UNDERHOOD™ 40
AIR COMPRESSORS

Installation Manual for VMAC System

V400012

2017 – 2022 Ford Super Duty F-250 – F-350
6.2 L Gas

www.vmacair.com

Table of Contents

Revision	Revision Details	Revised by	Checked by				Implemented
			Eng.		Tech.	Qual.	
			Mech.	Elec.			
D	ECN 19-206 Valve cover mod	MSP	BJG	N/A	MSP	LPH	3 Dec 2019
E	ECN: 20-210 Receiver tank requirement	MSP	MRH	N/A	MSP	N/A	4 Nov. 2020
F	ECN: 23-082 Cap model year	MSP	N/A	N/A	MSP	N/A	18 Apr. 2023

Additional Application Information

- Use of an air receiver tank (minimum 6 USG) is required with this application.
- 2017 - 2022 Ford Super Duty F-250 – F-350 6.2 L Gas.

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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

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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, 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, hours on the compressor and mileage on the vehicle.
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 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 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

System Identification, Warranty Registration and Warning Labels

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 no steps are missed.***

☐ 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 at (888) 241-2289.

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

☐ Complete the warranty form. The VMAC warranty form is located at the back of this manual, as well as online at: www.vmacair.com/warranty

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 (x2) 7/64 in holes and secure the plate with the supplied self-tapping screws (Figure 1).

Figure 1 — System Identification Plate

☐ Install the VMAC belt routing diagram in a suitable location under the hood.

☐ 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 2).

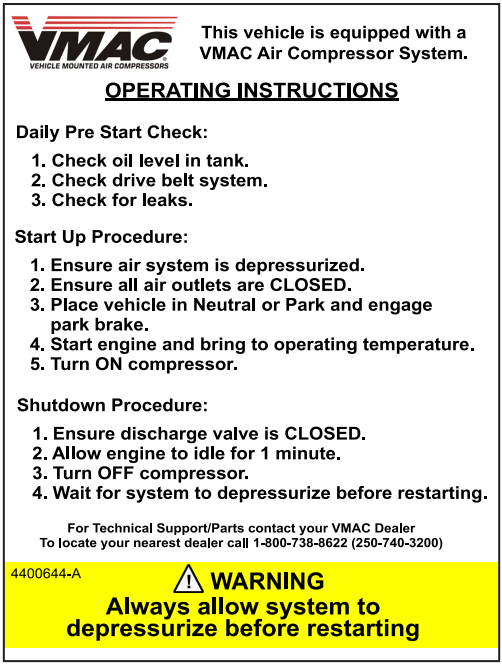


Figure 2 — Operating Instruction label

☐ To alert any technicians that may service the vehicle, affix the servicing caution/contact decal in a conspicuous area in the engine bay (where the decal will be easily noticed) (Figure 3).

Figure 3 — Advisory label

Preparing for Installation

Due to the variety of possible WHASP tank installation locations, VMAC does not include bulkhead fittings or hoses to run between any bulkhead and the WHASP tank. VMAC recommends determining where the WHASP tank will be located early in the installation so that appropriate hose lengths and bulkhead fittings can be ordered. Refer to page 22 for WHASP tank installation requirements.

This system is designed to work with both dual and single radiator vehicles.

Optional: Raise front of vehicle and support on jack stands.

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

☐ Disconnect the battery(ies).

☐ Remove the lifting eye (if equipped) (Figure 4).

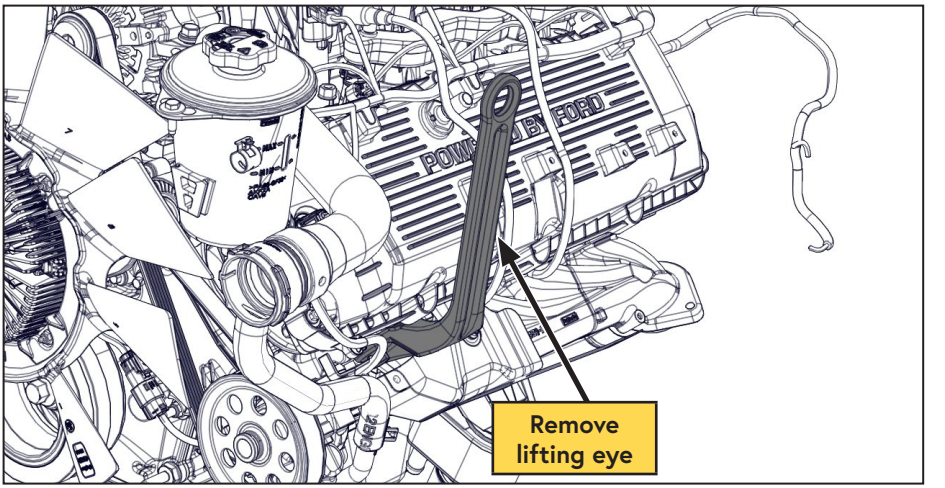


Figure 4 — Remove lifting eye

☐ Drain the coolant into a clean container and set it aside for use later.

☐ Remove the air intake and cover the ports to prevent debris entering the engine (Figure 5).

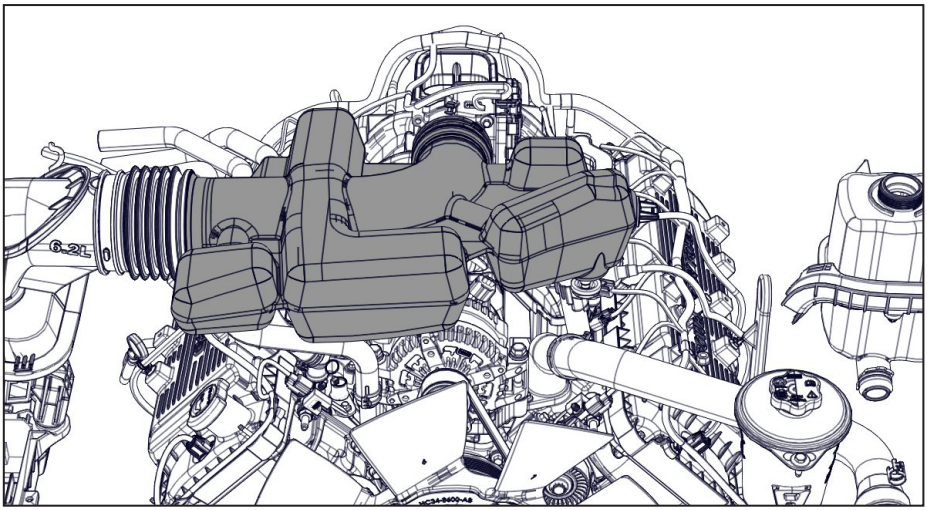


Figure 5 — Remove air intake

☐ Remove the top radiator cross member cover.

☐ Remove the upper radiator hose.

☐ Disconnect the fan clutch wire and remove the bolt securing the fan stator arm to the engine.

☐ Remove the fan and pull it out of the engine bay.

For ease of fan removal and installation, it is recommended that a pneumatic fan wrench removal set (such as Lisle 43300) or a manual fan pulley holder (such as KD3900) is used.

☐ Keeping the power steering lines connected, remove the power steering reservoir from the fan shroud.

☐ Temporarily tie the power steering reservoir up and out of the way of the shroud.

Ensure the power steering reservoir is kept upright to prevent it from leaking.

☐ Remove the fan shroud.

☐ Remove the Front End Accessory Drive (FEAD) belt and discard it.

☐ Remove the driver side idler and set it aside for use later (Figure 6)

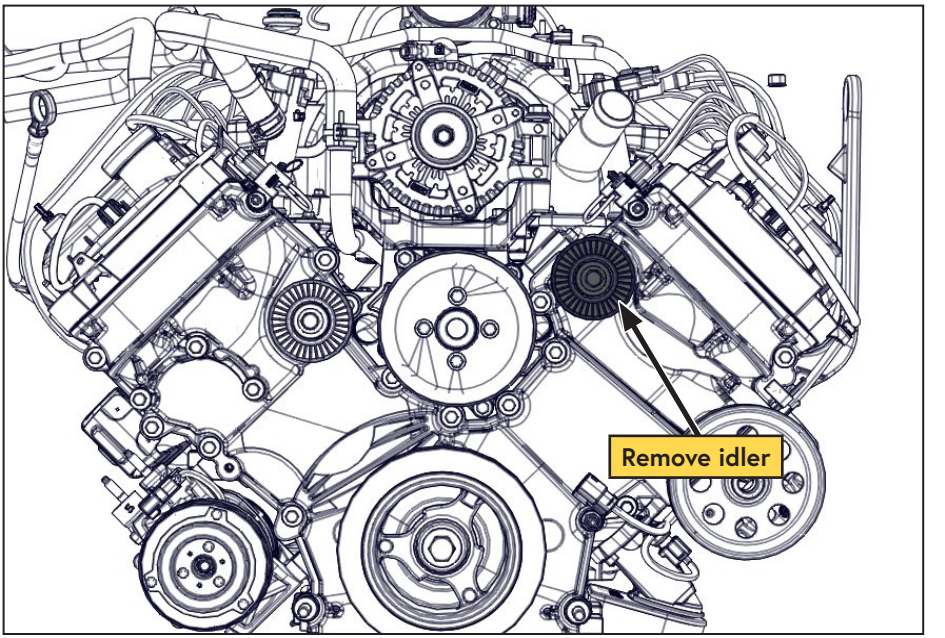


Figure 6 — Remove driver side idler

☐ Remove the thermostat housing and set it aside for use later. Leave the rubber seal and thermostat in place (Figure 7).

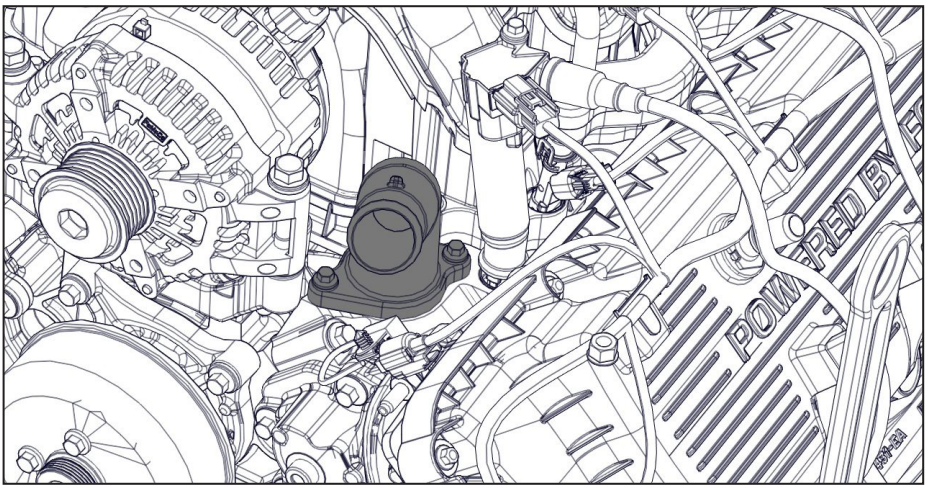


Figure 7 — Remove thermostat housing

☐ Assemble the VMAC thermostat spacer, O-ring, thermostat housing, and the supplied M6 fasteners (Figure 8).

☐ Apply Loctite 242 (blue) to the M6 fasteners and rotate the thermostat housing assembly into place. Torque the fasteners to specification (Figure 8).

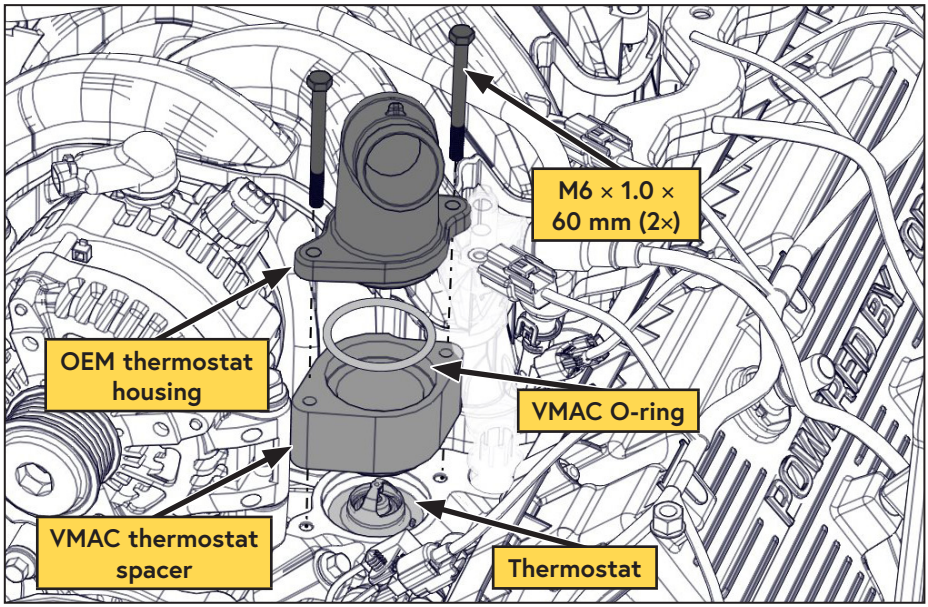


Figure 8 — Install thermostat spacer and housing

☐ Disconnect the harness from the Radio Interference Suppressor (RIS) and remove it from the mounting stud on the driver side timing cover (Figure 9).

