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VMAC – Vehicle Mounted Air Compressors

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Fax: 1-250-740-3201

Owner Manual - Document #1930060
VR70 and VR150 Systems
Changes and Revisions

Version	Revision Details	Revised	Approved	Implemented
00	Initial draft, revised to completion	IB 27 Jan 2004	SC 16 Mar 2004	16 Mar 2004
a	Added coalescing information	IB 19 Apr 2005	SM 27 Apr 2005	29 Apr 2005
b	Warranty information change	IB 18 Apr 2006	SM 19 Apr 2006	20 Apr 2006
c	ECN 06-220 Coalescing spring	IB 25 Oct 2006	SM 28 Oct 2006	30 Oct 2006
d	ECN 07-009 phone & general	IB 10 Jan 2007	RD 26 Jan 2007	29 Jan 2007
e	ECN 07-099 lack of use failure	IB 18 Jun 2007	SC 18 Jun 2007	24 Jun 2007
f	ECN 08-242 General updates	SL 15 Oct 2009	SC/SM 22Sep2010	22 Sep 2010
g	ECN 12-003 General updates	SR 06 Jan 2012	SJC 17 JAN 2012	19 JAN 2012
H	ECN 12-169 PRV and muffler	RK 10Dec 2012	MH 12 Dec 2012	17 Dec 2012

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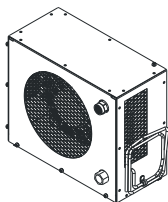
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Accessory Products from VMAC

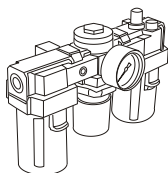
The following accessory products for your VR compressor system are available from VMAC. For more information or to order these products, call toll free 1-800-738-8622 or local 250-740-3200.



Eliminator Aftercooler

Part Number A800070

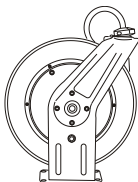
Removes up to 80% of moisture from compressed air. Quick installation, automatic drain and compact design



Filter Regulator Lubricator

Part Number A700151

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



Hose Reel

Part Number A700007

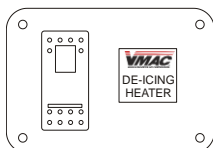
Secure, compact, retractable hose storage in a sturdy reel.



Air Receiver Tank

Part Number A300010

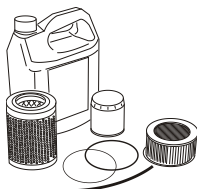
Thirty-five gallon capacity in a compact tank, complete with fittings and a gauge.



De-icer Kit

Part Number A700031

Insulated rope heater prevents freezing of lines and regulator in freezing conditions.



Service Kits

VR150 200 hour Part Number A700059

VR150 400 hour Part Number A700060

VR70 200 hour Part Number A700019

VR70 400 hour Part Number A700020

Using OEM service products will extend the life of your system. Includes oil, filters, seals and O-rings. 200 hour and 400 hour service interval kits are available

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Introduction

This manual provides operation instructions, specifications, adjustment, maintenance, and warranty information for the VMAC VR70 and VR150 underhood air compressor, and VMAC Electronic Throttle Controller.

Ordering Parts

To order parts, contact your VMAC dealer. Your dealer will ask for the VMAC serial number, part number, a description of the part and the quantity. To locate your nearest dealer, call 1-800-738-8622.

Important Safety Notice

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

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

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

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Safety Messages



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



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



This symbol is used to call your attention to additional instructions involving fire hazards.

Safety Precautions

Observe the following general safety rules:

- Pay attention to operations; do not leave the vehicle unattended.
- Follow safe work practices and wear the appropriate safety equipment when operating air-powered equipment, particularly eye and hearing protection.



Avoid all contact with pressurized air, because if it penetrates your skin it can enter your bloodstream and cause serious bodily harm or even death.

To prevent compressor explosion or fire, make sure that the air entering the compressor is free of flammable vapors.

To prevent compressor explosion or fire, make sure that correct servicing procedures and intervals are observed.

Vaporized oil propelled by high-pressure air is an explosive mixture.

Do not breathe the compressor air. Vaporized oil is a severe respiratory hazard.

Avoid contact with drive belts and stay clear of all moving parts when the system is operating.

