VMAC®

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Installation and Owner's Manual
Diesel Driven Air Compressor
D600003 | D600004
D60X003 | D60X004
D600017 | D600018

www.vmacair.com

Table of Contents

Revision	Revision Details	Revised by	Checked by				Implemented
			Eng.		Tech.	Qual.	
			Mech.	Elec.			
B	ECN 17-237 Fuel Filter information	MSP	JKR	N/A	GB	AWG	8 Dec. 2017
C	ECN 19-111 Formatting /20-227 Wheel kit and multiple updates	MSP	BJG	AJH	DSB	LPH	4 Jan. 2021
D	ECN: 22-024 Update air filter instructions	MSP	SPT	N/A	MSP	LPH	16 Mar. 2022

Additional Application Information

This manual applies to the following Diesel Driven Air Compressor models (D60) and accessories. See page 33 for a breakdown of the various D60 models:

D600003
D600004
D600017
D600018
D60X003
D60X004

Registered Trademarks

All trademarks mentioned in this manual are the property of their respective owners. VMAC's use of manufacturers' trademarks in this manual is for identification of the products only and does not imply any affiliation to, or endorsement of said companies.

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KUBOTA® is a registered trademark of Kubota Corporation.
Shocker PASS® is a registered trademark of Headwind Automotive Solutions Ltd.

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

General Information

Introduction

This manual provides installation guidelines, operating instructions, specifications, adjustment, maintenance and warranty information for the D60. Read this manual, as well as the Kubota Operator's Manual (P/N: 1900973) prior to installation, operating or servicing the D60.

Follow all safety precautions when operating or servicing the D60.

Proper service and repair are important to the safety of the operator and the safe, reliable operation of the equipment. Always use genuine VMAC parts.

The procedures described in this manual are the only approved methods of service and operation.

Ordering Parts

To order parts, contact a VMAC dealer. The dealer will ask for the VMAC System ID (see page 33), part number, description and quantity. Locate the nearest dealer online at https://www.vmacair.com/support/find-a-dealer or call (877) 912-6605.

Additional Support

Additional resources such as installation manuals, illustrated parts lists, the VMAC Knowledge Base, air tool consumption guides, etc. are available at https://www.vmacair.com/support/.

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.

Safety Precautions

As it is impossible to warn of every possible hazard that may result from operating this system, common sense and industry standard safety practices must be observed.

Read this information before operating the compressor for the first time. Follow the information and procedures in this manual for operation, maintenance and repair. Observe the following items to reduce the chance of personal injury or equipment damage.

Follow all safety precautions for mechanical work. Moving belts and rotating components are an extreme hazard. Stay clear of all moving parts when the system is operating. Only qualified personnel should perform maintenance and repair on system components and only while the system is properly shut down.

Proper service and repair are important to the safety of the service technician and the safe, reliable operation of the equipment. Always use genuine VMAC replacement parts.

The procedures described in this service manual are effective methods of service and repair. Some procedures may require the use of tools specially designed for a specific purpose. Anyone using a replacement part, service procedure or tool must first determine that neither their safety nor the safe operation of the equipment will be compromised by the replacement part, service procedure or tool selected.

Burn Hazard

- The compressor system gets very hot during operation, contact with the components or the oil can cause serious injury. Allow sufficient time for the system to cool before performing service.
- Never allow any part of your body to contact the compressor components.

Personal Safety

- Do not breathe the compressor air. Vaporized oil is a respiratory hazard.
- Always use the appropriate personal protective equipment, particularly eye and hearing protection when operating air powered equipment.

Burst Hazard

This system is designed to generate air pressure up to 150 psi during normal operation:

- Serious injury or death may result from an air tank explosion.
- Never exceed manufacturer's maximum air pressure rating.
- Do not repair components, only replace with approved parts.
- Do not tamper with, or disable factory safety equipment.

Harmful Vapours

Breathing fuel vapours or engine exhaust can expose you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well ventilated area.
- Do not breathe engine exhaust. Internal combustion engines produce carbon monoxide, a poisonous odorless gas which can cause death. Do not start or operate this system in an enclosed area.
- If in an enclosed area, vent the exhaust to the outside and ensure there is adequate access to fresh breathable air.

Fire and Explosion Hazard

- Vaporized oil propelled by high pressure air is an explosive mixture.
- Fire in the compressor can cause an explosion and flame projection. Should this occur, there is potential for serious injury or death.
- Operate the compressor in a well ventilated area free of flammable vapors, dust, or other combustible materials.
- Do not refuel the engine while the system is running or hot.
- Do not refuel the engine in an enclosed space or area with poor ventilation.
- If fuel is spilled, clean the area and wait for it to dry before starting the engine.
- Never place objects against, or on top of, the compressor.

- Never expose the system to extreme heat.
- Do not use starting fluids (such as ether) as they can cause an explosion.
- Accumulated oil and grease can cause the system to overheat and pose a fire hazard. Keep the system clean and repair any leaks immediately.

Compressor Air and Oil Hazard

- The compressor system is under sufficient pressure that a leak could force the air/oil mixture through the skin directly into your bloodstream. This could cause serious injury or death.
- Ensure the system is completely depressurized before attempting maintenance or repair.
- Do not use compressed air to clean off clothing or skin, compressed air can penetrate the skin causing serious injury or death.
- Do not move or service the system while it is pressurized or operating.
- Components and hoses under pressure could separate suddenly and cause serious injury or death. If equipped, the air receiver tank must be drained prior to servicing the system.
- Never adjust or attempt to make any repairs to the system while the engine is running. Components and hoses under pressure could fail and cause serious injury or death.

Moving Parts Hazard

- Before performing service, disconnect the negative battery cable to prevent unexpected engine start.
- Do not operate the system without guards in place. If the guards are damaged or missing, replace them before operating the equipment.

Lead Acid Battery Hazard

Working near lead acid batteries is dangerous. Batteries may generate sulphuric acid and explosive gases during regular operation. Lead acid batteries may explode if exposed to a spark.

- Follow all safety precautions when jump starting or charging a battery.
- Never attempt to jump start a frozen battery.
- Never overcharge a battery.

General Warnings

- Disconnect the negative battery cable prior to attempting any repair or service.
- Be cognizant of unexplained changes in operation and record any changes.
- Check the engine and compressor oil levels and condition prior to starting the system.
- Do not add or change oil while the system is running.
- Use only approved oils.
- Inspect the equipment before every use.
- The compressor may operate anytime the engine is running. Avoid contact with the compressor, hoses, or engine during operation.
- While in "Standby", the D60 may start at any time.
- Keep hoses and wiring away from hot, sharp, or moving components.
- Use only approved hoses and replacement parts.
- Do not modify the equipment.
- Do not operate the D60 unless this manual has been read in its entirety.
- Do not operate the D60 when fatigued or under the influence of alcohol or drugs.
- Never bypass or disable any of the safety equipment.
- Never adjust, or attempt to make any repairs, to the D60 while the engine is running unless expressly instructed to do so.
- Components and hoses under pressure could fail and cause serious injury or death.
- Loose fasteners or components can damage equipment, ensure all fasteners and components are properly torqued or secured.
- Do not operate this the D60 in environments where flamable gases may be present unless the unit is equipped with a Positive Air Shut-Off System (PASS).

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:

https://www.vmacair.com/support/warranty-registration

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/support/find-a-dealer

1) Communicate with VMAC Technical Support at (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, loss of income, 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).

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Installation Manual for Vehicle Mounting

(For system equipped with the wheel kit (D60X003 | D60X004), turn to page 21)

Installation Requirements and Considerations

The information in this section is critical to ensure proper operation of the system. Read these requirements prior beginning the installation.

Failure to adhere to these requirements may cause the D60 to operate erratically or impact the overall quality of the installation.

In order to take full advantage of the D60 "standby" feature, an air receiver tank with a minimum capacity of 3 USG is recommended. See "Recommended Accessories" on page 86 for more information.

Requirements:

- Ensure there is adequate clearance around the unit to provide good air circulation and effective cooling (see page 14).
- Ensure the unit is mounted in a location where hot air and/or exhaust will not recirculate into the system (see page 15).
- Ensure the service panel is accessible.
- Ensure the engine and compressor oil level can be checked easily.
- Ensure the unit can be serviced easily (i.e. without having to disconnect hoses, or reposition/remove the unit).
- Ensure the hose lengths are as short, and with the least amount of 90° fittings, as possible.
- Ensure the exhaust is routed to open air without being orientated in a way that will accumulate of water (see page 18).
- Ensure the unit is protected from damage from other operations.
- Ensure the intended mounting location is capable of safely supporting a minimum of 450 lb (204 kg).
- Ensure the unit is sufficiently isolated from vibration to prevent damage to the frame and other components.

Considerations:

- Is the intended location convenient for air connections?
- Will the unit be mounted away from heat sources such as engines, exhaust, or other components that can generate heat?
- Will the unit be mounted where it will be exposed to high contamination levels, including combustible gases?
- Will the unit be fueled via the optional 7 gallon fuel tank (P/N: A500005) or via the vehicle's fuel tank (diesel fuel only)?
- Will the unit be used in temperatures below -5 °C (23 °F)? If so, VMAC recommends ordering the system with the optional Cold Climate Kit.

Mounting and Ventilation Requirements

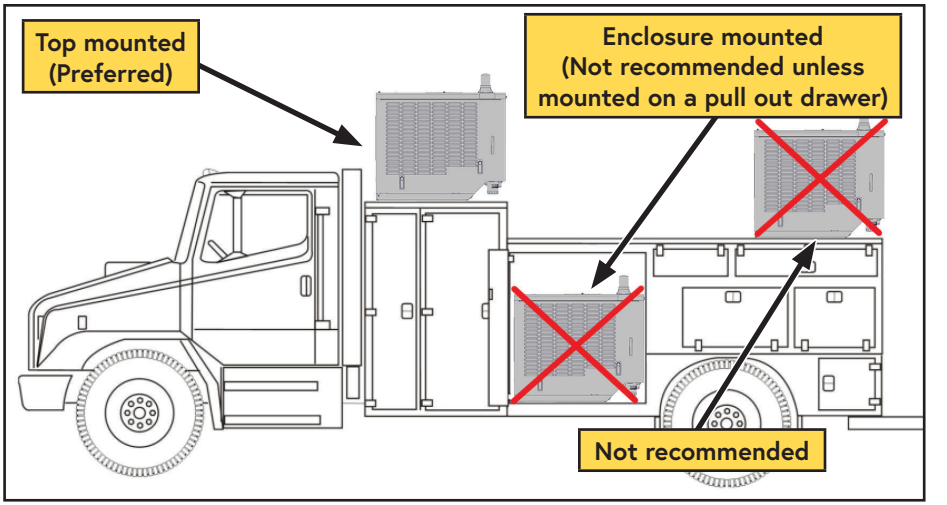


Figure 1 — Mounting locations

VMAC does not recommend mounting the unit at the back of the vehicle as the drag created when the vehicle is moving causes debris to be deposited (and accumulated) inside the unit.

Top Mounting (Preferred mounting location)

Placing the D60 on top of the service body provides the best access to cool fresh air. Maintain a minimum of 12 in between the sides of the D60 and all other solid objects. Ensure there is an ample supply of cool air to the service panel side of the D60 and that the hot air exhausted from the radiator can escape the area unrestricted (Figure 1).

Enclosed Mounting

Enclosed mounting is not recommended due to the risk of recirculating exhaust and the significant heat generated by the D60.

Mounting the D60 in an enclosure will limit access to cool fresh air, restrict the escape of hot air from around the D60 and have an adverse effect on cooling the system; ensure adequate ventilation is provided. If mounting in an enclosure, VMAC strongly recommends mounting the unit on a pullout drawer with a switch that prevents the unit from being operated unless the drawer is fully extended.

While it is not possible to make absolute recommendations regarding ventilation (due to the widely differing circumstances that are possible), duty cycle, ambient temperature and enclosure shape are some of the important variables that must be considered.

Ventilation Requirements

Adequate ventilation is vital for safety. Ensure the engine exhaust is directed away from any passenger compartments or enclosed areas where personnel may be working.

Systems without adequate cool air flow may experience stalling, premature oil deterioration, increased oil consumption, power loss, and reduced life or failure of the engine and/or compressor.

If the compressor overheats, the intelligent control features will shut the engine down and prevent restart until the oil temperature drops below 140 °C (284 °F).

Exhaust and waste heat from the D60 must be vented away from the system to prevent the diesel engine from ingesting its exhaust and stalling.

Cool air is drawn into the unit via the service panel while the hot air is pushed away from the unit via the engine radiator fan.

During operation, the D60 generates a considerable amount of heat that must be evacuated from the unit to allow it to run efficiently. While the engine is liquid cooled, it requires an adequate supply of cool fresh air to cool the engine and allow proper fuel combustion. Cool air is drawn in from the bottom of the unit and through louvers on the service panel. The D60 utilizes "pusher" fans on the engine radiator and compressor cooler to exhaust the hot air from the unit.

Ensure there is a minimum of 12 in of clearance between the service panel and radiator grille and any other components mounted on the vehicle.

The engine exhaust must be vented away from the D60 and toward a safe location. If mounted in an enclosure (including the bed of a pickup truck box), the exhaust must be vented outside of the vehicle to prevent the engine from ingesting its exhaust and overheating or stalling.

Dimensions and Mounting

External dimensions

All dimensions are in inches.

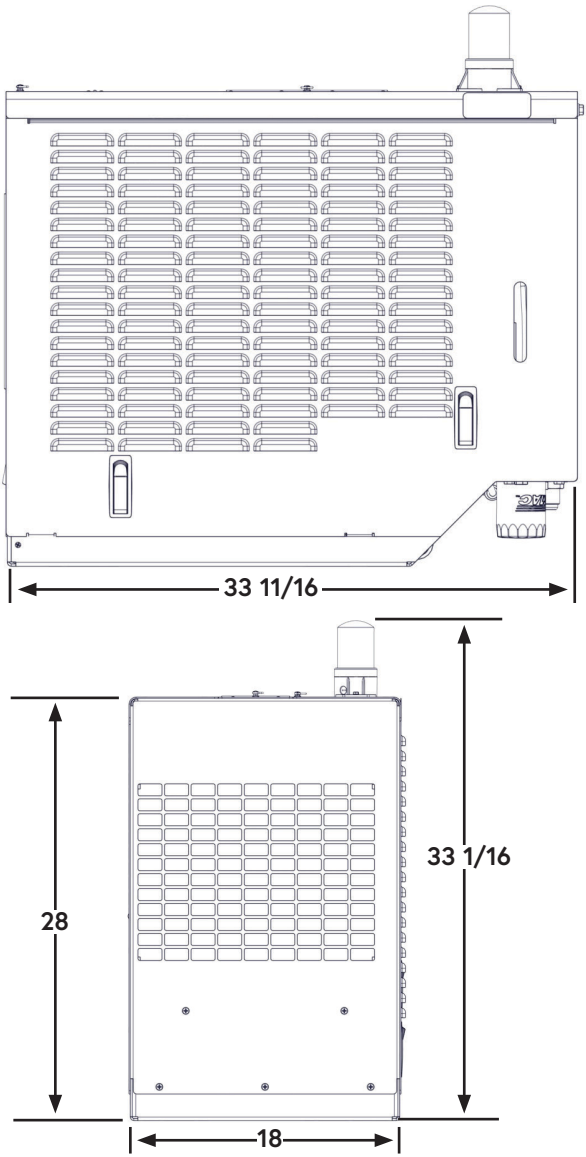


Figure 2 — External dimensions

D60 Base Plate

	The base plate has (×4) pre drilled holes that can be used to mount the system. If alternate mounting holes are required, holes can be drilled through the bottom of the formed plate.
	All dimensions are in inches.

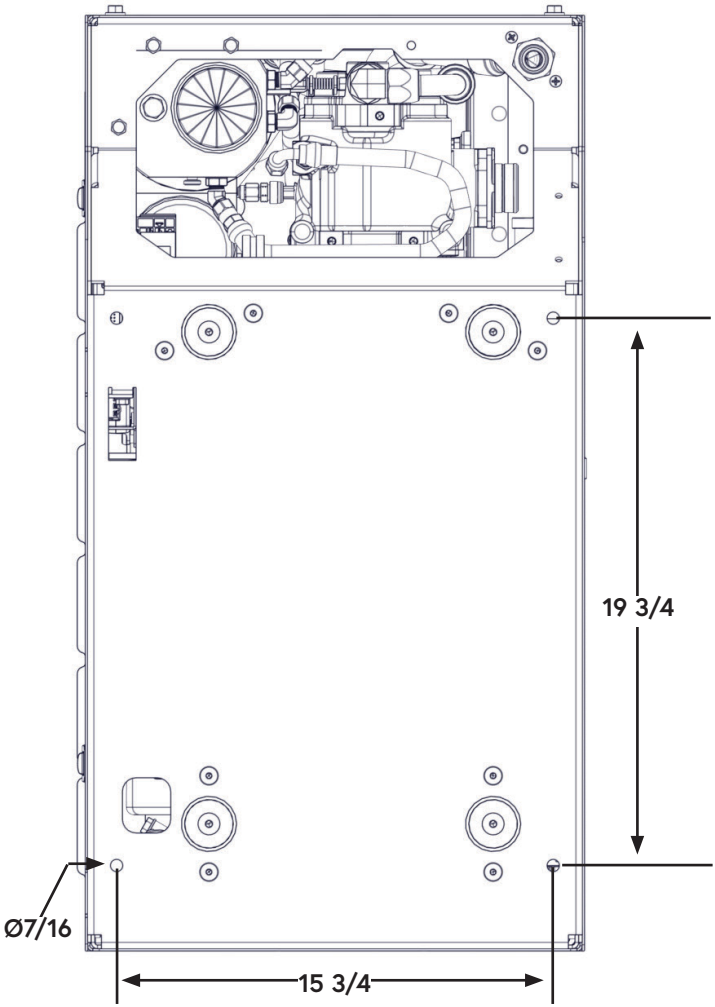
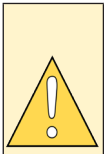


Figure 3 — Base plate

Installing the D60



While the D60 is manufactured with heavy duty vibration isolators between the engine and the base plate, VMAC recommends adding additional vibration mitigation (i.e. additional base plate with vibration isolators incorporated) if the vehicle will be driven off of paved roads to prevent impact damage to the frame and other components.

☐ Locate a suitable mounting location that will distribute the weight of the D60 over its entire base plate.

☐ Place the unit in its intended location and verify that there is a minimum of 12 in clearance between the unit and any other objects.

☐ Secure the D60 to the vehicle using a minimum of (×4) 3/8 in or 10 mm bolts (×2 on each end) with washers, and either lock washers or Loctite 242 (blue).

Fuel Supply

If the D60 will be fueled via the vehicle's diesel fuel tank, do not plumb the fuel line into the lower section of the fuel tank.

☐ Connect the D60 to the vehicle's diesel fuel tank, via the VMAC Fuel pump Kit (P/N: A500030), or the optional 7 gallon external fuel tank (P/N: A500005).

The fuel supply line is 5/16 in ID and the return line is 3/16 in ID.

Air Discharge

☐ Remove the #12 cap from the air outlet (located on the exhaust side of the unit) and connect the D60 to the receiver tank (sold separately, see "Accessory Products from VMAC" on page 87).

Exhaust

Ensure the exhaust pipe has suitable clearance from, and will not contact, any flammable materials.

If extending the exhaust, a suitable flex coupling or flex pipe must be used to prevent damage to the muffler and exhaust system.

Dependent upon the length of the extension, extra support may be necessary.

If the exhaust will be oriented up, ensure an appropriate flapper is installed to prevent water accumulation in the exhaust system (i.e. with hinge of flapper pointed toward the front of the vehicle).

The upfitter must supply an exhaust pipe suitable to the application. An exhaust elbow and flapper kit is available from VMAC (P/N: A500004).

☐ The muffler has a 1 5/8 in ID outlet.

☐ Install an adequate exhaust pipe.

LED Beacon Module

The LED beacon module will illuminate any time the D60 enters "STANDBY" mode. This warns anyone working near the D60 that it may start at any time.

If installing the LED Beacon module in an alternate location, the existing beacon wiring will need to be extended (the connector is located just above the coolant overflow bottle).

- ☐ Remove the service panel.
- ☐ Remove the top panel.
- ☐ Pass the connector through the 1 1/8 in hole in the top panel and seal the harness in place using the supplied grommet (Figure 4).