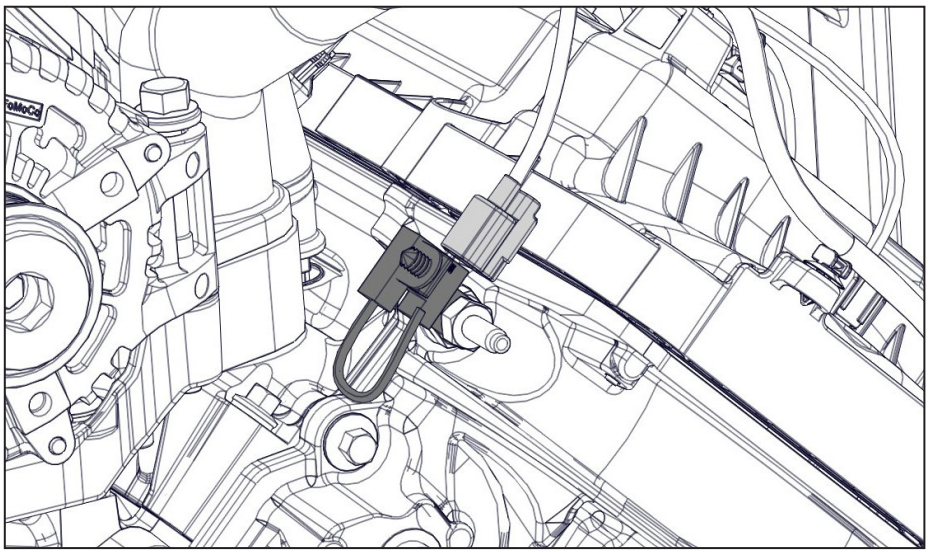


Figure 9 — Remove RIS

☐ Remove the corners of the RIS mount (Figure 10).

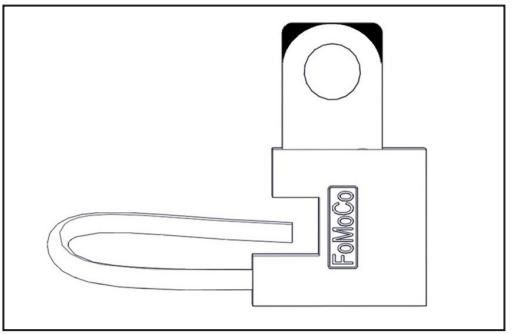


Figure 10 — Modify RIS mount

☐ Remove and discard the RIS stud (Figure 11).

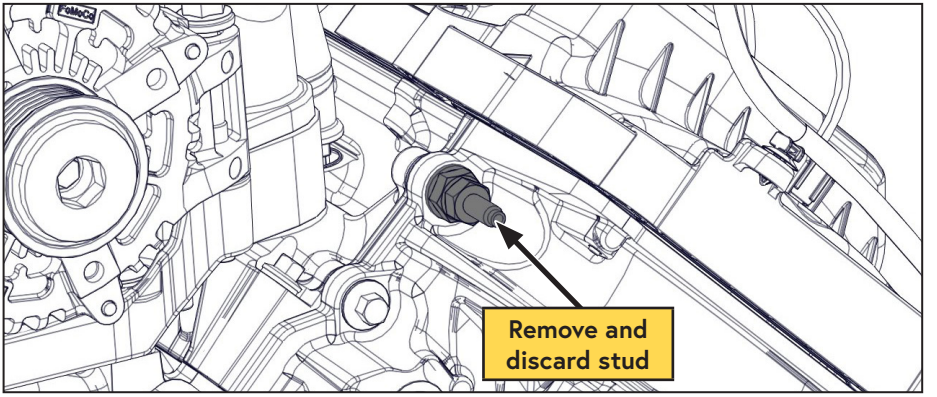


Figure 11 — Remove RIS stud

☐ Remove and discard the indicated fasteners (Figure 12).

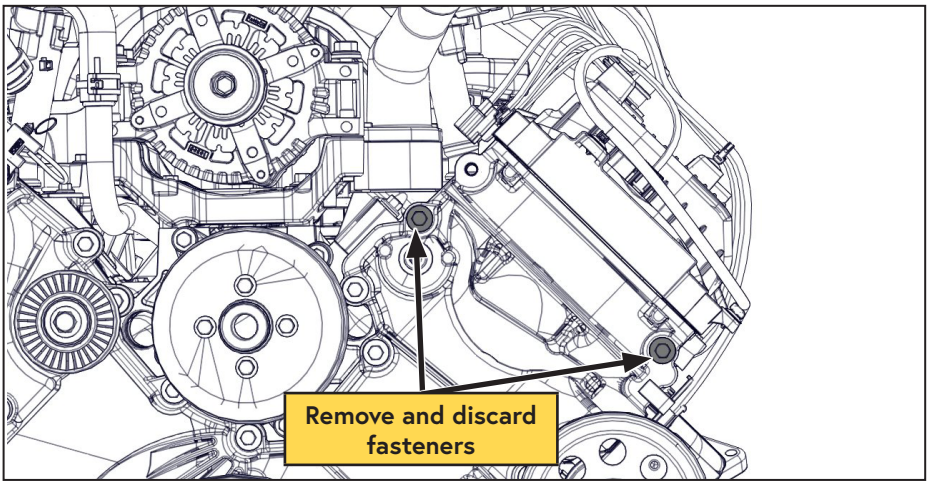


Figure 12 — Remove and discard fasteners

☐ Remove and discard the indicated cable retainers (Figure 13).

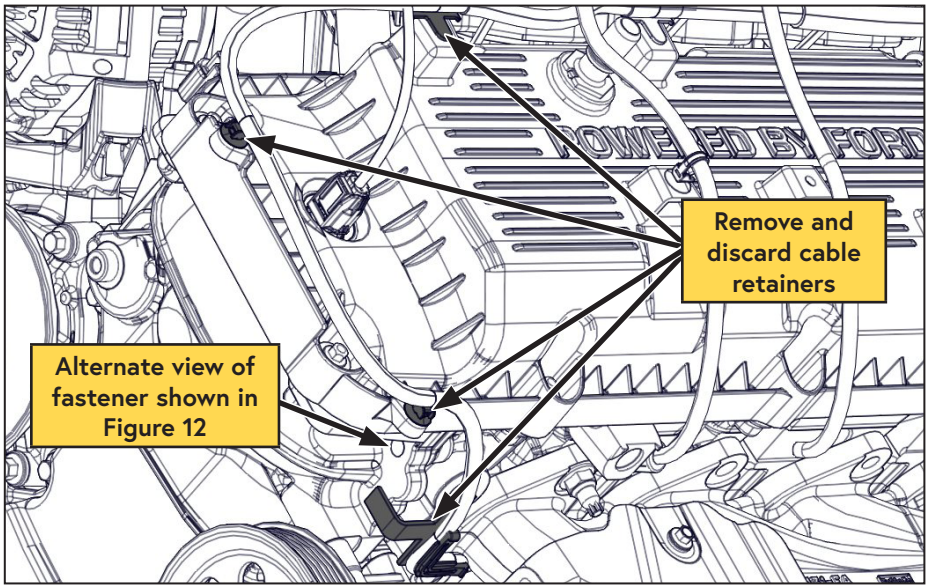


Figure 13 — Remove cable retainers

☐ Using a die grinder or pneumatic cut off wheel, remove the wire harness mounting tab on the driver side valve cover (Figure 14).

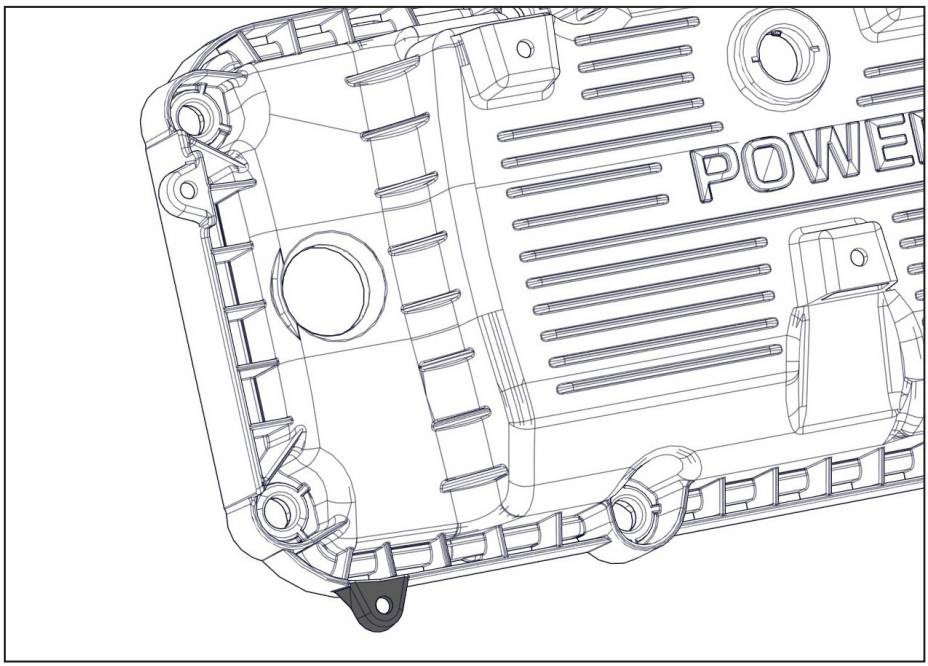


Figure 14 — Disconnect sensor

☐ Disconnect the sensor in the valve cover (Figure 15).

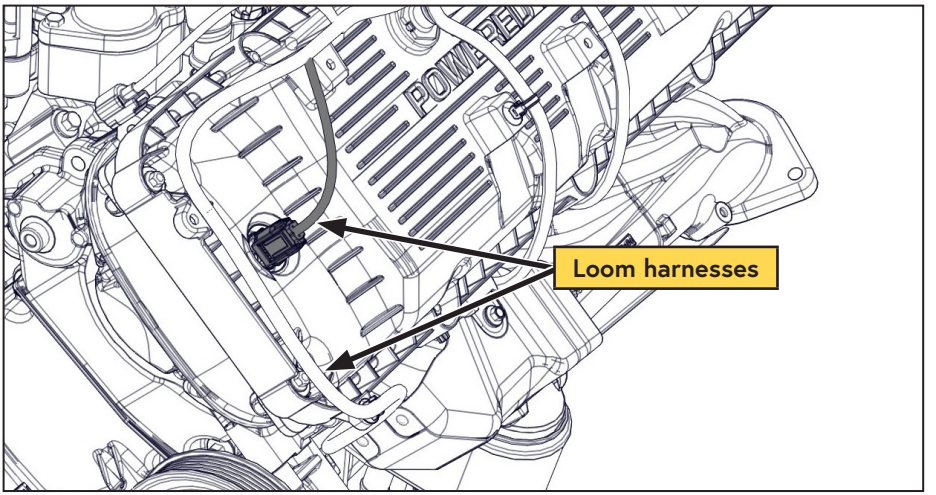


Figure 15 — Disconnect sensor

VMAC recommends wrapping the sensor harness, as well as the harness running along the front of the valve cover, with protective loom (not supplied) to prevent abrasion as they will be routed under, or around the back of the VMAC compressor bracket.

☐ Shift the harness running along the front of the valve cover toward the firewall as it will route between the compressor bracket and the valve cover.

Installing the Main Bracket and Compressor

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

While this compressor system was designed to accommodate dual battery vehicles, the battery harnesses may need to be rerouted to prevent conflict with VMAC components.

Ensure any wires shifted during the installation are routed to avoid hot, sharp, or moving components and are sufficiently protected from abrasion.

- ☐ Remove the idlers from the main bracket.
- ☐ To install the main bracket, slide the bracket over the cable retainer boss on the driver side of the valve cover, then rotate the bracket into place over top of the valve cover.
- ☐ Feed the valve cover sensor connector and harness under the bracket and toward the front of the engine.
- ☐ Secure the bracket using the (3×) M8 × 1.25 × 50 mm fasteners; leave the fasteners quite loose to ease the next step (Figure 16).