- Follow all safety precautions for underhood mechanical work.
- Follow safety procedures for the type of work being completed.

Observe these rules when operating the compressor:

- Do not bypass or disable the oil temperature sensor.
- Do not expose the tank or compressor to extreme heat.

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- Do not perform any service until the system has been completely blown-down and you have verified that all air has been discharged.
- Do not try to repair or service a pressurized system
- Maintenance and repair on system components should only be performed by qualified personnel
- The vehicle must be in park (for automatic transmissions) or neutral (for manual transmissions) with the park brake or air spring brake fully applied before starting the compressor and at all times during compressor operation
- Use a regulator in the output line to precisely control the final air delivery pressure
- Run the system at idle speed under no-load conditions for 1 minute before turning the system off to allow system cooling and lubrication
- Do not bypass the park brake or DDC connections
- Do not operate the compressor while driving
- Do not tamper with the pressure relief valve
- Do not attempt to repair or modify any component

Installation Instructions


Detailed information provided in a separate publication, *Installation Manual for the Underhood Air Compressor*, which provides specific information for each different application.

This information includes torque tables, recommendations and other important information for correct installation. The information in the installation manual is intended for use by trained, professional technicians with the knowledge, tools, and equipment to do the job properly and safely. Installation should not be performed by persons without the appropriate skills.



Do not attempt to install any of these systems without the appropriate installation manual.

Ensure that the safety and operational instruction decal is affixed in an obvious location so that vehicle operators can easily see it.



**This vehicle is equipped with a
VMAC Air Compressor System.**

OPERATING INSTRUCTIONS

Daily Pre Start Check:

1. Check oil level in tank.
2. Check drive belt system.
3. Check for leaks.

Start Up Procedure:


1. Ensure air system is depressurized.
2. Ensure all air outlets are CLOSED.
3. Place vehicle in Neutral or Park and engage park brake.
4. Start engine and bring to operating temperature.
5. Turn ON compressor.

Shutdown Procedure:

1. Ensure discharge valve is CLOSED.
2. Allow engine to idle for 1 minute.
3. Turn OFF compressor.
4. Wait for system to depressurize before restarting.

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

4400644-A



WARNING
**Always allow system to
depressurize before restarting**

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System Specifications

Model: VR70 and VR150 Underhood Air Compressor

Type: rotary screw

Drive System: front end auxiliary drive

Control: electric on/off 12V clutch control

Maximum Air Delivery:

- VR70 70 CFM and 175 PSI / 1207 KPA
- VR150 150 CFM and 175 PSI / 1207 KPA

Pressure Regulation: mechanical inlet control valve modulates flow in response to demand

Engine Controls: throttle control to modulate between idle and upper limit RPM to maintain air requirements



NOTE: Some trucks have onboard computers that must be programmed by the OEM dealer to permit operation of the electronic throttle control.

Safety Features:

- 200 PSI / 1379 KPA relief valve in oil/air tank
- temperature safety sensor in compressor
- rapid blow-down valve to discharge system pressure on shutdown (10-15 seconds)
- drive disable circuit (DDC)

Lubrication: VMAC certified and approved synthetic oil

Filters:

- paper-type replaceable air filter
- spin-on type high pressure oil filter
- coalescing separator element

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Operating Principles

These systems use a flooded-lobe, rotary screw compressor. The oil-filled compressor housing contains two rotors.

Compression occurs when inlet air (at normal atmospheric pressure) enters a chamber where it is trapped between the rotating rotor lobes.

A lubricated pitch line provides sealing. As the lobes mesh, they reduce the volume of the air, compressing it to the desired pressure.

Oil Separation and Cooling

The system has a two-stage air/oil separator. The first separation stage consists of baffles, which perform mechanical separation. The second stage uses an integral serviceable coalescing element.

A liquid-to-liquid cooler connected to the engine cooling system cools the oil. This maintains the oil temperature in an optimal performance range that increases system durability and reduces the temperature of the compressed air.

Filtration

The rotary screw compressor is designed and machined to exacting tolerances. Foreign particles entering the system will drastically damage or shorten the life expectancy of the compressor and will result in damage to bearings, gears, rotors and the inside of the housing.

The system is equipped with a replaceable paper element air inlet filter, spin on cartridge type high pressure capable oil filter and a scavenge screen filter.