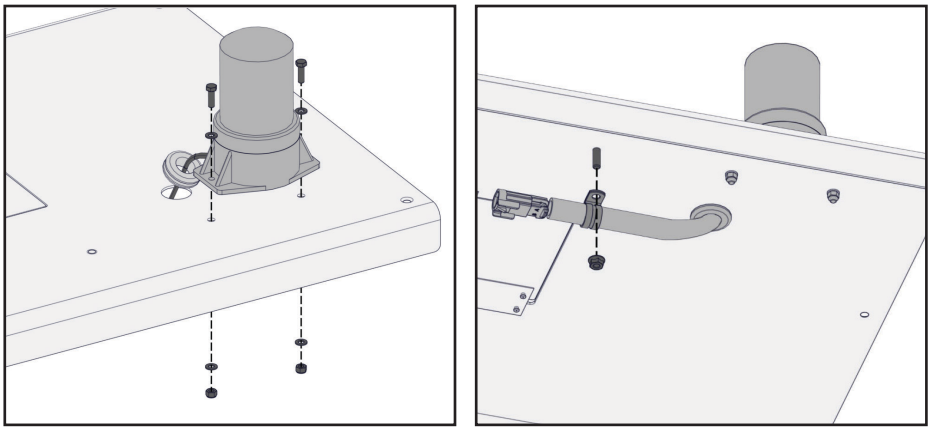


Figure 4 — Install LEAD beacon module

- ☐ Using the supplied hardware, secure the LED beacon module to the top panel (Figure 4).
- ☐ Using the supplied P-clip and fastener, secure the harness to the stud in the top panel (Figure 4).
- ☐ Reinstall the top panel onto the D60.
- ☐ Connect the LED beacon connector to the mating connector located just above the coolant overflow bottle.

If permanently connecting the D60 to the vehicle battery, a battery isolator or circuit must be installed.

Permanent Vehicle Battery Connection

- ☐ Remove the service panel.
- ☐ Remove the battery post boots.
- ☐ Connect appropriately sized battery cables to the threaded posts (positive: 3/8 in, negative: 5/16 in).
- ☐ Replace battery post boots.

Display Panel

The display panel is splash resistant, not weather proof; ensure the display panel is mounted where it will be protected from rain, snow, mud, direct sunlight, etc. (e.g. inside the cab, service body, or a cabinet).

VMAC recommends that the harness extensions be soldered and sealed with heat shrink tubing, or sealed butt splices (not supplied) to provide durable, and moisture resistant connections.

The D60 is shipped with male and female connectors (with pig tails) to facilitate making extension harnesses to connect the various components.

☐ Mount the display panel in a convenient location that is protected from the weather.

☐ Using the included connectors with pig tails, connect the display panel and key switch connectors (Figure 5).

Recommended Wire Gauge for Display Panel Harnesses Extensions				
Wire Description		Wire Gauge		
		Up to 10 ft	10 ft to 16 ft	16 ft to 22 ft
Display panel connections (4 pin connector)		18 AWG	18 AWG	18 AWG
Key switch	Key switch (yellow)	18 AWG	18 AWG	18 AWG
	Return power (orange)	14 AWG	12 AWG	10 AWG
	Supply power (red)	14 AWG	12 AWG	10 AWG

Figure 5 — Display Panel harness connections

Optional Equipment

Remote Start Wire

The D60 can be started remotely using a remote start wire running to the control box. A blunt cut yellow wire can be found near the control box (located inside the service panel).

With the key-switch in the "RUN" position, the remote wire can be grounded to start the system. Once the ground is interrupted, the control system will stop the engine.

☐ Connect the yellow remote start wire to one of the terminals on a Single Pole, Single Throw (SPST) switch and connect the other terminal to ground on the D60.

Instructions continue on page 29

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Setup Instructions for Wheel Kit Equipped Systems

D60X003 | D60X004

D60X003 | D60X004 Safety Information

The following safety information is particular to systems equipped with the optional Wheel Kit (D60X003 | D60X004) due to its added mobility.

This safety information is supplementary to the information/ warnings outlined under "Safety Precautions" on page 5.

Hot Exhaust

- Do not start or operate this system in an enclosed area. If in an enclosed area, vent the exhaust to the outside and ensure there is adequate access to fresh breathable air.
- Ensure the exhaust is not directed toward personnel, air intakes, enclosed/confined areas or where it may damage other equipment (high temperature, noxious/poisonous gases, excessive noise, or soot).
- To prevent burns and exhaust inhalation, do not pass in front of, or work near the engine exhaust.

Heavy Load

- The D60 weighs approximately 500 lb (227 kg).
- Losing control of the D60 may cause serious injury or death. Avoid potential tripping hazards and other risks that may cause a loss of control.
- Do not operate the D60 while it is rolling as unexpected movement of the unit may cause the tool operator to lose control of the air line, potentially causing injury or death.
- Observe all industry standard safety practices and jurisdictional regulations when hoisting/lifting the compressor system.
- The lifting eye is suitable for routine loading/unloading from vehicles for transport. For longer/higher lifts or aerial transport (such as a crane or helicopter), the use of appropriate slings/rigging is required.
- The undercarriage of the compressor system is <u>not</u> intended for transport or lifting via forklift.
- Use two people when loading/unloading the D60 or while navigating ramps.
- Do not handle or operate the D60 on grades exceeding 15°.
- Do not rely solely on the wheel brake, chock both sides of the front wheels prior to operation or leaving the D60 unattended (wheel chocks not supplied).
- Do use the handle for lifting or securing the compressor system.

Transporting and Moving the D60 with Wheel Kit

Read the "D60X003 | D60X004 Safety Information" section prior to moving or transporting the compressor system (page 23) and adhere to all industry standard safety practices and jurisdictional regulations.

Routine Lifting

The D60 is equipped with a lifting eye that is intended for routine loading and unloading from a vehicle. The lifting eye is centrally balanced and can be hooked on to directly or used with a shackle (Figure 6).

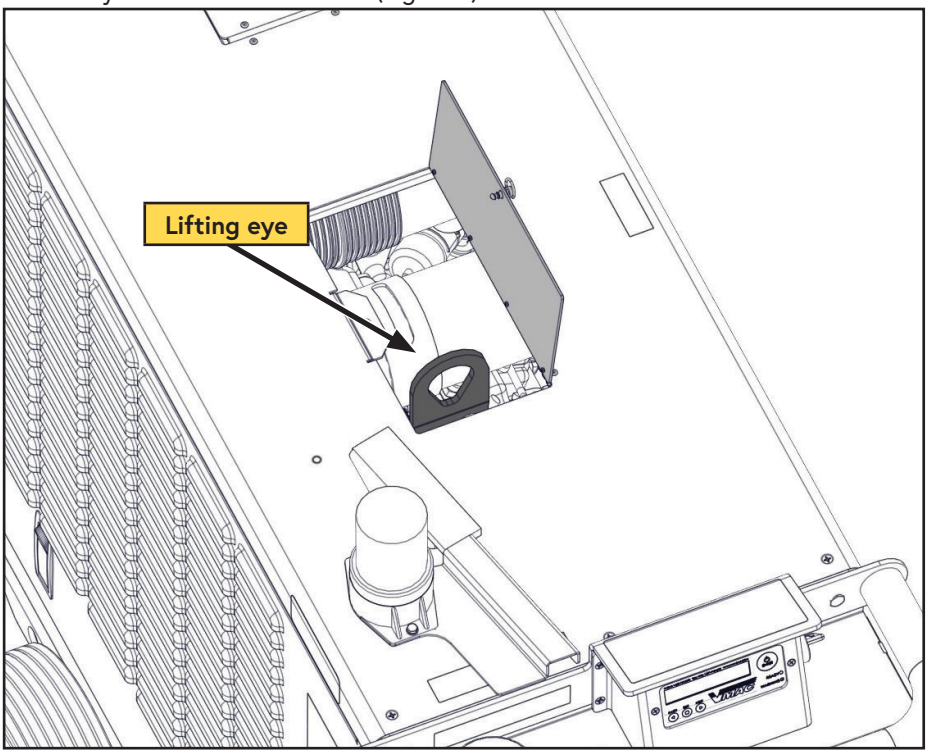


Figure 6 — Lifting eye

Securing for Transport

When securing the D60 for transport:

- ***Ensure the tie down straps are cinched sufficiently to secure the load.***
- ***Ensure the exhaust is protected from water or road debris ingress while it is being transported.***

Tie Down Locations

The D60 is equipped with multiple tie down locations for securing the unit during transport.

To prevent applying lateral force or unnecessary load to the axle and bearing assemblies, wheels, or caster, observe the compression/deformation of the tires while tightening the tie down straps.

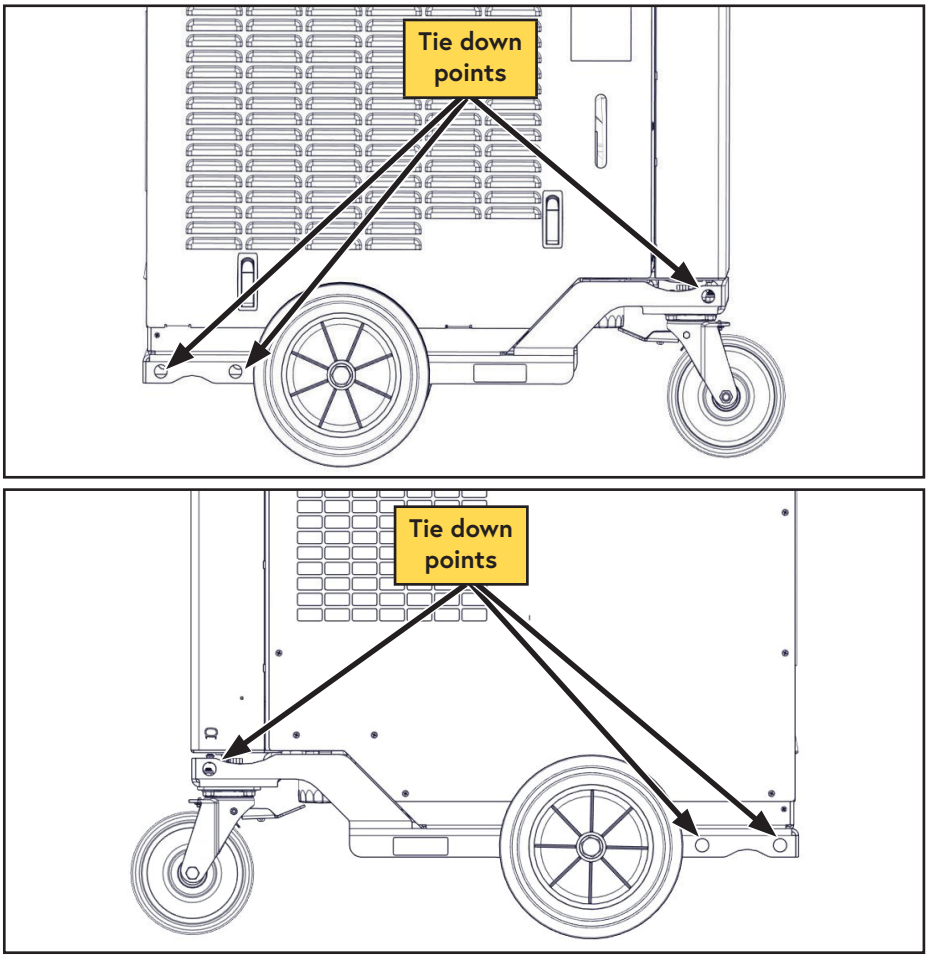


Figure 7 — Tie down locations

Wheel Brake

Wheel chocks must be used any time the unit is operated on an incline.

The brake should be checked regularly to ensure proper adjustment. See page 59 for adjustment instructions.

The D60 is equipped with a friction brake on the caster. While the wheel brake is sufficient for holding the unit stationary while operating on level ground, it should be used in conjunction with wheel chocks on the each of the side wheels to prevent accidental "run away".

☐ Press down to actuate the brake, lift up to release the brake (Figure 8).

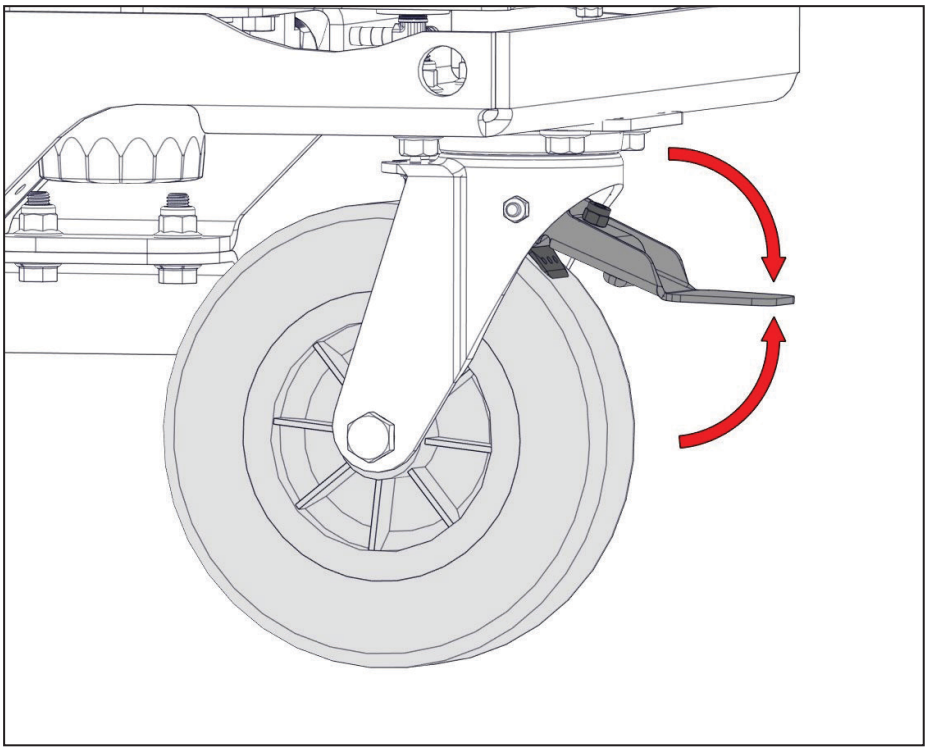


Figure 8 — Wheel brake

Operating Requirements and Considerations

Adequate ventilation is vital for safety. Ensure the engine exhaust is directed away from where personnel may be working, enclosed areas, or fresh air intakes.

The information in this section is critical to ensure proper operation of the system. Read these requirements prior setting up and operating the D60.

Failure to adhere to these requirements may cause the D60 to operate erratically or impact the overall quality of the installation.

While the wheels will tolerate some exposure to oils (include diesel fuel), prolonged or repeated exposure is not recommended as it will decrease their service life.

Requirements:

- Review and adhere to all safety information in the chapter titled "Safety Precautions" on page 5, and "D60X003 | D60X004 Safety Information" on page 23.
- When securing for transport, ensure the exhaust is either sufficiently covered, or the exhaust flapper (if installed) is oriented such that it will prevent water or road debris ingress.
- Ensure there is a minimum of 12 in of clearance between the service panel and radiator grille and any other obstructions.
- The engine exhaust must be vented away from the D60 and toward a safe location.
- Ensure the hose lengths are as short, and with the least amount of 90° fittings, as possible.
- Ensure the exhaust is routed to open air without being orientated in a way that will accumulate of water or will be ingested by the engine.
- Ensure the D60 is only used in areas capable of safely supporting a minimum of 500 lb (227 kg).

Considerations:

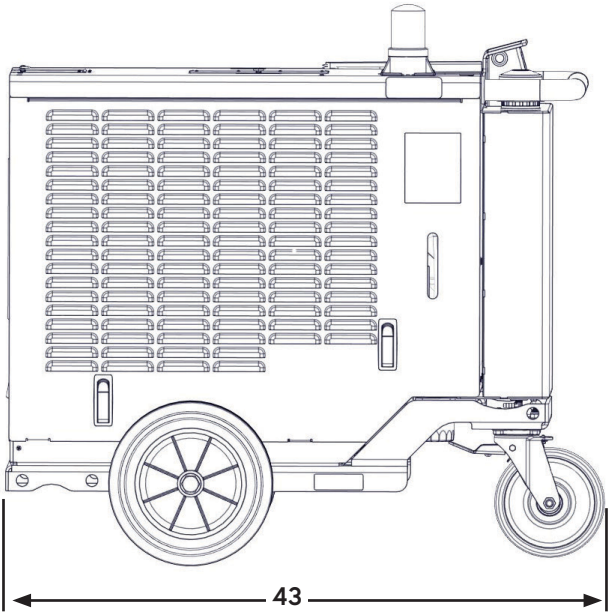
- Will the unit be used in temperatures below -5 °C (23 °F)? If so, VMAC recommends ordering the system with the optional Cold Climate Kit.
- When opting not to use a receiver tank, leak free plumbing and air tools are key to preventing frequent, short duration system restarts.
- To increase service life, store the D60 such that it will be protected from frequent rain and direct sunlight.
- An exhaust elbow and flapper kit is available from VMAC (P/N: A500004).

Operating environments:

- The Wheel kit components are rated for temperatures between -25 and +40 °C.

Dimensions

All dimensions are in inches.



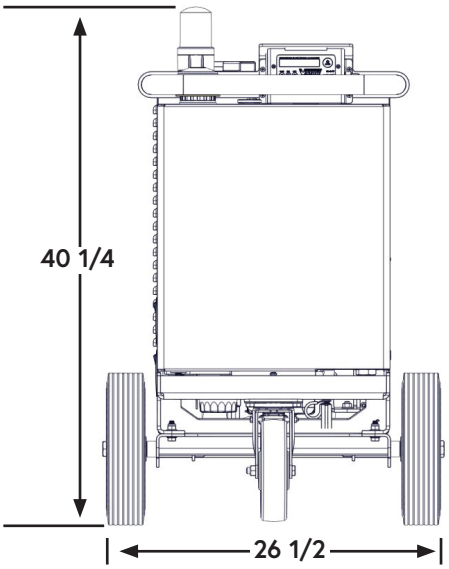


Figure 9 — External dimensions

Completing the Installation

Ensure all hoses, tubes or wires related to the installation are secured so that they will not contact any hot, sharp or moving parts and that adequate steps are taken to mitigate any wear due to equipment vibration.

Ensure the following steps have been completed prior to operating the D60 for the first time.

Verify the following fluids are at the correct level:

- ☐ Check the engine coolant level.
- ☐ Check the engine oil level.
- ☐ Check the fuel level.
- ☐ Check the compressor oil level.

Perform a final inspection to ensure that:

- ☐ Fasteners and connections are tight.
- ☐ Hoses are secure and adequately protected.
- ☐ Wiring is secure and adequately protected.
- ☐ All air outlets / ball valves are closed.

Testing the System

Remove the #12 cap from the air outlet (located on the exhaust side of the D60).

- ☐ Connect a VMAC Air Test Tool (P/N: A700052) with the 60 cfm orifice to the output of the air receiver tank; if not using an air receiver tank, connect the VMAC Air test Tool directly to the D60 air discharge port. If a VMAC Air Test Tool is not available, connect a ball valve and 200 psi pressure gauge to the output.

On systems equipped with the optional VMAC fuel tank, the fuel level in the tank must be higher than the location of the Kubota fuel filter bowl as it is gravity fed.

If the tank cannot be filled to an adequate level, a fuel primer bulb (such as those used in marine outboard engines), will need to be installed in the pressure line in order to prime the fuel system.

Continued on next page

Prime the Fuel System:

☐ Turn the fuel supply valve to the "ON" position.

☐ Turn the key switch to the "ON" position.

☐ Loosen the inlet bleed screw a few turns and allow the fuel to flow out (use a cloth to catch the fuel surplus) until there are no bubbles and tighten the bleed screw (Figure 10).

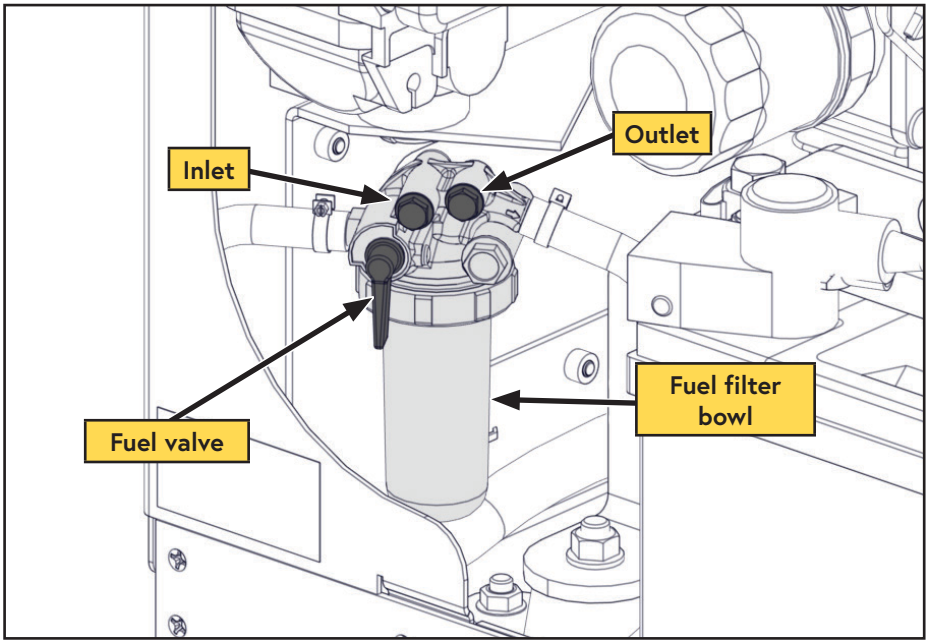


Figure 10 — Prime fuel system

☐ Loosen the outlet bleed screw and bleed until there are no bubbles and tighten the bleed screw (Figure 10).

