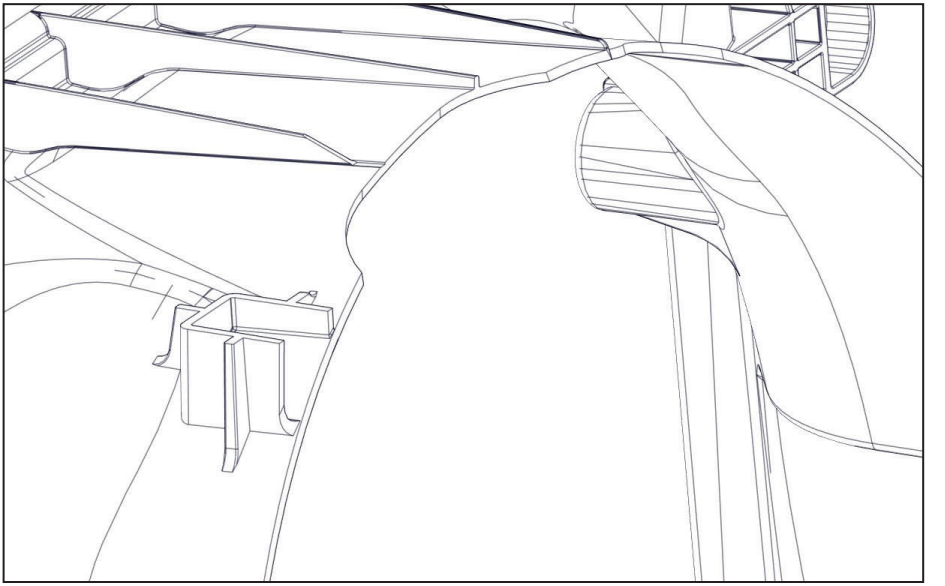


Figure 23 — Fan shroud modification
(after all upper coolant hose modifications)

VMAC Tensioner Clearance

☐ Remove the shaded portion of the shroud to provide clearance for the VMAC tensioner (Figure 24, Figure 25, Figure 26).

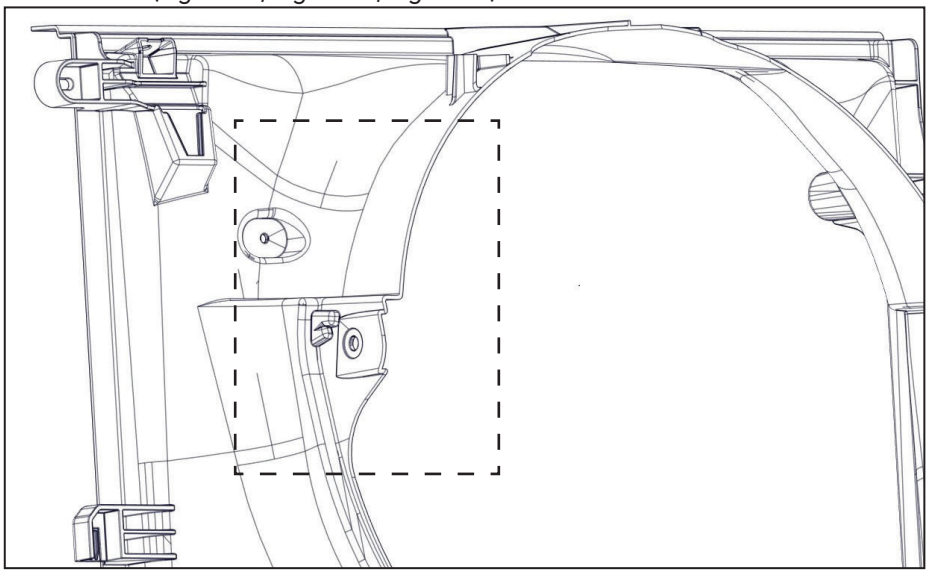


Figure 24 — Fan shroud modification

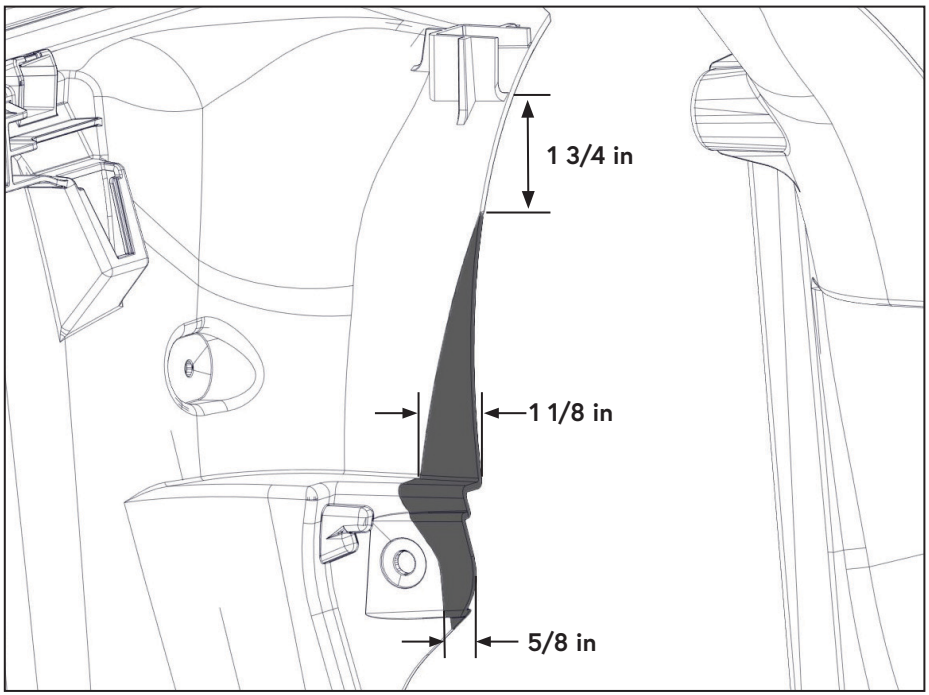


Figure 25 — Fan shroud modification

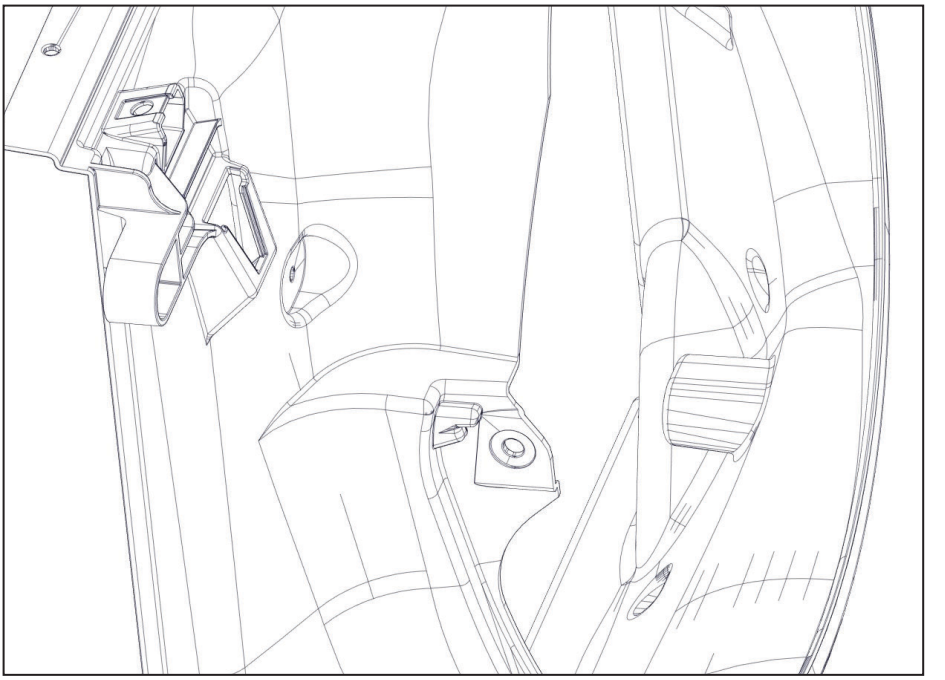


Figure 26 — Fan shroud modification
(after modification)

Installing the Crank Pulley and Main Bracket

Apply Loctite 242 (blue) to all fasteners (except nylon lock nuts) unless otherwise stated.

Main bracket installation

☐ Ensure the alternator slide bushing is flush with the inside face of the alternator mount (Figure 27).

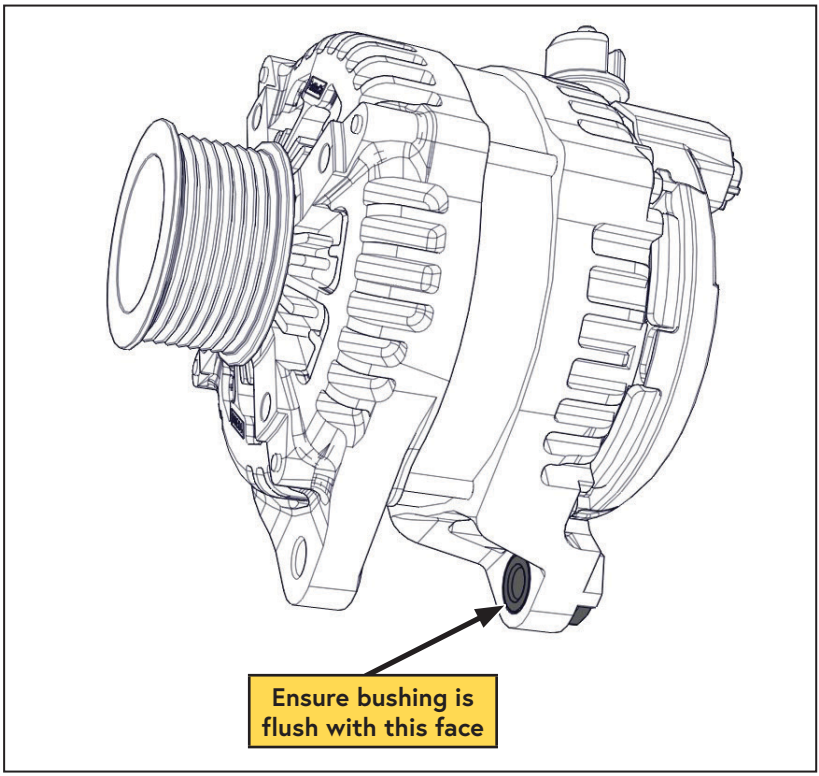


Figure 27 — Reset alternator slide bushing

☐ If required, adjust the bushing position using the OEM fastener and a shim block.

☐ Grind the shaded area of the terminal post shroud flush to the base (Figure 28).

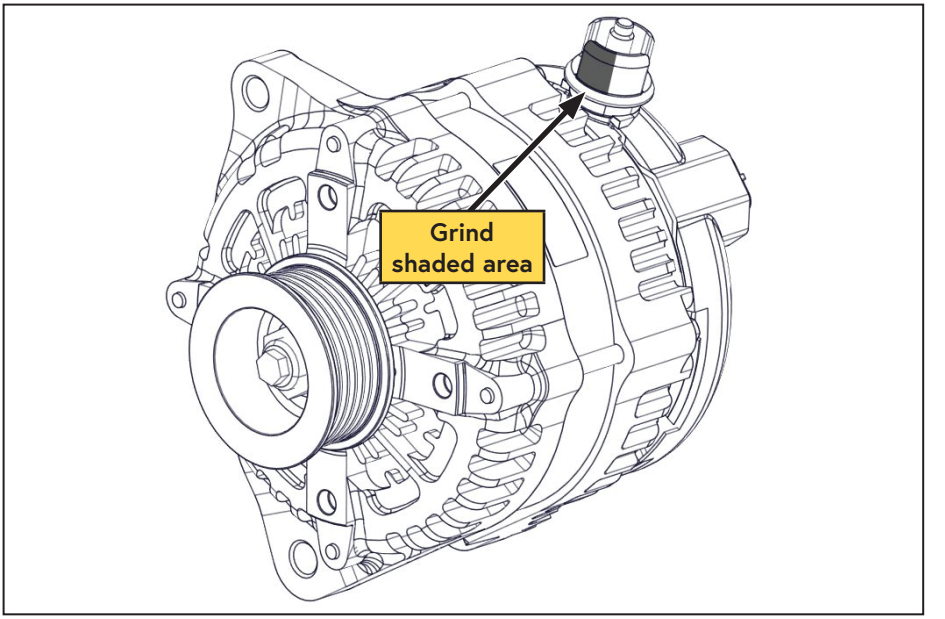


Figure 28 — Modify alternator post isolator

☐ Using the (×3) OEM fasteners, and the supplied bolt and washer, install the main bracket (Figure 29).

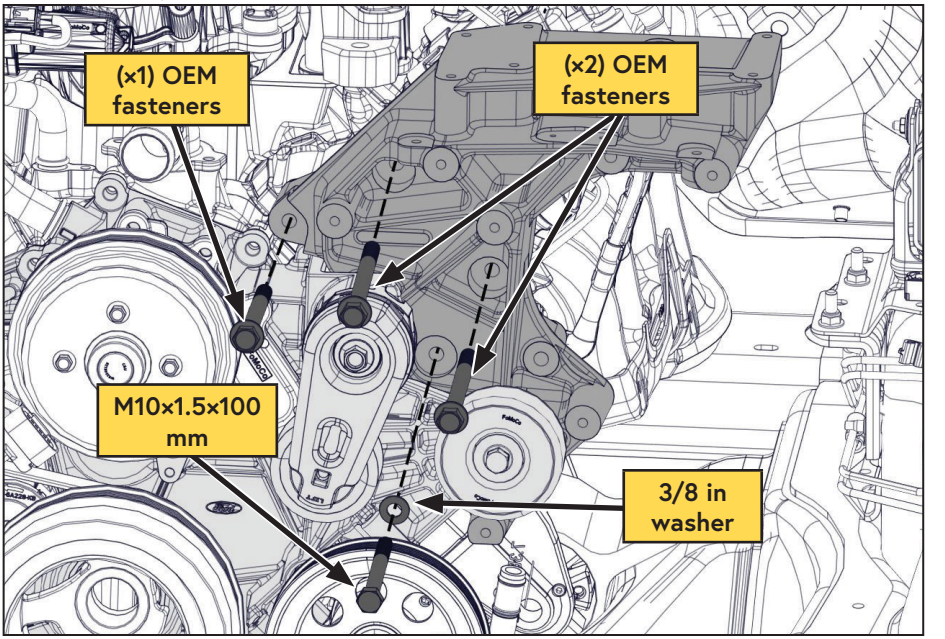


Figure 29 — Install main bracket

☐ Install the alternator using (×1) OEM fastener and (×1) supplied fastener (Figure 30).