These system filters enhance performance and extend component life by reducing damage from dust and other debris. Proper filter maintenance is the key to long compressor life.

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Belt Alignment and Tensioning

This system is equipped with automatic belt tensioning and does not require manual adjustment. Always check pulley alignment to ensure proper belt operation. All components are designed and machined for precision, some variation in mounting holes may still occur.

Pressure Regulation and Engine Speed Control

The system uses two control systems; an inlet control valve incorporating a mechanical pressure regulator and an engine speed control that automatically adjusts engine RPM to respond to air consumption demand. These control devices provide the following benefits:

- instant response to air flow demands
- reduction of standby noise
- reduction of cooling system load
- fuel conservation when not using air

For information an adjustment, please refer to the section titled “Adjusting the System”

An external regulator is recommended for operation at pressures lower than 145 PSI / 999.7 KPA.

Safety Devices

A 200 PSI / 1379 KPA pressure relief valve in the tank to prevent system over pressure. The system is also equipped with an automatic rapid blow-down system to discharge system pressure on shutdown.

There is a switch which only permits operation when the mechanical or air park brake is applied. Vehicles with automatic transmission are fitted with a “Drive Disable Circuit”, (DDC) which disables the throttle control and prevents engine speed increase when the vehicle is in gear.

The compressor is equipped with an oil temperature sensor which stops system operation should the temperature become excessive.

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A fuse protects the system. If the fuse blows continuously, there is an electrical problem that will not be solved by a higher fuse rating. Exceeding the rating can cause component damage.

Do not disable or bypass the over-temperature shutdown circuit. Failure of the shutdown system could result in equipment damage, injury or death.

Line Protection

To prevent damage to the lines, observe the following:

- Always ensure that the hoses are secure, do not allow the hoses to dangle under the vehicle
- Always ensure that the hoses do not get pinched in steering or suspension components
- Make sure to keep the hoses away from hot surfaces, such as turbocharger housings or exhaust system components
- Hoses should not be bent tightly around sharp metal edges
- Ensure that hoses are kept away from fan blades or belts
- If the hoses are secured in a bundle, protect them from abrasion by insulating them from each other using rubber padding or plastic loom

Special Installation Notes

If you intend to use an auxiliary air tank with this system you must observe the following installation procedure. Failure to observe this procedure may result in damage to the system.

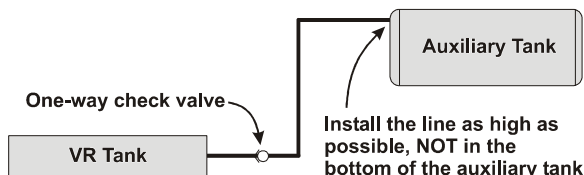
The line from the VMAC tank to the auxiliary air tank must have a check valve installed to prevent VR tank blow-down from draining the auxiliary tank and to prevent moisture from entering the VMAC tank.

The line to the auxiliary tank must not be installed in the bottom of the tank, but must be installed as high as possible to prevent water from clogging the line.

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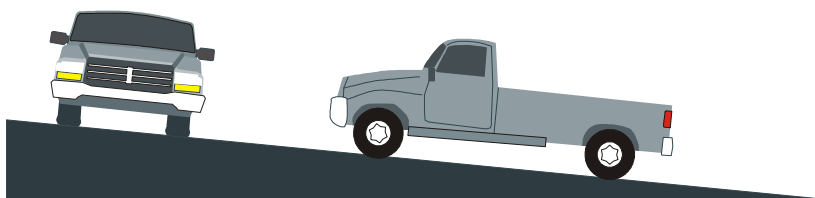
System Operation

Diesel Particulate Filter Warning (DPF)

When engine driven or PTO driven equipment is run on vehicles with DPF for extended periods of time, particulate may build up in the filter. All vehicles with a DPF have a warning light (or message) on the instrument panel or message center. Run time until filter build up depends on many variables and is the responsibility of the operator to monitor. It is suggested that if equipment is run for extended periods of time (over 1 hour) without driving, the vehicle DPF warning system must be checked after 1 hour and every 15 min thereafter. If the DPF warning light or message appears, see the vehicle owner's manual for methods of cleaning or regenerating.