The initial start up will be rough until the internal pump and injector lines are cleared of air.

☐ Press the "ENTER" button to start the engine and allow it to reach normal operating temperature.

☐ Check the system for any leaks.

☐ Slowly open the ball valve on the VMAC Air Test Tool. If not using a VMAC Air Test Tool, slowly open the ball valve until the system maintains 100 psi.

Allow the system to run for a minimum of 1/2 hour. This test ensures that the system has adequate ventilation.

☐ Close the ball valve on the VMAC Air Test Tool.

☐ Press the "ENTER" button to shut down the system.

☐ Turn the Key switch to "OFF".

VMAC®

AIR INNOVATED®

Diesel Driven Air Compressor Owner's Manual

Identifying Your System

The System ID will be requested any time that parts are ordered, when calling for technical support, or submitting a warranty claim.

The system ID is the preferred method of identifying the system as it serves as a master record of all of the components in the system. The system ID decal is found behind the engine coolant overflow bottle (Figure 11).

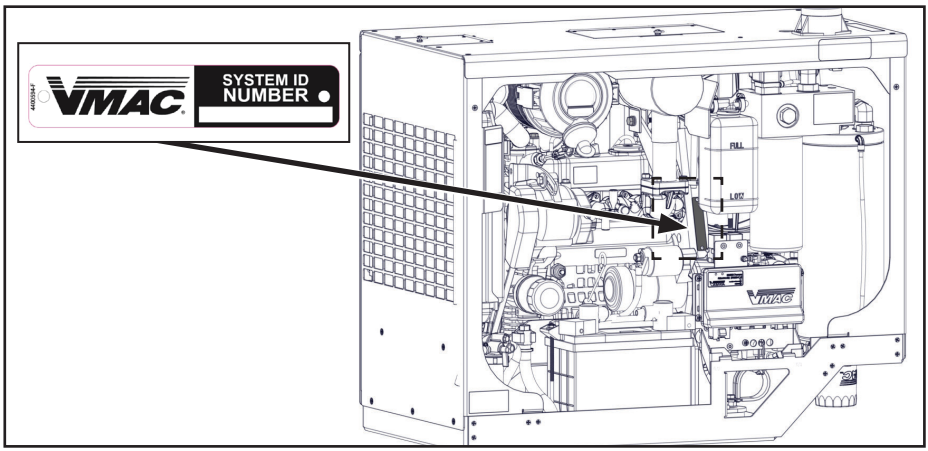


Figure 11 — System ID location

An alternative method of identifying the system is via the compressor serial number which is found on a plate attached to the compressor. This is a less desirable method of identifying the system as it may not link back to the original system if the compressor has been replaced.

System ID breakdown

The system ID provides specific information about the system such as the model, revision, production date and the unique identifier (Figure 12).

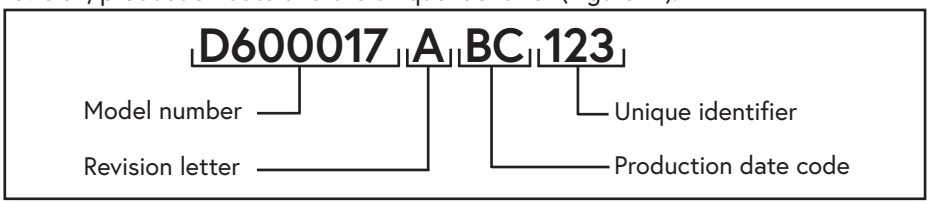


Figure 12 — System ID breakdown

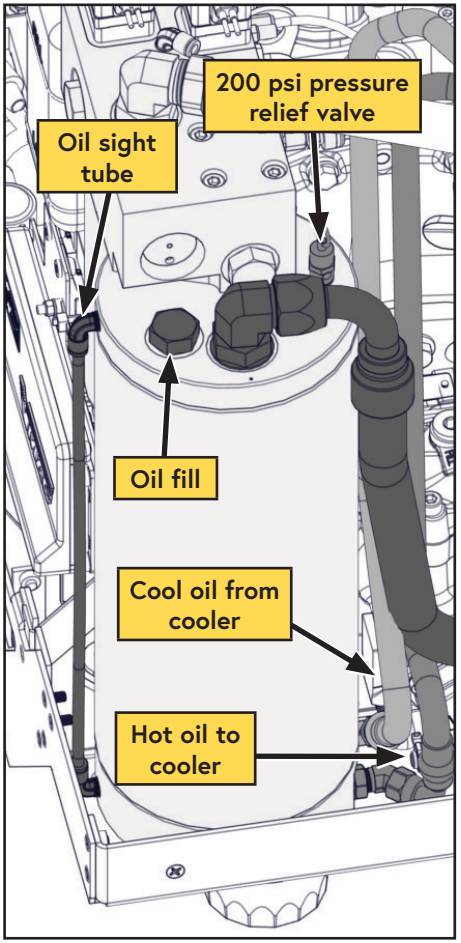
VMAC Diesel Driven Air Compressor Models

D600003: Standard configuration.
D600004: Cold climate kit equipped.
D60X003: Standard configuration with wheel kit.
D60X004: Cold climate kit equipped with wheel kit.
D600017: Cold climate kit equipped, white panels.
D600018: White panels.

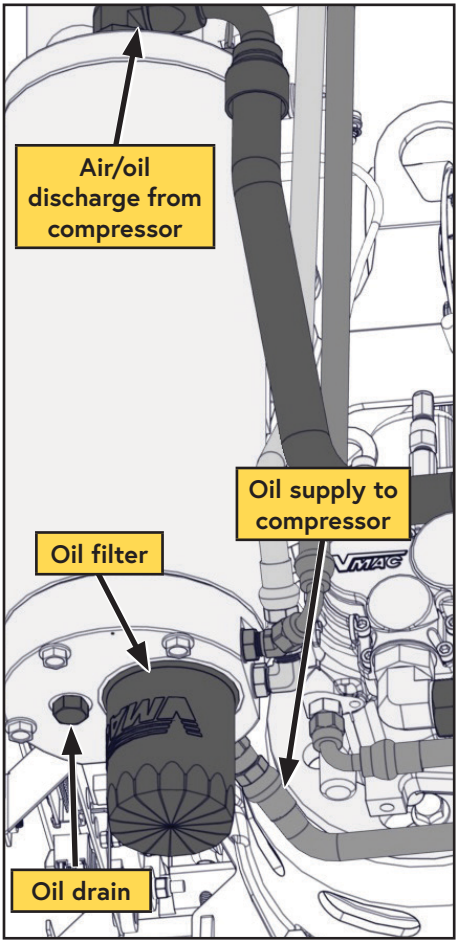
Components

The D60 consists of the following components (dependent upon model and/or optional features):

- Air Oil Separator Tank (AOST).
- Compressor.
- Oil cooler.
- Coalescing manifold.
- Control box.
- Digital display panel.



Top view



Bottom view

Figure 13 — AOST

Compressor

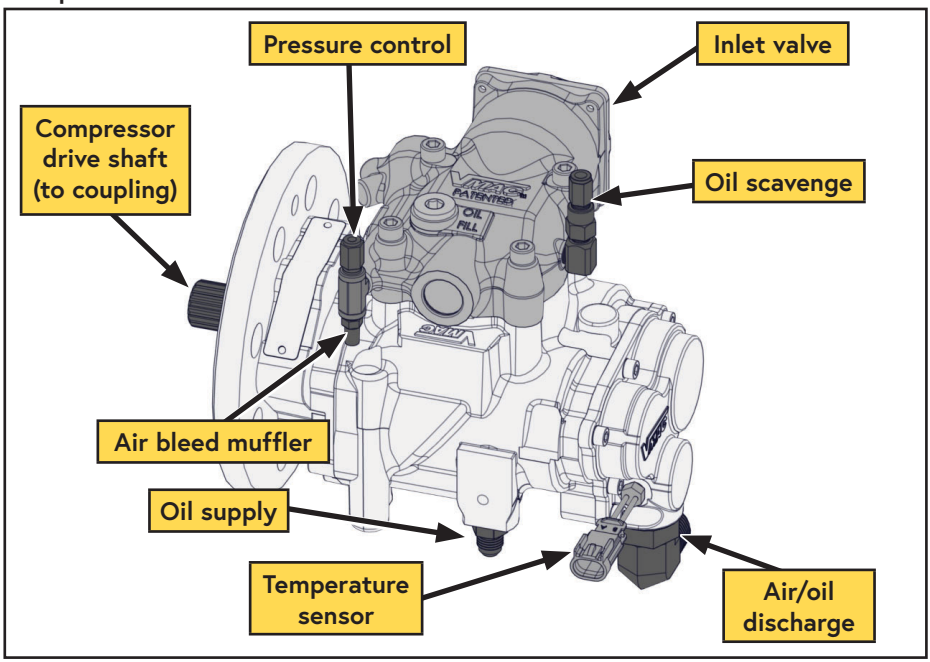


Figure 14 — Compressor assembly

Compressor Oil Cooler (Liquid to Air)

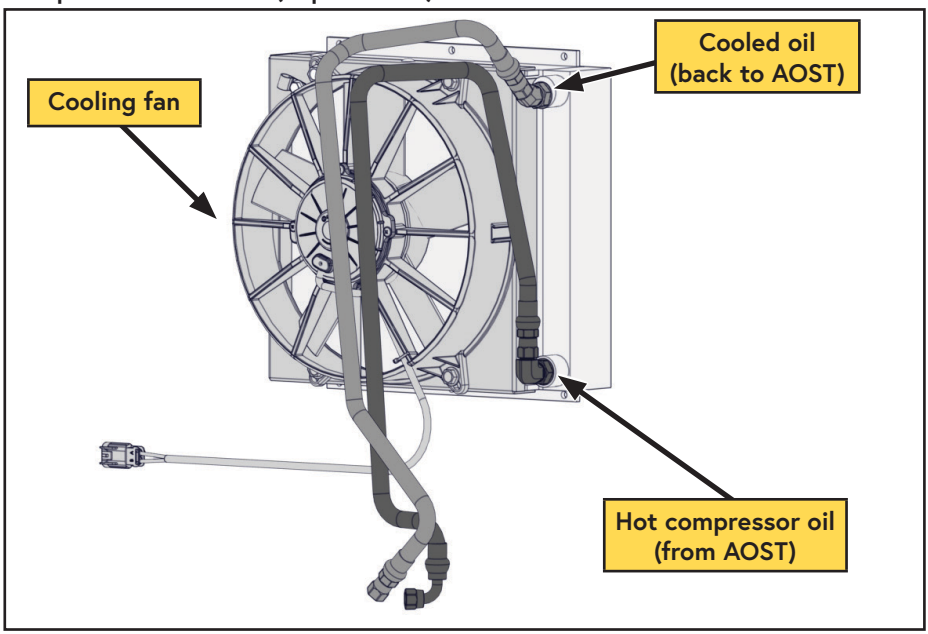


Figure 15 — Compressor oil cooler

Coalescing Manifold

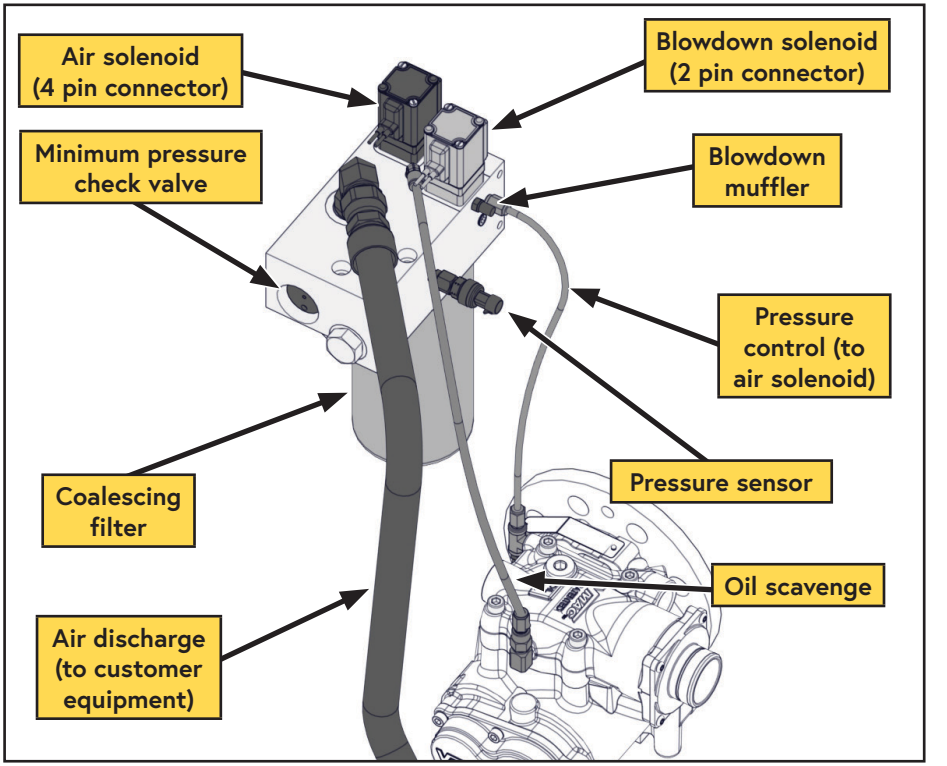


Figure 16 — Coalescing manifold

Control Box

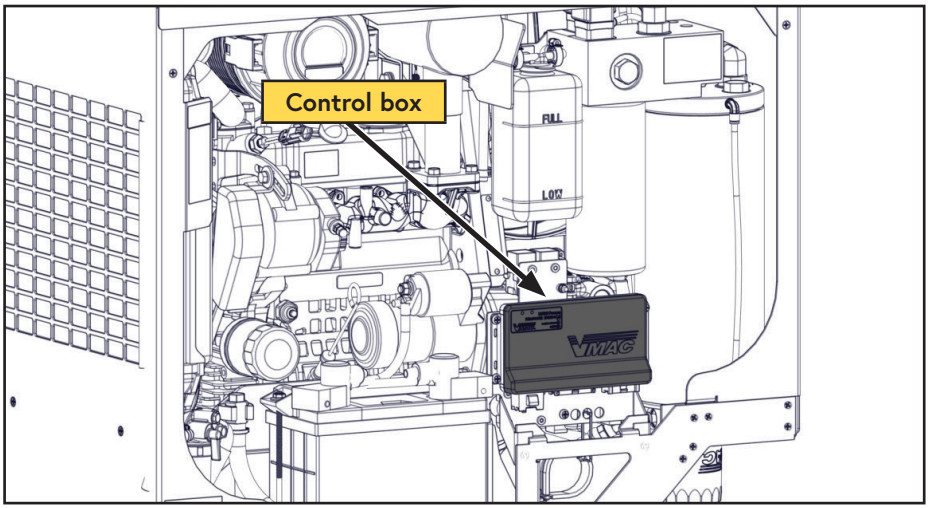


Figure 17 — Control box

Digital Display Panel

The digital display panel serves as the operator's control panel and contains the ignition key switch, the display LED (displays information such as compressor hours, service reminders, warning messages, error codes, adjustable parameters, and diagnostic information), the display panel navigations buttons, and the "READY" and "WARNING" lights.

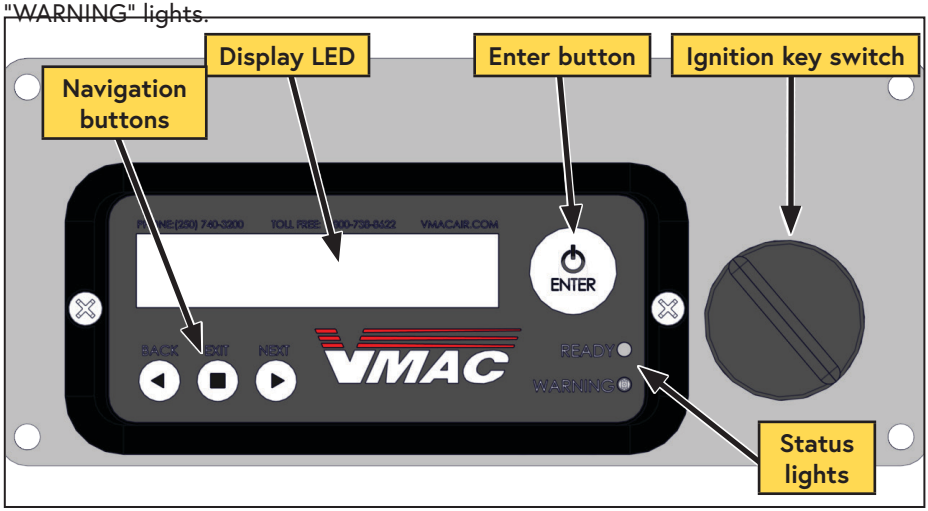


Figure 18 — Digital display panel

Hoses / Tubes

VMAC compressor systems include hoses that include an AQP inner liner that is compatible with VMAC compressor oil. The PTFE tubes used in VMAC systems are rated for the high temperatures VMAC compressors generate. Use of hoses or tubes other than those supplied or recommended by VMAC may fail and/or cause compressor damage and may void warranty. Please contact VMAC for replacement hoses or tubes or for further information.

- Hoses must have an AQP liner.
- Oil scavenge and pressure control tubes must be appropriately rated PTFE.

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.

System Specifications

The D60 is powered by the Kubota D902; this 24 hp (18.5 kw) naturally aspirated, 3 cylinder diesel engine drives a 60 cfm VMAC air compressor. Average fuel consumption is approximately 1.7 g/h (6.4 l/h).

Air Compression

The D60 uses a VMAC designed and manufactured flooded lobe, rotary screw compressor. The oil filled compressor housing contains (×2) rotors. Compression occurs when air (at normal atmospheric pressure) enters a chamber where it is trapped between meshing rotor lobes. Cooled oil is injected into the rotors during compression to lubricate the rotors and bearings, absorb the heat of compression, and seal the rotor lobes to allow for efficient compression. As the rotors rotate, the meshing lobes compress the volume of the trapped air/oil mixture before sending it, via the discharge line, to be cooled and separated by the AOST.

When the compressor switch is in the "ON" position, air pressure is monitored via a pressure sensor mounted in the coalescing manifold. The intelligent control system monitors the air pressure and will respond if the pressure drops below the configurable top up pressure and / or high air rate (see "Adjustable Parameters (User Setup)" on page 48).

Air pressure is electronically controlled by an air solenoid via the control box. When the compressor is "unloaded" (during engine warm up or once full system pressure has been built), the air solenoid will actuate, allowing excess air to escape via the air bleed muffler.

Compressor Oil Separation and Cooling

The system utilizes a 2 stage air/oil separator. The hot air/oil mixture from the compressor enters the AOST and is mechanically separated with internal baffles. The second stage uses a spin-on coalescing filter to remove the remainder of the oil from the air stream.

The small amount of oil recovered from the coalescing filter is returned directly to the compressor via a 1/4 in PTFE scavenge tube.

The hot compressor oil is directed to VMAC's liquid to liquid cooler (which is integrated into the diesel engine's coolant system) before being returned to the compressor.

Safety Features

A 200 psi (1380 kPa) pressure relief valve is installed in the coalescing filter manifold to prevent over pressurization. The D60 is also equipped with an integrated rapid blow down system that, via an air solenoid connected to the air bleed muffler (mounted on the compressor inlet), automatically discharges pressure upon shutdown.

Temperature sensors are installed in the compressor and the engine. In the event that the air/oil, or engine coolant temperature increases above a safe level, the system will shut down the engine, illuminate the "WARNING" light on the display panel and log the error message.

Air Pressure Regulation

Air pressure regulation is achieved via an inlet valve and is adjustable via the display panel. The system pressure (factory set at 150 psi) can be adjusted between 80 psi and 150 psi. VMAC recommends the use of a Filter Regulator Lubricator (FRL) to reduce the operating pressure delivered to the tools.

Filtration

VMAC rotary screw compressors are designed and machined to exacting standards. Foreign particles entering the compressor can damage components such as rotors, bearings, seals, and the housing resulting in performance and efficiency losses, and reduced system life.