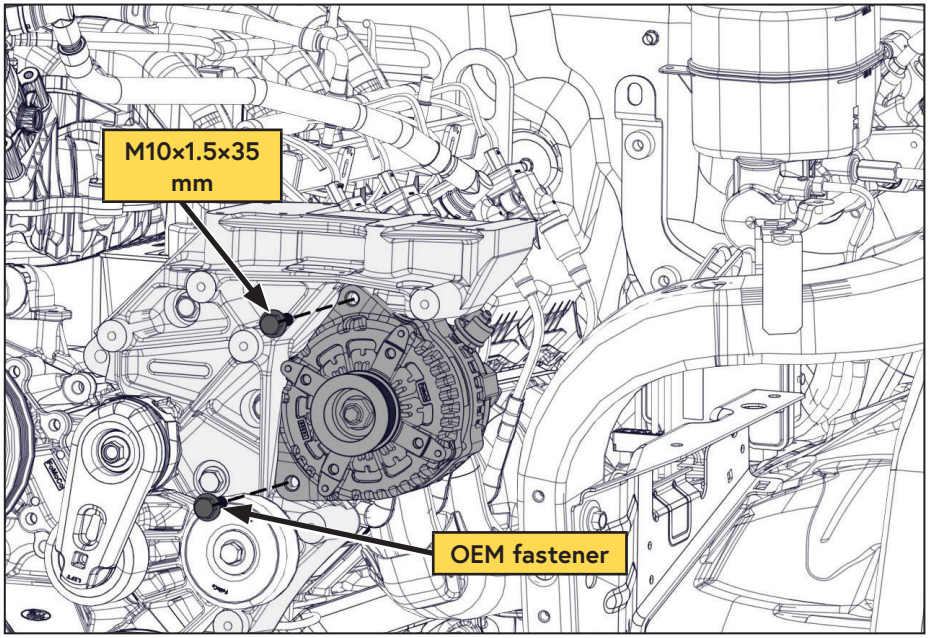


Figure 30 — Install alternator

☐ Install the OEM idler onto the VMAC main bracket (Figure 31).

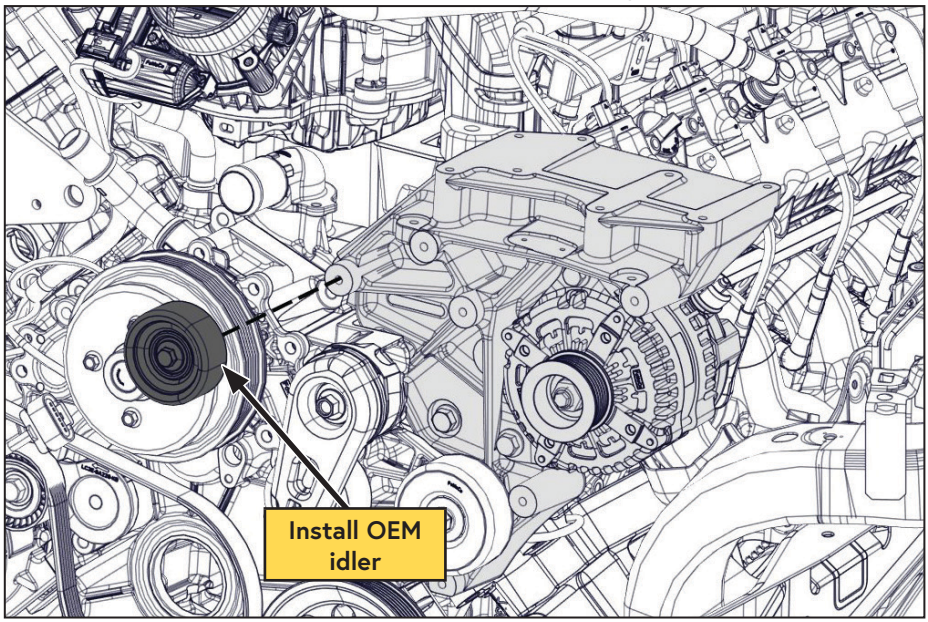


Figure 31 — Install OEM idler

☐ Install and tension the single alternator OEM FEAD belt (see note on page 8) (Figure 32).

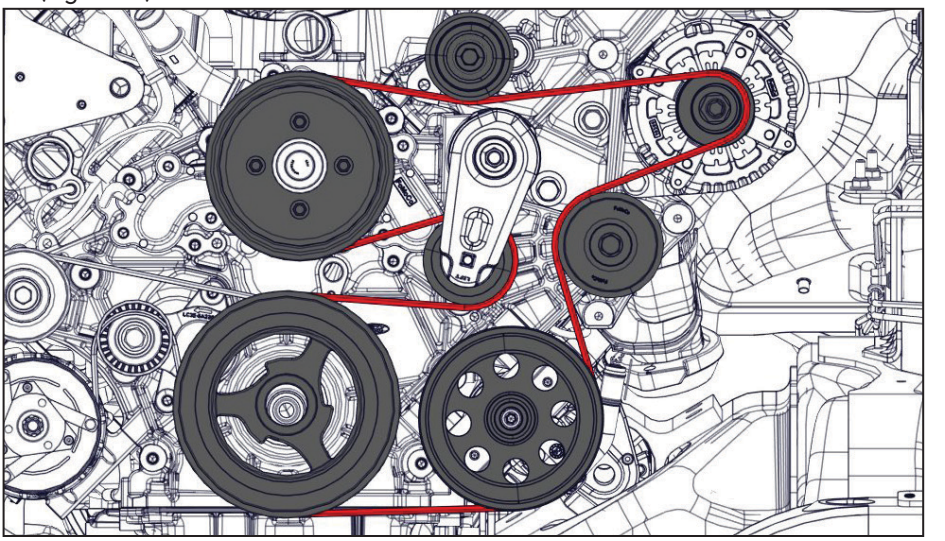


Figure 32 — OEM FEAD belt routing

Installing the crank pulley

☐ Remove and discard the OEM crank pulley bolt.

☐ Inspect the face of the OEM pulley and remove any surface burrs to ensure there is a clean mating surface for the VMAC crank pulley.

☐ Place the VMAC crank pulley in position over the OEM pulley. Ensure that it fits flat against the OEM pulley.

Liquid Loctite 242 must be used to achieve correct torque on the crankshaft bolt as it functions as a thread lubricant, as well as a locking compound. Solid or Stick Loctite cannot be used.

☐ Completely coat the threads with Loctite 242 (blue) and install the supplied VMAC crankshaft bolt, washer, and spacer finger tight (Figure 33).

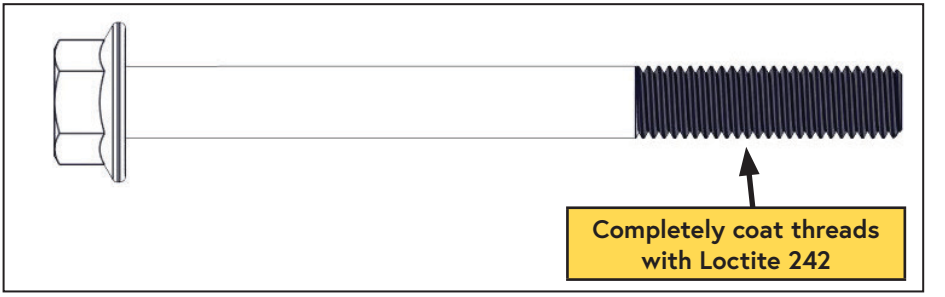


Figure 33 — VMAC crank pulley bolt

☐ Rotate the VMAC crank pulley counterclockwise until the lugs on the back of the pulley are tight against the OEM pulley spokes and tighten the bolt sufficiently to hold the pulley in position Figure 34).

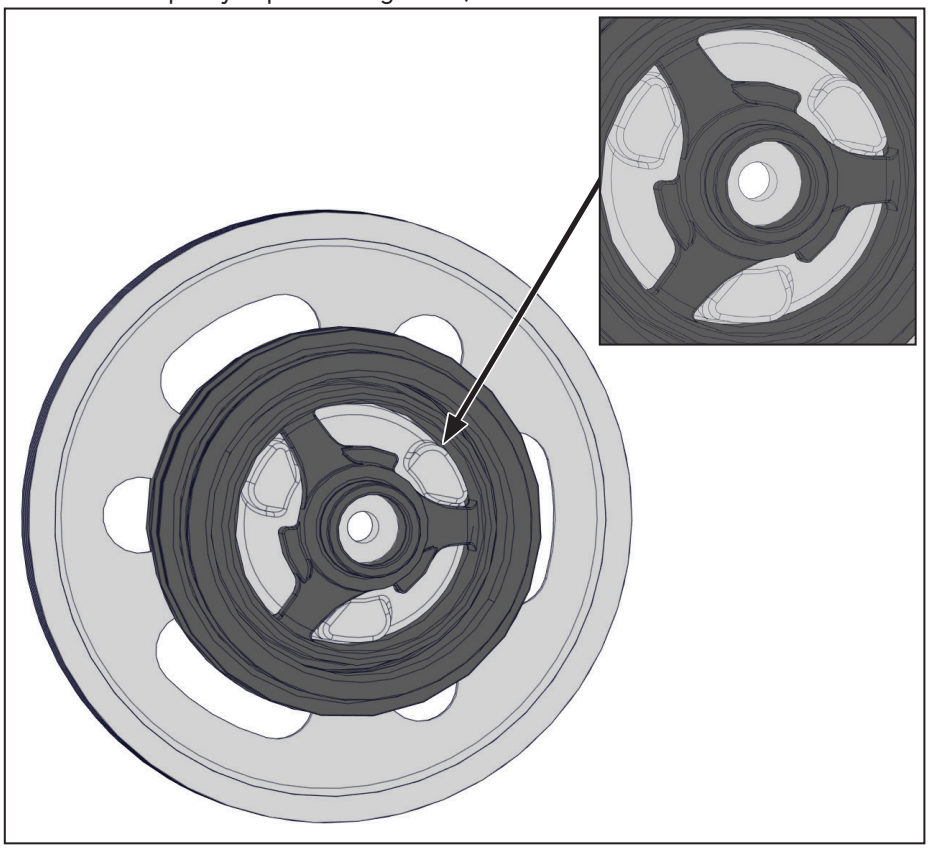


Figure 34 — Engage VMAC crank pulley lugs on OEM pulley

Ensure the VMAC crank pulley does not move off of the OEM pulley face before tightening the pulley bolt. Ensure the pulley is rotated tight against the pulley lugs.

Do not use an impact tool to tighten the pulley bolt

Torque the VMAC crank pulley bolt as per Ford specifications. The Ford specifications as of 1 January 2020:

1) Torque to 66 ft•lbs (89 N•m).
2) Loosen 360°.
3) Torque to 129 ft•lbs (175 N•m).
4) Turn an additional 150°.

****Angle can be measured with Lisle 28100 Torque Angle Meter.***

Connecting the Alternator

The instructions related to completing the alternator installation (including electrical connections) are vehicle configuration specific.

Single Alternator Vehicles

☐ Remove the rubber OEM terminal lug boot and set it aside.

☐ Install the supplied bracket and terminal post onto the main bracket (Figure 35).

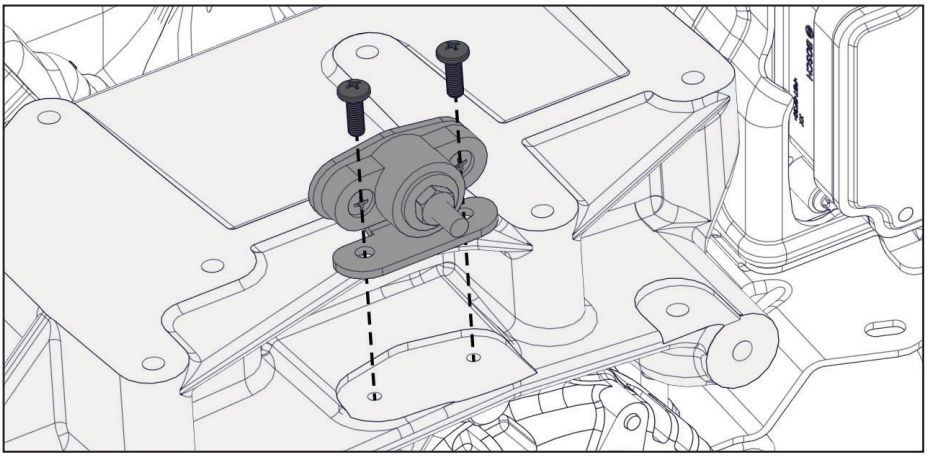


Figure 35 — Install terminal post

☐ Secure the supplied boot, OEM cable, and jumper cable onto the terminal post as shown (note the orientation of the harness terminals) (Figure 36).

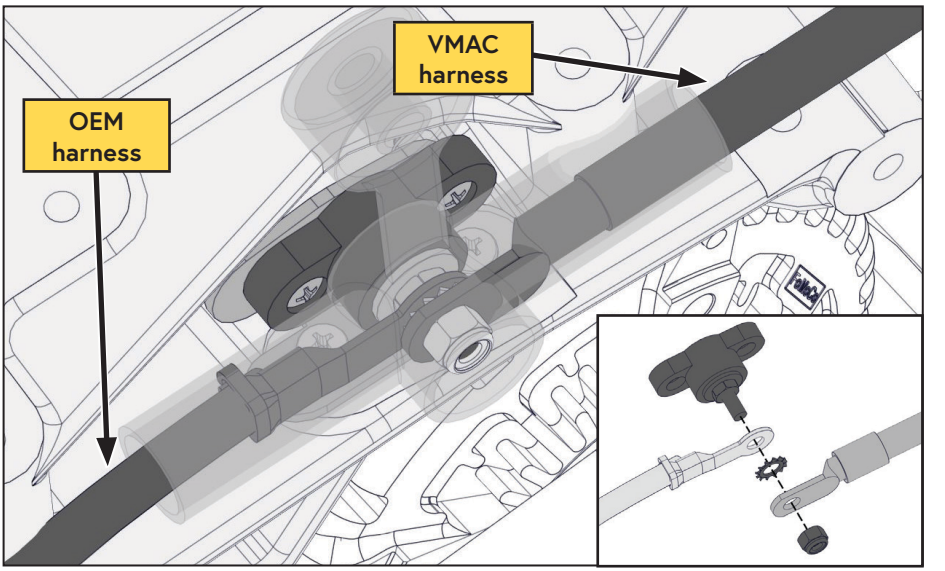


Figure 36 — Install alternator harness

☐ Close the terminal boot cover (Figure 37).

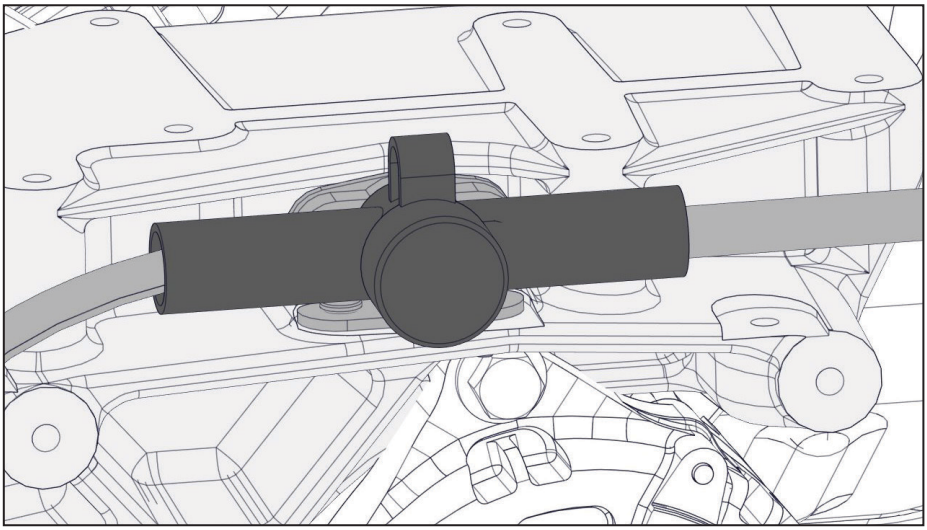


Figure 37 — Install OEM alternator boot

☐ Connect the supplied 3 pin jumper harness to the matching OEM harness.

☐ Wrap the harnesses in the supplied heat wrap.

☐ Cut the heat wrap as required for the harness breakout connections.

☐ Using the suppled P-clips and fasteners (dual battery vehicles: use fastener pack with larger P-clips), secure the heat wrapped bundle to VMAC main bracket (Figure 38).