Operating Instructions

The vehicle must not be parked on grades exceeding 15 ° in slope as this may affect lubrication and air/oil separation.



1. Place the manual transmission in neutral or the automatic transmission in park and fully apply the park brake.
2. Start and run the vehicle long enough for the engine to stabilize at base idle and reach normal operating temperature.
3. Close the hood (if open).
4. Close all compressor air system outlets.

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5. Activate the compressor using the ON button on the control box.



Digital control box



Please note that the digital control box will not allow system restart for 30 seconds.

Check the blow down valve for correct operation. If the blow down valve has failed, 30 seconds will not be adequate time to vent system pressure.

Engine RPM will rise for a few moments while the compressor system comes up to pressure, then RPM will settle to the standby speed which is at a preset base idle RPM. This is normal operation.



Starting the compressor immediately after shutdown will cause the belt to slip and the clutch to burn out.

Cold Climate Operation

1. Place the manual transmission in neutral or the automatic transmission in park and fully apply the park brake.
2. Start the vehicle engine and allow it to reach normal operating temperature.

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3. Allow the vehicle to run for an additional 15 minutes after reaching operating temperature to allow radiant heat transfer throughout the compressor system. If the vehicle is to be used consistently in cold climates the use of a de-icer kit (VMAC part #A700031) is recommended.
4. Activate the compressor by pressing the “ON” button.

The clutch will engage, a green light will be displayed on the control box and the engine speed will increase to the Maximum Rpm setting on the throttle, once the system has reached full regulated pressure, the engine should drop down to VR idle – a base preset idle RPM.

Control Box Features and Operation

Features of the control box:

- Turning the Compressor on when the ON button is pressed
- Turning the Compressor off when the OFF button is pressed
- Monitoring Compressor System Temperature
- Monitoring Battery Voltage
- Monitoring the Park brake signal
- Monitoring the Clutch Current
- Recording error codes when errors occur (data logging)
- Providing 200hr and 400hr service alerts

Warning/Information Messages:

Warning/Information Message		Warning/Information Description	Compressor State
1	HRS:XXXX:XX	Main Screen hour meter	On/Off
2	Park Brake	(Park Brake is not applied or bad signal)	Off
3	HRS:XXXX200HRSVC	(200HR service is needed)	On/Off
4	HRS:XXXX400HRSVC	(400HR service is needed)	On/Off
5	COMP TOO COLD	Compressor too cold for operation	On
6	TEMP XXXF/XXXC	(Displays elevated temperature 130°C/266° F to 150°C/300°F)	On/Off
7	Wait xx Seconds	A 30 second delay to allow for compressed air blow down.	Off

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There are 7 warning/information messages:

Error Messages:

There are 7 error messages:

Error Code	Display	Fault	LED Code	Possible Problem(s):
01	OVER TEMP	Compressor is too hot	RED LED ON	Low compressor oil level. Faulty or crushed cooler lines. Exceed cooling capacity of compressor cooling system. OEM changes in cooling; non- standard application.
02	TEMP PROBE SHORT	Short to ground in temp probe circuit	Flash code1 RED LED	Faulty temp probe. Crushed temp probe wires. Pinched or bared wires that are grounded.
03	TEMP PROBE OPEN	Open circuit in temp probe circuit	Flash code1 RED LED	Faulty temp probe. Broken temp probe wires. Unconnected temp probe.
04	BATTERY LOW	A battery voltage less than 11V has been detected	RED LED ON	Faulty power line connection. Bad or intermittent fuse. Broken or poorly crimped connectors. Truck charging system problems.
05	CLUTCH HIGH	Too high of current draw on clutch 5-10A	Flash code 2 RED LED	Faulty clutch. Broken or pinched clutch wire.
06	CLUTCH LOW	Too low of current draw on clutch<2A	RED LED ON	Faulty clutch. Broken or pinched clutch wire. Disconnected clutch wire.
07	CLUTCH SHORT	Too high of current draw on clutch >10A	Flash code 2 RED LED	Faulty clutch. Shorted to ground or pinched clutch wire.

Flash Codes

FLASH CODE 1



FLASH CODE 2



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Limp mode

Limp mode was created to provide a way to bypass the temperature sensor in case of a sensor failure. This mode is an emergency mode and should be used with extreme caution.