The system is equipped with a replaceable paper element air filter, a high pressure spin-on oil filter, and a spin-on coalescing filter.

VMAC Cold Climate Kit[1]

VMAC's cold climate kit consists of a 110 V ac heater cartridge installed in the compressor housing, a 110 V ac pad heater installed on the engine oil pan, and a 110 V a/c heater installed in the engine block to warm the coolant.

The VMAC Cold Climate Kit requires connection to either a 1,500 W power inverter (minimum) or ac "shore power" in order to power the heater cartridges.

Dependant upon the ambient temperature, the heaters may need to be energized for up to 90 minutes prior to attempting to start the system.

[1]On applicable models only (see page 33).

Do not disable or bypass any safety components. Disabling or bypassing safety components could result in equipment damage, injury or death.

Control System Features

The D60 features an intelligent control system that monitors and manages various components, some of which are listed below:

- Multiple adjustable system parameters including: restart options, delayed restart, system pressure, etc.
- Hour meter.
- Starting and stopping the D60 (via the key switch on the display panel, remote wire, or the optional crane remote interface (P/N: A500029).
- Automatic engine shutdown if no air use is detected.
    - If equipped with the optional external fuel tank, the control system will monitor the fuel level and shut the system down to prevent the system from running dry.
- Automatic engine restart. The system will restart from Standby when the system detects: high air use, air pressure drops below the preconfigured threshold, the system detects that the engine or compressor temperature drops too low, or the battery voltage gets too low.
    - If connected to the vehicle's engine battery, the D60 will monitor the vehicle's battery and automatically restart to charge it as required.
- Air filter restriction warning.
    - Engine monitoring and error logging:
    - Engine under speed.
    - Engine over speed.
    - Running when not expected.
    - No tachometer signal.
    - Starting error.
    - Low oil pressure.
- Separate error and warning message logging for both the engine and VMAC systems.
- 500 hour and 1,000 hour compressor service reminders.
- 100 hour engine service reminders.
- LED lights warn that the system is in standby and may restart unexpectedly.
- Audible buzzer and LED lights warn when the system is about to start.

Control System Terminology

The following messages will appear on the display panel to indicate the system state at a given time (key switch in the "ON" position).

"SYSTEM READY"

The D60 has completed its self diagnostic test and is ready to be started by:

- Pressing the "ENTER" button.
- Turning the key switch to the "START" position for 1 second and then releasing the key.
- Grounding the remote start wire.

"GLOW PLUG"

The glow plugs are energized. The glow plugs will be energized for between 1 and 15 seconds dependent upon the engine temperature.

Once the glow plugs are energized, the engine restart alarm will sound for 3 seconds and pause for 3 seconds until the engine starts.

"STARTING"

The control system will attempt to start the engine.

The starter will be engaged for up to 15 seconds. If the engine fails to start after 3 attempts, the system will log error code 35, "ENGINE CRANK TIME OUT".

"WARMING"

The control system is monitoring the engine temperature. The system will remain in the "WARMING" state until the engine reaches 5 °C (41 °F).

"RUNNING"

Once the engine coolant temperature reaches 5 °C (41 °F), the system will enter the "RUNNING" state. The system is ready for the compressor to be engaged.

If no air is demanded (the system has built to full system pressure), the "delay to unload" timer will begin counting down.

"UNLOAD"

Once the "TIME TO UNLOAD" timer reaches 0M:00S, the control system will energize the air solenoid and the internal air pressure generated by the compressor will be evacuated via the air bleed muffler mounted on the inlet.

While in the "UNLOAD" state, the control system will continue to monitor the air use rate and restart pressure. If the control system detects air use, it will return the system to the "RUNNING" state, increase the engine speed to 3,600 rpm and de-energize the air solenoid to allow the compressor to build air.

If no demand is placed on the system the system has built to full system pressure and no air use is detected), the control system will start the "TIME TO STANDBY" timer.

"STANDBY"

Once the "TIME TO STANDBY" timer reaches 0M:00S, the control system will shut down the engine. While in "STANDBY", the control system will continue to monitor air pressure, air rate, battery voltage, and engine temperature. The control system will automatically restart the engine in response to the adjustable parameters (see "Adjustable Parameters (User Setup)" on page 48).

	***While in "STANDBY", the strobe lights will flash to indicate that the engine may start unexpectedly.*** ***If the control system sends a signal to start the engine, an audible alarm will sound to indicate that the engine is starting.***
	***By default, the "DISABLE AUTO RESTART DELAY" is set to 60 minutes. After 60 minutes in "STANDBY", the system will shut down completely (including the strobe lights) even though the ignition key remains in the "ON" position. To start the system again, turn the ignition key to "OFF", then back to "ON", and follow the normal startup procedure.*** ***See "Adjustable Parameters (User Setup)" on page 48 for more information on restart delay.***

"STOPPING"

When the system is running and the "ENTER" button is pressed, the system will enter the "STOPPING" state.

Once in the "STOPPING" state, the stop solenoid will engage for 10 seconds to allow the system to shut down. If the system is still pressurized, it will blow down air pressure from the compressor and the AOST.

Starting and stopping the D60

Do not rely solely on the wheel brake, ensure wheel chocks are used on both sides of each wheel prior to operating the D60, or leaving it unattended.

Prior to Operating the D60

☐ Ensure the system is not mounted (or parked) on grades exceeding 15° as this will affect lubrication and air/oil separation (Figure 19).

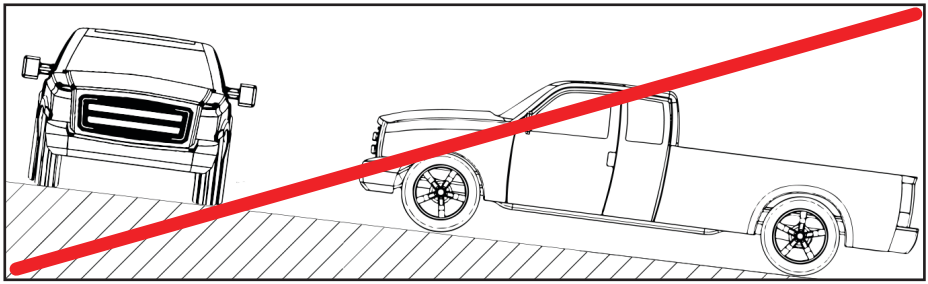


Figure 19 — Do not exceed 15° grade

If installed inside a cabinet or enclosure, open the door or cover completely and secure in the open position to provide proper ventilation

Startup Procedure

☐ If the temperature is below -5 °C (23 °F), enable the Cold Climate kit heaters (if equipped). The time required for the heaters to sufficiently warm the D60 prior to attempting to start it will depend upon the ambient temperature.

☐ Check the compressor oil level at the sight glass in the AOST.

☐ Check the engine oil level.

☐ Check the engine coolant level.

☐ Check for any fluid leaks around the unit.

☐ Ensure any air tools are securely connected and the air discharge valve is closed.

If the D60 has not been started for several weeks, prime the fuel system prior to attempting to start the unit (page 30).

☐ Turn the key switch to the "ON" position.

The display panel will go through a self diagnostic check; if no errors are detected, the system will move into the "ready" state.

☐ Press the "ENTER" button (or turn the key switch to "START", hold it there for approximately 1 second, then release it.

The display panel will indicate "GLOW PLUGS ENABLED". The glow plugs will be active for between 1 and 15 seconds, dependent upon the ambient temperature.

Once the glow plugs are energized, the engine restart alarm will sound for 3 seconds and pause for 3 seconds, until the engine starts.

After the glow plugs have sufficiently warmed the intake, the display panel will indicate "SYSTEM IN START MODE", after which the engine will crank.

If the engine coolant temperature and/or compressor oil is below 5 °C (41 °F), the display panel will display "ENGINE WARMING" and the control system will keep the compressor unloaded.

System State: RUNNING (Normal Operation)

Once the control system detects that the engine coolant has reached 5 °C (41 °F), the control system will increase engine speed to 3,600 rpm and load the compressor, allowing it to rapidly build to full system pressure (factory default: 150 psi). Once the system has built to full system pressure, the engine speed will reduce to 2,400 rpm.

If system pressure remains between full system pressure and the "top-up pressure" (factory default: 10 psi below full system pressure = 140 psi) the system will start the "delay to unload" timer. While the "delay to unload" timer is counting down, the control system will continue to monitor air pressure and battery voltage.

If the system pressure drops below the "top up pressure", it will open the inlet poppet valve and build to system pressure, and the "delay to unload" timer will reset. If the control system senses that the battery voltage is below the threshold, or a larger amount of air is used during the countdown (i.e. 20 psi drop from full system pressure) it will also increase engine speed to 3,600 rpm.

System State: UNLOAD

Once the "delay to unload" timer reaches zero, the control system will unload the compressor (the inlet poppet valve will be closed and any air generated will be vented via the air bleed muffler located on the inlet valve) but maintain engine speed of 2,400 rpm.

Once in the "UNLOAD" state, the "DELAY To STANDBY" timer will start counting down. During this time, the control system will monitor system pressure and the air use rate amount (a measurement of air rate change over time or psi/second). If a large amount of air is used, or the system pressure falls below the "TOP UP" pressure, the system will return to the "RUNNING" state.

System State: STANDBY

Once the "DELAY TO STANDBY" timer reaches zero, the control system will shut the engine down and the LED beacon will be activated to indicate that the system is in "STANDBY". While in "STANDBY", the control system will continue to monitor system pressure, high air use, engine and compressor temperatures (if "ALLOW COLD ENGINE RESTART" is enabled), and battery voltage, and will restart the engine in response to any of these triggers.

The ""DISABLE AUTO RESTART" setting will prevent the system from restarting out of "STANDBY" after a preset amount of time, this prevents the engine from restarting if it is accidentally left unattended.

Additional Information

While the system is running, additional information such as air pressure, air rate, engine speed, engine temperature, battery voltage, time to unload / standby, compressor temperature, can be viewed by pressing the "▶" and "◀" buttons. To return to the "SYSTEM RUNNING" menu, press the "■" button.

Shutdown Procedure

Prior to shutting down the D60, allow the system to build to full system pressure and the engine to reduce to base idle.

- ☐ Turn off any air tools.
- ☐ Allow the system to build to full system pressure.
- ☐ Once the system goes to "UNLOAD" and the engine speed reduces to2,400 rpm, press the "ENTER" button.

The display panel will indicate "STOPPING" and the stop solenoid will engage for 10 seconds in which time the engine will shut down and the system will blowdown any internal air pressure.

- ☐ Turn the ignition key to "OFF".

Cold or Hot Weather Operation

Cold Weather Operation

In extreme cold weather, the D60 Cold Climate Kit should be plugged in for up to 90 minutes prior to attempting to start the engine. This will warm the compressor oil, engine oil and engine coolant, making starting easier and reducing wear on the various components.

To extend the service life of your engine in all weather conditions, warm the engine with no load (air discharge closed) to full operating temperature before using air and increasing engine speed.

For more details, consult the Kubota Operator's Manual (P/N: 1900973).

In extremely cold weather, VMAC recommends setting the "STANDBY DELAY" to "NEVER" to prevent the engine from shutting down.

Overtemperature Shutdown

If the compressor or engine gets too hot, the overtemperature circuit will unload the compressor to reduce the load on the engine and allow the coolant system to reduce temperature. If the system temperature continues to rise, the system will shut the engine down.

In the event of an overtemperature shutdown, the red LED on the display panel will illuminate and the display panel will show a message identifying the problem.

If this problem persists, see "Diagnostics and Troubleshooting" on page 77.

Diagnostics Mode

Diagnostics Mode provides access to various features such as error logs, user adjustable settings, and service logs.

Entering DIAGNOSTICS mode

☐ Turn the key switch to the "RUN" position but do not start the system.

☐ Once the system has completed its self diagnostics, press and hold the "►" and "◄" buttons for 5 seconds to enter the diagnostic mode.

☐ Cycle through the menus using the "►" and "◄" buttons.

The system will slowly scroll through menu headings.

Entering a submenu

When the desired submenu is displayed:

- Press the "ENTER" button.

Scrolling

While in a submenu, scroll through the data and variables using the "►" and "◄" buttons.

Making a selection

To accept a parameter, press the "ENTER" button.

Exiting a submenu

To exit a submenu, press the "■" button to return to the previous submenu.

Exiting DIAGNOSTICS mode

Repeatedly press the "■" button until "SYSTEM READY" is displayed on the display panel.

Submenus

Once in the Diagnostics menu, there are (x5) submenus.

"USER SETUP"

This submenu contains all of the adjustable parameters.

"SERVICING"

Clears the compressor service message and records the system hours when the last 10 system service reminders where cleared.

If the display has been showing a compressor service reminder, enter this section and clear the message once the service has been completed.

"VIEW LOGGED ERRORS"

Lists the 10 most recent system errors. See page 78 for a list of error messages.

"VIEW LOGGED MESSAGES"

Lists the 10 most recent system messages. See page 80 for a list of warning messages.

"VIEW LOGGED SERVICES"

Lists the 10 most recent services logged.

Adjustable Parameters (User Setup)

Parameter	Description	Adjustment	Default Value
SYSTEM PRESSURE	Operating system pressure.	80 psi — 150 psi (5 psi increments).	150 psi.

Parameter	Description	Adjustment	Default Value
UNLOAD DELAY	Used to adjust the time delay before system changes from "RUNNING" state to "UNLOAD" state.	0.5 min, 1 min, 2 min, 5 min, 10 min, 15 min, 30 min, never.	1 min.

Parameter	Description	Adjustment	Default Value
STANDBY DELAY	Used to adjust the time delay before the system changes from "UNLOAD" to "STANDBY" state (engine shuts down).	1 min, 2 min, 5 min, 10 min, 15 min, 30 min, never.	5 min.

Parameter	Description	Adjustment	Default Value
TOP-UP PSI	psi drop below system pressure before the inlet will open to build air before the engine increases to its second speed. This prevents the engine from cycling between high and low rpm to maintain full system pressure and compensates for small drops in pressure (minor leaks at quick couplings, etc.)	1 psi — 15 psi (1 psi increments).	10 psi (System will engage compressor at 140 psi).

Parameter	Description	Adjustment	Default Value
HIGH AIR RATE	Measures the air use over time (psi/second). This parameter allows the system to potentially respond to high air use ***before*** system pressure drops below the "RESTART PRESSURE". This is useful for tools that use large volumes of air and will allow the system to start generating air before the air stored in the receiver tank is consumed.	0 psi — -30 psi (0.5 psi increments.) (A system with a small receiver tank combined with a high cfm tool will have a higher "air rate").	-3.0 psi/sec.

Parameter	Description	Adjustment	Default Value
RESTART PRESSURE	The pressure at which the system will restart the engine from "STANDBY".	80 psi — 150 psi (5 psi increments).	120 psi.

Parameter	Description	Adjustment	Default Value
COLD ENGINE RESTART	Allows the engine to restart if the engine begins to reach freezing temperatures.	Enabled \ Disabled.	Enabled.

Parameter	Description	Adjustment	Default Value
DISABLE AUTO RESTART	Disables the system from restarting from "STANDBY" after the configured time (behaves like turning the key to "OFF"). Key switch must be turned to "OFF", then back to "ON" to restart the system.	Always, 30 min, 60 min, 120 min, never.	60 min.

Parameter	Description	Adjustment	Default Value
LOW BATT RESTART	Allow the system to restart from "STANDBY" if the battery voltage drops below the configured value.	Enabled \ Disabled.	Enabled.

Parameter	Description	Adjustment	Default Value
BATT LOWER THRSH	The engine will restart if the battery voltage drops below the configured value for 30 seconds.	10.0 V — 14.0 V (0.1 V increments).	12.1 V.

Parameter	Description	Adjustment	Default Value
BATT UPPER THRSH	After a low battery restart, the engine will run until the battery voltage is above the "upper threshold".	10.0 V — 15.0 V (0.1 V increments).	12.8 V.

Parameter	Description	Adjustment	Default Value
LOW BATT RESTART DELAY	Delay before the countdown to "UNLOAD" / "STANDBY" starts.	1 min, 2 min, 5 min, 10 min, 15 min, 30 min.(A 2 minute delay should be adequate for standalone systems. If the D60 is connected to the vehicle's batteries, a setting of 5 minutes or more should be used).	2 min.

Parameter	Description	Adjustment	Default Value
FACTORY RESET	Resets all adjustable parameters to their factory settings.	N/A	N/A

Maintenance Schedule and General Maintenance Information

Illustrated Parts Lists (IPL)

In addition to this manual, the illustrated parts list is an invaluable resource when inspecting, diagnosing or repairing the system. The IPL is available free of charge from VMAC. The part number portion of the System ID will be needed to locate the correct IPL. See "Identifying Your System" on page 33 for the System ID location.

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

Routine Maintenance

The D60 must be run a minimum of once every 30 days for at least 30 minutes to prevent impact damage and premature bearing failure in the compressor due to vibration. Regularly running the system will also help to vaporize and exhaust any water that has condensed and accumulated in the AOST.

In order to maintain the VMAC warranty, VMAC's maintenance schedule must be followed. Only genuine VMAC parts can be used to maintain the system.

With proper maintenance, the likelihood of premature failure or component replacement can be drastically reduced.

The most critical aspect of maintenance is proper air filtration, clean oil, and regular use. If any particles enter the compressor, they can score the rotors and contaminate the roller bearings in the compressor. Any contamination will cause rapid and severe damage to components.

Maintenance Schedule

The Kubota engine maintenance schedule must be observed in order to maintain the Kubota engine warranty (administered by Kubota).

Refer to the Kubota Operator's Manual (P/N: 1900973) for the complete engine maintenance schedule and instructions.

In the event of a warranty claim, VMAC or Kubota may request service records.

The following maintenance schedule must be observed to maintain both the "Standard" and "Lifetime" VMAC warranties and to assure proper performance and long service life of the system. In the event of a warranty claim, VMAC may request service records.

The D60 control system records the engine and compressor hours separately. A service reminder indicating which type of service is upcoming (compressor or engine) will scroll on the display panel, 10 hours before the service is due.

The hours indicated are those displayed on the Control Box. Service should be performed at the lesser of the two intervals (whichever occurs first).

To order service kits, see the ordering information on page 3.

Continued on next page

In order to maintain the warranty on the D60, use only genuine VMAC replacement parts to service the system.

First 50 Hours Engine Service (Kit P/N: A500007)	
• Change the engine oil. • Replace the engine oil filter.	• Replace engine fuel filter (optional).

Every 100 Hour / 1 Year Engine Service (Kit P/N: A500007)	
• Change the engine oil. • Replace the engine oil filter.	• Replace fuel filter element. • Clean the air filter

Every 500 Hour / 6 Month Compressor Service (Kit P/N: A500001)	
• Change the compressor oil. • Replace the compressor oil filter.	• Replace the air filter.

Every 1,000 Hour / 1 Year Compressor Service (Kit P/N: A500017)	
• Change the compressor oil. • Replace the compressor oil filter.	• Replace the coalescing filter. • Replace the air filter.

For units used in extreme conditions / environments (such as mines) VMAC recommends completing the 1,000 hour / 1 year service (P/N: A500017) every 250 hours.

Service Kit Contents

500 Hour / 6 Month Compressor Service Kit P/N: A500001		
Part #	**QTY**	**Description**
4400992	1	Next Service Due Decal
9200039	1	Oil Filter
9500061	1	Air Filter Element
A700094	1	VMAC Compressor Oil 4 L

1,000 Hour / 1 Year Compressor Service Kit P/N: A500017		
Part #	**QTY**	**Description**
4400992	1	Next Service Due Decal
3600079	1	Spin-on Oil Separator
9200039	1	Oil Filter
9500061	1	Air Filter Element
A700094	1	VMAC Compressor Oil 4 L

100 Hour Engine Service Kit P/N: A500007		
Part #	**QTY**	**Description**
5240315	1	Engine, Oil 15W–40 (3.78 L)
9500075	1	Engine Oil Filter
9500076	1	Fuel Filter Element

Table 2 — Service kit contents

Maintenance and Repair Safety

It is impossible to warn of all the possible hazards that may result from operating, servicing, or repairing this system.

Follow all safety precautions and industry standard "best practices".