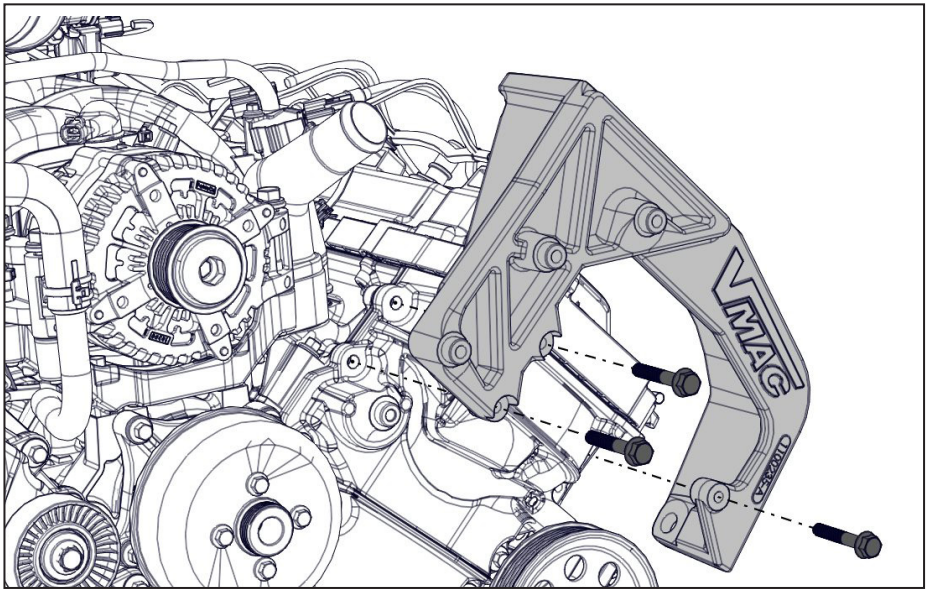


Figure 16 — Install main bracket

☐ Install the spacer between the engine block and the main bracket and secure it with the supplied M16 fastener, do not torque it (Figure 17).

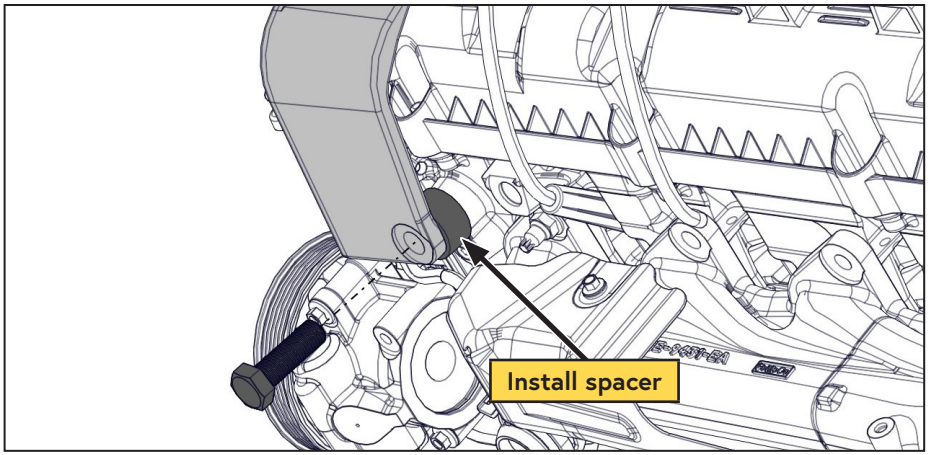


Figure 17 — Install main bracket spacer

Ensure the harnesses are not pinched between the engine block and the main bracket.

☐ Grab the wire harnesses going to the valve cover sensor on both sides of the VMAC main bracket and confirm they are not pinched between the main bracket and the engine.

☐ Torque the (3×) M8 fasteners to specification.

☐ Torque the M16 fastener to specification.

☐ Reconnect the sensor removed from the valve cover.

☐ Install the driver side OEM idler (Figure 18).

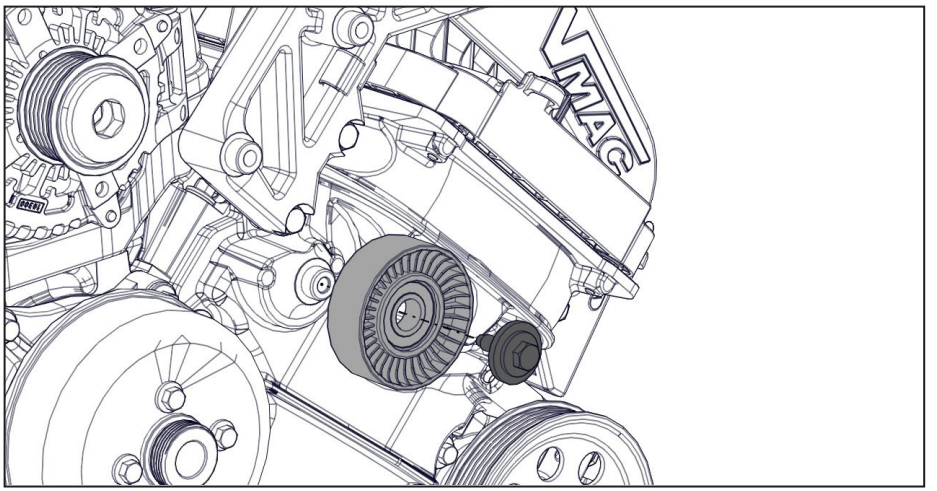


Figure 18 — Install OEM idler

☐ Install the VMAC idlers onto the main bracket (Figure 19).

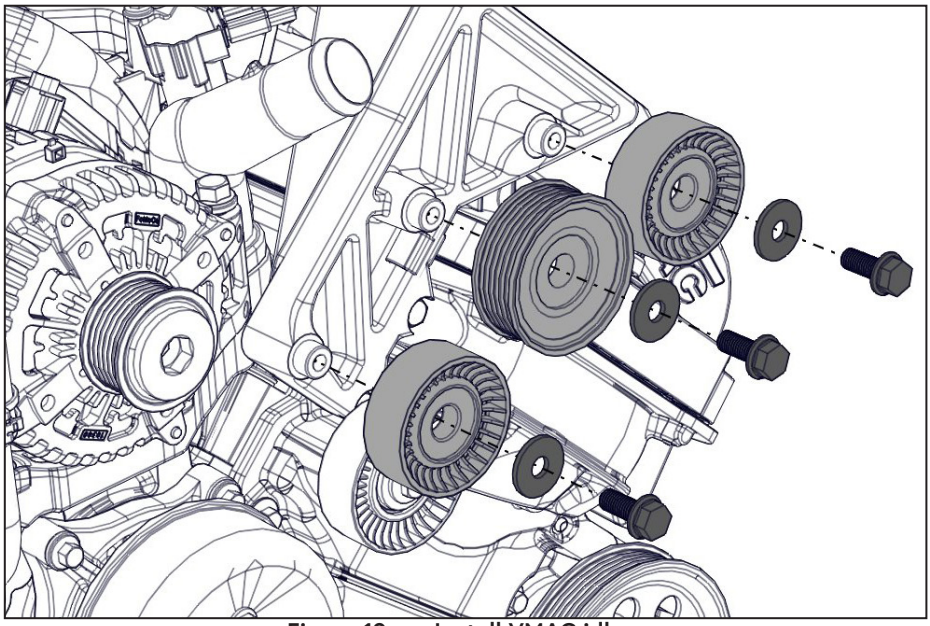


Figure 19 — Install VMAC idlers

☐ Install the VMAC air filter bracket (figure 20).

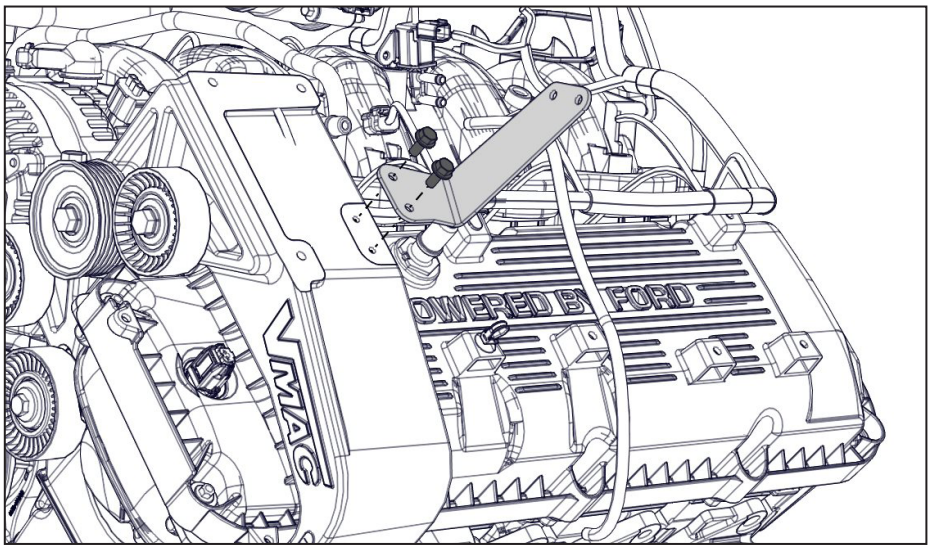


Figure 20 — Install air filter bracket

☐ Mount the compressor onto the main bracket using the (2×) M8 × 1.25 × 100 mm fasteners but do not torque them yet (Figure 21).

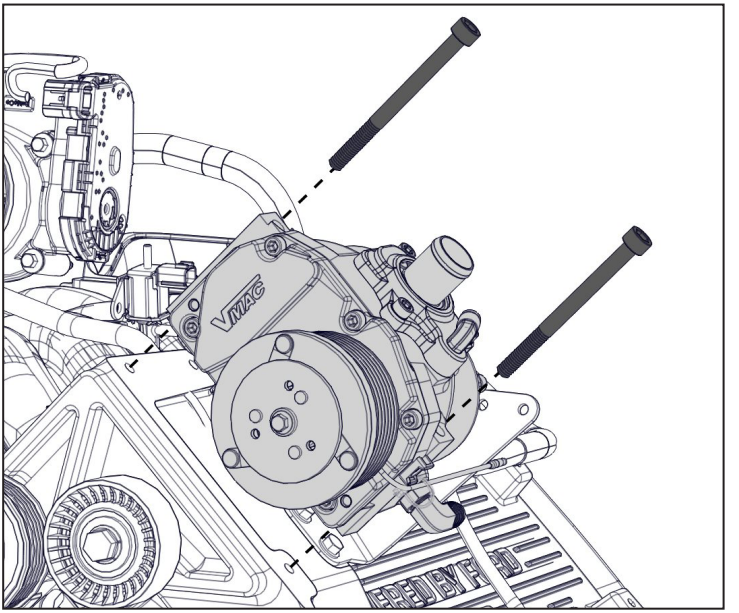


Figure 21 — Install compressor

☐ Install the RIS with the M8 × 1.25 × 35 mm rear compressor fastener (Figure 22).

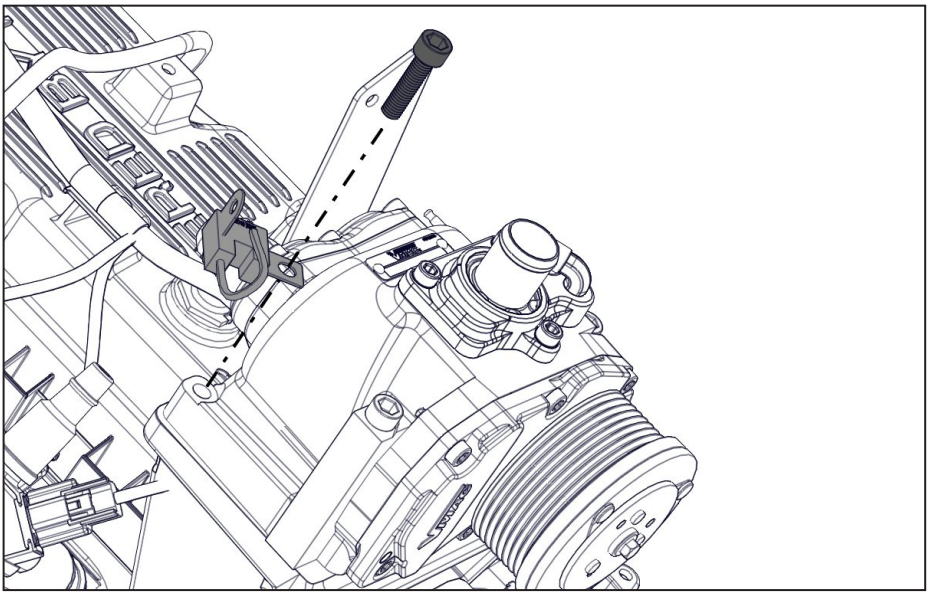


Figure 22 — Install RIS

☐ Torque the compressor fasteners to specification.

Belt Routing

☐ Install and tension the FEAD belt (Figure 23).