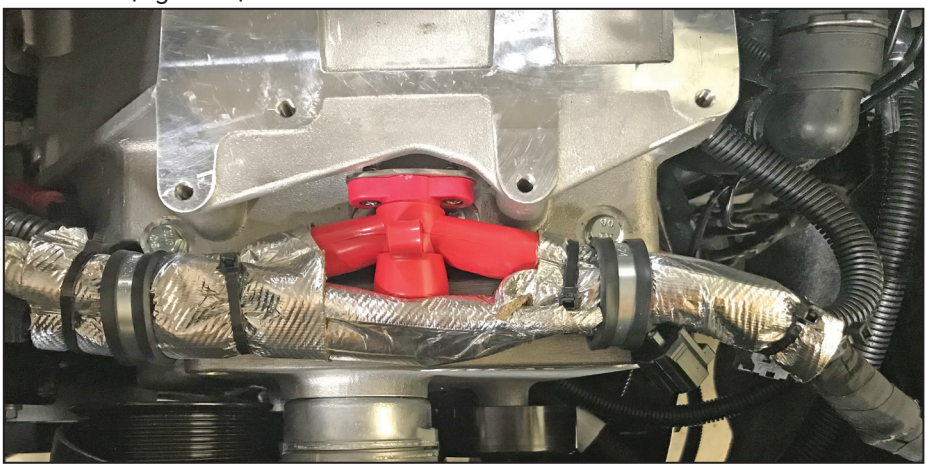


Figure 38 — Secure positive battery harness (dual battery harness shown)

☐ Slide the OEM electrical boot over the alternator side of the supplied jumper cable and, using the OEM fastener, connect it to the alternator.

☐ Connect the supplied 3 pin jumper harness to the alternator.

Dual Alternator / Dual Battery Vehicles

☐ Using the supplied heat shrink tubing, cover the upper alternator ring terminal (Figure 39).

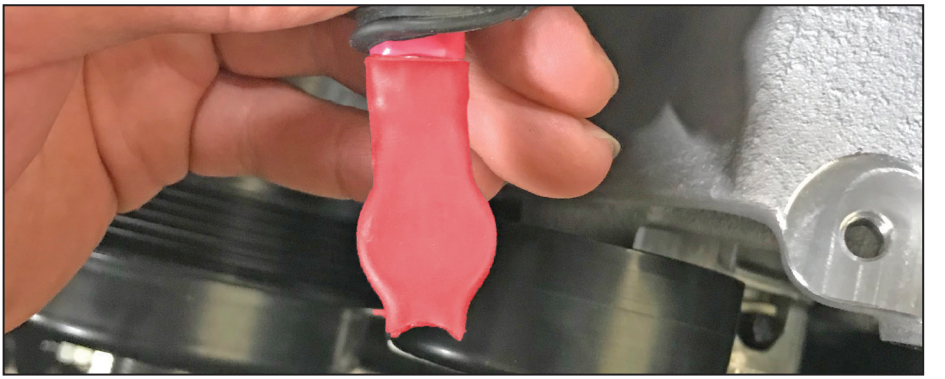


Figure 39 — Isolate secondary alternator harness

☐ Using a cable tie, secure the ring terminal to the harness to protect it from shorting.

☐ Using the (×2) sheets of supplied heat wrap (overlapping the sheets as necessary to accommodate the larger circumference of the dual alternator harness), wrap the harness in the supplied heat wrap and secure the cables ties and P-clips (Figure 40).

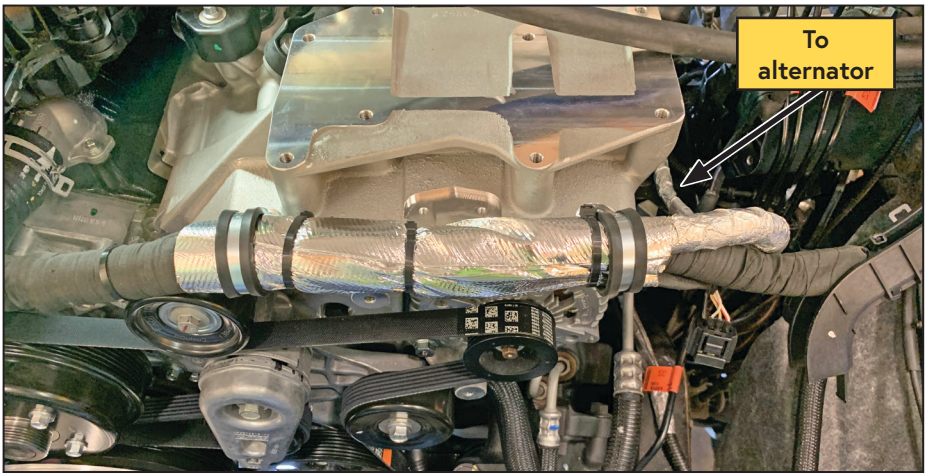


Figure 40 — Secure positive battery harness

☐ Connect the harness and cable to the alternator.

Installing the VMAC FEAD Bracket and Compressor

☐ Remove the tensioner and idlers from the VMAC FEAD bracket.

☐ Using the supplied fasteners, install the FEAD bracket onto the VMAC main bracket (Figure 41).

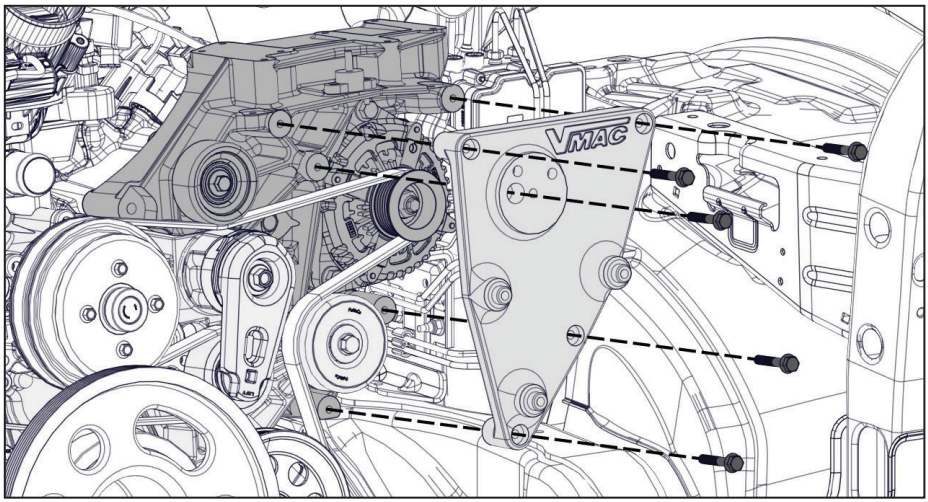


Figure 41 — Install VMAC idler bracket

☐ Lower the fan shroud into the engine bay approximately half way.

☐ Install the idlers and tensioner onto the VMAC FEAD bracket (Figure 42).

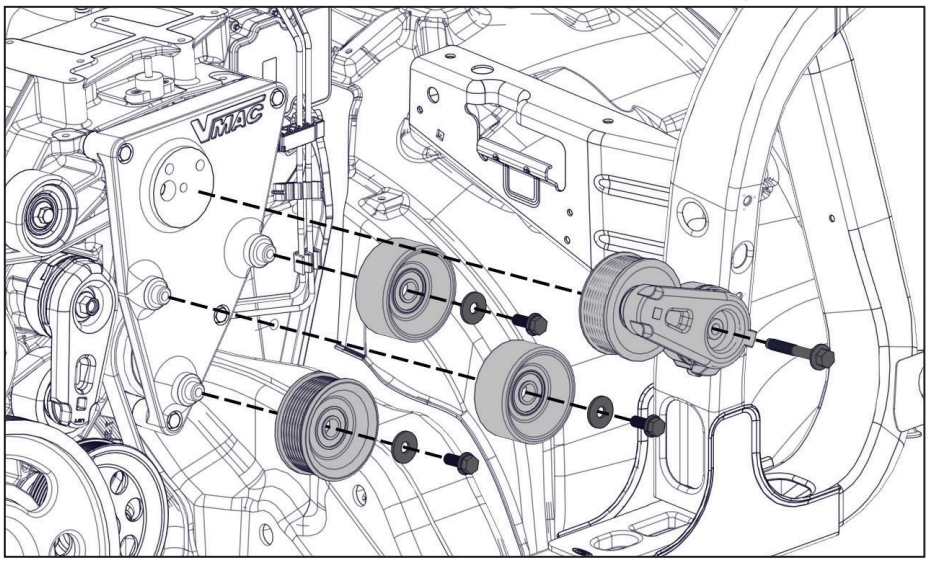


Figure 42 — Install VMAC idler bracket

- ☐ Install the fan spacer onto the fan driver.
- ☐ Remove the fan blades from the fan clutch.
- ☐ Raise the fan shroud enough to allow the fan clutch to be slid into the engine bay.
- ☐ Install the fan clutch onto the fan spacer.
- ☐ Install the fan harness spacer (Figure 43).

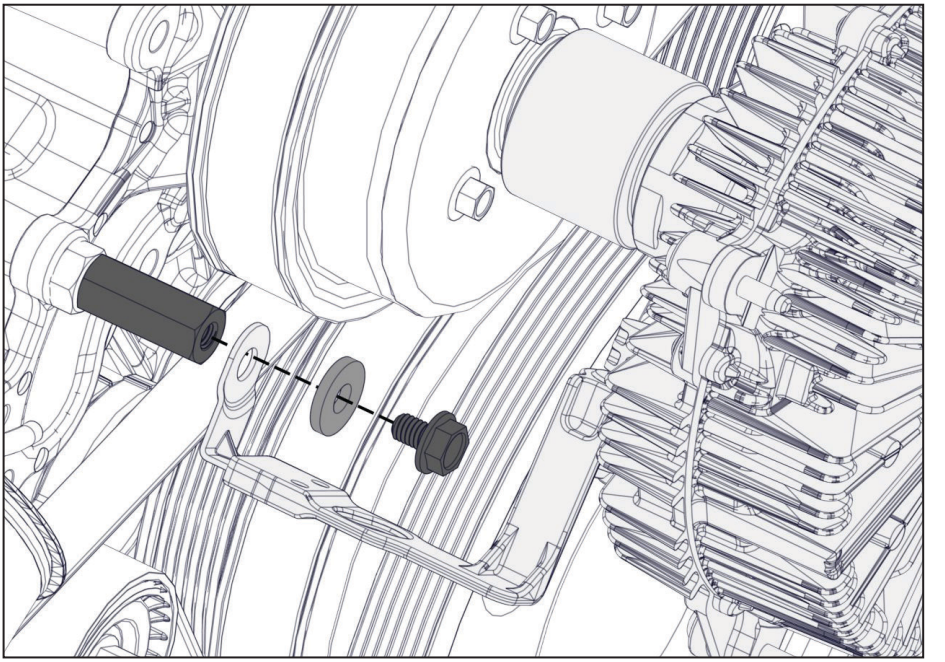


Figure 43 — Install fan harness spacer

- ☐ Connect the fan harness.
- ☐ Re-attach the fan blades to the fan clutch.
- ☐ Using the OEM fasteners, secure the fan shroud.
- ☐ Re-attach the harness that runs below the shroud.
- ☐ Reinstall the lower fan shroud.

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 it using the (×4) supplied bolts; torque the compressor bolts to specification (Figure 44).

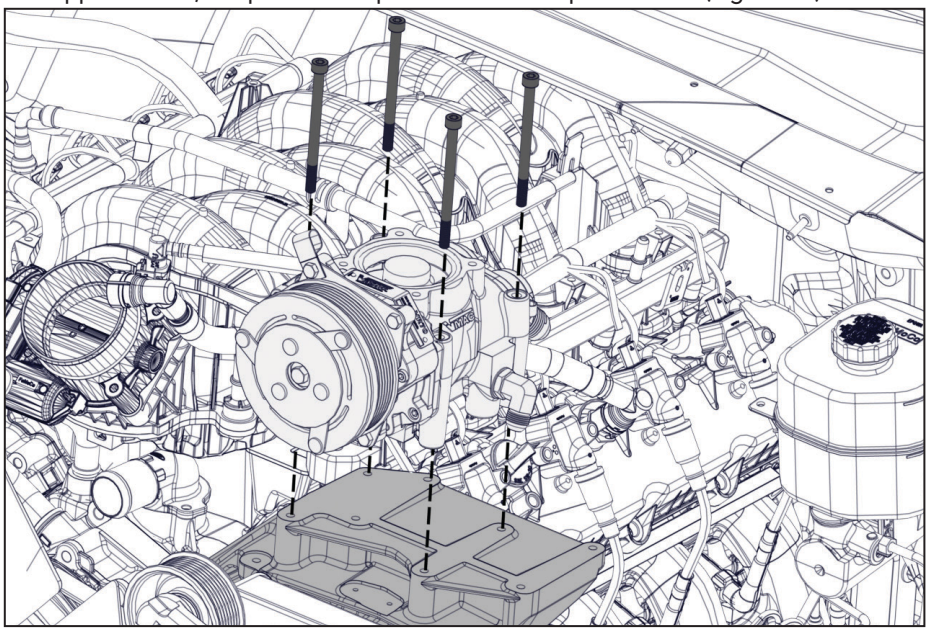


Figure 44 — Install Compressor

The inlet valve is secured with bolts of varying 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 covering and reinstall the Viton O-ring and inlet onto the compressor. Torque to specification (Figure 45).

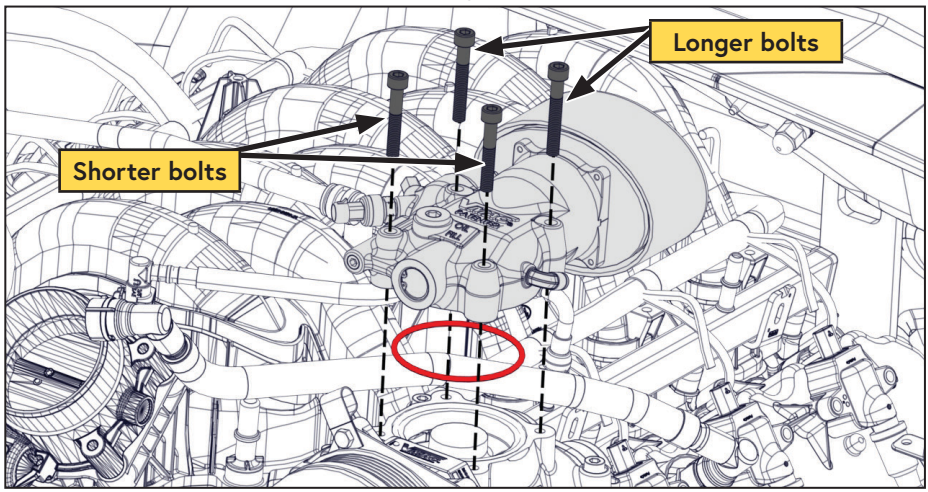


Figure 45 — Install the inlet

☐ Install and tension the VMAC drive belt (Figure 46).