- ***Wear all appropriate Personal Protective Equipment and follow all industry standard safety practices.***
- ***Prior to performing any service, ensure the vehicle transmission is in "PARK" with the parking brake applied and the wheels chocked (if applicable).***
- ***Confirm that the system is depressurized and has cooled prior to performing any service work.***
- ***Never use flammable solvents to clean any components. If a flammable solvent has been used, rinse the component thoroughly with water and dry it before reinstalling it to prevent the possibility of explosion.***
- ***Use only genuine VMAC parts to maintain the system. Genuine VMAC parts are designed to work with the high pressure and heat generated by the compressor. Substituting genuine VMAC parts may void the warranty and could cause equipment damage, injury, or death.***
- ***This information is intended for people with mechanical trade certification who have the tools and equipment to properly and safely perform the service or repair. Do not attempt to service or repair this system without the appropriate mechanical training, knowledge and experience.***

Safety Check List

- ☐ Open the ball valve or connect an air tool to the system to ensure all of the stored air is released.
- ☐ Gently pull up on the ring, on the pressure relief valve (located inside the service panel), to confirm the system is depressurized.
- ☐ Disconnect the negative battery terminal.

Do not use the pressure relief valve as a means of depressurizing the compressor system. Doing so will prematurely wear the internal spring or the seat, preventing the valve from maintaining normal system pressure.

Regular Inspection Instructions

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

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.

Inspecting and Adding Compressor Oil

- ☐ Ensure the unit is level and that the compressor system is depressurized and cool to the touch.
- ☐ Check the oil level in the sight tube and ensure that it is between the "MAX" and the "MIN" lines.
- ☐ If the level is below the "MIN" line, perform the following steps:
- ☐ Remove the oil fill plug from the top of the AOST.
- ☐ Using a funnel, pour oil into the AOST until the oil level in the sight glass reaches the "MAX" line.
- ☐ Replace the oil fill plug and tighten it securely.

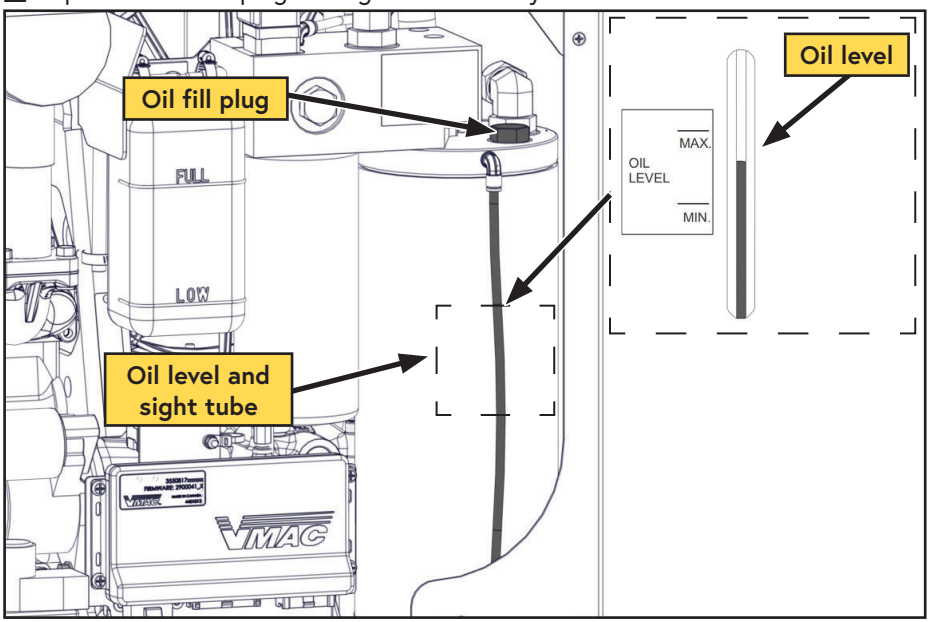


Figure 20 — Inspecting the compressor oil

Cleaning or Replacing the Compressor / Engine Air Filter

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

To avoid any possibility of contamination, ensure the air inlet is covered with masking tape or a clean cloth whenever the air filter is removed.

Do not attempt to clean the filter element, or use compressed air to perform any tasks around the compressor until the filter and cover are replaced.

- ☐ Clean any loose debris from around the air filter housing to prevent contaminants from entering the system.
- ☐ Remove the air filter cover.
- ☐ Remove the air filter.
- ☐ Clean or replace the air filter. To clean the air filter, lightly tap or shake the air filter to remove any particulate or debris.
- ☐ Using a clean, dry cloth, clean the inside of the air filter housing.
- ☐ Install the new air filter
- ☐ Install and latch the air filter cover.

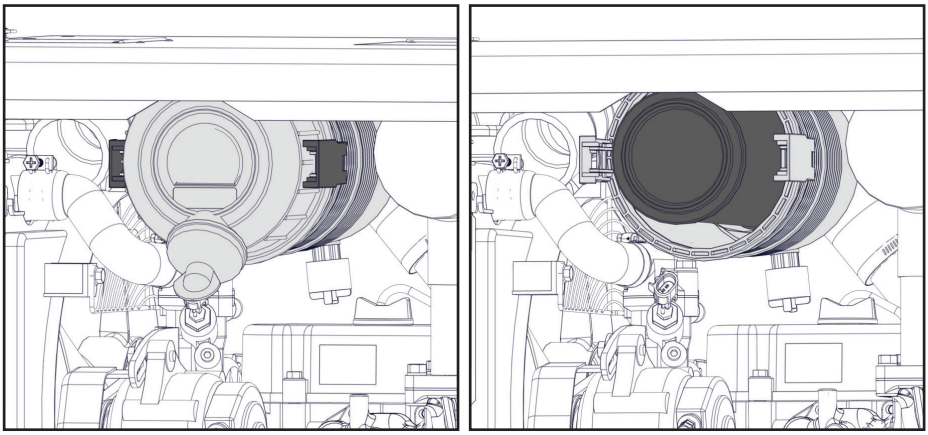


Figure 21 — Replace air filter

Inspecting and Replacing the Pressure Relief Valve

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Do not use the pressure relief valve as a means of releasing pressure from the system. Doing so will prematurely wear the internal spring or the seat, preventing the valve from maintaining normal system pressure.

- ☐ Visually inspect the valve and ensure it is not corroded and that the vent holes are not plugged.
- ☐ Turn the system on and allow it to reach full system pressure (factory setting 150 psi).
- ☐ Ensure that air does not leak out of the valve. Air leaking from the pressure relief valve when system pressure is at or below 175 psi indicates that the spring or seat in the valve is worn and the valve must be replaced.
- ☐ If the pressure relief valve is showing loss of functionality, contact a local VMAC dealer for a replacement.

While the pressure relief valve can be accessed and changed from the service panel side of the D60, removing the top panel may provide the easiest access.

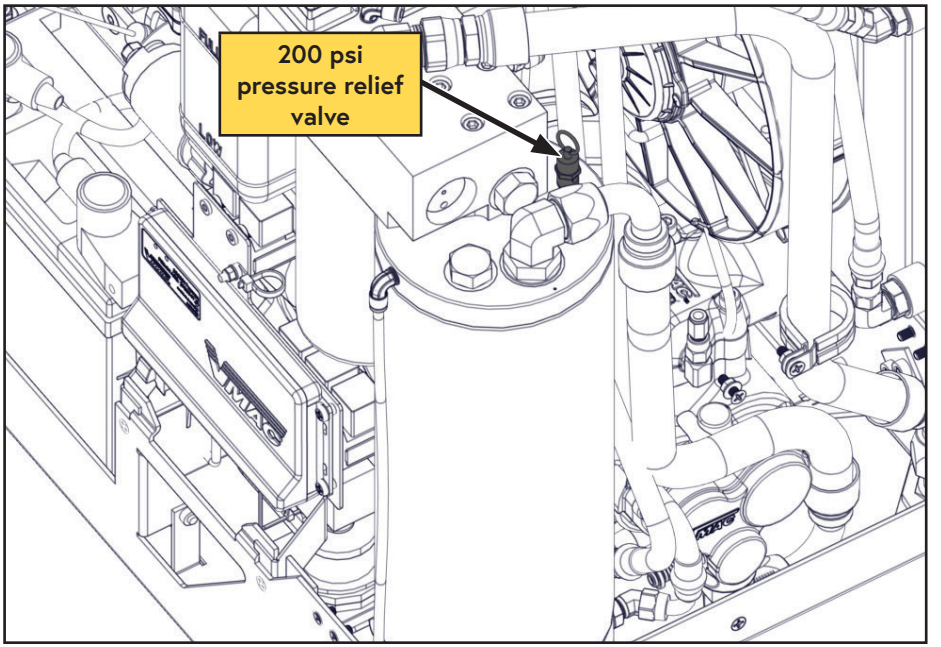


Figure 22 — Pressure relief valve

Inspecting the Engine Oil

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Refer to the Kubota Operator's Manual (P/N: 1900973) for the proper procedure to check the D60 engine oil and the oil specifications.

The engine oil dipstick is located to the left of the starter motor and can be accessed via the service panel.

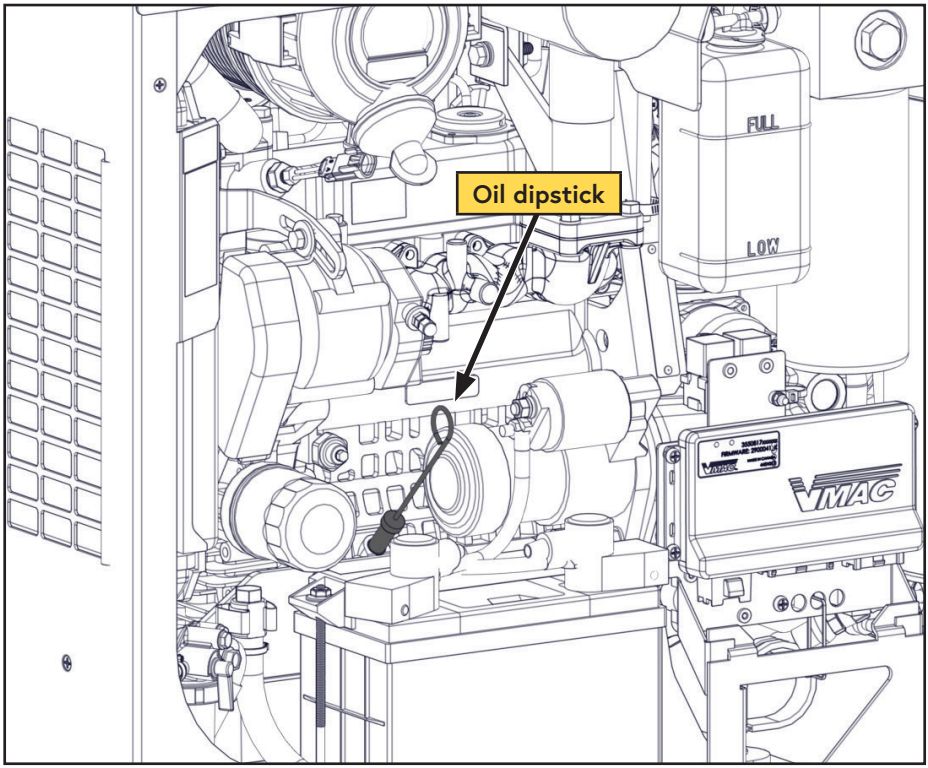


Figure 23 — Inspecting the engine oil

Inspecting the Engine Coolant

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Refer to the Kubota Operator's Manual (P/N: 1900973) for the proper procedure to check the D60 engine coolant, and the coolant specifications.

☐ The engine coolant can be checked from the service panel side of the system via the graduated coolant overflow bottle.

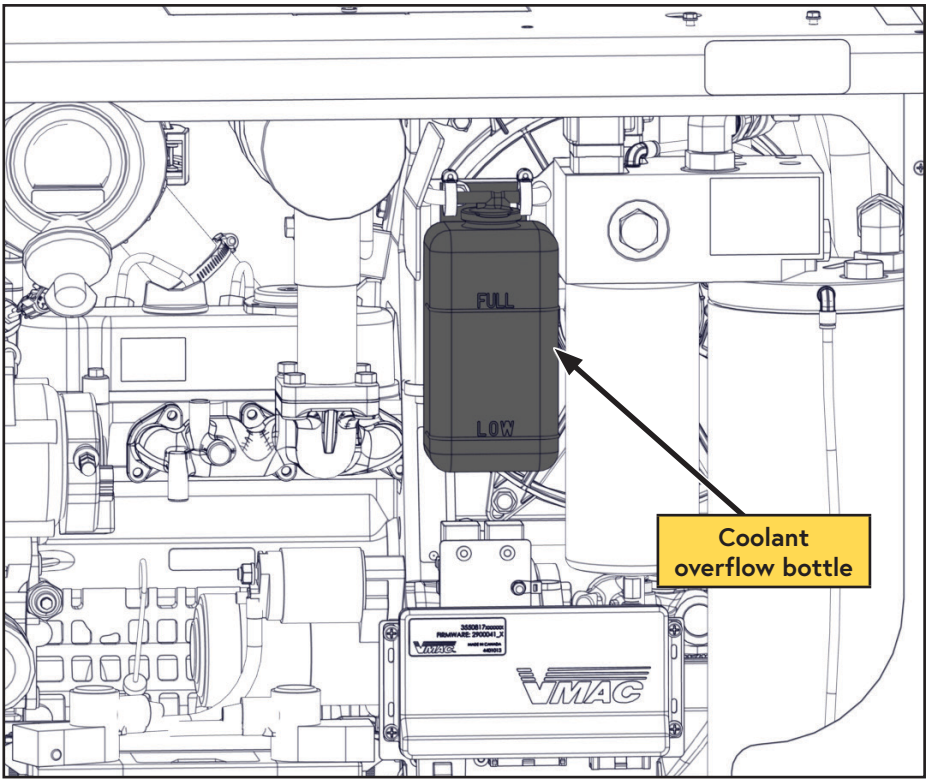


Figure 24 — Inspecting the compressor oil

The Kubota coolant specification is a 50/50 mix of long life coolant and clean, soft water.*

****This information is current at the time of writing (August 2020).***

Adjusting the Wheel Brake

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Ensure the D60 is adequately blocked/supported prior to commencing work on the brake, wheels, or caster assembly.

Brake Adjustment

As the wheel wears, the brake may start to lose its effectiveness.

Rotate the brake adjustment nut until the brake pad holds the unit in place.

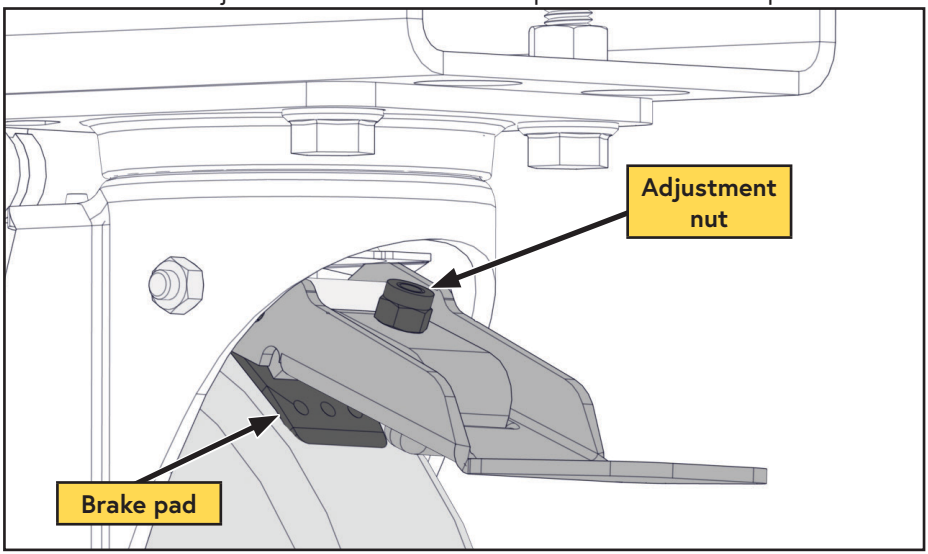


Figure 25 — Brake adjustment

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

- ☐ If the system is cold, operate the compressor system for a few minutes to bring the compressor oil to operating temperature. Warming the system will allow the oil to flow better and will also help to suspend contaminants in the oil allowing them to be removed from the system with the old oil.
- ☐ Shut the compressor down.
- ☐ Ensure the system is fully depressurized prior to beginning any service work.
- ☐ Check the old oil for any evidence of metal filings or contamination. If any metal filings are found, flush the hoses and the ASP using the VMAC flushing kit (P/N: A700214).

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, with the collet pushed into the fitting, firmly push he tube into the fitting until the tube is fully seated.
- 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.

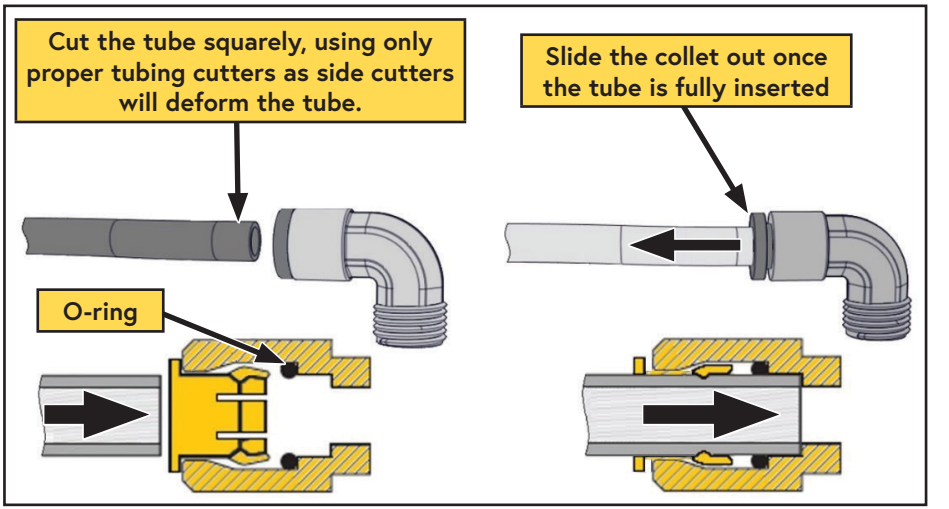


Figure 26 — Push-to-connect fittings

500 Hour / 6 Month Service (Compressor)

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Do not use compressed air or perform any other tasks around the air filter and cover until both are replaced. Never clean the filter element with compressed air as this may allow contaminants to enter the compressor system. Always replace the air filter element during this service.

A clean engine compartment, in addition to being more efficient, makes detecting issues (i.e. oil or coolant leaks, etc.) easier. VMAC recommends cleaning the D60 as part of regular servicing.

- ☐ Clean the area around the AOST and the oil filter to prevent contamination.
- ☐ Place appropriate absorbent material under the filter to collect oil spills.
- ☐ Remove the oil drain plug and drain the oil into a container with a capacity of at least 1.3 USG (5 L) (Figure 27).

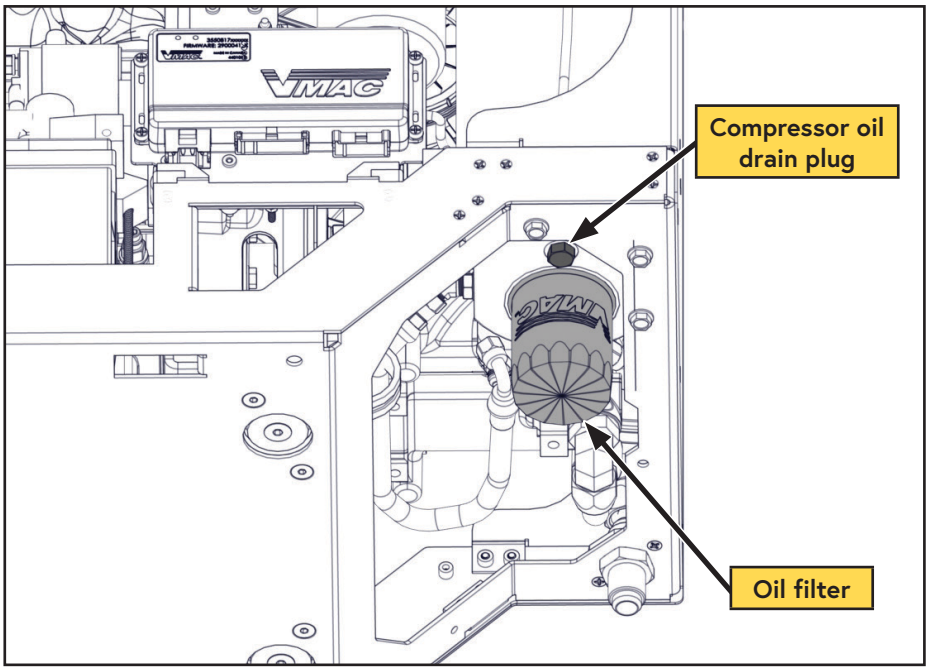


Figure 27 — Drain compressor oil

- ☐ Remove the oil filter (Figure 27).
- ☐ Install and tighten the oil drain plug.

☐ Ensure the threaded nipple did not unscrew with the oil filter (Figure 28).