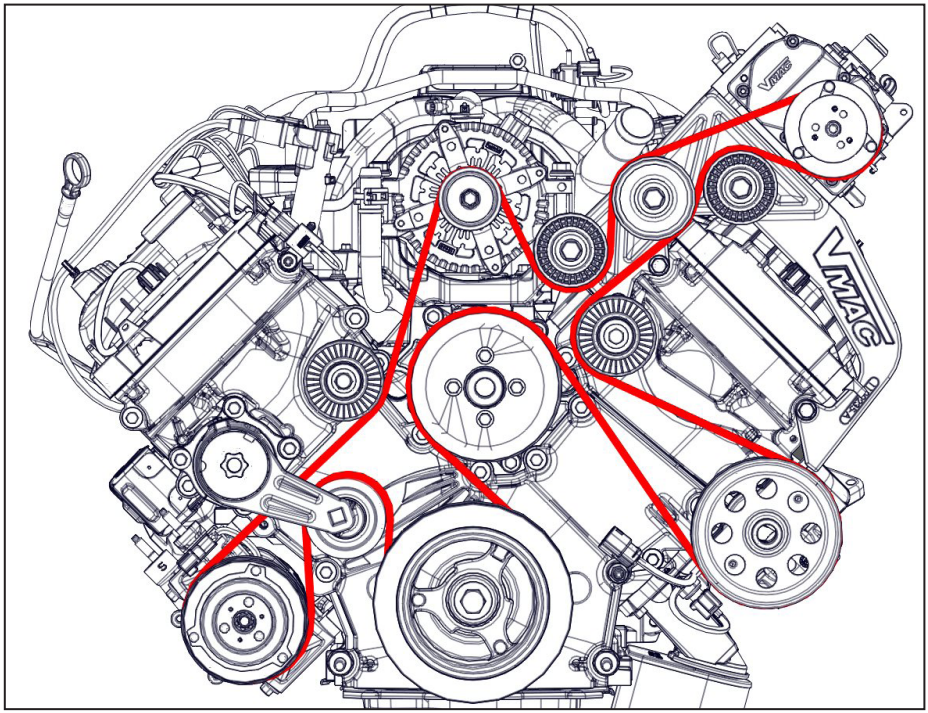


Figure 23 — FEAD belt routing

Ensure all electrical harnesses and wires are secured away from the FEAD belt.

Installing the Waste Heat Air Separator Package (WHASP) Tank

WHASP Tank location guidelines

When determining a mounting location for the WHASP Tank, ensure the following conditions are met:

- Adequate supply of fresh air and venting for the cooling fan.
- Minimum of 12 in of clearance at the front of the cooling fan.
- Minimum of 6 in clearance at the rear of the unit.
- Hose connections and wiring are accessible.
- Mounted on a level surface.
- Impact protection.
- The oil level sight glass is easily accessible.
- The oil fill and drain ports are accessible for servicing.
- Minimize the hose lengths to maximize performance.

Mounting the WHASP Tank

Refer to (Figure 24) for mounting dimensions.

Special consideration must be made to ensure the WHASP Tank will be protected from damage and to ensure that it has adequate ventilation.

In some cases, it may be necessary to fabricate a mounting bracket to position the tank in an appropriate location.

Secure the WHASP Tank by bolting the mounting feet to the installation surface, use M8 or 5/16 in fasteners (not supplied).

Mounting in an Enclosure or Body

Mounting the WHASP Tank in an enclosure will limit access to cooling air or restrict the escape of hot air from around the unit and will have an adverse effect on cooling.

Ensure adequate ventilation is provided for the cooling system to function properly.

It is not possible to make absolute recommendations regarding ventilation because of the widely differing configurations that are possible. Duty cycle, ambient temperature and enclosure shape are some of the important variables that need to be taken into account when determining the suitability of enclosure mounting.

Cool air ducted to the cooler and installing an exhaust fan to remove hot air is recommended.

Confirm the hose lengths included in this kit when determining the location of the WHASP Tank and bulkhead fittings. Hose lengths can be found in the Illustrated Parts List (IPL). If the WHASP Tank or bulkhead fitting location requires longer hoses, contact a local VMAC dealer. See page 6 for ordering information .

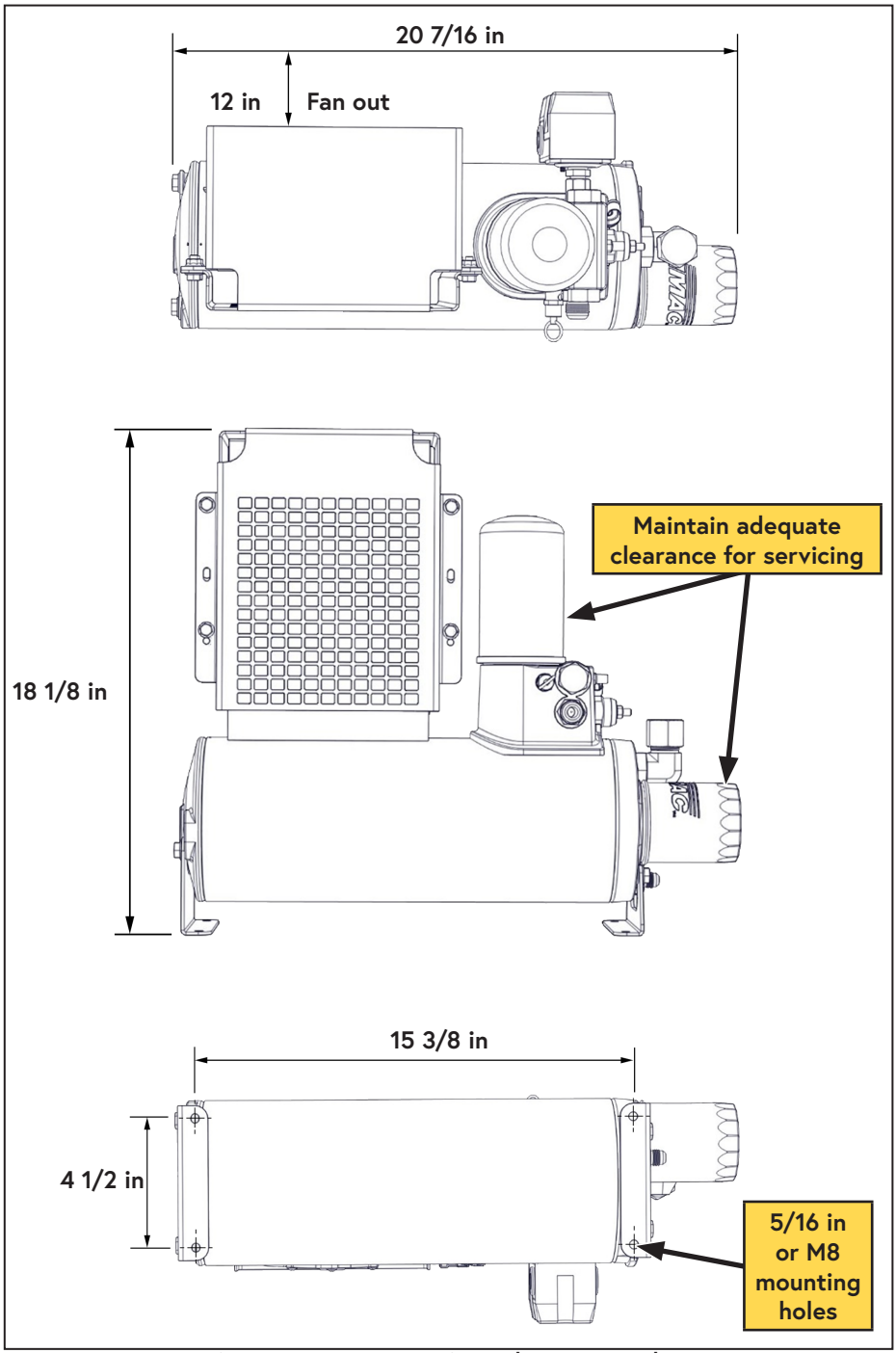


Figure 24 — Minimum WHASP Tank mounting clearances

Mounting the WHASP Tank

The WHASP Tank uses a "puller" fan to cool the air/oil mixture. Position the WHASP Tank to ensure there is adequate air flow and so that the fan is blowing out toward the cargo door. During operation, the door should be kept open to ensure there is a constant supply of cool air to prevent the system from overheating (Figure 25).

Provide ample space to check the oil level, as well as access to the filters and compressor oil drain to facilitate servicing.

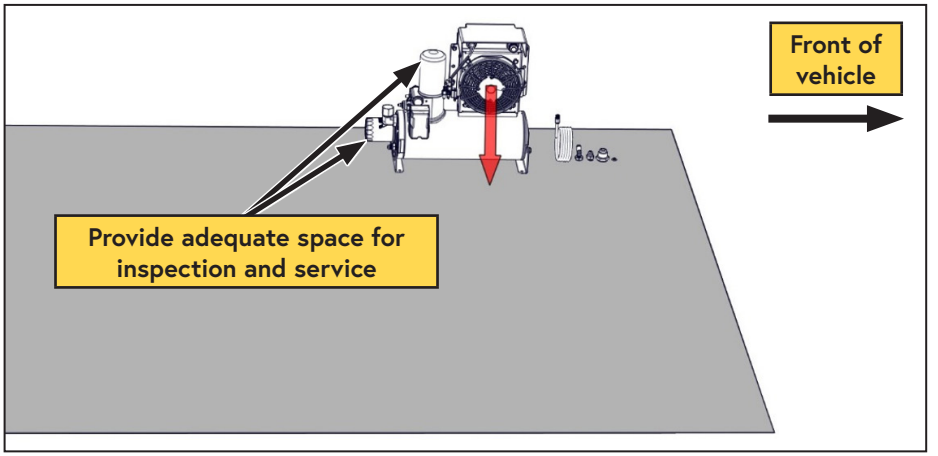


Figure 25 — WHASP ventilation

A minimum of 6 in of clearance is recommended around the radiator (intake) side of the WHASP Tank to allow fresh, cool air to circulate into the cooler and fan (Figure 26).

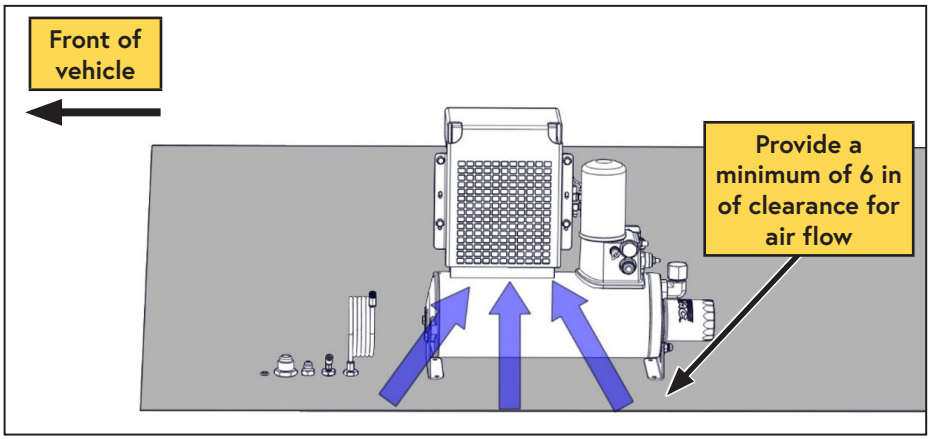


Figure 26 — WHASP ventilation

Hose Requirements

Only attempt to shorten the supplied hose if there is access to the appropriate equipment. Do not attempt to cut the hose and splice it 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 1/4 in PTFE tube, and the 3/8 in and 3/4 in hoses with AQP elastomer liner, are specifically designed to work with VMAC compressor oil and at compressor operating temperatures.

Based on the desired location of the WHASP Tank, the hose lengths provided with this system may not be ideal. They 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 lengths 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:

- 3/4 in × 160 in.
- 3/8 in × 172 in.
- 1/4 in (PTFE Tube) × 173 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.

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.

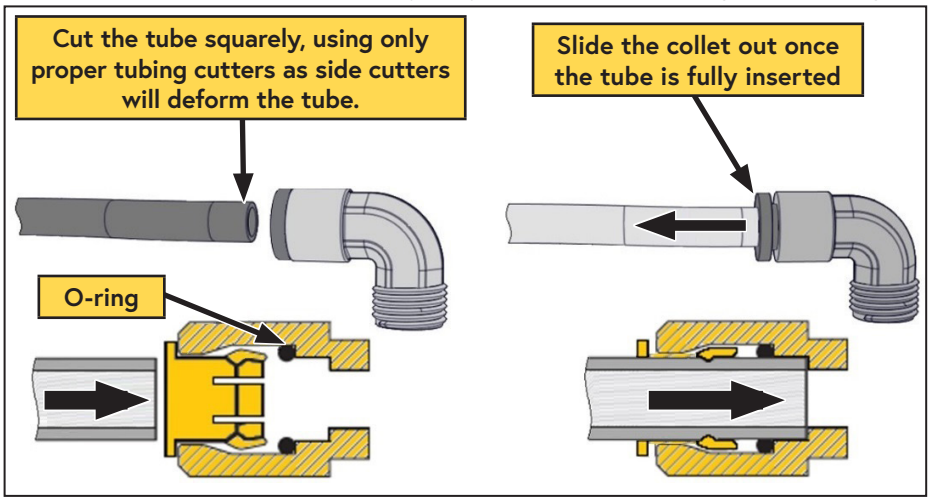


Figure 27 — Push-to-connect fittings

- ☐ Apply high temperature split loom (not supplied) or equivalent hose protection to the 1/4 in PTFE tube as well as the 3/4 in and 3/8 in hoses.
- ☐ Install the 1/4 in PTFE scavenge tube onto the compressor.
- ☐ Install the straight fitting from the 3/8 in hose onto the matching fitting on the compressor.
- ☐ Install the straight fitting from the 3/4 in hose onto the matching fitting on the compressor.
- ☐ Route the 3/4 in hose from the compressor to the firewall.
- ☐ Secure the hose to the lower bolt on the steering column's firewall plate using the supplied P-clip (Figure 28).