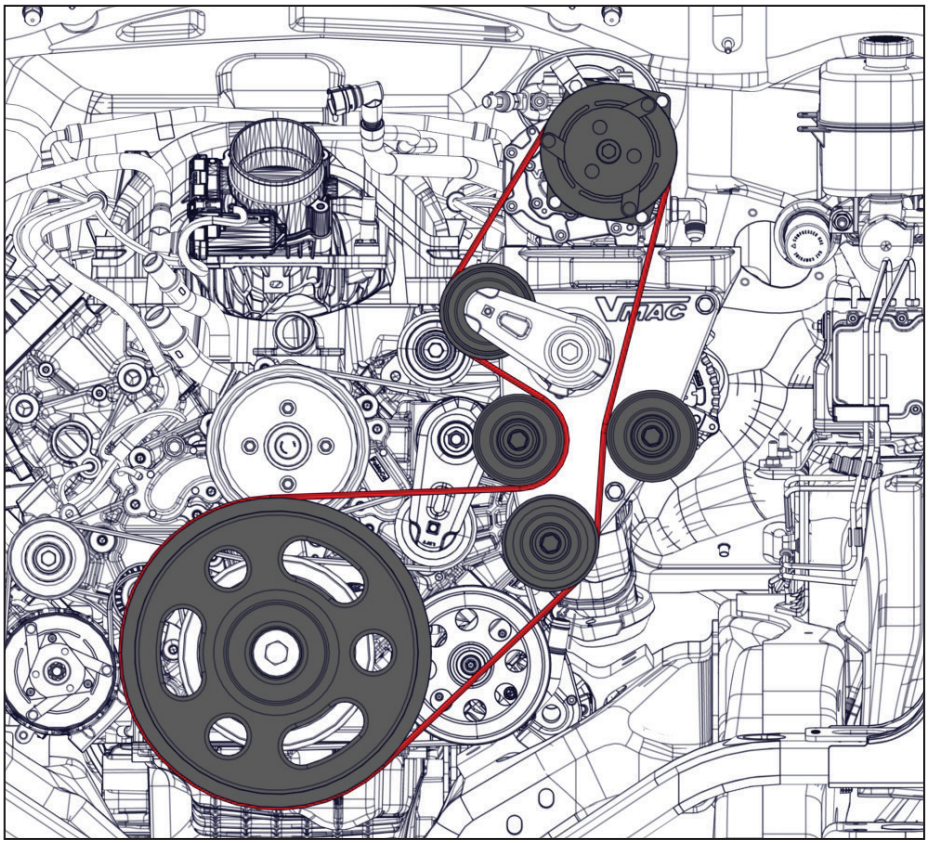


Figure 46 — VMAC belt routing

Installing the Air Oil Separator Tank (AOST)

Dependent upon 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 VMAC compressor oil. Use of hoses other than those supplied or recommended by VMAC may cause compressor damage and may void the warranty.

The AOST must be level for proper air/oil separation, and to ensure that the oil level will display accurately in the sight glass.

Apply Loctite 242 (blue) to all fasteners (except nylon lock nuts) unless otherwise stated.

Installing the AOST

The AOST will mount to the passenger side frame rail, with the brackets straddling the transmission cross member (Figure 47).

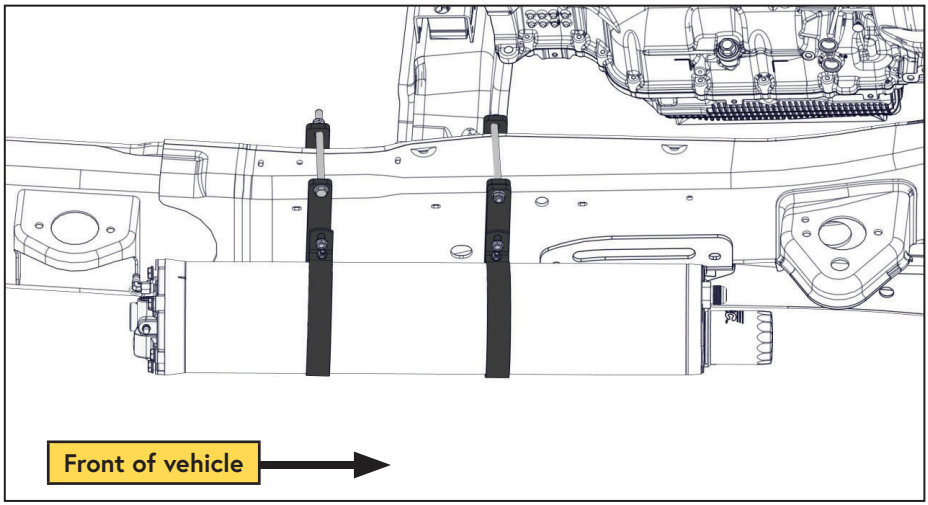


Figure 47 — AOST installed

The top bolt on the forward tank mount will need to be installed from the inside of the frame (Figure 48).

☐ Install the tank mounting brackets on the frame (Figure 48):

- The front tank mount bracket mounts between the radius arm mount and the transmission crossmember.
- The rear tank mount bracket mounts just before the bend in the frame.

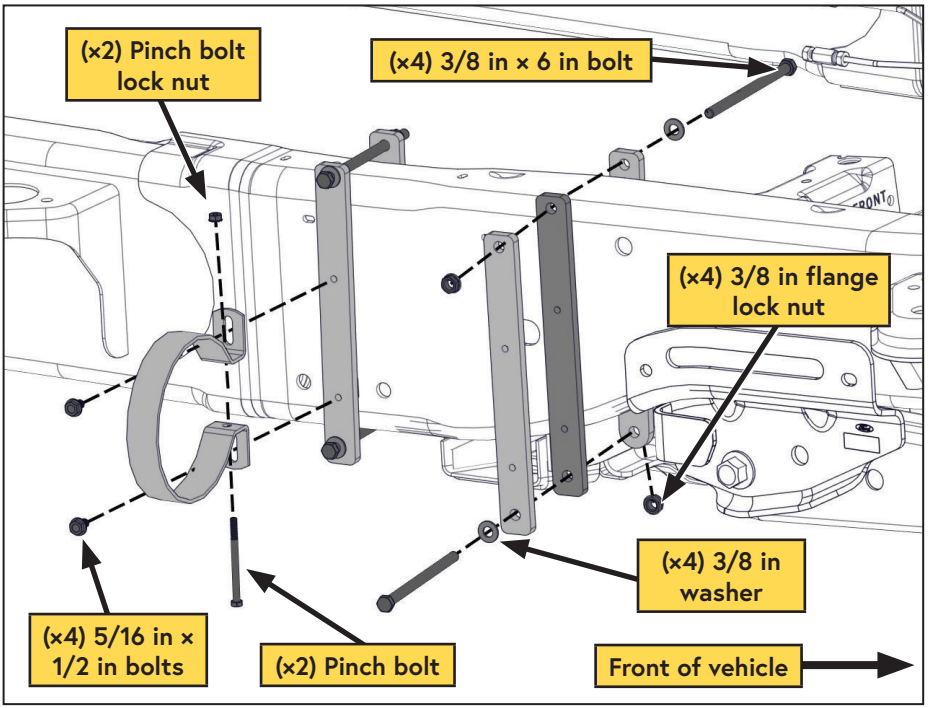


Figure 48 — Installing the AOST
(For clarity, the rear AOST mounting hardware is not shown)

☐ Apply Loctite 242 (blue) to the (×2) 3/8 in × 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 for minor adjustment (Figure 48).

☐ Remove the tank clamp pinch bolts.

☐ Install the tank clamps over the front of the tank and slide them toward the centre of the tank.

Install the tank onto the tank mounts (Figure 48)*:

☐ *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) 3 in × 1/4 in pinch bolts and install them into the mounting clamps. Leave the fasteners finger tight to allow for adjustment when installing the hoses.

☐ Rotate the tank so that the directional arrow on the rear of the tank is pointing upwards (Figure 49).

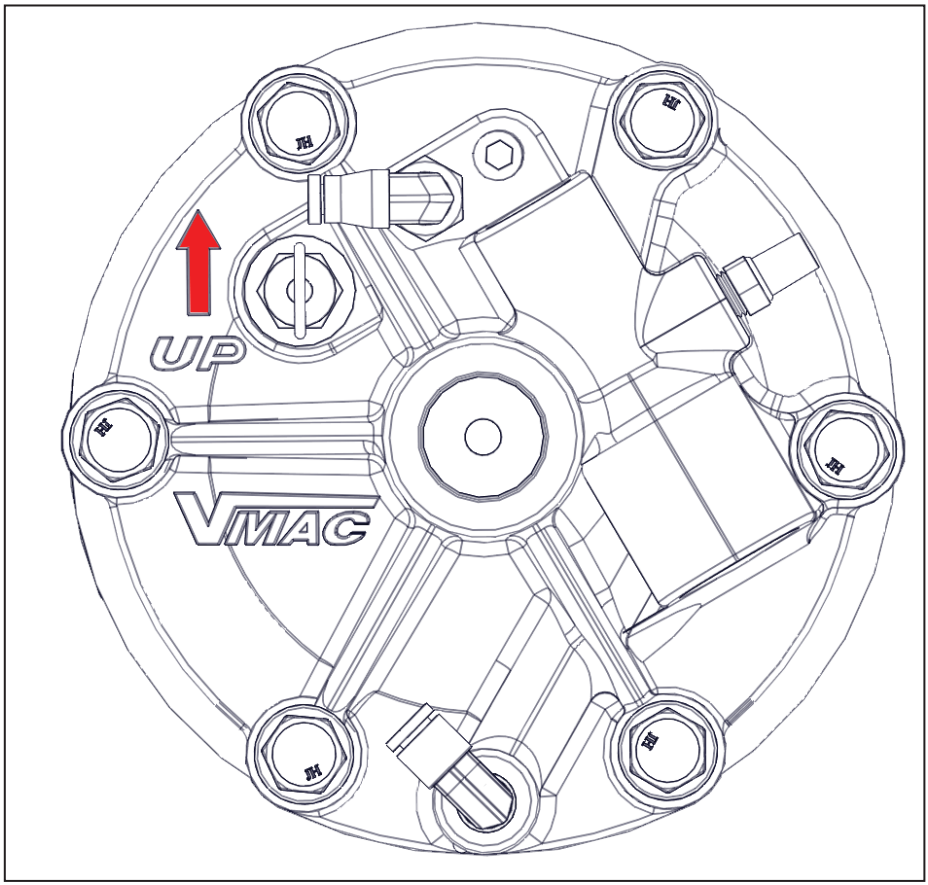


Figure 49 — Securing the AOST (Rear view)

AOST orientation is critical. The arrow must be pointing up to prevent compressor failure due to oil starvation, or oil in the discharge air.

Hose Requirements

Only attempt to shorten the supplied hose if there is access to the appropriate equipment. Do not cut and splice the hose using hose clamps.

VMAC Compressor oil will degrade rubber lined hoses, use only hoses with an AQP elastomer type liner. Contact VMAC Technical Support at 1-888-241-2289 for further information.

The PTFE tubes and AQP elastomer lined hoses are specifically designed to work with VMAC compressor oil and at compressor operating temperatures.

Based on the desired location of the AOST, the hose lengths provided with this system may not be ideal. VMAC suggests first trying to adjust the AOST within its mounts to take up any excess slack in the hoses. If this is not effective, the hoses can be shortened or replaced as necessary, or hose extenders can be used.

VMAC recommends shortening these hoses as a preferred alternative to coiling up and securing the excess. ***Shorter hose length will maximize system performance.***

Avoid using 90° fittings wherever possible as they cause flow restrictions and negatively impact performance.

The following hoses are included with this compressor kit:

- 1/2 in × 45 in.
- 1/2 in × 71 in.
- 1 in × 73 in.
- 1/4 in (PTFE Tube): 119 in
- 3/16 in (PTFE Tube): 110 in

If longer hoses are required:

To order parts, contact a VMAC dealer. The dealer will ask for the VMAC serial number, part number, description and quantity. See page 6 for ordering information.

- Eaton Aeroquip hoses with an "AQP" type inner liner are required.
- OTC fittings are required for the VMAC supplied hose.
- Push-lock fittings are suitable if FC332 hose is used.
- If Push-lock fittings are being used, do not use hose clamps as they will damage the hose and cause leaks.

Routing and Connecting the Hoses

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

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

Ensure there is sufficient slack in the hose routing to allow for normal engine movement.

PTFE Tubing, Loom, and Push-To-Connect Fittings

- ☐ PTFE tubing should only be cut using proper tubing cutters. Side cutters, utility knives, etc. will deform the tube, preventing a proper seal (or leave sharp edges which cut the internal O-ring).
- ☐ When applying loom to the PTFE tube, leave approximately 1 in between the loom and the fitting.
- ☐ Ensure the tube is clean, cut at 90° and that there are not sharp edges.
- ☐ Lubricate the tube and firmly push it into the fitting so that the tube fully seats in the fitting.
- ☐ Slide the collet out, away from the body of the fitting to lock the tubing in place.
- ☐ Ensure the tube does not have any "play" to prevent the O-ring from wearing.

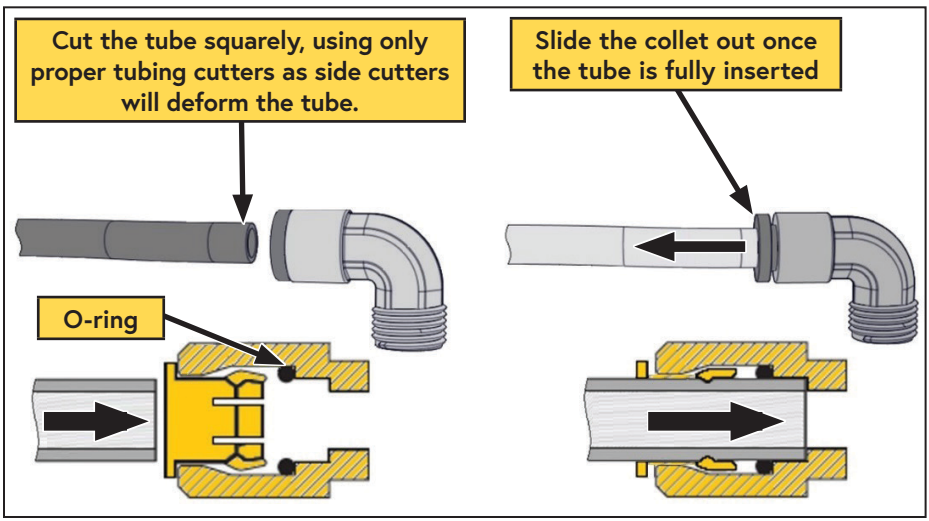


Figure 50 — Push-to-connect fittings

Hose Routing for Passenger Side Frame Rail Mounted AOST

☐ Connect the straight fitting on the 3/4 in discharge hose to the matching fitting on the compressor, leave the fitting somewhat loose to allow the hose to be adjusted.

☐ Route the 3/4 in discharge hose to the firewall, then toward the passenger side of the vehicle (Figure 51).

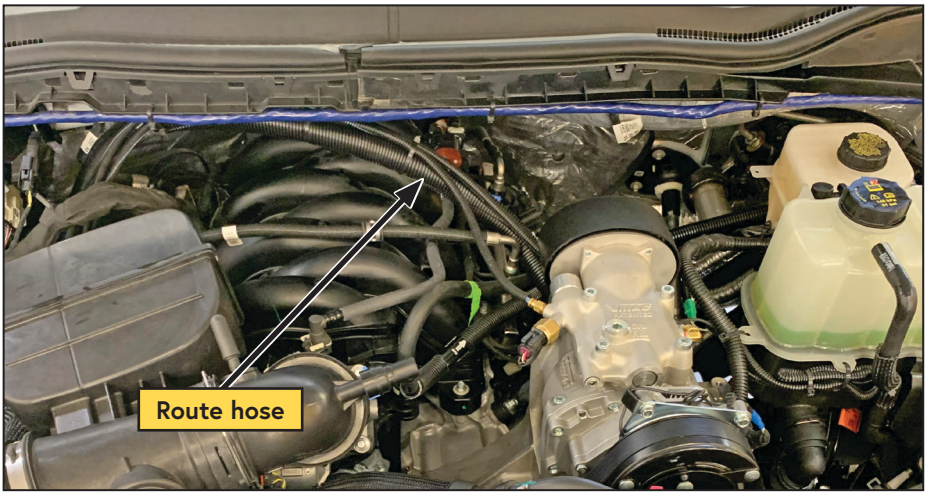


Figure 51 — Route discharge hose

☐ Route the 3/4 in discharge hose down between the frame and the fender liner, and toward the AOST (Figure 52).