How it works:

Press "OFF" button until the DIAGNOSTICS screen will appear (approx 5 seconds). Release the "OFF" and the screen E01 xxxx xx will be displayed. Press the "OFF" button again. The screen "NO TEMP PROBE?" will appear. To disable the temp probe input, press the "ON" button TEMP PROBE DIS will appear. This means the temperature probe has been disabled. Press both "ON" and "OFF" keys at the same time to exit.

On the main menu screen NO TEMP. PROBE? and Red LED then CHECK OIL and Green LED and then hours and green LED. They will toggle between messages approx every second. The clutch and throttle will be on for 1 min and then off for one min in this mode. When power is removed from control box, the control box will operate normally.

Clearing 200hr and 400hr service Messages:

Press and hold OFF button for 5 sec minimum until DIAGNOSTICS screen appears. Release the OFF Button and then press and hold the OFF button until 200 HR CLEAR? Appears. Keep pressing the OFF button until message CLEAR OK appears. Use same procedure for 400 hr service. Press the "ON" and "OFF" buttons at the same time to exit diagnostics mode.

Retrieving data logged Error Messages:

1. Turn key ON. Do not start engine.
2. Press and hold "OFF" button until "DIAGNOSTICS" is displayed.
3. Press "OFF" to scroll down. Press "ON" to scroll up.
4. The following tables represent the lines that will be shown on the control box display. Completely fill in all of the blanks on the following tables.

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Automatic Shutdown

If the compressor oil gets too hot, the over-temperature circuit will disengage the compressor clutch, preventing operation of the system. The red indicator light on the control console will illuminate, indicating a problem.

If this problem persists, refer to the problem diagnosis section in this manual.

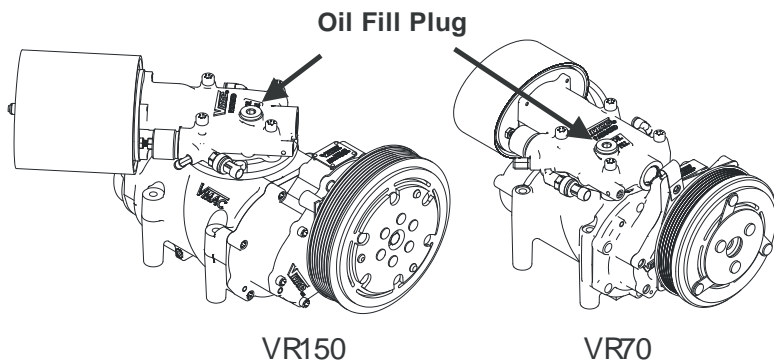
1. Press the “OFF” button on the control box.
2. Allow a few minutes for the system to vent pressure and for the oil to drain back to the tank, then check the oil level through the sight-glass on the tank. Oil level must be checked with the vehicle in a level position, not on a slope.
3. If the oil level is low, check and repair any leaks, then add oil until the correct level is reached.

Adding Oil to the System

1. Remove the fill plug (remote oil fill if equipped), from the inlet control valve.



The oil is clear and the level may be difficult to see in the sight glass. Have someone watch the level as you add oil.

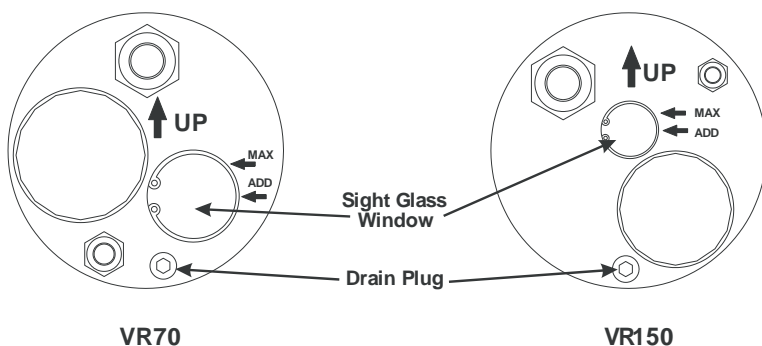


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2. Pour oil into the oil fill hole on the inlet control valve using a funnel. It is important not to overfill the system. Overfilling the system with oil can flood the sight glass window and make the system appear empty.
3. As you add oil, turn the compressor clutch clockwise with a ratchet and socket using the hex head cap screw at the center of the compressor clutch.
4. Allow five minutes for the oil to drain into the tank, then check the sight-glass on the tank to ensure that the correct oil level is attained.
5. Install the fill plug and tighten it securely.