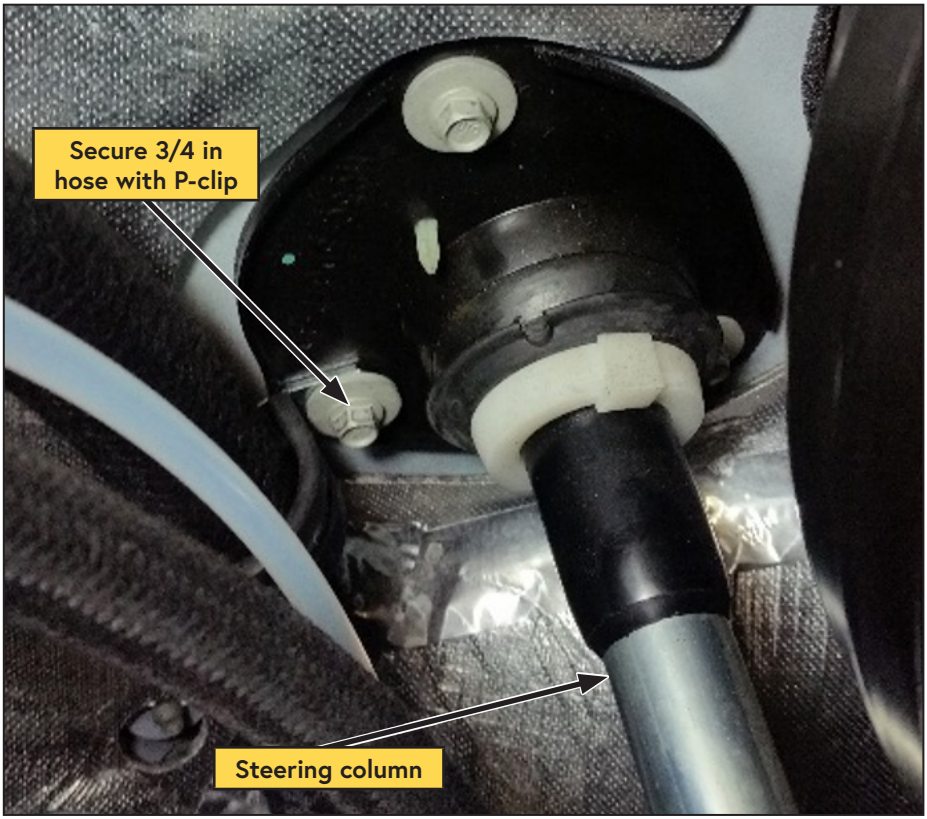


Figure 28 — Hose routing

- ☐ Route the 3/4 in hose along the top of the frame rail towards the rear of the vehicle, securing as necessary with rubber coated P-clips or cable ties.
- ☐ Follow the same routing path with the 3/8 in hose and 1/4 in PTFE tube, securing them as necessary to the 3/4 in hose with cable ties.

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

- ☐ Connect the 90° fitting on the 3/4 in hose to the #12 JIC fitting (air/oil inlet) on the cooler above the fan (Figure 29).
- ☐ Connect the 90° fitting on the 3/8 in hose to the #6 JIC fitting (oil return fitting) beneath the oil filter on the tank (Figure 29).
- ☐ Connect the 1/4 in PTFE tube to the 1/4 in push-to-connect (oil scavenge) fitting near the coalescing filter (Figure 29).
- ☐ Connect the discharge fitting (#8 male JIC) to the customer's air system (hose not supplied).
- ☐ Secure all hoses, tubes, and wires with P-clips and/or cable ties.

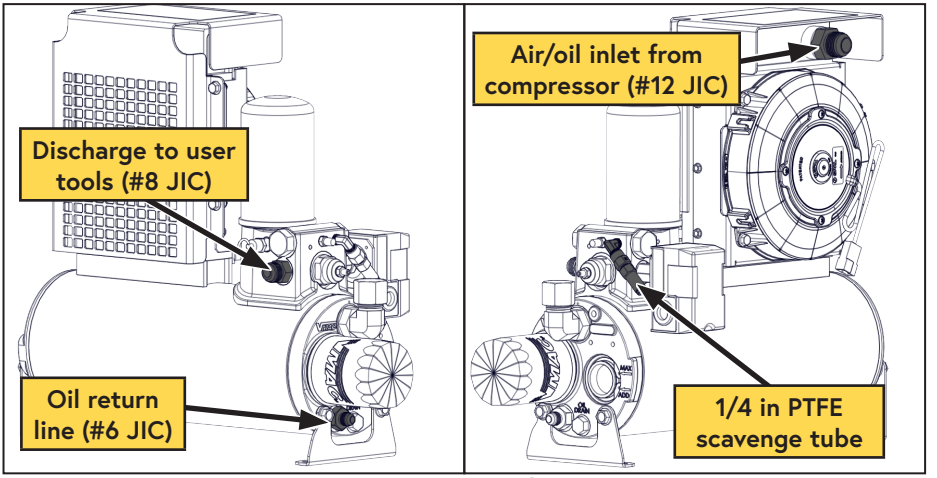


Figure 29 — WHASP Tank connections

Use of an air receiver tank (minimum 6 USG) is required with this application.

Follow the instructions on page 37 of this manual to prevent damage to the system.

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.

- ☐ Remove the fill cap on the WHASP Tank (above the sight glass) (Figure 30).
- ☐ Using a funnel, pour oil into the tank until the oil level in the sight glass reaches the "MAX" line. **The system capacity is 4 L** (Figure 30).
- ☐ Reinstall the fill cap and tighten it securely. Ensure the fill port remains accessible as it will be necessary to check and top up the oil after the first compressor start.

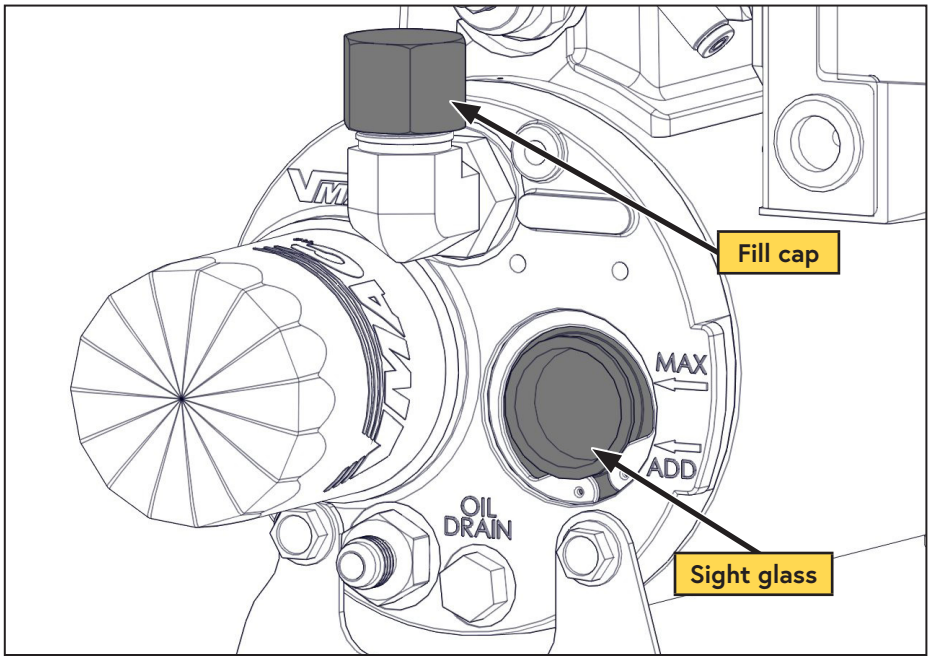


Figure 30 — Filling the WHASP Tank

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.
- Whenever possible, solder all electrical connections and protect the joint with heat shrink.
- 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.

Splicing into OEM Wiring (Figure 31 and Figure 32)

VMAC recommends against cutting OEM wires whenever practical. The preferred method is to remove the pin from the connector using an appropriate tool and slide the shrink tube onto the wire. Strip the wire at the desired location and solder the VMAC wire into place. Slide the shrink tube up to the soldered joint and seal it. Finally, replace the pin in the connector, taking special care to ensure the pin is fully inserted and the locking tabs are engaged.

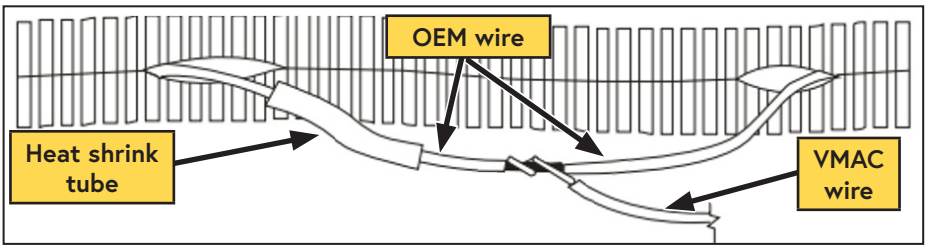


Figure 31 — Solder spliced joint

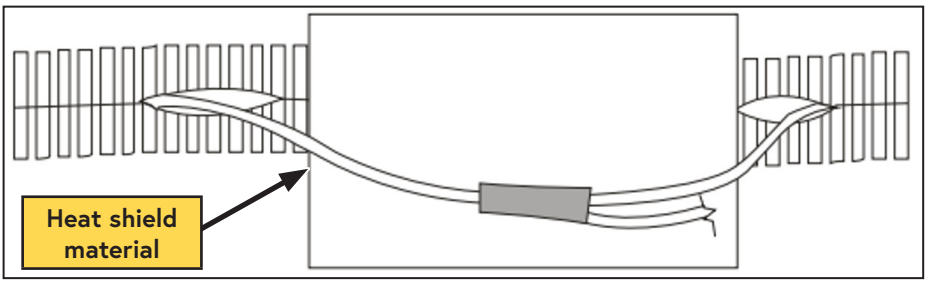


Figure 32 — Seal soldered joint

Electrical Modules

- The Throttle Control, Control Module, and Interface Panel are not weather proof; ensure they are mounted where they will be protected from rain, snow, mud, direct sunlight, etc. (e.g. inside the cab, service body or cabinet).
- Keep the rear of the Interface Panel protected.
- Ensure the Control Module and Throttle Control are mounted away from the pedals, park brake mechanism, or where they could be inadvertently knocked by occupants.