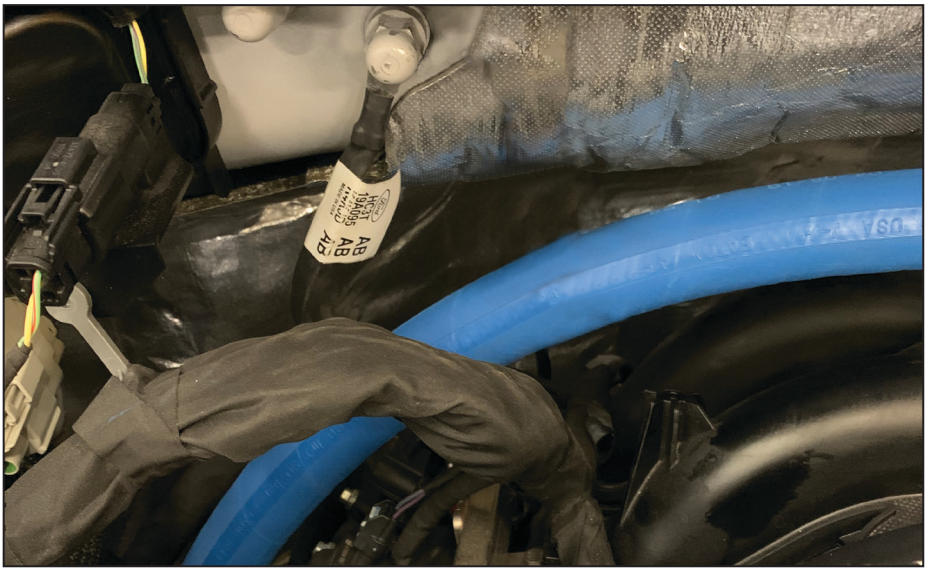


Figure 52 — Install hose routing bracket
(blue hose shown for clarity)

☐ Using the supplied P-clip and fastener, secure the 3/4 in discharge hose to the firewall (Figure 53).

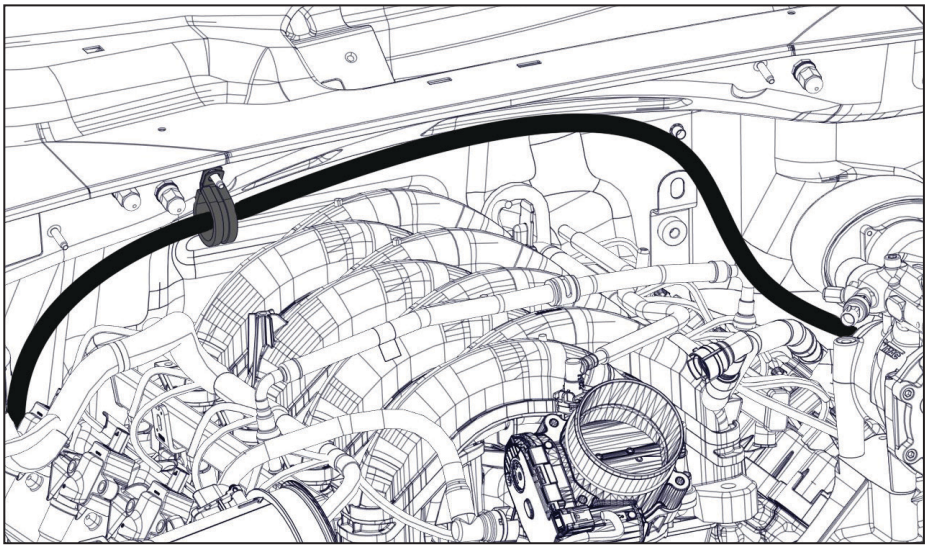


Figure 53 — Install hose routing bracket

☐ Secure the hose away from the sharp edge of the body mount using the supplied P-clip, bracket, bolt, nut and snubbing washer (Figure 54).

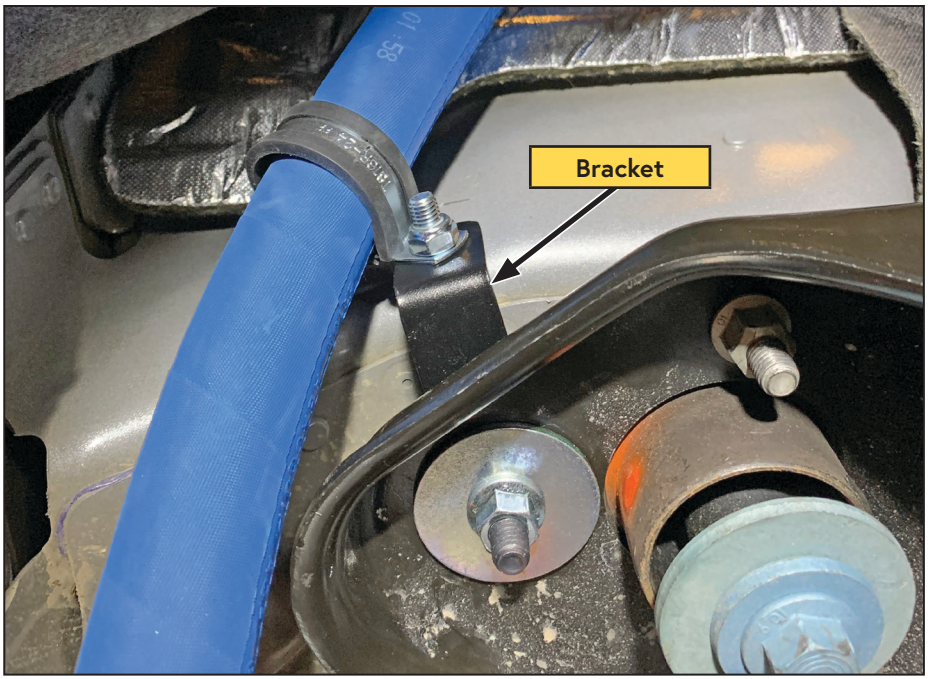


Figure 54 — Routing the hoses

Due to vehicle frame variations, the square hole (Figure 55) may not be present.

On applications without the square hole, route the hose along the top of the frame to the AOST. If routing along the top of the frame, skip to page 43.

- ☐ Connect the 45° fitting to the matching fitting on the AOST.
- ☐ Using tape, secure the cap plugs in place on the longer 1/2 in oil hose.
- ☐ From the straight fitting on the longer hose, measure 8 in and mark the location.
- ☐ From the straight fitting on the longer hose, measure 45 1/2 in and mark the location.
- ☐ Apply the supplied spiral wrap loom to the hose, centering the loom sections on the locations marked in the previous steps.
- ☐ Connect the 90° fitting on the longer hose to the matching fitting on the driver side of the oil cooler.
- ☐ Route the hose from the oil cooler, between the frame cross member and the body coloured radiator support and over to the passenger side frame rail.
- ☐ Route the hose into the frame via the square located near the AC compressor (Figure 55).

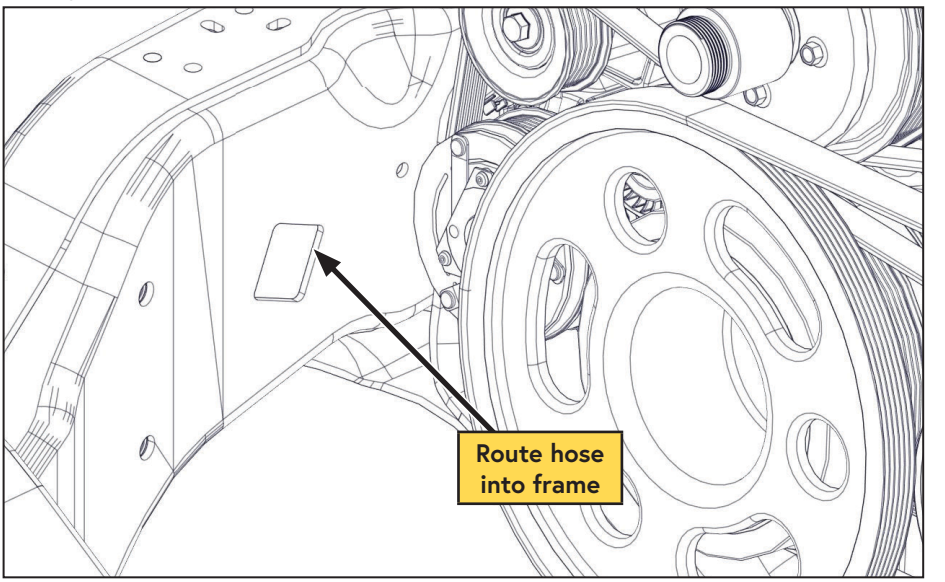


Figure 55 — Route oil hose

- ☐ Route the oil hose out of the frame via the round access hole under the cab mount near the front of the AOST.
- ☐ Verify that the spiral wrap loom is positioned to properly protect the hose where it enters and exits the frame.
- ☐ Coil any excess hose and secure it to prevent it from being snagged by any road hazards, etc.

- ☐ Remove the cap plug from the oil hose and connect it to the matching 45° fitting on the AOST.
- ☐ Connect the 90° fitting on the shorter 1/2 in hose to the matching fitting on the passenger side of the oil cooler.
- ☐ Route the hose up to the compressor and connect it to the matching fitting on the side of the compressor.
- ☐ Apply the supplied loom to the 1/4 in and 3/16 in PTFE tubes.
- ☐ Connect the PTFE tubes to their respective fittings on the inlet.
- ☐ Route the 1/4 in and 3/16 in PTFE tubes along the 3/4 in discharge hose, securing the PTFE tubes to the 3/4 in hose using cable ties.
- ☐ If necessary, trim the PTFE tubes and connect them to their respective fittings on the rear of the AOST.
- ☐ Adjust the hoses and/or the AOST to minimize sharp bends, or contact with any hot, sharp or moving parts. Tighten all of the fittings, the tank mounts and straps.
- ☐ Bundle the hoses together and secure them with cable ties.
- ☐ Move the steering between the left and right lock positions to confirm adequate clearance.

Modifying and Installing the Degas Bottle

Single Battery Vehicles

☐ Cut the indexing feature of the degas bottle flush with the foot (Figure 56).

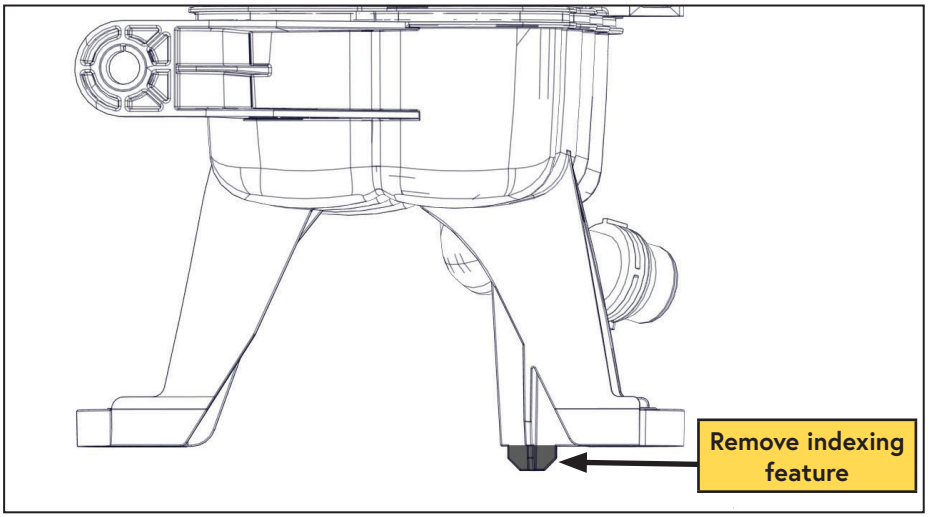


Figure 56 — Modify degas bottle

☐ Rotate the large hose connected to the power steering reservoir 90° counterclockwise (Figure 57).

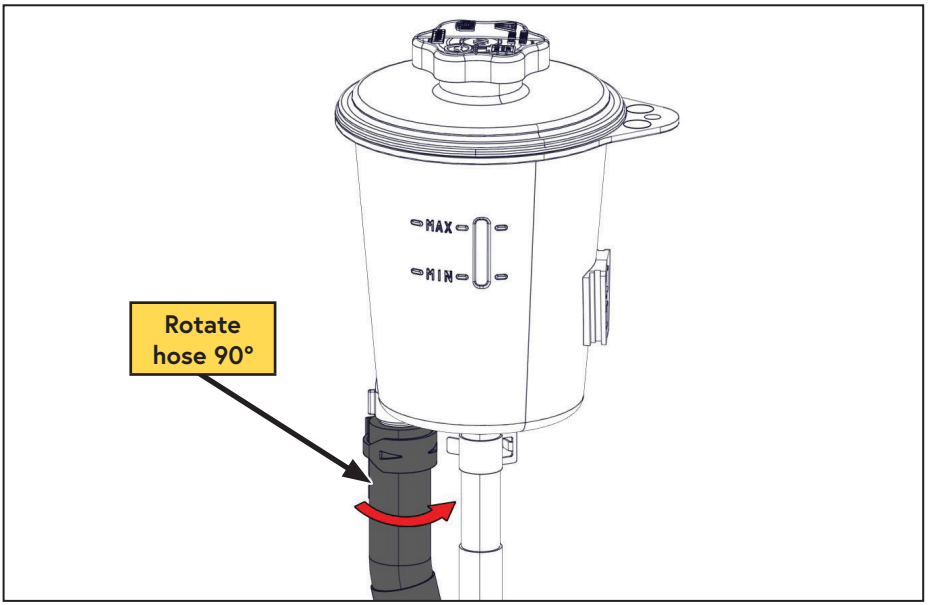


Figure 57 — Modify degas bottle

☐ Using the supplied fasteners, mount the power steering relocation bracket, and the degas relocation bracket, to the degas bottle (Figure 58, Figure 59).