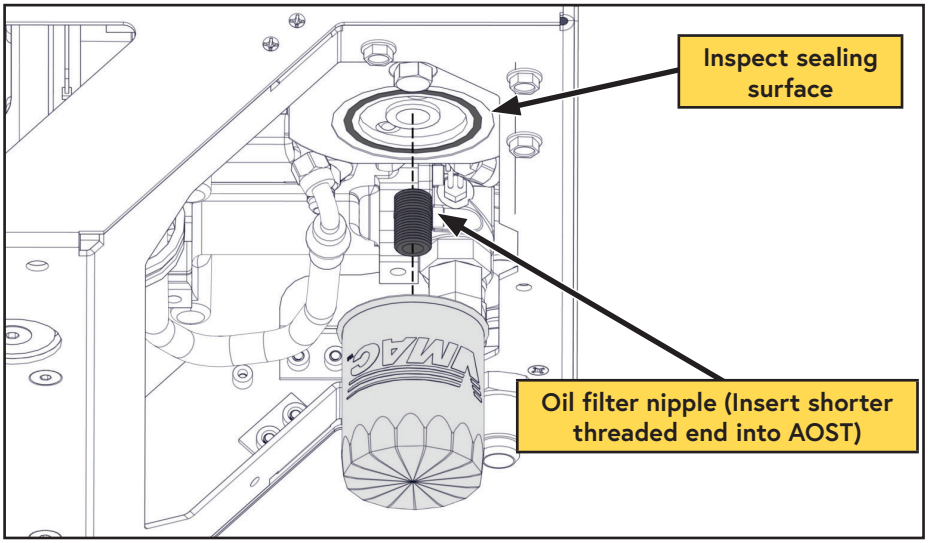


Figure 28 — Replace oil filter

☐ *If the nipple came out with the oil filter, remove it from the filter, being careful to avoid damaging the threads (Figure 28).

☐ *To reinstall the nipple, thoroughly clean the threads and apply Loctite 242 (blue) to the end with the short threads and replace it in the AOST (Figure 28).

☐ Clean the gasket sealing surface on the front of the AOST and inspect it for damage. The surface must be free of old gasket material, and smooth, to ensure a good seal (Figure 28).

☐ Apply a thin coat of compressor oil to the rubber gasket on the oil filter.

☐ Spin the filter onto the threaded nipple until the gasket contacts the sealing surface on the tank, then tighten the filter an additional 3/4 to 1 turn to seat the gasket.

☐ Remove the oil fill plug from the top of the AOST (Figure 29).

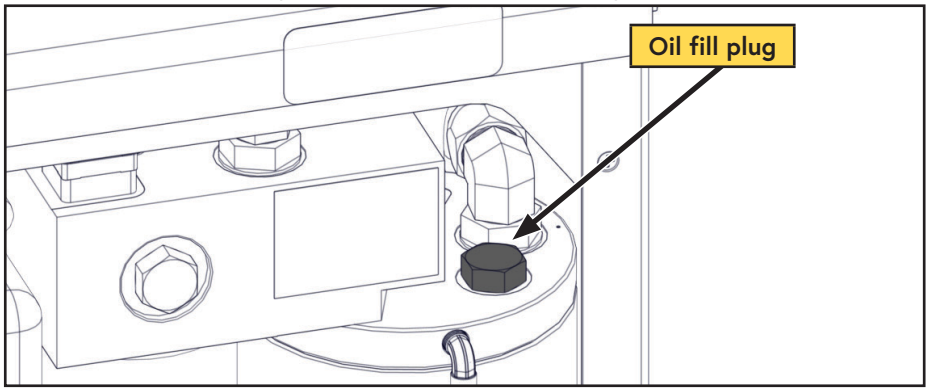


Figure 29 — Add compressor oil

☐ Using a funnel, add oil to the AOST until it reaches the "MAX" line on the sight glass on the front of the AOST. The air compressor system holds approximately 1 USG (4 L) of oil when dry (Figure 30).

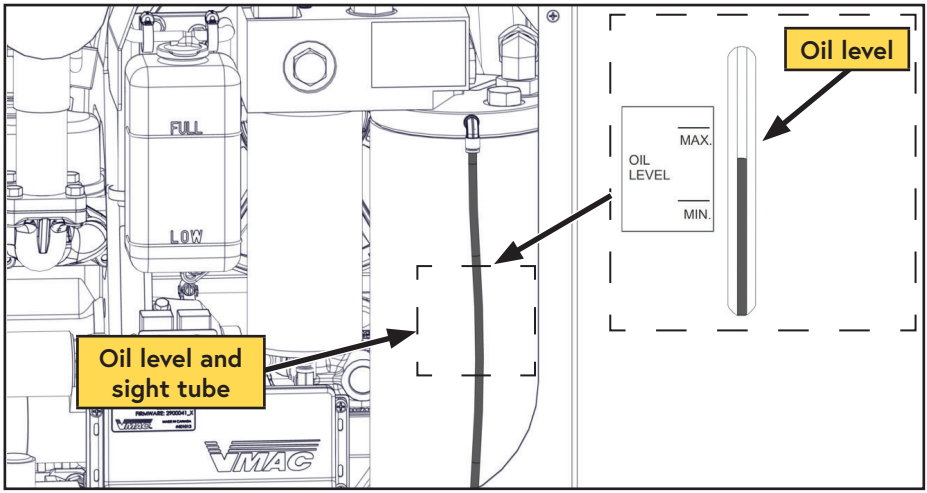


Figure 30 — Add compressor oil

☐ Replace the oil fill plug and tighten it securely.

☐ Clean any loose debris from around the air filter housing to prevent contaminants from entering the system.

⚠	***To avoid any possibility of contamination, ensure the air inlet is covered with masking tape or a clean cloth whenever the air filter is removed.***

⚠	***Do not attempt to clean the filter element, or use compressed air to perform any tasks around the compressor until the filter and cover are replaced.***

☐ Remove the air filter cover (Figure 31).

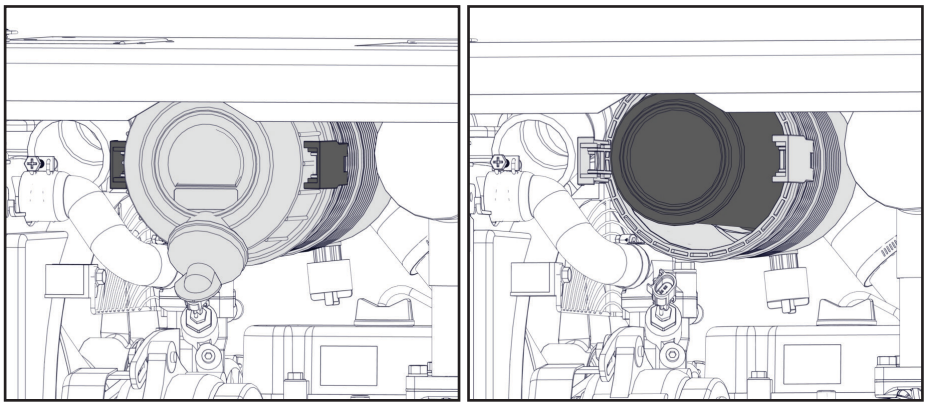


Figure 31 — Replace air filter

- ☐ Remove the air filter.
- ☐ Immediately cover the air inlet opening with a clean cloth or masking tape to prevent contaminants from entering the system.
- ☐ Clean the inside of the filter cover with a clean, dry cloth.
- ☐ Remove the cloth or masking tape from the air inlet and install the new air filter element.
- ☐ Install and latch the air filter cover.

Completing the Compressor service

- ☐ Inspect the pressure relief valve (page 56).
- ☐ Inspect all wire harnesses for signs of wear. If signs of wear are present, apply protective loom as necessary and secure with rubber coated P-clips or cable ties.
- ☐ Inspect all hoses for signs of wear. If signs of wear are present, take appropriate action to prevent further wear.
- ☐ Connect the negative battery terminal.
- ☐ Start the system and check for oil leaks.
- ☐ Allow the system to build to full system pressure (factory setting 150 psi).
- ☐ Turn the system "OFF".
- ☐ Once the system has sat for 5 minutes, check the oil level in the sight glass and add oil as necessary.
- ☐ Verify there are no oil leaks.
- ☐ ***Wheel kit equipped systems only:*** *I*nspect the wheel brake and adjust as necessary (page 26).

Clearing Service Reminders

- ☐ For systems that show a service reminder "HRSxxx500HRSVC" on the display panel:
- ☐ Turn the key switch to the "ON" position but do not start the system.
- ☐ Once the system has completed its self diagnostics, press and hold the "▶" and "◀" buttons for 5 seconds to enter the diagnostic mode.
- ☐ Cycle through the menus using the "▶" button; once "SERVICING" is displayed, press the "ENTER" button.
- ☐ Press the "ENTER" button again to log the service.

1,000 Hour / 1 Year Service (Compressor)

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

Do not use compressed air or perform any other tasks around the air filter and cover until both are replaced. Never clean the filter element with compressed air as this may allow contaminants to enter the compressor system. Always replace the air filter element during this service.

A clean engine compartment, in addition to being more efficient, makes detecting issues (i.e. oil or coolant leaks, etc.) easier. VMAC recommends cleaning the D60 as part of regular servicing.

- ☐ Clean the area around the AOST and the oil filter to prevent contamination.
- ☐ Place appropriate absorbent material under the oil filter to collect oil spills.
- ☐ Remove the oil drain plug and drain the oil into a container with a capacity of at least 1.3 USG (5 L) (Figure 32).

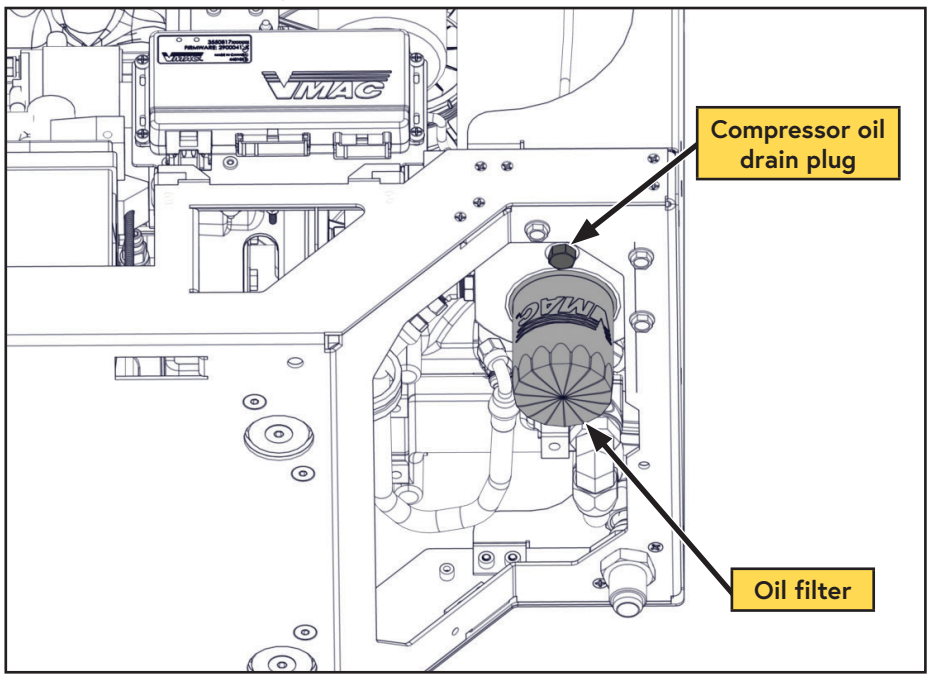


Figure 32 — Drain compressor oil

- ☐ Remove the oil filter (Figure 32).
- ☐ Install and tighten the oil drain plug.

☐ Ensure the threaded nipple did not unscrew with the oil filter (Figure 33).

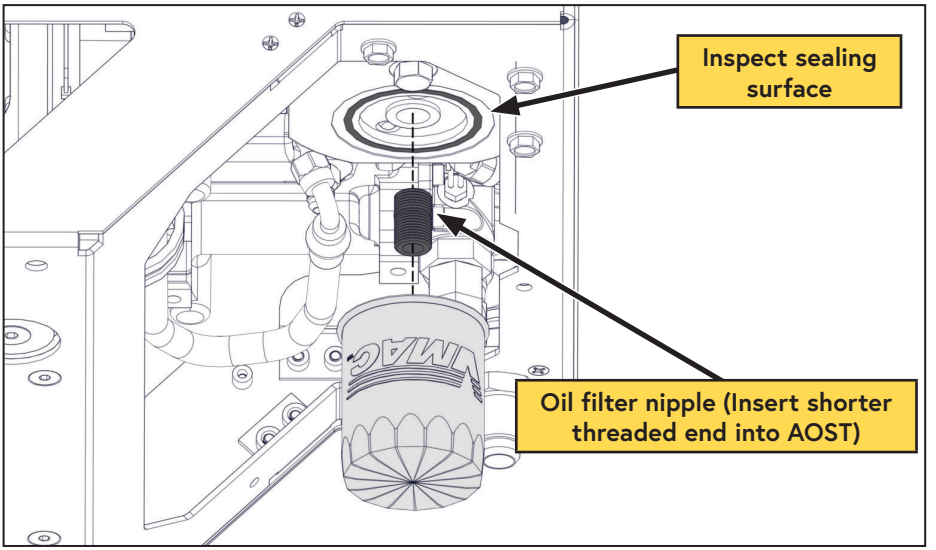


Figure 33 — Replace oil filter

☐ *If the nipple came out with the oil filter, remove it from the filter, being careful to avoid damaging the threads (Figure 33).

☐ *To reinstall the nipple, thoroughly clean the threads and apply Loctite 242 (blue) to the end with the short threads and replace it in the AOST (Figure 33).

☐ Clean the gasket sealing surface on the front of the AOST and inspect it for damage. The surface must be free of old gasket material, and smooth, to ensure a good seal (Figure 33).

☐ Apply a thin coat of compressor oil to the rubber gasket on the new oil filter.

☐ Spin the filter onto the threaded nipple until the gasket contacts the sealing surface on the tank, then tighten the filter an additional 3/4 to 1 turn to seat the gasket.

☐ Place appropriate absorbent material under the coalescing filter to collect oil spills.

Only use an appropriate oil filter wrench to remove the coalescing filter, punching a screwdriver (or similar object) into the side of the filter may damage the scavenge tube or screen.

☐ Remove the coalescing filter, being careful to avoid damaging the scavenge tube or screen that is inside the filter (Figure 34).

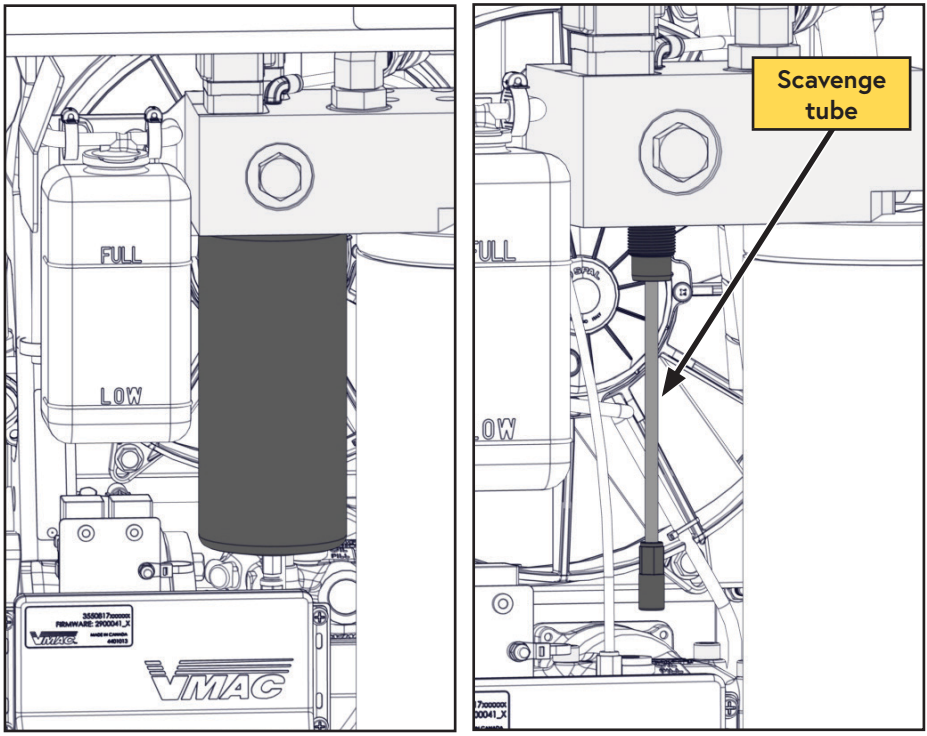


Figure 34 — Remove the coalescing filter

☐ Ensure the scavenge screen is in place on the scavenge tube (Figure 35).

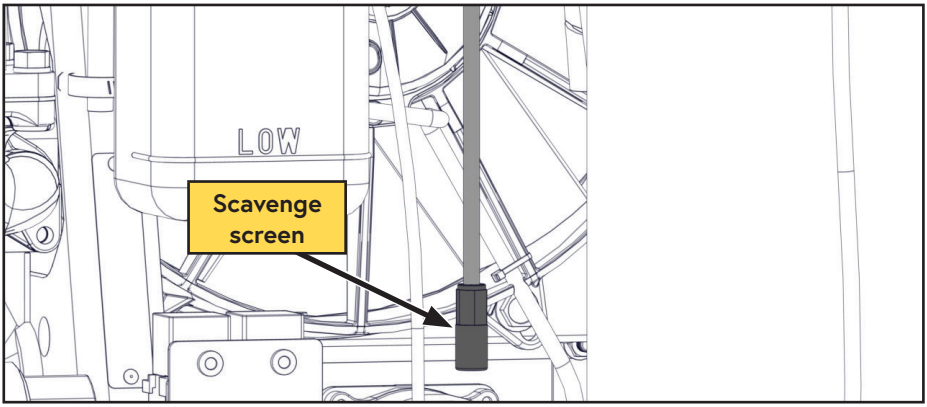


Figure 35 — Scavenge screen

☐ Clean the gasket sealing surface on the coalescing manifold and inspect it for damage. The surface must be free of old gasket material, and smooth, to ensure a good seal.

☐ Apply a thin coat of compressor oil to the rubber gasket on the coalescing filter.

☐ Spin the new coalescing filter onto the threaded nipple until the gasket contacts the sealing surface on the coalescing manifold, then tighten the filter an additional 3/4 to 1 turn to seat the gasket.

☐ Remove the oil fill plug from the top of the AOST (Figure 36).

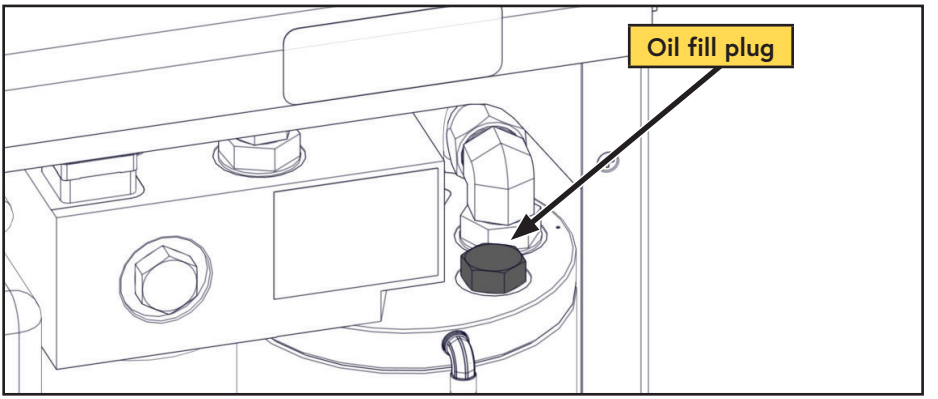


Figure 36 — Add compressor oil

☐ Using a funnel, add oil to the AOST until it reaches the "MAX" line on the sight glass on the front of the AOST. The air compressor system holds approximately 1 USG (4 L) of oil when dry (Figure 37).