Control Components Overview

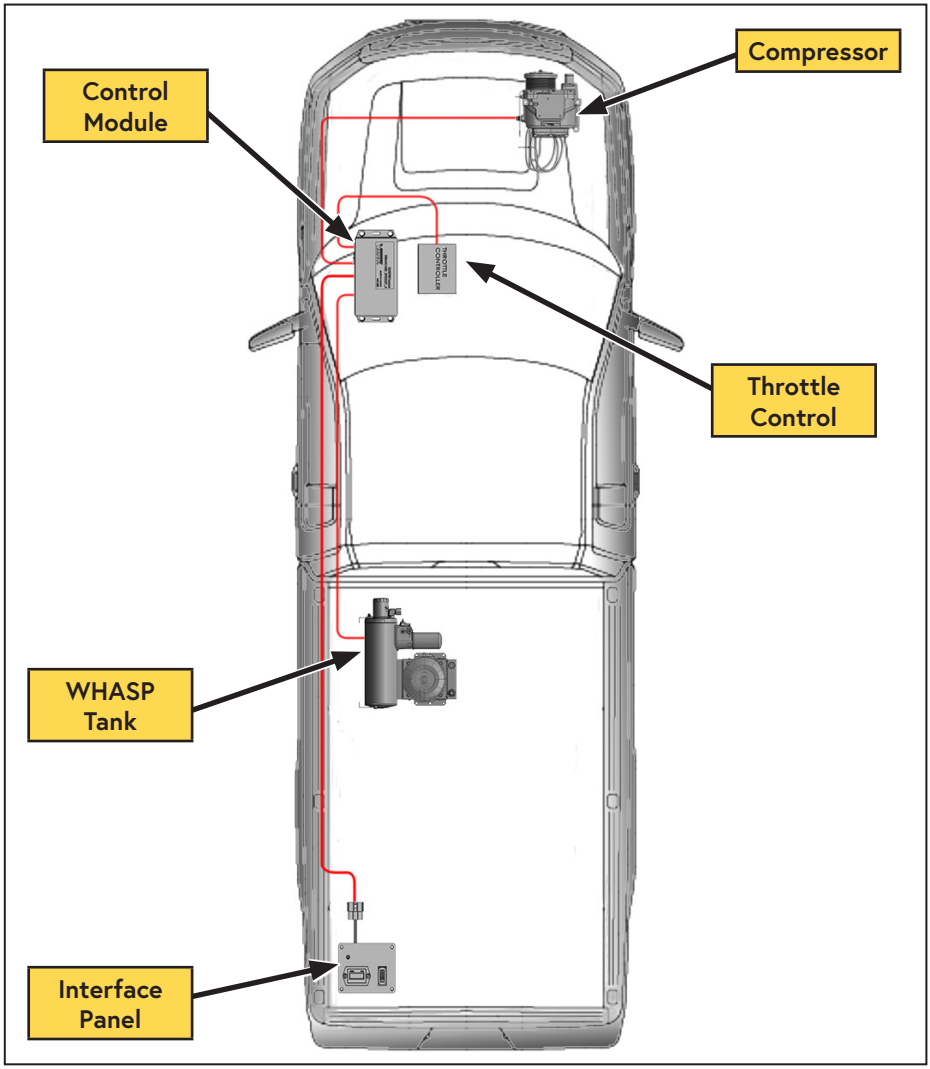


Figure 33 — General component overview
(Actual installation locations may vary)

Control Module (Figure 34)

The Control Module serves as the primary input/output interface between the vehicle and the various VMAC components (compressor, Throttle Control, WHASP Tank, Control Interface, etc.).

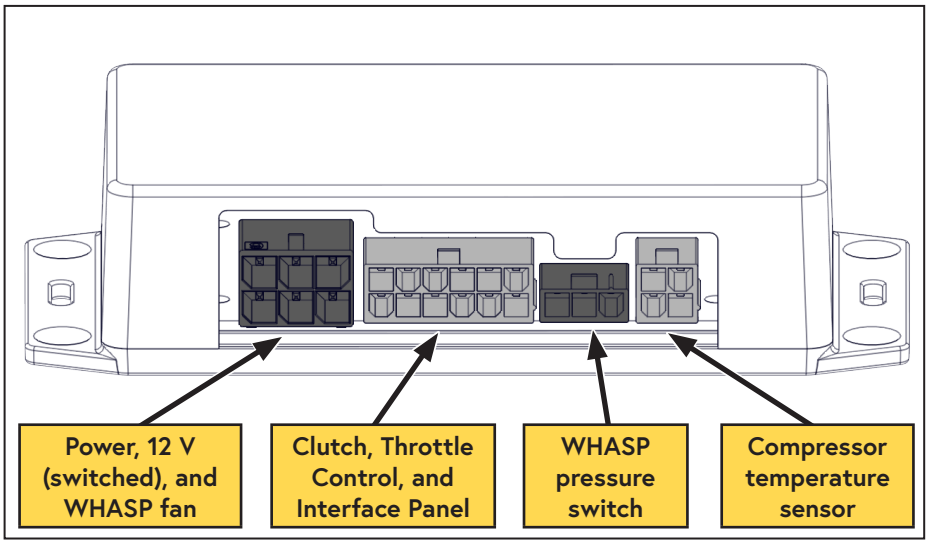


Figure 34 — Control Module

Interface Panel (Figure 35)

The Interface Panel serves as the operator's control panel and contains the "ON/OFF" switch, compressor status light, and the compressor hour meter.

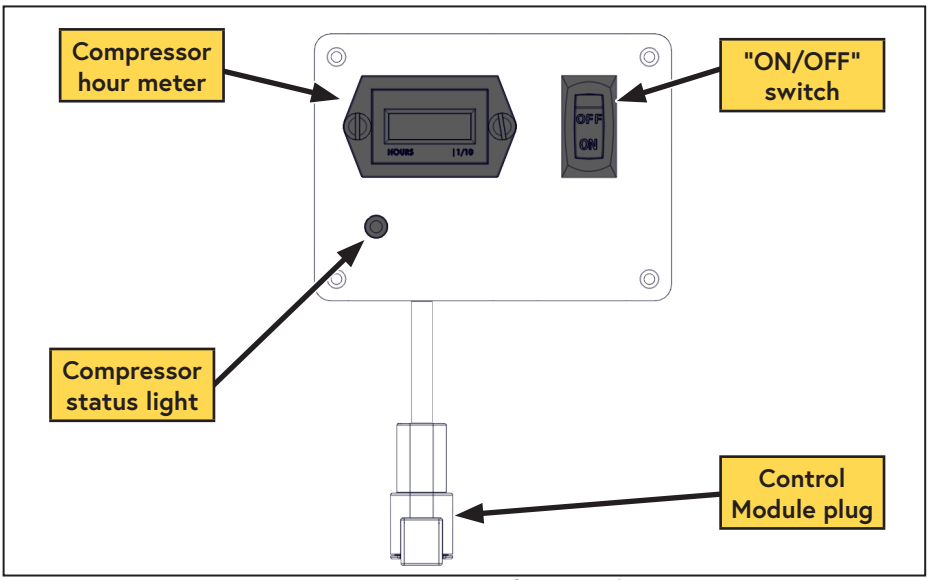


Figure 35 — Interface Panel

Throttle Control (Figure 36)

The Throttle Control responds to signals from the pressure sensor and commands the vehicle's throttle to increase or decrease engine speed in response to air demand.

The Throttle Control also allows the operator to configure the vehicle's engine speed (when air is demanded) to their needs (maximum cfm, specific tool requirements, fuel efficiency, or a combination of these factors).

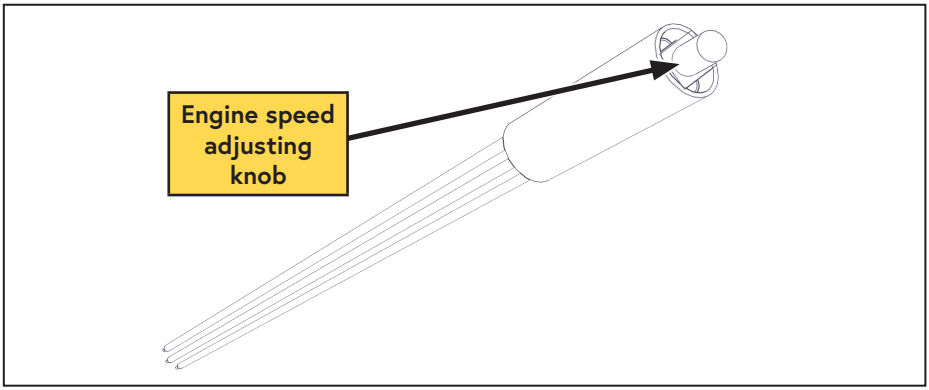


Figure 36 — VMAC Throttle Control

Mechanical Pressure Switch (Figure 37)

The mechanical pressure switch is mounted on the side of the WHASP Tank and limits the maximum pressure to a safe amount by disengaging the clutch once system pressure is achieved.

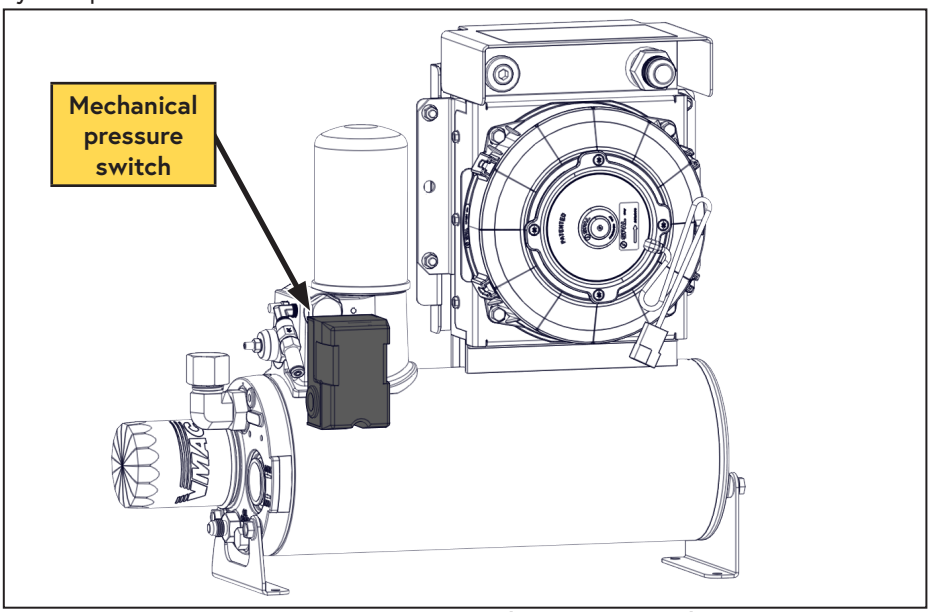


Figure 37 — WHASP Tank pressure switch

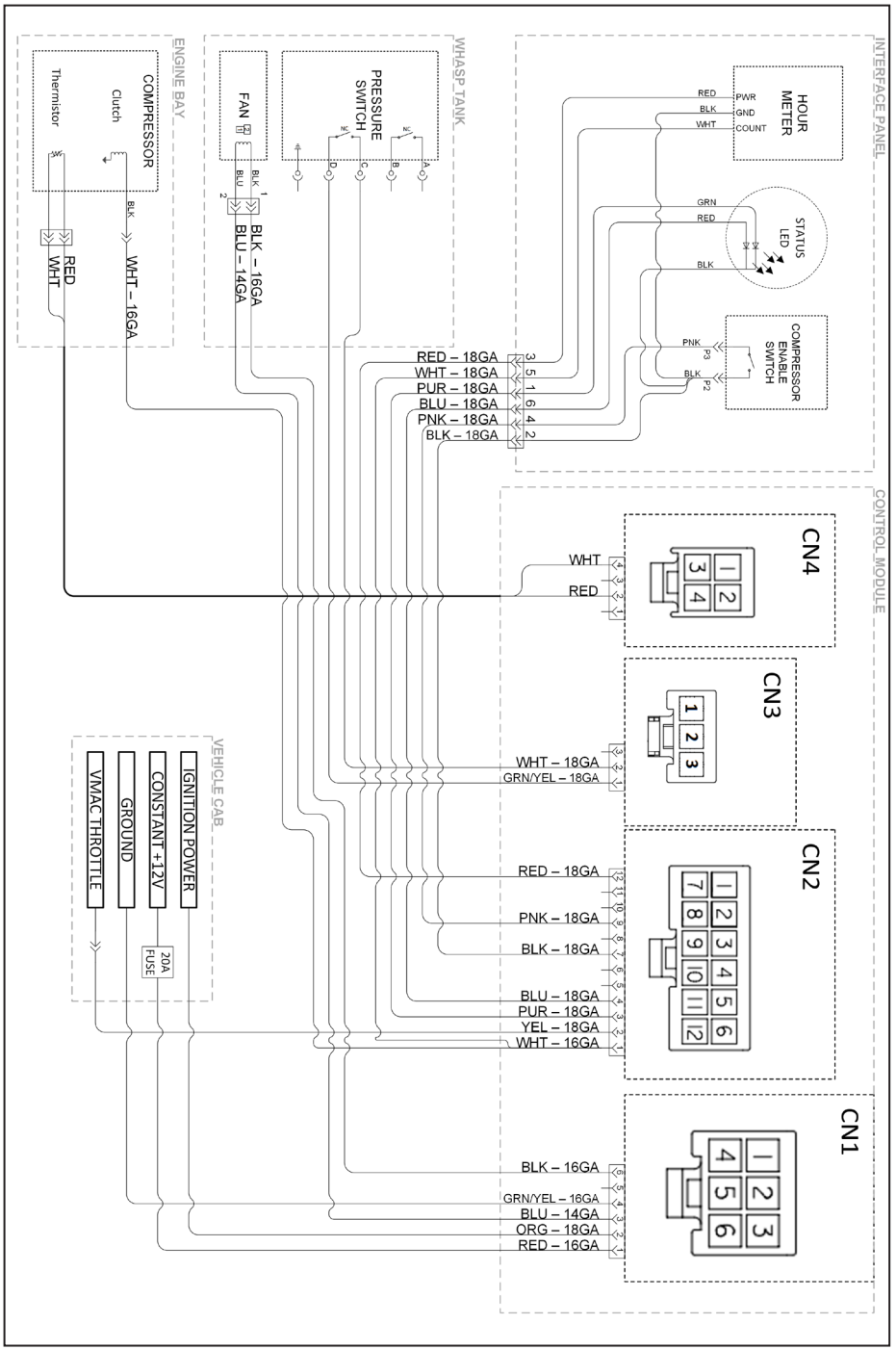


Figure 38 — Electrical schematic

Installing the Control Components

Throttle Control and Control Module

☐ Splice the following VMAC wires to the OEM Stationary Elevated Idle Control (SEIC) interface connector wires (Figure 39, Table 2).