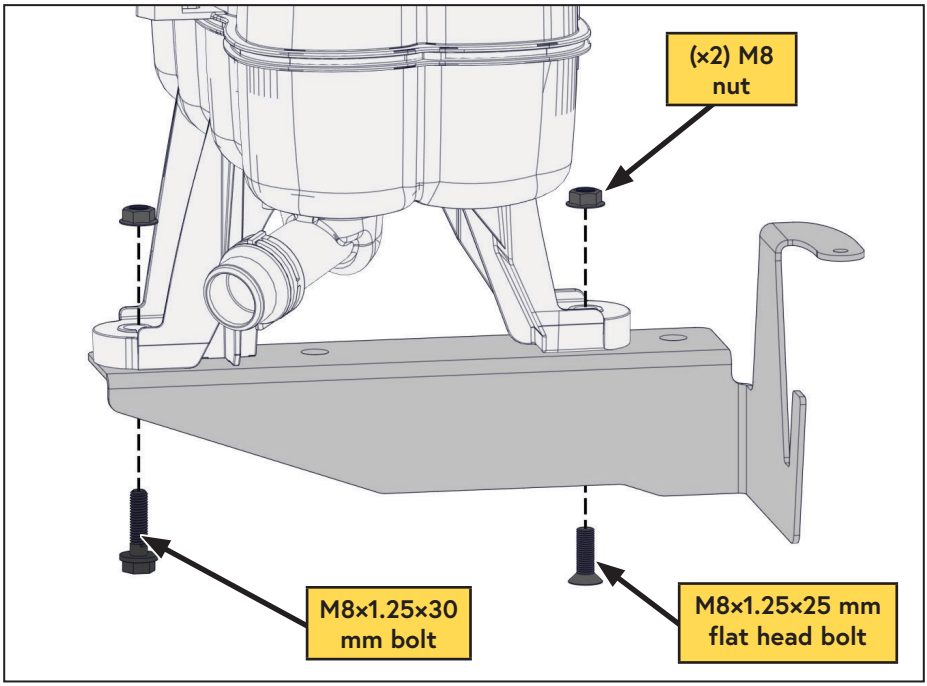


Figure 58 — Power steering relocation bracket

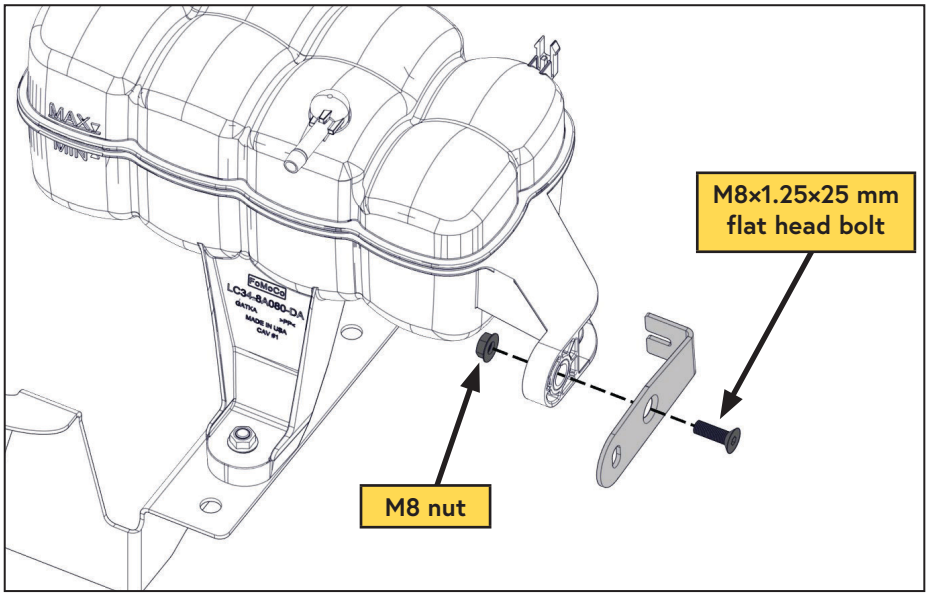


Figure 59 — Degas bottle relocation bracket

☐ Using (×3) OEM battery box fasteners, and (×1) supplied flange nut, install the degas bottle assembly into the engine bay (Figure 60, Figure 61).

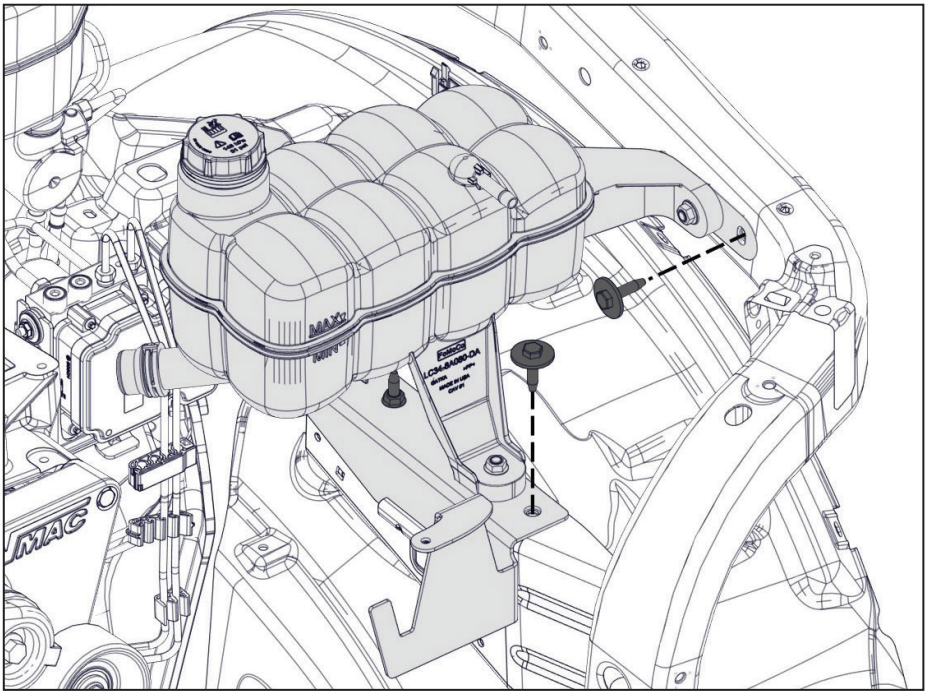


Figure 60 — Power steering / battery post relocation brackets

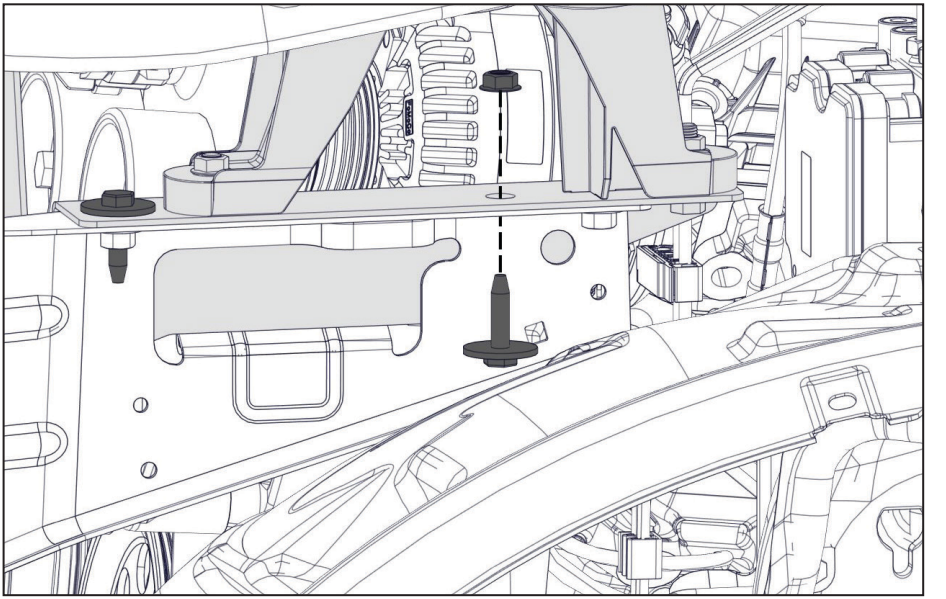


Figure 61 — Degas bottle relocation bracket

Dual Battery Vehicles

☐ Set the OEM degas bottle and battery box assembly in position in the engine bay (Figure 62).

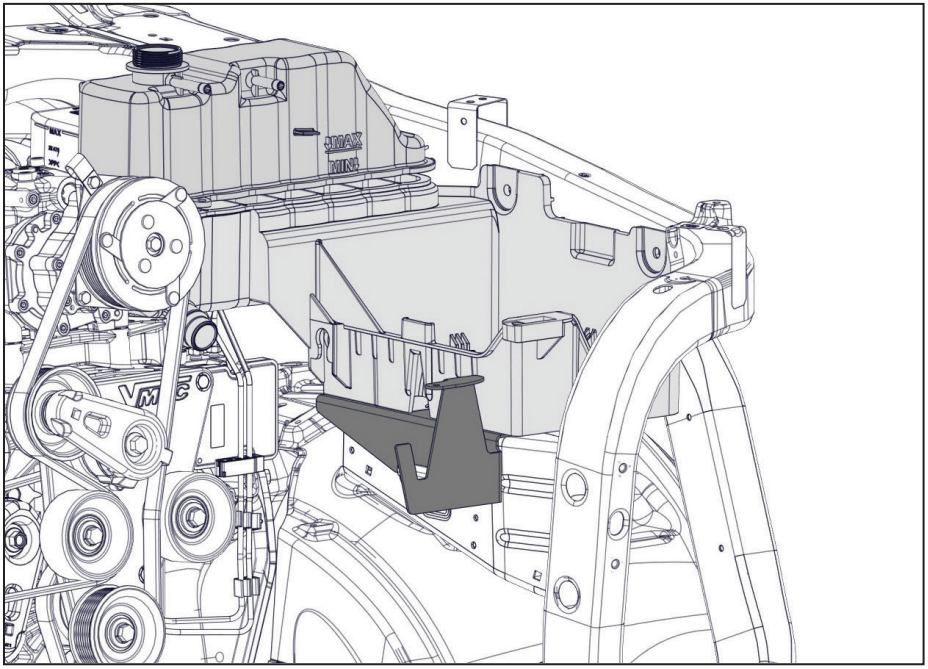


Figure 62 — Power steering / battery post relocation brackets

☐ Slide the supplied power steering reservoir relocation bracket underneath the battery box, align the holes, and secure the assembly using the OEM fasteners.

All Configurations

☐ Insert the power steering reservoir into the slot on the reservoir relocation bracket. Adjust the large power steering hose (that was re-clocked earlier) as necessary to prevent kinking or stress (Figure 63).

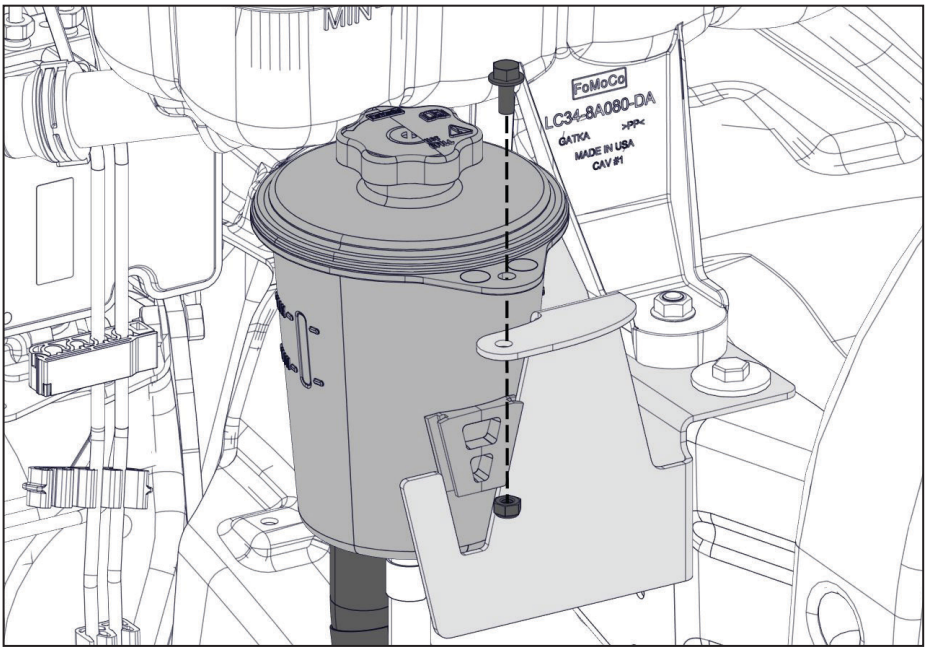


Figure 63 — Mount power steering reservoir

☐ Using the supplied fasteners, secure the power steering reservoir to the bracket (Figure 63).

Specific instruction for remounting the components to the degas bottle are not possible due to the differences between vehicle models and the various brake systems and degas bottles.

☐ Reconnect the coolant tubes, and re-attach the various components to the degas bottle. Where the harnesses or components cannot be mounted to the degas bottle in their original position, secure them using cable ties.

☐ Using loom and cable ties (not supplied), ensure that any hoses or components are protected from abrasion.

Installing the Upper Coolant Hose

☐ Install the upper coolant hose quick connect, retained earlier, onto the upper radiator spigot.

☐ Install the supplied bent tube into the upper coolant hose as shown, and orient it toward the upper radiator spigot (Figure 64).

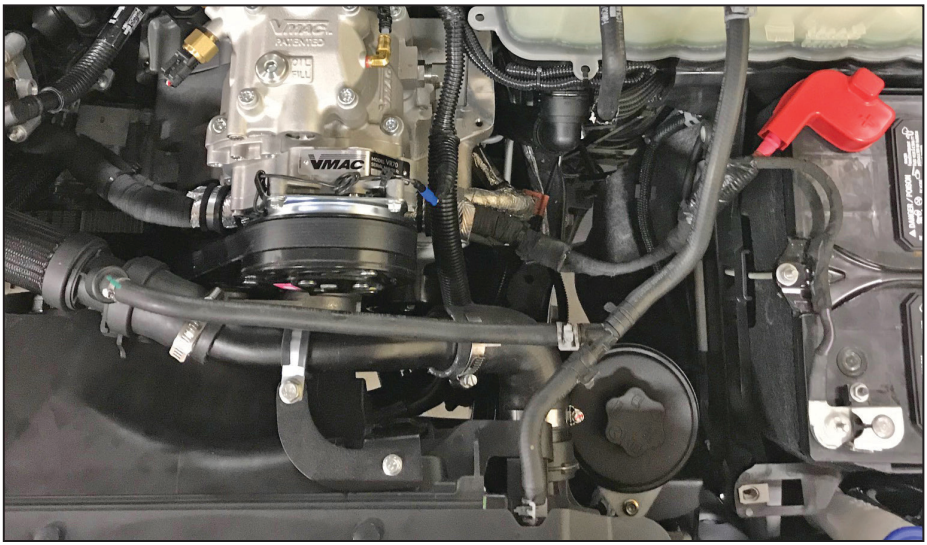


Figure 64 — Connect upper radiator hose

☐ Using the supplied gear clamp, install the short side of the supplied 90° hose onto the quick connect and connect the other side to the bent tube (Figure 64).

☐ Using the OEM fastener, secure the upper coolant bracket to the fan shroud (Figure 64).

☐ Using the supplied P-clip and fasteners, secure the upper coolant hose to the bracket. Ensure the hose is secured away from the clutch (Figure 64).

As the coolant system pressurizes, the upper hose assembly may move up to 3/4 in, ensure it is adequately secured to prevent it from contacting moving components, and protected from abrasion.

Installing the Control Components

Best Practices

- To confirm a good ground, use an ohm meter to measure the resistance between the ground point and the negative battery terminal. Resistance should be less than 1 Ω.
- Route all wires to ensure they will not contact hot, sharp or moving parts (including the park brake mechanism, steering column, and pedals).
- Before drilling any holes ensure there are no OEM wires, hoses, or components that may be damaged.
- Do not use a test light to probe for power on vehicle circuits, the increased current draw of the test light may damage components.
- 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.
- Apply loom to all wiring:
    - Use high temperature loom in areas where high temperatures may be expected.
    - Use spiral loom in areas with high vibration.

In-line Butt Splice Connections

- Cut the wire approximately 2 in from the connector.
- Strip approximately 3/8 in from the end of both sides of the cut wire, as well as from the end of the wire being spliced in-line.
- Twist the wire to be spliced in-line, together with the "live" side of the wire (not the wire attached to the connector).
- Slide the butt connector onto the twisted wires and crimp it.
- Insert the "connector side" of the wire into butt connector and crimp it.
- 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.