You must use VMAC certified and approved synthetic compressor oil. Failure to use this oil will result in damage to the compressor and may void your warranty.

Adjusting the System

If insufficient airflow is developed under high demand conditions, check engine RPM.

When the inlet control valve is wide open, approximately thirty engine revolutions are required to produce one cubic foot of air flow from the VR70 compressor and fifteen for the VR150 compressor.

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The Throttle Control is adjusted at the factory to provide good results without adjustment in most typical, compressor applications. Some applications may require adjustments to provide the necessary airflow and pressure.

Engine RPM adjustments must be made so that the amount of air delivered by the system matches the requirements of the tools or equipment that you will be using.

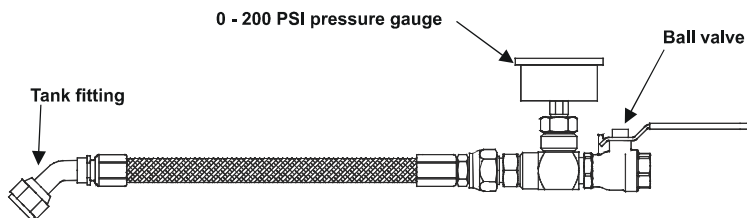
Airflow and system pressure are related. If airflow demands on the system are low, operating pressure will remain high. If airflow demands are high, operating pressure will reduce. By making adjustments to the engine speed while operating a specific tool, you will achieve optimum performance.

If you must set up a system without knowing the demands on the system, you can make engine speed adjustments by using an orifice in the outlet to simulate tool use. The diagram below shows a system testing and adjustment tool, (VMAC part # A700052) that you can use to simulate different operating situations. Install this tester to the tank output fitting before making any changes.



Use the correct orifice for the VR70 or VR150 system. These orifices are different and must be used for the correct application.

- ***For 70 CFM application, (VR 70) use a .190 ORIFICE, (part #3200224).***
- ***For 150CFM application, (VR150) use a .250 ORIFICE, (part #3200223).***



System Testing and Adjustment Tool - A700052

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Adjusting the Pressure Regulator

The pressure regulator is adjusted to limit maximum pressure to a safe level. Because pressure and flow are related, this adjustment is also very important for optimum performance. You cannot accurately adjust system flow by using the pressure regulator.

1. Install the test tool in the tank outlet with the ball valve closed.
2. Make sure that the oil level is correct and the system is at operating temperature.
3. Operate the system until it reaches full pressure. Observe the pressure on the gauge.
4. Loosen the adjusting screw lock nut on the regulator.
5. Pressure can be adjusted within a range of 145-175 PSI / 999.7 KPA – 1307 KPA, depending on your requirements.



Prolonged operation above 175 PSI / 1307 KPA may damage the pressure regulator.

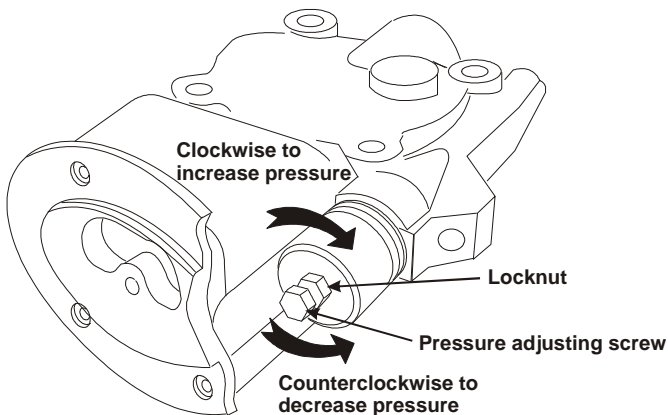
Never adjust the pressure cutout to exceed 175 PSI / 1307 KPA. 200 PSI / 1379 KPA will result in activation of the pressure relief valve at the air/oil tank. Rapid air loss will occur which may cause component damage, injury, or death.

6. Rotate the adjustment bolt clockwise to increase pressure. Rotate counterclockwise to decrease pressure. Tighten the lock nut.