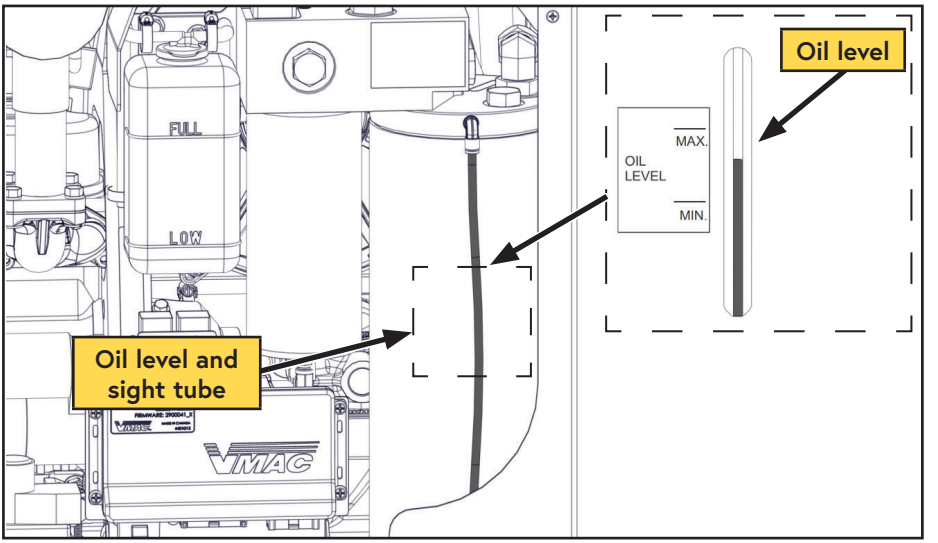


Figure 37 — Add compressor oil

☐ Replace the oil fill plug and tighten it securely.

☐ Clean any loose debris from around the air filter housing to prevent contaminants from entering the system.

To avoid any possibility of contamination, ensure the air inlet is covered with masking tape or a clean cloth whenever the air filter is removed.

Do not attempt to clean the filter element, or use compressed air to perform any tasks around the compressor until the filter and cover are replaced.

☐ Remove the air filter cover (Figure 38).

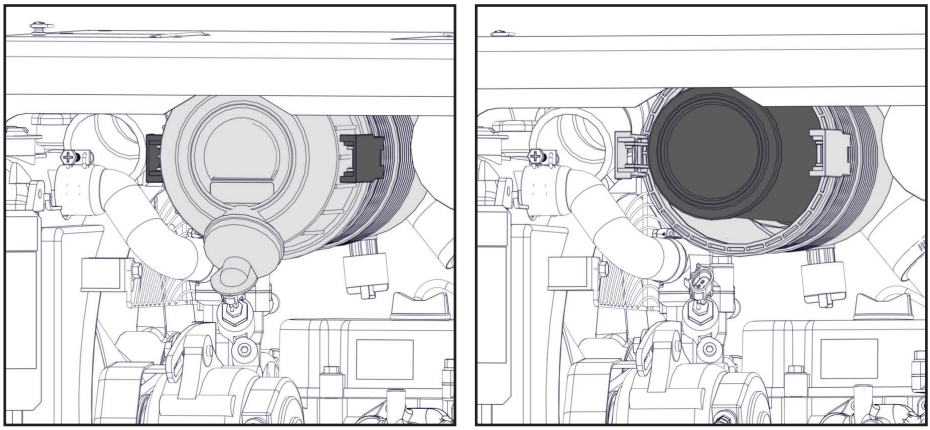


Figure 38 — Replace air filter

☐ Remove the air filter.

☐ Immediately cover the air inlet opening with a clean cloth or masking tape to prevent contaminants from entering the system.

☐ Clean the inside of the filter cover with a clean, dry cloth.

☐ Remove the cloth or masking tape from the air inlet and install the new air filter element.

☐ Install and latch the air filter cover.

Completing the Compressor service

☐ Inspect the pressure relief valve (page 56).

☐ Inspect all wire harnesses for signs of wear. If signs of wear are present, apply protective loom as necessary and secure with rubber coated P-clips or cable ties.

☐ Inspect all hoses for signs of wear. If signs of wear are present, take appropriate action to prevent further wear.

☐ Connect the negative battery terminal.

☐ Start the system and check for oil leaks.

☐ Allow the system to build to full system pressure (factory setting 150 psi).

☐ Turn the system "OFF".

- ☐ Once the system has sat for 5 minutes, check the oil level in the sight glass and add oil as necessary.
- ☐ Verify there are no oil leaks.
- ☐ ***Wheel kit equipped systems only:*** *I*nspect the wheel brake and adjust as necessary (page 26).

Clearing Service Reminders

- ☐ For systems that show a service reminder "HRSxxx1000HRSVC" on the display panel:
- ☐ Turn the key switch to the "ON" position but do not start the system.
- ☐ Once the system has completed its self diagnostics, press and hold the "►" and "◄" buttons for 5 seconds to enter the diagnostic mode.
- ☐ Cycle through the menus using the "►" button; once "SERVICING" is displayed, press the "ENTER" button.
- ☐ Press the "ENTER" button again to log the service.

100 Hour Service (Engine)

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

The 100 hour Kubota Engine Service Kit (P/N: A500007) is intended to provide the components required to perform a basic engine service. These instructions are not comprehensive and are intended to supplement the Kubota Operator's Manual (P/N: 1900973).

See the Kubota Operator's Manual for a complete list of maintenance recommendations and the service interval.

A clean engine compartment, in addition to being more efficient, make detecting issues (i.e. oil or coolant leaks, etc.) easier. VMAC recommends cleaning the D60 as part of regular servicing.

☐ Turn the fuel supply valve to the "OFF" position (Figure 39).

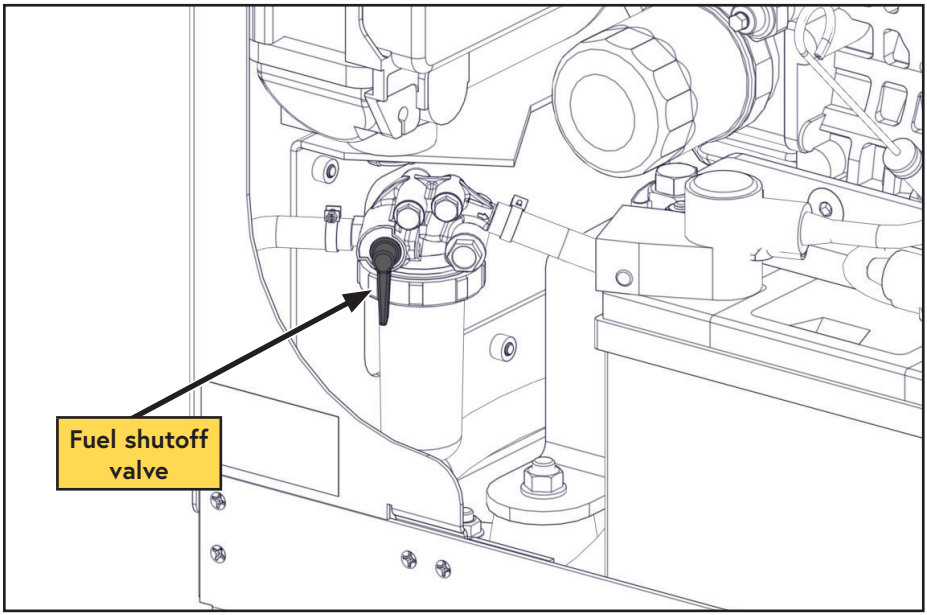


Figure 39 — Fuel shutoff valve

The location of the inline fuel filter will vary and is dependent upon whether the D60 is connected to the vehicle's fuel tank or is drawing from the optional 7 gallon fuel tank (P/N: A500005)

The service life of the inline fuel filter is dependent upon multiple factors including fuel quality and operating environment. Replace the fuel filter (not included) as necessary.

☐ Clean the area around the primary fuel filter to prevent contamination.

☐ Place a suitable container under the fuel filter bowl to catch any fuel that may spill.

☐ Remove the fuel filter bowl (Figure 40).

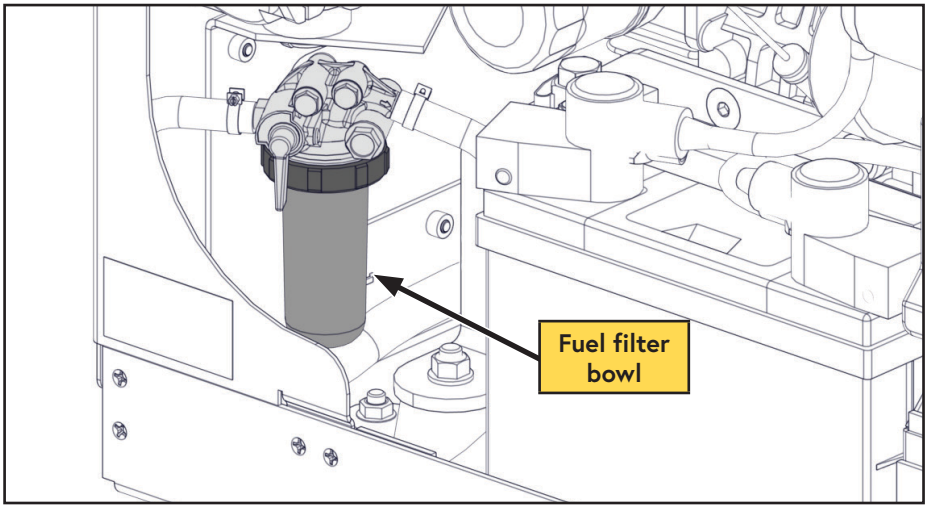


Figure 40 — Remove fuel filter

☐ Remove the fuel filter element.

When installing the fuel filter element, ensure the closed end is oriented toward the bottom of the fuel bowl.

☐ Install the new fuel filter element (Figure 41).

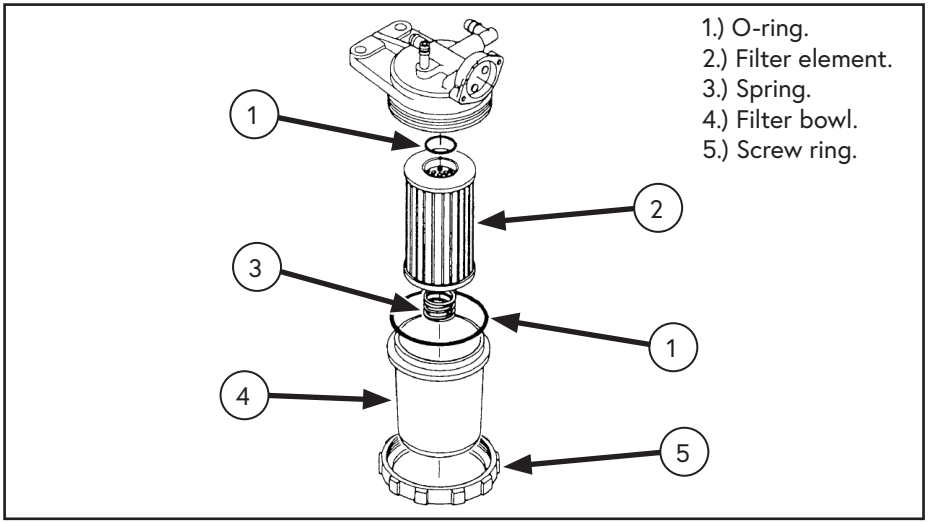


Figure 41 — Fuel bowl assembly

- ☐ Clean the area around the oil drain and the oil filter to prevent contamination.
- ☐ Place appropriate absorbent material under the oil filter and oil drain to collect any spills.
- ☐ Remove the oil drain plug and drain the oil into a container with a capacity of at least 1.6 USG (6 L) (Figure 42).

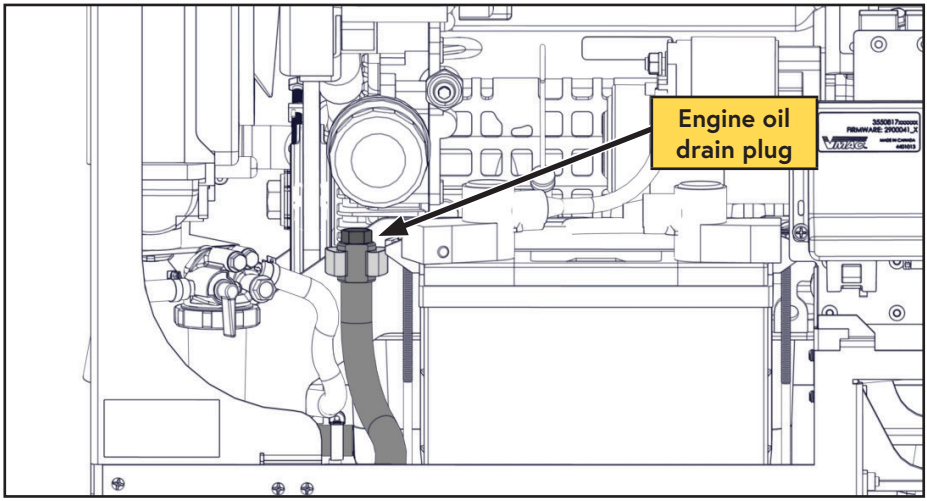


Figure 42 — Drain oil

- ☐ Replace the oil drain plug.
- ☐ Remove the engine oil filter (Figure 43).

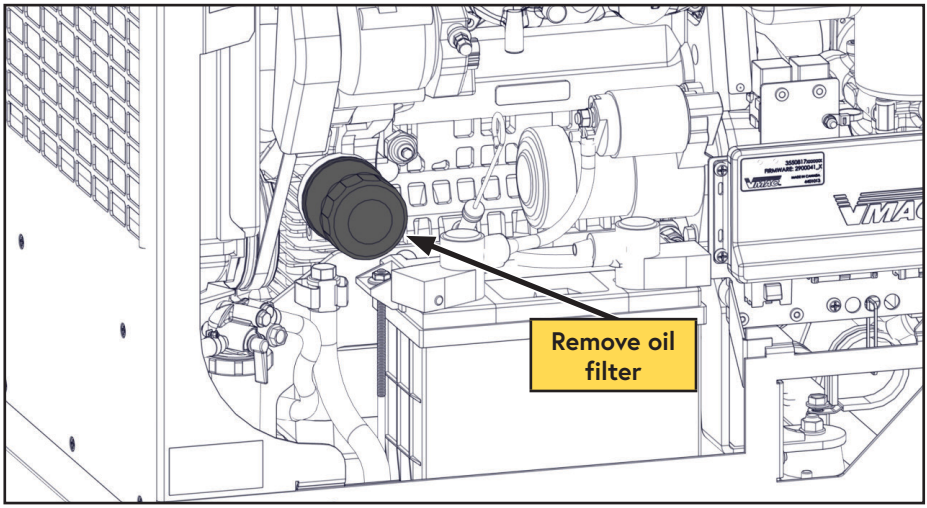


Figure 43 — Engine oil filter

- ☐ Clean the oil filter sealing surface of the engine block.
- ☐ Apply a thin film of clean oil to the oil filter gasket.

- [ ] Thread the new oil filter onto the engine until the gasket contacts the engine.
- [ ] Rotate the oil filter an additional 3/4 of a turn.
- [ ] Remove the oil fill cap, and using a funnel, add the supplied oil into the crankcase (capacity is 0.98 USG (3.7 L when dry) (Figure 44).

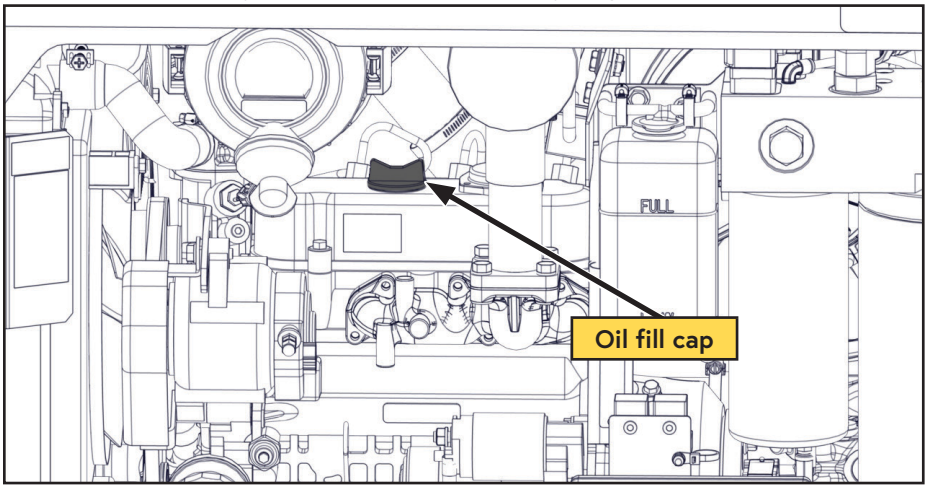


Figure 44 — Add engine oil

- [ ] Replace the oil fill cap and tighten it securely.
- [ ] Remove the air filter cover (Figure 45).

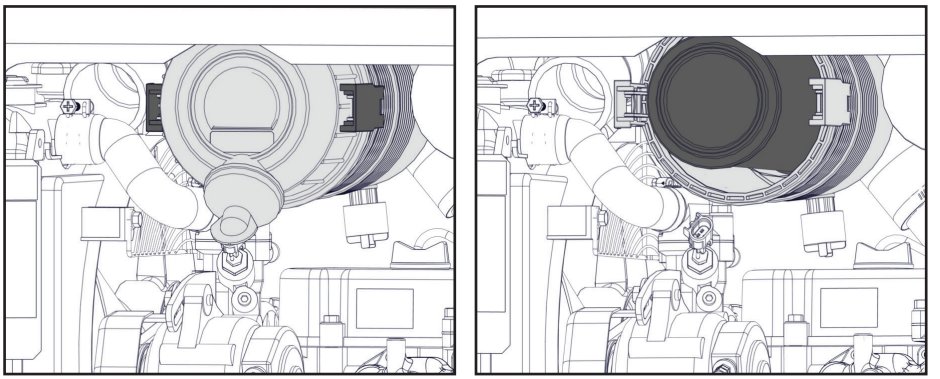


Figure 45 — Clean air filter

- [ ] Remove the air filter.
- [ ] Immediately cover the air inlet opening with a clean cloth or masking tape to prevent contaminants from entering the system.
- [ ] Lightly tap or shake the air filter to remove any particulate or debris.
- [ ] Clean the inside of the filter cover with a clean, dry cloth.
- [ ] Remove the cloth or masking tape from the air inlet and reinstall the air filter element.
- [ ] Install and latch the air filter cover.

- ☐ Inspect the engine coolant (page 58).
- ☐ Perform all of the additional inspections listed in the Kubota Operator's Manual (P/N: 1900973).
- ☐ Inspect all wire harnesses for any signs of wear. If signs of wear are present, apply protective loom as necessary and secure with rubber coated P-clips or cable ties.
- ☐ Inspect all hoses for any signs of wear. If signs of wear are present, take appropriate action to prevent further wear.
- ☐ Connect the negative battery terminal.
- ☐ With the fuel "OFF", crank the engine for 15 seconds and immediately turn the key switch to "OFF" (this prevents crankcase bearing damage).
- ☐ Prime the Fuel System (see page 30)
- ☐ Start the engine and allow it to run at base rpm for 2 minutes to ensure the lubrication system and the filter are filled.
- ☐ Stop the engine and allow it to sit for a minimum of 10 minutes to allow the oil to settle.
- ☐ Check the oil level on the engine oil dipstick and add oil as necessary to ensure the level is between the "ADD" and the "FULL" marks.

There is no way to clear the engine service reminder. Engine service reminders are displayed for 10 hours prior to the service being due, and for an additional 10 hours after the service was due.

Electrical Schematic

Scan or click the QR code for a high resolution electrical schematic.

Diagnostics and Troubleshooting

Read the "Maintenance and Repair Safety" section prior to performing any work on the system (beginning on page 53).

Wear appropriate Personal Protective Equipment and follow all industry standard safety practices.

For the following tests, isolate the AOST from all downstream (customer supplied) equipment.

If the D60 is still within the warranty period, see the warranty claim process on page 10 prior to commencing with any diagnostics or repairs.

If you are unsure whether the unit is still covered under warranty, contact VMAC Technical Support.

Problem diagnosis should follow sound, recognized practices. Quick and accurate diagnosis of problems should involve the following:

- Follow industry standard safety practices.
- Accurately identify the problem by operating the system (provided it is safe to do so).
- Determining the possible causes for the problem by understanding how the system operates.
- Isolating the potential causes by accurate testing using correct and recognized procedures.
- Performing proper repairs using the correct procedures and the recommended replacement parts.
- Performing proper post repair testing to ensure that the repairs were effective.
- Electrical testing should be performed according to the processes described in the troubleshooting charts and in conjunction with any documentation provided by VMAC.
- Additional troubleshooting and specific test procedures can be found on VMAC's Knowledge Base kb.vamacair.com.

See "Diagnostics Mode" on page 47 for instruction to access diagnostic information.