Posi-Tap Connectors

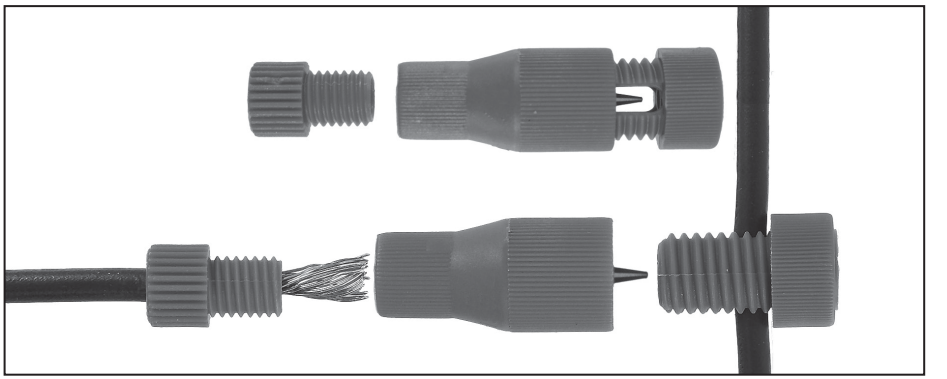


Figure 65 — Posi-Tap wire connector

- Slide the OEM (live) wire into the slot on the large cap as far as it will go.
- Thread the tap (barrel with pin) over the slotted cap, ensuring the pin is centered on the wire. Firmly tighten the tap.
- Strip approximately 3/8 in from the end of wire.
- Unscrew the small cap.
- Twist the wires together and insert the wire into the cap.
- Deflect the wires to one side.
- Insert the cap into the tap, ensuring the wires enter one side of the metal core.
- Ensuring the wire does not slip out of the cap, push and turn until the threads catch and firmly tighten the cap.
- Ensure all of the connections are firmly tightened by hand (overtightening will cause the threads to strip).

Tying into OEM connectors

Some OEM connectors may have locking tabs that must be disengaged prior to inserting a crimped connector.

Digital Throttle Control Wire Schematic

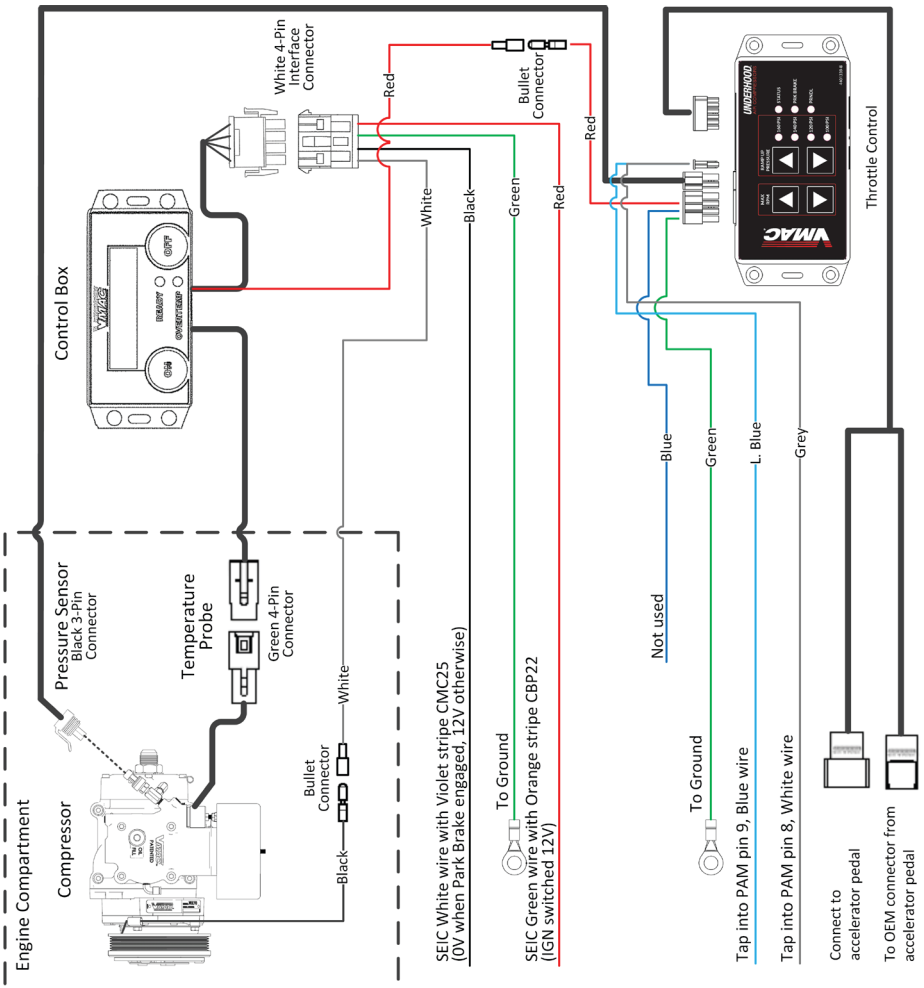


Figure 66 — Digital throttle control

Control Box

- ☐ Remove the plastic trim panel from the doorsill and the kick panel on the driver side.
- ☐ Install the control box in a convenient location in the cab, positioned so that the wire harness will reach the compressor. The most common location for the control box is between the driver side seat and the door.

Throttle Control

- ☐ Using cable ties, secure the throttle control under the dashboard, next to the OBD II port. Ensure it is away from moving parts and positioned so that the buttons and LED lights are accessible.

Connecting the Wiring

- ☐ Unplug the OEM cable from the accelerator pedal and plug it into the matching connector from the throttle control. Plug the cable from the throttle control into the matching connector on the accelerator pedal.
- ☐ Connect the interface harness to the matching connector from the control box.
- ☐ Replace the doorsill trim and the kick panel.
- ☐ Attach the green wire with ring connector, running from the control box, to a good ground under the dashboard.
- ☐ Locate the Parking Assist Control Module (PAM) (located on the driver side, under the dashboard and above the parking brake). The PAM harness will either be plugged into a blanking plug, or a PAM module (Figure 67).

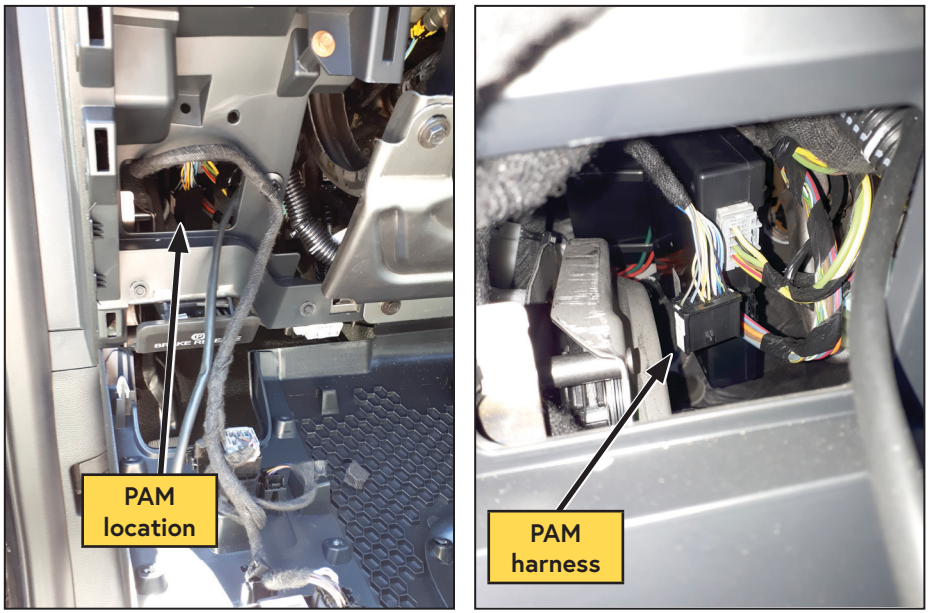


Figure 67 — Parking Assist Control Module (PAM)

☐ Disconnect the connector.

Due to running OEM changes, the PAM wire colours are subject to change without notice however, pins 8 (CAN low) and 9 (CAN high) of the PAM connector shall be the definitive method for determining the correct wire connections.

Pins 8 and 9 will have 2 wires of the same colour crimped to their respective pins, either wire may be utilized for the connections.

☐ Using the supplied Posi-Taps (see page 50), connect the blue wire from the throttle control to the wire at pin 9 (blue wire at time of writing) of the PAM connector (Figure 68).

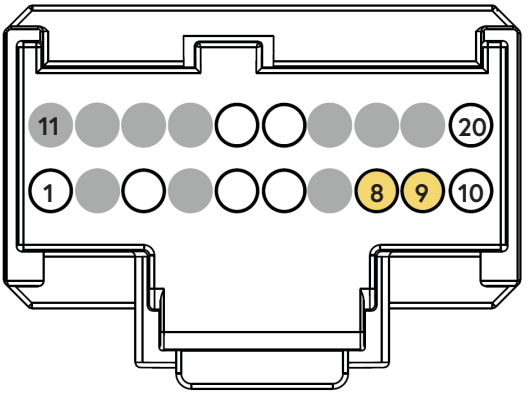


Figure 68 — PAM connector

☐ Using the supplied Posi-Taps, connect the grey wire from the throttle control to the wire at pin 8 (white wire at time of writing) of the PAM connector (Figure 68)

☐ Reconnect the PAM harness to the PAM module or blanking plug.

☐ Remove the glove box compartment to gain access to the wire run behind it.

☐ Shorten the darker blue wire running from the throttle control and apply insulation (e.g. shrink tube, electrical tape, etc.) to safely terminate the wire.

Route the following wires to the SEIC interface located behind the kick panel in the passenger side footwell (there is a wire run behind the glove compartment)*:

- ☐ *Black wire from the white 4-pin connector.
- ☐ *Red wire from the white 4-pin connector.

☐ Unplug the SEIC pigtail from the SEIC interface plug.

☐ Splice the blunt cut red wire (from 4-pin connector) to the green wire with orange stripe (CBP22).

☐ Splice the black wire to the white wire with violet stripe (CMC25).

Route the following wires into the engine compartment via a grommet in the firewall*:

- ☐ *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.

☐ Cover all of the engine compartment wires with plastic loom.

Compressor connections

☐ Route the (×2) grey cables and the white wire over to the compressor.

☐ 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.

Adding Oil to the System

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.

- ☐ Lower the vehicle from the axle-stands.
- ☐ Ensure the vehicle is parked on level ground.
- ☐ Remove the oil filter from the AOST and discard the cardboard warning tag. Apply a light film of compressor oil to the filter gasket and thread the filter onto the AOST until the gasket makes contact. Tighten the filter an additional 3/4 to 1 turn after the gasket contacts the base.
- ☐ Remove the cap from the oil-fill port located on the Inlet valve (Figure 69).

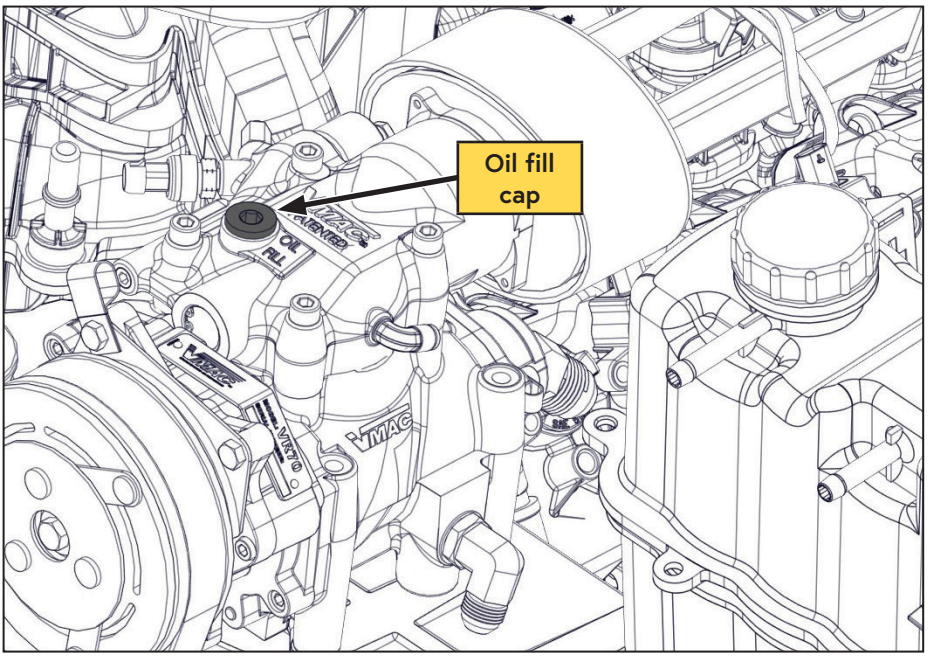


Figure 69 — Oil fill location

- ☐ Add the 4 L (1 USG) jug of oil to the system.
- ☐ 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 from the 1 L (1 qt) bottle until the level is correct.
- ☐ Replace the oil fill cap and tighten.

Completing the Installation

- ☐ Reinstall the air intake tube and resonator assembly
- ☐ Reinstall the radiator cross member cover.
- ☐ Connect the upper degas hose to the radiator and VMAC degas tank (trim hoses as necessary).
- ☐ Reinstall the lower bumper air dam (if removed).
- ☐ ***Optional:*** Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the system.
- ☐ Ensure the radiator drain spigot is closed.
- ☐ Fill the degas bottle to the "MAX FILL" line.
- ☐ Install the degas bottle cap until it contacts the hard stop.
- ☐ Check all wiring, hoses and tubes to ensure that they will not contact any hot or moving components and will not interfere with the operation of the vehicle. Ensure all wiring, hoses and tubes are secured with cable ties and protected with loom as required.
- ☐ 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.
- ☐ Pull any excess wiring back into the cab and tie it up and out of the way under the dash with cable ties.
- ☐ Reconnect the battery terminal(s).

The System Identification 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.

- ☐ Locate a conspicuous area in the engine bay (where the tag will be easily noticed) to install the System ID tag.
- ☐ Mark and drill (×2) 7/64 in holes and secure the plate with the supplied self-tapping screws (Figure 70).

Figure 70 — System Identification Plate

☐ 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 (Figure 71).

Figure 71 — Advisory label

☐ Install the belt routing label in the engine compartment near the hood latch in a visible location (Figure 72).

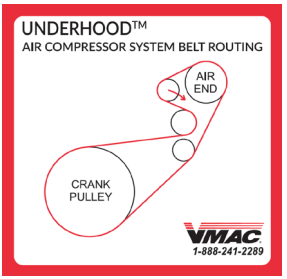


Figure 72 — Belt routing label
(actual belt routing label may differ)

☐ 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. A good spot for this is usually on the inside of the door or on the panel underneath the steering wheel (Figure 73).

Figure 73 — Operating Instruction label

Recommended Accessories

While the compressor system will function without the following accessories, VMAC strongly recommends their use for optimal performance.

See the "Accessory Product" section of this manual on page 68 for a list of products available for purchase through VMAC.

Receiver Tank

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.

Pressure Gauge

While not critical to system performance, a pressure gauge is important for fine tuning the system and simplifies any potential troubleshooting.
Install a 200 psi pressure gauge downstream of the air discharge valve.

Pressure Regulator and/or Lubricator or FRL

The compressor can produce air pressures up to approximately 175 psi (1207 kPa). It is the responsibility of the user to know the pressure and air flow requirements of the tools powered by the air compressor system.

An appropriate air pressure regulator and lubricator can be installed downstream of the air discharge valve. Failure to regulate the air pressure may cause damage to the tool.

Air Receiver Tank

If an air receiver tank will be used with this system, a check valve (not supplied) must be installed to prevent damage to the system.

Once a check valve is installed, 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, discharge any stored air 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.

The VMAC compressor system will automatically depressurize when it is shutdown, therefore the hose from the VMAC AOST to the air receiver tank must have a check valve installed; this prevents blow back and moisture from the receiver tank entering the AOST

While the air receiver tank can be installed at any height in relation to the AOST, the discharge hose running from the AOST must be installed as high as possible on the air receiver tank to prevent problems with condensation that may have accumulated in the receiver tank (Figure 74).