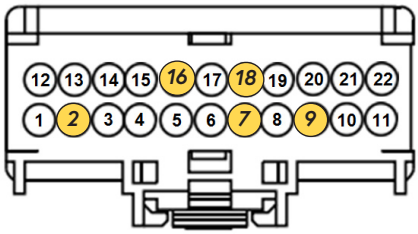


Figure 39 — SEIC interface connector

OEM SEIC Interface			VMAC Control Module Harness	
Circut ID	**Pin Loc.**	**Colour**	**Colour**	**Description**
CASC CBP22	Pin 2	Green / Orange	Orange	Switched power
PTO 1	Pin 7	Yellow / Green	Yellow	Air request
PTO RTN	Pin 16	Yellow / Violet	Purple	Throttle Control
PTO RPM	Pin 9	Green	Green	Throttle Control
PTO REF	Pin 18	Yellow / Green	White	Throttle Control

Table 2 — Throttle control connections

☐ Position the throttle controller under the dashboard in the passenger side footwell, in a location where it will be protected from day-to-day abuse but will still be accessible for making adjustments. Secure the controller in position with cable ties.

☐ Plug the 4 harnesses into the Control Module.

☐ Mount the Control Module under the dashboard, up and out of the way of the pedals, steering column, and the park brake mechanism.

☐ Connect the green ground wire from the Control Module to a chassis ground point.

☐ Connect the orange wire from the Control Module to the 12 V OEM Customer Access Signal Circuit (CASC) CBP22.

☐ Locate a grommet in the firewall and pass the following wires from the Throttle Control and Control Module through to the engine bay*:

- ☐ *White 16 AWG wire with bullet connector from the Control Module (clutch wire).
- ☐ *Grey cable with the green connector from the Control Module (Temperature sensor).
- ☐ *Red wire from the Control Module (Constant power).

☐ Route the grey cable and white wire running from the Control Module with the compressor hoses installed earlier.

☐ Connect the green connector on the grey cable to the matching connector on the compressor.

☐ Connect the bullet connector on the white wire to the matching connector the compressor.

☐ Crimp the supplied fuse holder to the red wire running from the Control Module. Ensure the fuse holder is installed as close to the power source as possible.

☐ Connect the other end of the fuse holder to the positive battery terminal.

Interface Panel

☐ Install the Interface Panel in a suitable location (Figure 40).

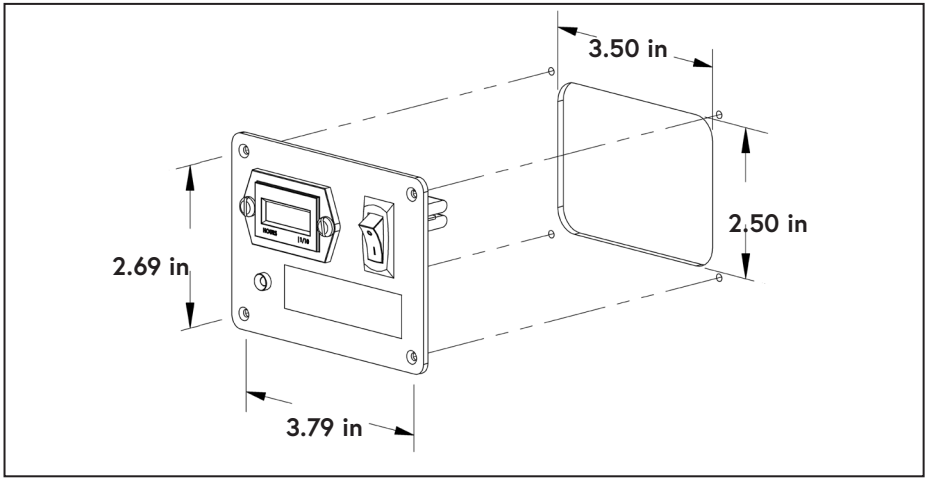


Figure 40 — Interface Panel mounting dimensions

☐ Connect the harness from the control module to the interface panel.

☐ Connect the fan connector from the control module to the plug on the WHASP Tank.

☐ Remove the cover from the WHASP Tank pressure switch and connect the 2 ring terminals from the control module to the pressure switch on the WHASP Tank (not polarity dependent) (Figure 41).

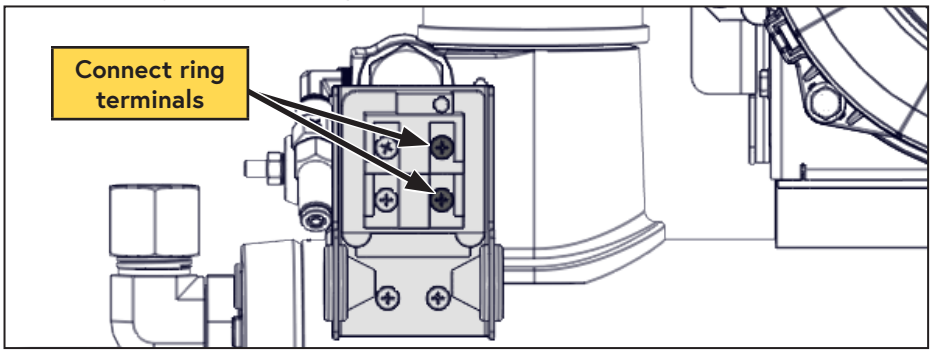


Figure 41 — Connect pressure switch

☐ Replace the cover when finished.

The WHASP Tank harnesses are made to a generic length. Any excess harness should be coiled up and secured out of the way. There are (×2) extra ring terminals included with the pressure switch harness; if desired, cut the harness to length and crimp the spare ring connectors to it.

☐ Ensure all wires and harnesses are protected with loom and routed away from sharp, hot, or moving components and away from high traffic areas.

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, discharge any stored air in the air receiver tank.

The VMAC WHASP Tank has a built-in check valve. Use of an additional check valve is not required and may cause erratic performance.

The VMAC compressor system will automatically depressurize when it is shutdown. The WHASP Tank has a built in check valve which prevents blow back and moisture from the receiver tank entering the WHASP Tank. Installation of an additional check valve will cause erratic performance.

While the air receiver tank can be installed at any height in relation to the WHASP, the discharge hose running from the WHASP 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 42).

Drain the condensed water from the receiver tank daily.

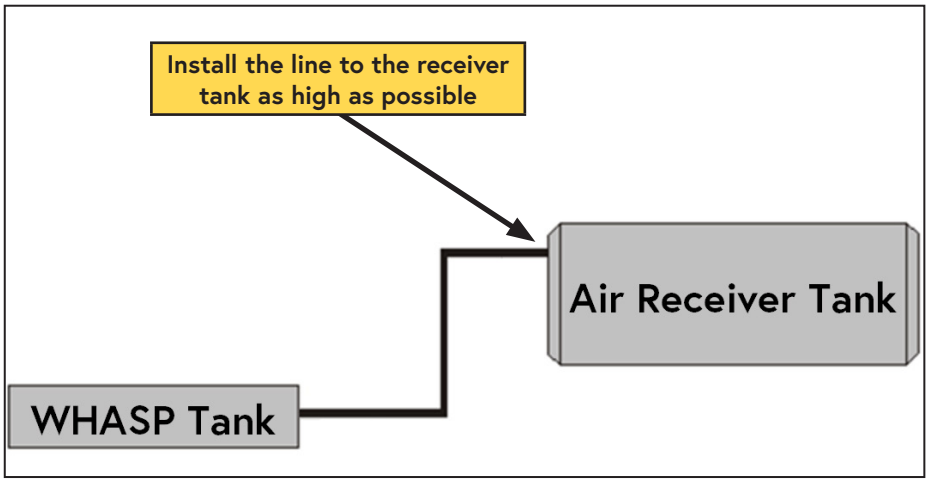


Figure 42 — Air receiver tank

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 46 for a list of products available for purchase through VMAC.

Larger Air Receiver Tank

A larger capacity air receiver tank provides a larger 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.

(This application requires a minimum air receiver tank size of 6 USG).

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 150 psi (1035 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.

Completing the Installation

☐ Mount the VMAC air filter assembly onto the air filter bracket (Figure 43).

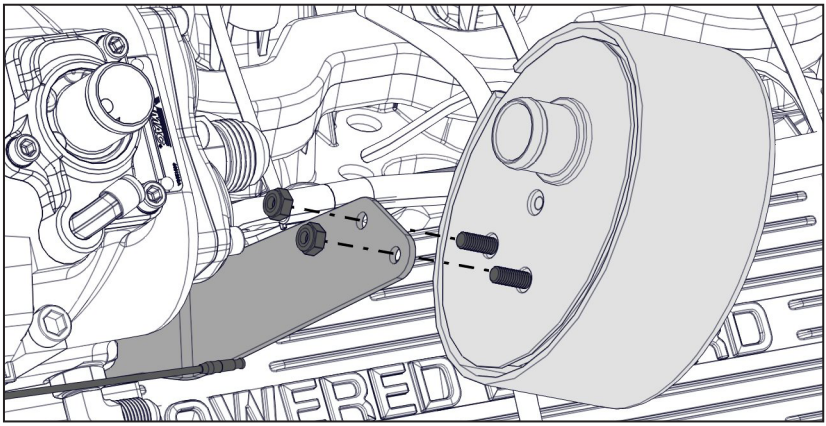


Figure 43 — Mount VMAC air filter

☐ Install the hose between the VMAC air filter assembly and the compressor and secure it with the supplied gear clamps (Figure 44).

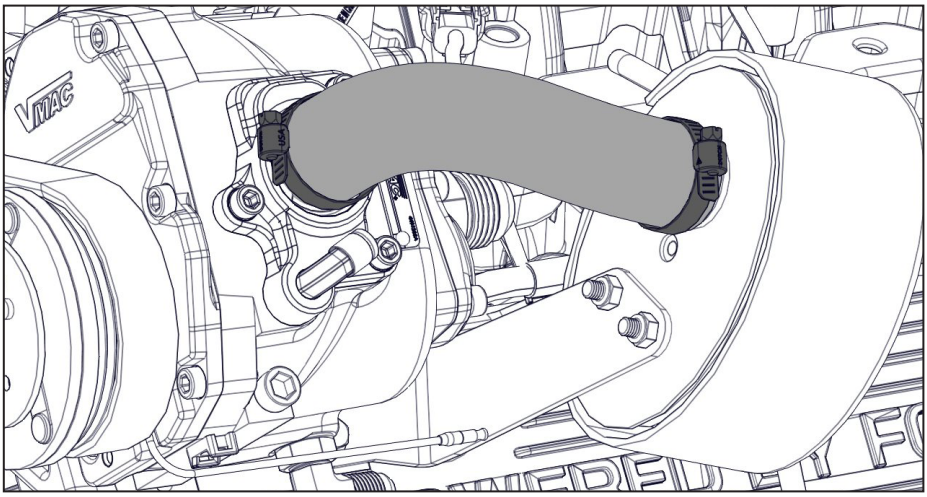


Figure 44 — Connect VMAC air filter

☐ Reinstall the radiator fan and shroud.

☐ Reconnect the engine fan harness connector.

☐ Reinstall the power steering reservoir.

☐ Reinstall the upper radiator hose.

Ensure there is adequate clearance between the upper radiator hose and the FEAD belt.

☐ Secure the harness running to the engine fan and the engine sensor to the power steering hose using one of the supplied cable ties (Figure 45).

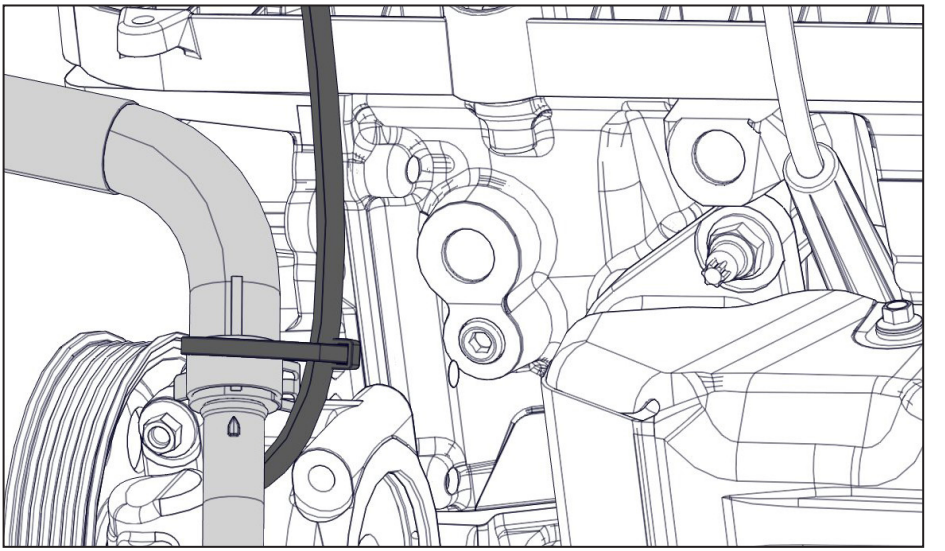


Figure 45 — Secure harness

☐ Check all VMAC and OEM wiring to ensure that it will not contact any hot, sharp or moving components and will not interfere with the operation of the vehicle. Secure all wiring with rubber coated P-clips, cable ties and loom as required.