VMAC Error Codes

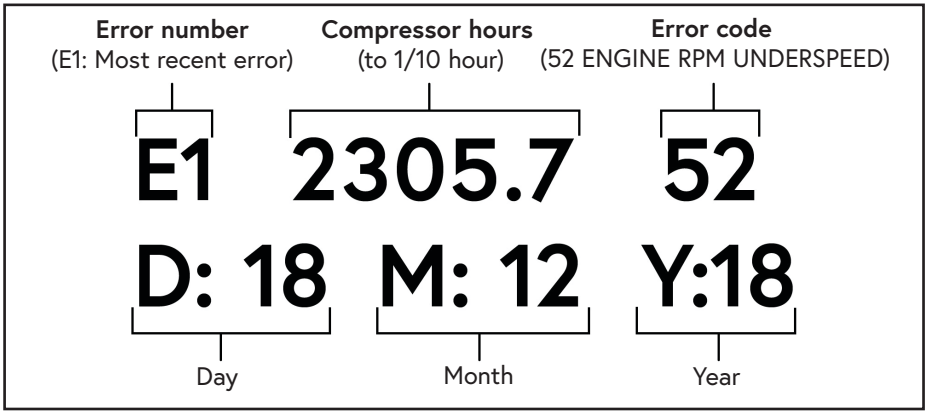


Figure 46 — Error log display

Error Code	Display	Fault	Possible Problem(s) / Solution(s)
05	COMP TEMP SENSOR FAILED – OPEN	Compressor temperature probe disconnected or failed.	• Test temperature sensor. • Repair wiring to sensor.
06	COMP TEMP SENSOR FAILED – SHORT	Compressor temperature probe wires shorted or failed.	Repair wiring to sensor.
07	COMP TOO COLD xx.x°F/xx.x°C	The compressor temperature is below 5 °C (41 °F).	Allow the system to warm up; once the compressor temperature reaches 5 °C (41 °F) the compressor will start.
08	COMP OVER TEMP xx.x°F/xx.x°C	The compressor temperature is above 138 °C (280 °F).	• Low compressor oil level. • Faulty or crushed cooler hoses. • Cooling fan not operating. • Insufficient air-flow or ventilation. • Failed temperature probe or faulty electrical connection. • Incorrect compressor oil used. See "Compressor is getting too hot and is shutting down." on page 82.
11	MANIFOLD ERROR CHECK COALESCER	Restriction detected at the coalescing filter.	Coalescing filter plugged or sensor is faulty.
12	AIR PRESS SIGNAL VOLTAGE LOW	The voltage signal from the air pressure sensor is below the expected value.	• Pressure sensor faulty. • Wiring to pressure sensor faulty.
13	AIR PRESS SIGNAL VOLTAGE HIGH	The voltage signal from the air pressure sensor is above the expected value.	• Pressure sensor faulty. • Wiring to pressure sensor faulty.

Error Code	Display	Fault	Possible Problem(s) / Solution(s)
14	AIR PRESS SENSOR TOO HIGH AIR PRESSURE ×××.× PSI	Air pressure is too high to start the engine (air pressure is displayed).	Blowdown not working. • Check blowdown muffler (see page 36). • Test blowdown solenoid.
27	UNEXPECTED ENGINE OPERATION	Rpm detected during an "OFF" state.	• Engine runaway due to combustible air. • Test stop solenoid. • Stop circuit fault.
34	ENGINE RPM NOT DETECTED	The engine did not start during the crank cycle.	Engine rpm not detected. Engine stopped unexpectedly. • Tach wire from hall effect sensor cut or damaged. • Hall effect sensor on bellhousing faulty or out of adjustment. • Fuel delivery issue.
35	ENGINE CRANK TIME OUT	The engine did not start during the crank cycle.	• No fuel. • Too cold to start.
36	ENGINE OIL LOW	Engine oil pressure is low.	• Oil leak. • Lack of service. • Oil pressure switch faulty.
37	ENGINE TEMP PROBE OPEN	Engine temperature probe disconnected or failed.	• Test temperature probe. • Repair wiring between probe and control box.
38	ENGINE TEMP PROBE SHORT	Engine temperature probe wires shorted.	Repair wiring to probe.
39	ENGINE TEMP TOO COLD TO START	Engine temperature is below -40 °C (-40 °F).	Plug the Cold Climate Kit in and allow the D60 to warm prior to attempting to start the engine.
40	ENGINE OVER TEMP	The engine is above 110 °C (230 °F).	• Inadequate ventilation. • Loose fan belt. • Lack of service. • Coolant leak. • Radiator fins plugged.
42	FUEL LEVEL LOW PLEASE RE-FILL (Optional external fuel tank only)	Engine fuel level is low.	Fill fuel tank prior to attempting to restart the engine.
51	ENGINE OVERSPEED	Engine speed above 4,200 rpm detected.	Ensure engine high idle is within spec.
52	ENGINE RPM UNDERSPEED	Engine speed fell below 2,000 rpm for 3 seconds.	Engine speed below 2,000 rpm for 3 seconds.
—	DISPLAY CANBUS CONN ERROR	CAN bus error between the display panel and the control box.	Check harness running between control box and display panel.
—	END OF ERRORS RE-TRY STARTING?	All errors have been reviewed.	Press "ENTER" button to start D60.

Warning Messages

The messages below may be displayed in both the "SYSTEM READY" and "SYSTEM RUNNING" states.

If a message is present, the red "WARNING" LED will flash on and off.

Error Code	Display	Fault	Possible Problem(s) / Solution(s)
29	AIR FILTER PLUGGED	Air filter is restricted.	Check air filter and replace as necessary.
32	BATTERY VOLTAGE TOO LOW	Battery voltage below 11.9 V.	• Low battery automatic restart disabled. • System left in standby with low battery automatic restart disabled.
46	ENGINE RESTART DUE TO COLD	The engine was restarted as the internal temperature dropped below the threshold.	Engine will restart to prevent it from freezing. Once the engine has reached operating temperature, the system will enter standby mode and shut down.
—	500HR / 6MTH SERV DUE IN ×× HOURS	N/A.	This warning will be displayed 10 hours before the 500 hour / 6 month service is due.
54	COMPRESSOR SERV 500HR / 6MTH	The compressor system is due for service.	Perform 500 hour / 6 month service. Service reminder must be cleared via the "Diagnostics" menu (this also logs the service).
—	1000HR / 12MTH SERV DUE IN ×× HOURS	N/A.	This warning will be displayed 10 hours before the 1,000 hour / 12 month service is due.
55	COMPRESSOR SERV 1000HR / 12MTH	The compressor system is due for service.	Perform 1,000 hour / 12 month service. Service reminder must be cleared via the Diagnostics menu (this also logs the service).
—	ENGINE SERVICE 500 HOURS	The engine is due for service.	Perform 500 hour service. (Engine service reminders do not need to be cleared).
58	ENGINE RESTART DUE TO LOW BATT	Battery voltage below restart threshold for 30 seconds.	Engine will restart to charge the battery. Once upper battery voltage threshold is reached and the battery restart delay timer has counted down, the system will enter standby mode and shut down.

Symptoms

The following diagnostic tables are not exhaustive, they are intended to provide basic troubleshooting steps to resolve common errors. Further, or more in depth information may be posted on VMAC's Knowledge Base: kb.vmacair.com

If the information provided in these tables does not resolve the issue, contact the VMAC Technical Support team at:

Toll free: (888) 241-2289 | Email: tech@vmacair.com

Key Temperatures

Engine is too cold to start: -40 °C (-40 °F) and below

The engine is too cold. Plug the VMAC Cold Climate Kit in to warm the engine.

Engine is too cold to engage compressor 5 °C (41 °F) and below

Compressor will remain "Unloaded" until engine reaches operating temperature.

Over temperature shutdown

- Once the engine coolant reaches 108 °C (226 °F), the compressor will automatically unload to reduce load on the engine.
- Once the engine coolant reaches 110 °C (230 °F), the engine will shut down.
- Once the compressor oil reaches 143 °C (290 °F), the engine will shut down.

Symptom	Possible Cause	Corrective Action
System restarting from standby for short durations or too frequently.	Air leak from tools or plumbing.	Identify and fix air leaks.
		Install air receiver tank
	Inadequate receiver tank size.	Install larger receiver tank.

Symptom	Possible Cause	Corrective Action
Compressor not building any air.	Compressor coupler failed.	Replace compressor coupler.
	Compressor inlet not opening.	Test air solenoid.

Symptom	Possible Cause	Corrective Action
Engine will not start.	System in STANDBY.	Use air.
	Battery is discharged.	Check battery voltage and charge as necessary.
	Fuel delivery issue.	• Check fuel level in the tank (vehicle's fuel tank or optional 7 gallon tank). • Perform fuel prime instructions (page 30).
	No power to key switch.	Check voltage at key switch.

Symptom	Possible Cause	Corrective Action
Water in the air stream.	Filter/Regulator/Lubricator failure (if installed).	Check drain on filter.
	Air receiver tank not drained regularly (if installed).	Drain air receiver tank daily.

Symptom	Possible Cause	Corrective Action
Low air pressure.	Air receiver tank drain open.	Close air receiver tank drain.
	Air filter and/or air inlet obstructed.	Clean air inlet / replace air filter.
	Air leak.	Check air hoses and fittings for damage or wear.
	Air demand too high.	Reduce air consumption. Install air receiver tank (see page 86).
	Blowdown system stuck open.	Check for air venting from the blowdown muffler while the system is running (page 36).
	Air solenoid failure.	Check air solenoid and wiring.
	Pressure sensor faulty.	Test pressure sensor.
	Inlet valve will not open completely.	Replace inlet valve.

Symptom	Possible Cause	Corrective Action
No power to display panel.	Display panel harness disconnected or damaged.	• Check display panel connection. • Check harness for damage.
	Poor connection at display panel harness connector.	Check pins in harness plug to ensure they are fully seated.

Symptom	Possible Cause	Corrective Action
Compressor is getting too hot and is shutting down.	Low compressor oil.	Add oil as necessary (page 54). See "Excessive oil in the air stream (oil carry over) " on page 83 to troubleshoot.
	Compressor oil flow restricted.	• Check oil filter for blockage. • Remove hoses and check for blockage. • Check cooler for blockage.
	Insufficient air-flow or ventilation.	• Ensure cooler and air filter are not blocked. • Pull out drawer (if installed in an enclosure). • Improve ventilation. • Move D60 out of cabinet.
	Failed temperature probe or bad electrical connection.	Check temperature probe and wiring connections.
	Lack of compressor and / or engine service.	Service system as necessary.
	Incorrect compressor oil used.	Flush and service system.

Symptom	Possible Cause	Corrective Action
Air pressure relief valve opens.	Compressor system pressure exceeding 200 psi.	• Install pressure gauge at AOST outlet to confirm pressure is above 200 psi. • Check pressure sensor.
	Air pressure relief valve failure (opens below 200 psi).	Replace pressure relief valve.
	Unload solenoid has failed energized.	Check solenoid and wiring.
	Inlet valve poppet O-ring dislodged.	Contact VMAC Technical Support.
	PTFE Pressure Control tube disconnected or failed.	Check PTFE tube between air solenoid and inlet valve.
	Connection to control box poor or faulty.	Check control box connectors and harness.

Symptom	Possible Cause	Corrective Action
High compressor oil consumption.	Compressor, hose, fitting, or cooler oil leak.	Check system for leaks.
	Compressor shaft seal leaking (Oil will leak from bottom of gear case).	Replace compressor shaft seal.
	Excessive oil in the air stream.	Refer to "Excessive oil in the air stream (oil carry over) " on page 83 to troubleshoot.

Symptom	Possible Cause	Corrective Action
Engine rpm not increasing to second speed.	Poor connection to throttle pull relay or solenoid. Poor connection to throttle hold relay or solenoid faulty.	Swap "pull" and "hold" relays. (For testing only! Do not run system in this configuration for more than a few seconds).
	Connection to control box poor or faulty.	Check control box connectors and harness.

Symptom	Possible Cause	Corrective Action
Excessive oil in the air stream (oil carry over).	D60 was shut down while building air.	Stop air demand and allow engine speed to drop to base idle prior to shutting down the D60.
	Unit operating on grade greater than 15°.	Level the vehicle and run the system. Oil carry over may take up to 40 minutes to dissipate.
	High oil level.	Correct oil level.
	Failed coalescing filter.	Replace coalescing filter.
	Clogged scavenge screen.	Clean scavenge screen (page 67).

Compressor Performance Testing

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 appropriate orifice in the outlet to simulate tool use (Figure 47).

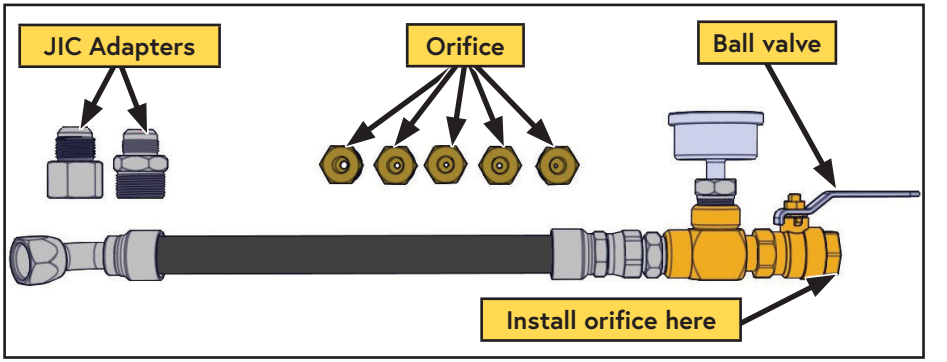


Figure 47 — A700052 VMAC Air Test Tool

Disconnect all downstream equipment (hose reels, etc.) and connect the test tool directly to the discharge fitting on the D60.

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

- ☐ Install the VMAC test tool at the D60 outlet with the 60 cfm orifice.
- ☐ Ensure the ball valve is closed.
- ☐ Start the system and allow it to reach normal operating temperature.
- ☐ After the system has reached normal operating temperature, observe the pressure gauge on the test tool. The pressure should be approximately 150 psi.
- ☐ Open the ball valve on the test tool and observe the pressure gauge.

If the system is not able to maintain air pressure at 95 psi when the ball valve is opened fully, the compressor has failed the performance test.

- ☐ Close the ball valve slowly to allow the system pressure to rise.
- ☐ The D60 can be shut down normally unless the control system is being tested.

Control System Testing

- ☐ When the pressure reaches 150 psi (factory default setting), the system will "unload" and air should be heard escaping from the air bleed muffler in the inlet.
- ☐ After 5 minutes without air use (factory setting), the system will go into standby and the engine will shut down.

While in standby, the system will continue to monitor the battery voltage, system temperature, air use, and air pressure and will restart as needed to maintain operating parameters.

Air Receiver Tank

This system has a built-in check valve. 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 system has a built-in check valve. Use of an additional check valve is not required and may cause erratic performance.

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 shutdown. The AOST has a built in check valve that prevents blow back and moisture from the receiver tank entering the AOST. 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 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 48).

Drain the condensed water from the receiver tank daily.

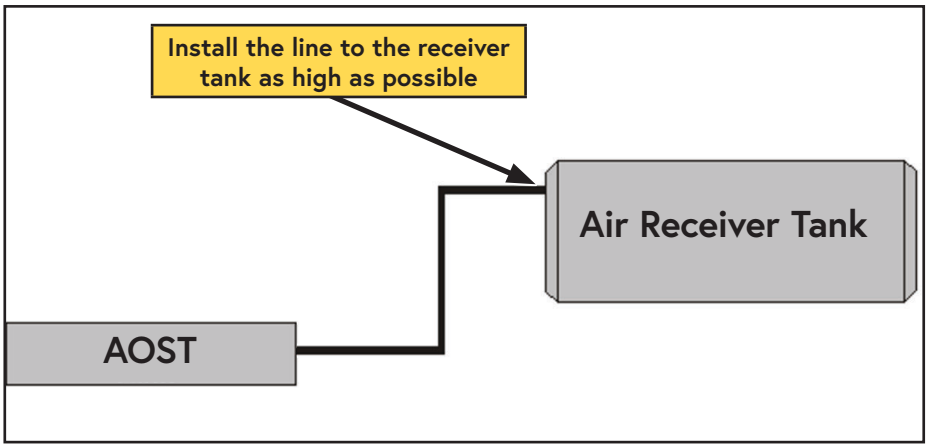


Figure 48 — Air receiver tank

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

Receiver Tank

An air receiver tank provides a buffer as it gives the D60 time to react (increasing the engine speed, or waking the D60 from "Standby" mode) by producing air before the tool stalls. Air receiver tanks also have the advantage of lowering the duty cycle of the compressor system.

Without an air receiver tank installed, use of low air demand tools (e.g. die grinder, brad nailer, etc.) or small air leaks may cause the D60 to "short cycle" (switching between high and low rpm, or restarting shortly after entering "Standby" mode). Larger air receiver tanks will allow the D60 to stay in "Standby" mode for longer periods before having to restart the engine.

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

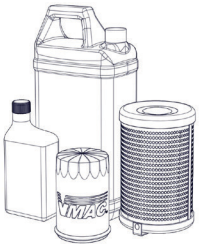
The compressor can produce air pressures up to approximately 150 psi

(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.

Accessory Products from VMAC

Compressor Service Kit



500 Hour or 6 Month Service Kit -
Part number: A500001

Includes VMAC high performance compressor oil, oil filter, air filter, and next service due decal.

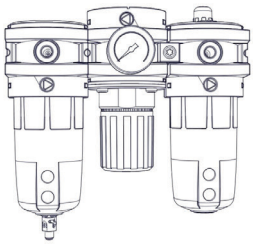
1,000 Hour or 1-Year Service Kit -
Part number: A500017
Includes VMAC high performance compressor oil, oil filter, air filter, coalescing filter, and next service due decal.

Kubota Engine Service Kit

100 hour Service Kit
Part number: A500007

Includes engine oil, oil filter, fuel filter.

Filter Regulator Lubricator (FRL) — 70cfm

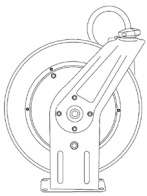


Part number: A700151

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.

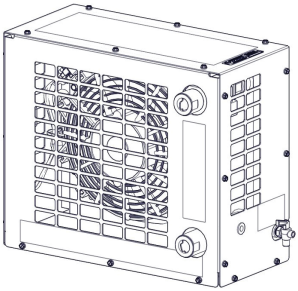
1/2 in × 50 ft Hose Reel



Part number: A700007

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

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).

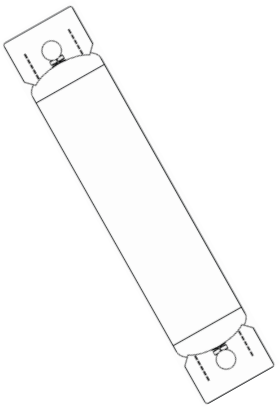
10 Gallon, 200 psi Air Receiver Tank w/ Mounting Feet

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 (including Green Series Air Compressors), DTM70/ DTM70-H, 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, 200 psi Air Receiver Wing Tank

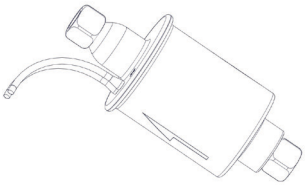


Part number: A300010

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 (including Green Series Air Compressors), DTM70/DTM70-H, 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).

External Diesel Fuel Pump Kit



Part number: A500030

The external diesel fuel pump allows the MF to be tied into the vehicle's diesel fuel tank; mounts externally; activates automatically when the air compressor key switch is in the "RUN" position and disables automatically when system enters "Standby" mode or key switch is turned the "OFF" position.

7-Gallon Diesel Fuel Tank

Part number: A500005

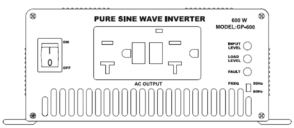
7 USG (26.5 L) diesel fuel tank mounts directly to the D60; includes mechanical fuel gauge and low fuel shutoff sensor.

Exhaust Kit

Part number: A500004

Exhaust kit directs the exhaust as required by the operator (includes rain flapper).

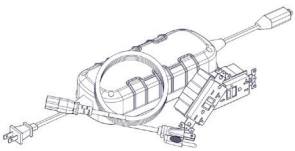
1,500 W Power Inverter



Part number: A500206

1,500 W, 12 V power inverter; required to power the MF Cold Climate Kit.

Additional Cold Climate and Charging Accessories



Part number: A500208 (AC Shore Power)
AC Shore Power plugs into a power source to keep the MF's battery warm and charged in cold climates while the truck sits without use for an extended period. (Includes A500195 7.2A battery charger).

(100 A Battery Charger) Part number: A500190
Used to charge the vehicle's battery.

(7.2 A Battery Charger) Part number: A500195
Used to charge the MF's battery.

(80 W Battery Blanket) Part number: A500196
Plugs into a power source to warm the MF's battery in cold climates.

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: **D6** _ _ _ _ _ _

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 Address: _____

Vehicle Information (Optional)

Unit: _____ Year: _____

Make: _____ Model: _____

Vehicle Identification Number: _____

Manufactured by

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