Drain the condensed water from the receiver tank daily.

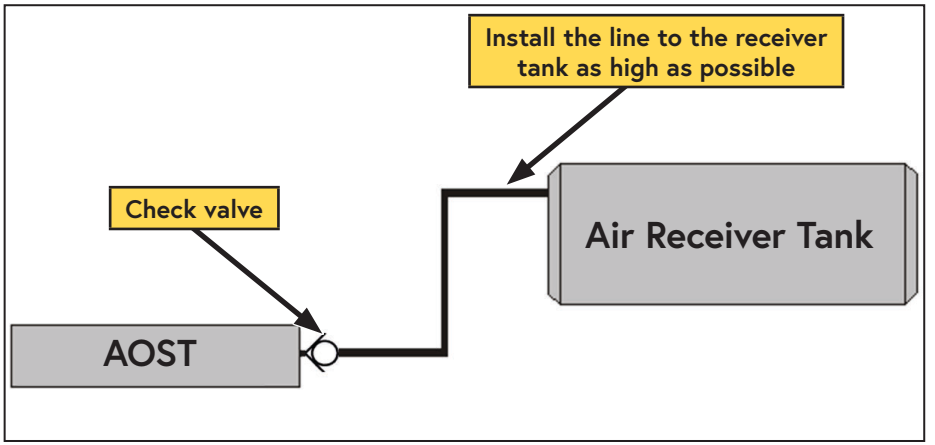


Figure 74 — Air receiver tank

Testing the Installation

Safety Test

Ensure the following has been completed:

- ☐ Place the automatic transmission in "PARK" and apply the park brake. Turn the ignition "ON" but do not start the engine.
- ☐ Check the control box to see if it is illuminated. If there is no display, there is no power to the control box.
- ☐ Press the "ON" button on the control box. The green LED should come on and the compressor clutch will engage, this should be audible.

On systems equipped with VMAC's digital throttle control, the "PRK BRAKE" LED will remain illuminated at all times, regardless of park brake position.

Prior to proceeding, ensure the green LED on the control box is still illuminated from the previous step. If not, ensure the vehicle transmission is in "PARK", the park brake is applied, and the vehicle ignition is turned to "ON". Cycle the compressor off, then on again to reset the safety parameters.

Release the park brake*.

- ☐ *The green light on the control box should flash and the display will flash "PARK BRAKE".
- ☐ *Apply the park brake again and press the "ON" button. The green light should come on.

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

- ☐ *The "STATUS" and "PRNDL" LED's on the digital throttle control will turn off.
- ☐ *The green LED on the control box will remain illuminated.
- ☐ *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 "STATUS" and "PRNDL" LED's on the digital throttle control will turn off (Note that *on some vehicles, the engine speed will remain elevated, and the "STATUS" and "PRNDL" LED's may remain illuminated when the vehicles is placed in "NEUTRAL", this is normal*).

- ☐ Press the "OFF" button on the control box.
- ☐ Turn the ignition "OFF".

The engine must be running to complete the final steps in the safety test. This will be done after the pre-start checks have been completed.

Place the vehicle in a safe operating position and adequately block the wheels. Ensure that there are no people around the vehicle prior to performing the following tests.

Before Starting the Engine Checklist

Ensure the following has been completed:

- ☐ Verify that the compressor oil level at the AOST sight glass is correct.

- ☐ Verify that the vehicle coolant level is correct.
- ☐ Perform a final inspection of the installation to ensure everything has been completed.
- ☐ Check all wiring for security and protection. Ensure nothing is touching the compressor body.
- ☐ Install the VMAC Air Test Tool (P/N: A700052) with the 70 cfm (0.190 in) orifice installed and the ball valve closed.
- ☐ Ensure all of the compressor outlets are closed.
- ☐ Ensure the parking brake is engaged and the transmission is in "PARK".
- ☐ Start the engine.

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 vehicle to reach operating temperature.
- ☐ Turn on the compressor.

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 1,500 rpm and then drop down to VMAC base idle (approximately 1,100 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.
- ☐ Drain any stored air is drained from the system.
- ☐ 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 "MAX" line in the sight glass and check for leaks.
- ☐ Start the engine.

☐ Turn on the compressor and allow it to build to full system pressure.

☐ Release the park brake.

- The control box should read "PARK BRAKE", the compressor clutch should disengage and engine speed should reduce to OEM idle.

☐ Re-engage the park brake and start the compressor.

☐ Allow the engine speed to stabilize after re-engaging the compressor.

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".

Digital Throttle Auto Calibration

The VMAC digital throttle is equipped with an auto calibration and engine learning routine that will assist with maintaining accurate and stable engine speeds. No user input is required.

Coolant System Purge Instructions

Regardless of whether a vacuum cooling system filler is used or not, the following procedure must be performed.

1) Turn the climate control system off.
2) Start the engine and increase the engine speed to 3,500 rpm and hold it there for 30 seconds.
3) Turn the engine off for and wait for 1 minute to purge any large air pockets from the cooling system.

To prevent injury, ensure the engine is shut off, the engine and coolant have cooled to a safe temperate, and the pressure has dissipated prior to loosening the degas bottle cap.

4) Check the engine coolant level in the degas bottle. If necessary, fill to the:
   - o If the engine is warm, ensure the level is to the "MAX FILL" line on degas bottle.
   - o If the engine is cold, ensure the level is to the MIN FILL LEVEL line on degas bottle.
5) Start the engine and let it idle until the cooling fan cycles on at least once.
6) Increase the engine speed to 3,500 rpm and hold it there for 30 seconds.
7) Allow the engine to idle for 30 seconds.
8) Turn the engine off for 1 minute.

To prevent injury, ensure the engine is shut off, the engine and coolant have cooled to a safe temperate, and the pressure has dissipated prior to loosening the degas bottle cap.

9) Repeat steps 6 through 8 a total of 10 times to remove any remaining air trapped in the system.
10) Check the engine coolant level in the degas bottle. If necessary, fill to the "MAX FILL" line on degas bottle.
11) Install the degas bottle cap until it contacts the hard stop.

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 belt alignment is good and nothing is rubbing or contacting hot components.
- ☐ 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 System Adjustments

Performance Testing and System Adjustment

System operation can be tested using the tools that will be operated by the system or by using the VMAC Test Tool (A700052) with the 70 cfm (0.190 in) orifice in the outlet to simulate tool use (Figure 75).

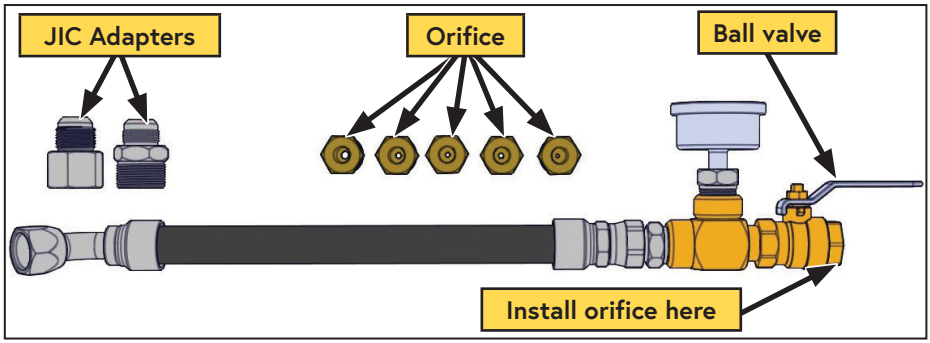


Figure 75 — A700052 VMAC Air Test Tool

Disconnect all downstream equipment (hose reels, etc.) and connect the test tool directly to the discharge fitting on the AOST.

Ensure there are no leaks in the test tool. The system may not idle down if there are leaks in the lines or fittings.

- ☐ Install the VMAC test tool at the AOST outlet with the 70 cfm (0.190 in) orifice.
- ☐ Ensure that the ball valve is closed.
- ☐ Place the transmission in "PARK" and fully apply the park brake.
- ☐ Allow the engine to run until it is at operating temperature.
- ☐ Turn on the air compressor system and allow it to operate until the oil is warm.
- ☐ Observe the pressure gauge. Pressure should be approximately 150 psi.

Open the ball valve on the test tool and observe the engine tachometer*:

- ☐ *Engine speed should increase to approximately 2,250 rpm.
- ☐ Close the air valve slowly to allow the system pressure to rise.
- ☐ 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 Control Operation and Adjustments

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.

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.

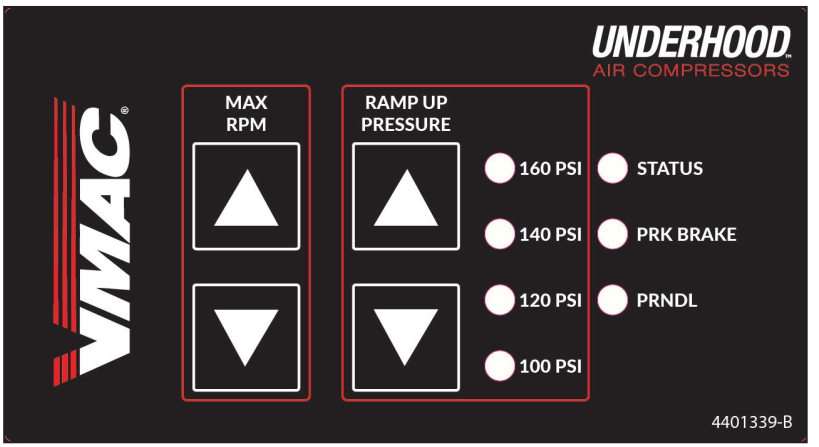


Figure 76 — Throttle control

If the park brake is released, or the vehicle is placed in gear, the "STATUS" LED and the corresponding lockout 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; the system achieves maximum cfm at 2,350 rpm.
Maximum VMAC rpm can be adjusted between 1,500 rpm and 2,350 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 may increase to the new value for 4 seconds, then return to base idle.

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.

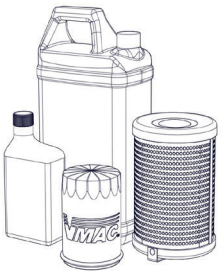
To perform a factory reset, turn the system on and allow the engine speed to drop to VMAC base idle (approximately 1,000 rpm). Using a paper clip (or similar object), push and hold the factory reset button for 5 seconds. All of the LED lights will illuminate for several seconds while the settings revert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

For more information on the digital throttle, including error codes, see the related article the VMAC Knowledge Base:

https://kb.vmacair.com/help/vmac-digital-throttle-control

Accessory Products from VMAC

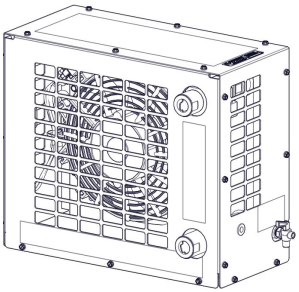
Compressor Service Kits



200 Hour or 6 Month Service Kit -
Part number: A700019
Includes 5 L VMAC high performance compressor oil, oil filter, air filter, and next service due decal.

400 Hour or 1-Year Service Kit -
Part number: A700020
Includes 5 L VMAC high performance compressor oil, oil filter, air filter, coalescing filter, pressure relief valve, muffler, and next service due decal.

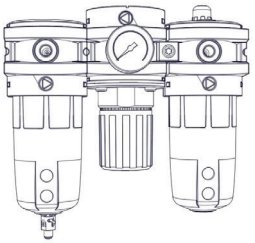
Air Aftercooler — 70 cfm



Part number: A800070
Improves tool performance and extends the life of air tools; removes up to 80% of water from compressed air; includes automatic water drain.

- Max air flow: 70 cfm / 175 psi.
- Port size: 3/4 in NPT inlet and outlet.
- Electrical: 12 V.
- Dimensions: 17 in (43.2 cm) L × 8.0 in (20.3 cm) W. × 14.5 in (36.8 cm) H.
- Weight: 35 lb (15.8 kg).

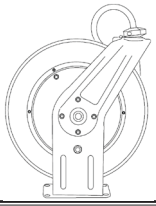
Filter Regulator Lubricator (FRL) — 70 cfm



Part number: A700151
Extends the life of air tools; filter removes contaminants from the compressed air, adjustable regulator can reduce air pressure going to tools, lubricator adds atomized tool oil to the air stream to lubricate air tools (Tool oil not included).

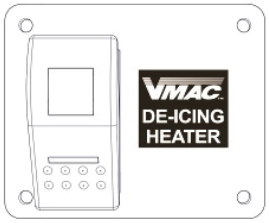
- Max air flow: up to 70 cfm / 150 psi
- Port size: 3/4 in NPT inlet and outlet

1/2 in × 50 ft Hose Reel



Part number: A700007
Spring-loaded 1/2 in × 50 ft hose reel; steel construction; full flow shaft and swivel for maximum performance.

VMAC De-icer Kit



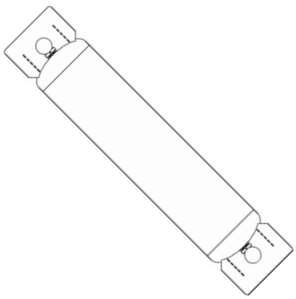
Part number: A700031
Cold climate heater package for operating VMAC compressors in cold climates; proven at temperatures of -30 °C (-22 °F). Requires 12V DC at 10A.

10 Gallon Air Receiver Tank w/ Mounting Feet

Part number: A300047
Air receiver tanks are used for lowering compressor duty cycle and removing water from compressed air. Recommended for optimum operation of VMAC Hydraulic Air Compressors, VMAC Diesel Driven Air Compressors, UNDERHOOD40, UNDERHOOD70 – Green Series Air Compressors, and VMAC Multifunction Power Systems, which include standby mode; ASME certified; includes fittings, 200 psi pressure relief valve, tank drain, and 200 psi pressure gauge.

- Max pressure: up to 200 psi.
- Dimensions: 30 in (76.2 cm) L × 10 in (25.4 cm) D.
- Weight: 33 lb (15 kg).

35 Gallon Air Receiver Wing Tank



Part number: A300010
Air receiver tanks are used for lowering compressor duty cycle and removing water from compressed air. Recommended for optimum operation of VMAC Diesel Air Compressors, Hydraulic Air Compressors, UNDERHOOD40, UNDERHOOD70 – Green Series Air Compressors, and VMAC Multifunction Power Systems, which include standby mode; ASME certified; includes fittings, 200 psi pressure relief value, tank drain, and 200 psi pressure gauge.

- Max pressure: up to 200 psi.
- Dimensions: 73 3/4 in (187.3 cm) L × 14 in (35.6 cm) D.
- Weight: 95 lb (43.1 kg).

Notes

Notes

Warranty Registration

This form must be fully completed and returned to VMAC at the time the vehicle is put into service. Warranty may be void if this form is not received by VMAC within 3 months of receiving the vehicle, or 200 hours of operation, whichever occurs first.

VMAC's Warranty policy and registration can be viewed online at:
www.vmacair.com/warranty

Product Information

System Identification Number: **V** _ _ _ _ _ _ _ _ _ _ _ _ _
Compressor Serial Number: **P** _ _ _ _ _ _ _ _ _ _ _ _ _

Owner / End User Information

Company Name: _____

City: _____ State / Province: _____

Phone: (____) ____–_____

Email Address: _____

Date vehicle was put into service: ____/____/____
Day Month Year

Installer Information

Installer Company Name: _____

City: _____ State / Province: _____

Submitted by

Name: _____ Phone: (____) ____–_____

Email: _____

Vehicle Information (Optional)

Unit: _____ Year: _____

Make: _____ Model: _____

Vehicle Identification Number: _____

Manufactured by

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