☐ Check all VMAC and OEM hoses and tubes to ensure that they will not contact any hot, sharp or moving components and will not interfere with the operation of the vehicle. Secure all hoses and tubes with rubber coated P-clips, cable ties and loom as required.

☐ Reinstall the engine air intake.

☐ Reinstall the top radiator cross member cover.

☐ Refill the coolant.

☐ Reconnect the battery(ies).

Testing the Installation

Lift the vehicle, ensuring the driven wheels are off of the ground. Support the vehicle securely with appropriately rated jack stands. Ensure there are no people around the vehicle before beginning the test.
If the vehicle fails the test, ensure the wiring to all of the connections are correct and secure. If additional assistance is required, contact your local VMAC dealer or call VMAC Technical Support 1-888-241-2289 or 250-740-3200.

Safety Test

Ensure the following has been completed:

- ☐ Place the transmission in "PARK" and apply the park brake. Turn the ignition key to "ON" but do not start the engine.
- ☐ Turn on the compressor and listen for the compressor clutch to engage.
- ☐ Observe the hour meter, and ensure the hourglass icon is blinking.
- ☐ Turn off the compressor switch and ensure the clutch has disengaged.

Before Starting the Engine Checklist

Ensure the following has been completed:

- ☐ Check that the compressor oil level at the tank sight glass is correct.
- ☐ Complete a final inspection of the installation to ensure everything has been completed.
- ☐ Perform a final belt alignment check.
- ☐ Check all wiring for security and protection. Ensure nothing is touching the compressor body.
- ☐ 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

- ☐ Allow the vehicle to reach operating temperature.
- ☐ Turn on the compressor. The compressor clutch should engage, and the engine speed should increase in response to the throttle control. The vehicle's tachometer should indicate approximately 2,000 rpm.
- ☐ Allow the compressor to run for approximately 10 seconds.
- ☐ 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.
- ☐ Start the engine. Assistance may be required for the next steps.

The following tests confirm that the drive disable system is working correctly. The drive disable system prevents the VMAC throttle from increasing engine rpm unless the transmission is in "PARK" and the park brake is engaged.

2 people are required to perform this safety test. 1 person must remain in the driver seat and be prepared to actuate the service (foot) brake if necessary.

The second person will actuate the compressor switch and ball valve as necessary

- ☐ Install the VMAC Air Test Tool (P/N: A700052) with the 40 cfm (5/32 in) orifice installed and the ball valve closed.
- ☐ With the engine running and the vehicle in "PARK", release the parking brake.
- ☐ Turn on the compressor and open the ball valve. The clutch should engage, but engine speed should NOT increase.
- ☐ Close the ball valve.
- ☐ Turn off the compressor.
- ☐ Reapply the park brake.

The steps marked with asterisks will be repeated.

- ☐ *With the engine running, Depress the service (foot) brake and shift the transmission out of "PARK".
- ☐ *Turn on the compressor and open the ball valve. The clutch should engage, but engine speed should NOT increase.
- ☐ *Close the ball valve.
- ☐ *Turn off the compressor.
- ☐ *Drain any accumulated air from the system.
- ☐ *Shift the transmission into "PARK".
- ☐ Repeat the steps marked with asterisks for all transmission selector positions, returning the gear selector to "PARK" after each gear is tested.

Engine speed should not increase unless the vehicle is in "PARK" or "NEUTRAL".

- ☐ Drain any air that may have accumulated during the previous tests.
- ☐ Ensure the parking brake is engaged.
- ☐ Turn on the compressor and open the ball valve.
- ☐ Release the park brake. The engine speed should drop to base idle.
- ☐ Reapply the park brake. The engine speed should increase as soon as the park brake is engaged.
- ☐ Close the ball valve, allow the system to build to full pressure and the engine speed to return to base idle.
- ☐ Turn the compressor off and shut down the engine.
- ☐ Drain any accumulated air 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).

The WHASP Tank cooling fan is thermostatically controlled, and may start or stop without warning.

- ☐ Road test the vehicle for approximately 20 km (14 miles).
- ☐ Observe the compressor while it is operating to ensure 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.

The VMAC Throttle Control <u>is not</u> tuned for maximum cfm output! For instructions on throttle adjustment and compressor performance testing, see the instructions starting on the next page.

Performance Testing and System Adjustments

Adjusting the Throttle Control

Adjustment is made by turning the "SPEED 1" adjustment screw. Turn the screw counter-clockwise to decrease engine speed, or clockwise to increase engine speed.

The Throttle Control is designed to provide 40 cfm when the throttle adjustment is at its maximum, this also prevents overspeeding the compressor.

Engine speed adjustments may be made so that the amount of air delivered by the system matches the requirements of the tools or equipment that will be used.

- This system achieves 40 cfm at 2,700 rpm.
- If the system is unable to "keep up" with a specific tool, the engine speed is too low. Try increasing the engine speed gradually, until the desired performance is obtained.
- If the system is cycling on and off rapidly when using a particular tool, the engine speed is likely higher than necessary for that tool. Try turning the engine speed down and observe the performance.

When testing the system or adjusting the VMAC Throttle Control, ensure the system does not exceed 2,900 engine rpm. Exceeding this speed will cause erratic system performance and in extreme cases may also cause long term damage to the compressor.

If the system is overspeeding, verify all wiring connections and retest. If the system continues to overspeed, contact VMAC Technical Support at 888-241-2289.

Compressor Performance Testing

This system has been adjusted at the factory for general operation, not maximum cfm. Any performance testing should be done with the Throttle Control set for maximum cfm. See the previous page for instruction on adjusting the Throttle Control.

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 40 cfm (5/32 in) orifice in the outlet to simulate tool use (Figure 46).

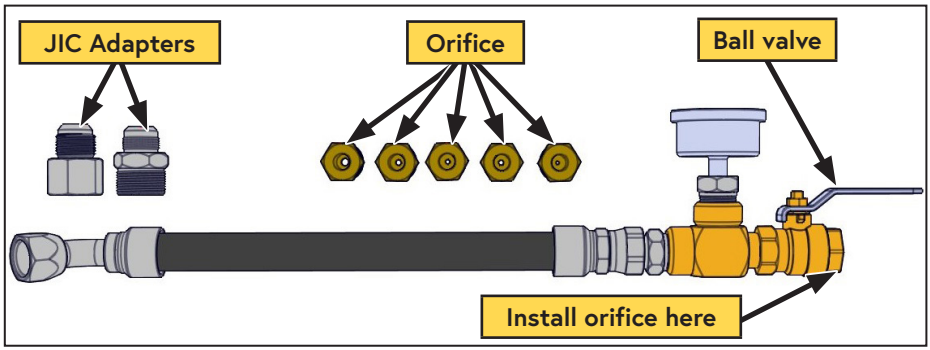


Figure 46 — A700052 VMAC Air Test Tool

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

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 system outlet with the 40 cfm (5/32 in) orifice.
- ☐ Ensure 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 2,700 rpm. The pressure on the gauge should be 90 - 120 psi.
- ☐ Close the air valve slowly to allow the system pressure to rise. When the pressure reaches the pressure switch set-point of 150 psi, the system will disengage the compressor clutch and reduce the engine speed to base idle.
- ☐ Once the system pressure is at maximum, slowly open the ball valve on the test tool until the pressure on the gauge begins to drop. Engine speed should ramp up to approximately 2,700 rpm when the pressure drops approximately 40 psi below the pressure switch set-point.

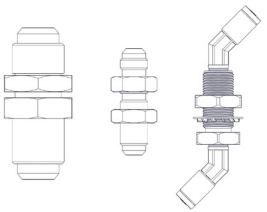
Accessory Products from VMAC

Compressor Service Kits

200 Hour or 6 Month Service Kit -
Part number: A700263
Includes 4 L VMAC high performance compressor oil, oil filter, air filter, and next service due decal.

400 Hour or 1-Year Service Kit -
Part number: A700264
Includes 4 L VMAC high performance compressor oil, oil filter, air filter, spin-on oil separator, safety valve, muffler, and next service due decal.

Bulkhead Fittings



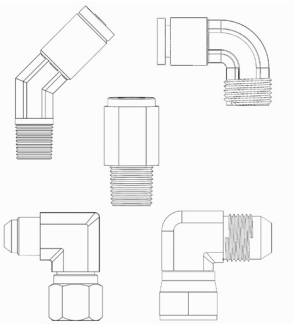
Part number: 3801095

Includes:

Bulkhead fittings are used for passing the system discharge, oil, and scavenge hoses through the floor or body panels.

- 3/4 in JIC bulkhead fitting P/N: 4900170.
- 3/8 in JIC bulkhead fitting P/N: 4900209.
- 1/8 in NPT bulkhead fitting P/N: 5000178.
- 2 × 45° 1/4 push-to-connect fittings P/N: 5000158.

Hose Fittings



45° 1/4 push-to-connect fitting P/N: 5000158.
1/4 in push-to-connect fitting For PTFE scavenge tube.

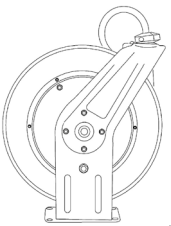
90° 1/4 push-to-connect fitting P/N: 5000020.
1/4 in push-to-connect fitting For PTFE scavenge tube.

Straight 1/4 in push-to-connect fitting P/N: 5000012.
1/4 in push-to-connect fitting For PTFE scavenge tube.

90° 3/8 in hose fitting P/N: 4900117.
3/8 in hose fitting for Oil Return Hose.

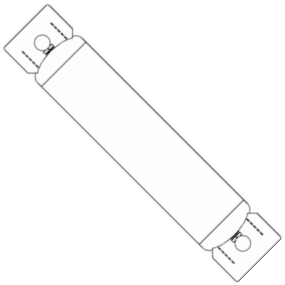
90° 3/4 in hose fitting P/N: 4900043.
3/8 in hose fitting for Compressor Discharge Hose.

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.

6 Gallon Air Receiver Wing Tank



Part number: A300056
Air receiver tanks are used for lowering compressor duty cycle and removing water from compressed air; recommended for optimum operation of all VMAC Gas Driven, Diesel Driven, Hydraulic, and UNDERHOOD40 air compressors. Manufactured to FMVSS 121 standard; includes fittings, 170 psi pressure relief valve, and tank drain.

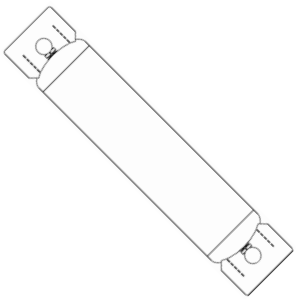
- Max pressure: up to 170 psi.
- Dimensions: 32 in (81.3 cm) L × 8 in (20.3 cm) D.
- Weight: 23 lb (10.4 kg).

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).

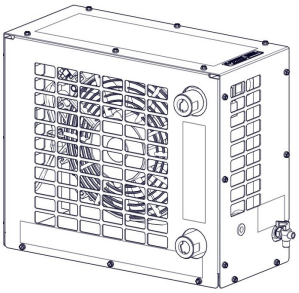
35 Gallon Air Receiver Wing Tank



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).

UNDERHOOD 70 Air Aftercooler

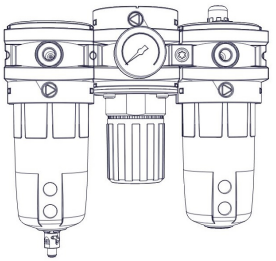


Part number: A800070

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

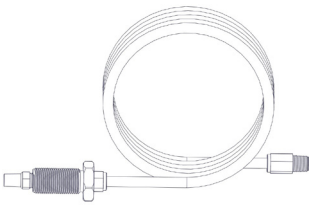


Part number: A700151

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.

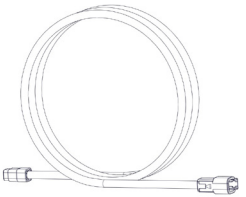
Remote Muffler



Part number: A700224

The A700224 WHASP remote mount muffler kit is designed to relocate the blowdown muffler to an external location. This is recommended for applications where the WHASP Tank will be located inside of a van or service body, the remote mounted muffler will reduce cabin noise when the compressor blowdown operates, and will ensure any oil vapor will be safely discharged outside of the vehicle.

Interface Harness Extension



Part number: A700265

This interface harness extension provides an additional 10 ft of cable which allows for greater flexibility in locating the Interface Panel.

Notes

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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