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For illustration purposes only, the inner filter plate is shown partially cut away.

7. Open the ball valve to allow air to flow and pressure to drop. Engine speed should increase. Close the valve and observe the pressure to make sure that the adjustment is correct.

Electronic Throttle Control Adjustment

1. Place the manual transmission in neutral or the automatic transmission in park and fully apply the park brake.
2. Allow the vehicle to run until the engine is at operating temperature.
3. Operate the air compressor system until the oil is warm.
4. Open the ball valve on the test tool and observe the engine tachometer.



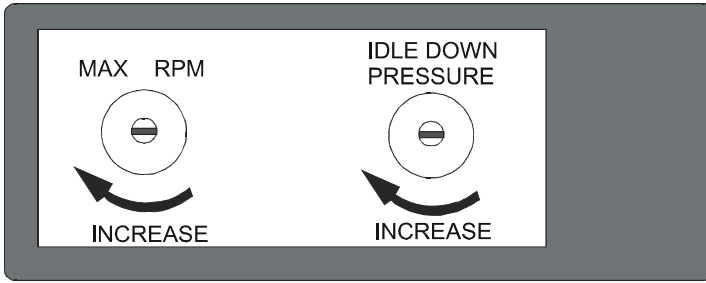
Make sure that there are no restrictions to air flow. If the system cannot produce maximum flow from the tank, there will be no change in RPM when you turn the adjusting screw.

5. Turn the maximum RPM adjustment screw clockwise to increase engine speed and counterclockwise to decrease maximum engine speed. Count the turns in case you have to start over.

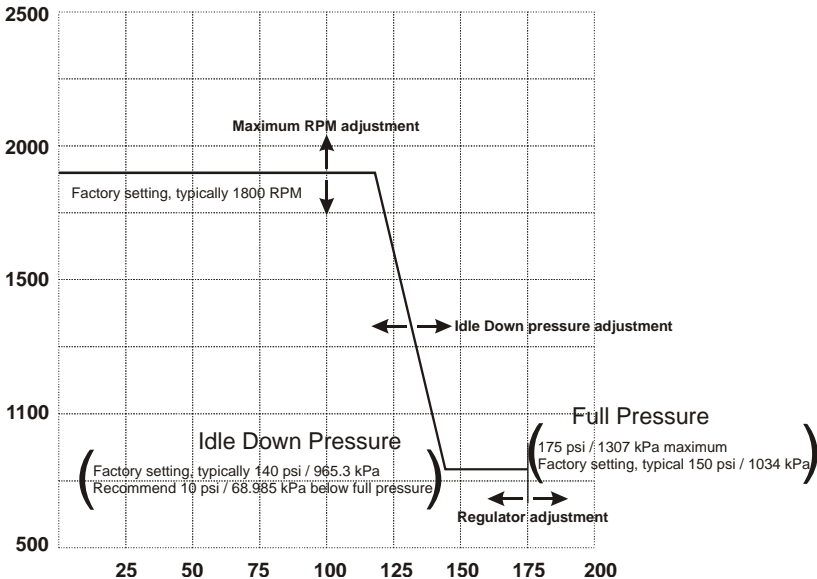
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6. Close the air valve slowly to allow the system pressure to rise.
7. Once the system pressure is at maximum, slowly open the ball valve on the test tool until the pressure is approximately 10 PSI / 68.95 KPA below maximum. Engine speed should start to ramp-up at this point.
8. Adjust the "Idle Down Pressure" up or down so that the engine speed just starts to climb at approximately 10 PSI / 68.95 KPA below maximum system pressure. The adjustment for idle-down pressure must be turned clockwise to increase pressure or counterclockwise to reduce pressure.



Routine Maintenance

The compressor system contains no reed-valves or other easily fouled, fatigue-prone components. With proper maintenance, the need for premature repair or component replacement can be drastically reduced.



Impact damage and premature bearing failure may occur in the compressor bearings if the system is not operated on a regular basis due to vibration caused by truck operation. Operate the system at least every 30 days for 15 minutes at no load to ensure bearing lubrication and rotation.

During the warranty period, you must follow the maintenance schedule and use only original genuine VMAC replacement parts to maintain your system and your warranty.

The most critical aspect of maintenance is proper air filtration and clean oil. If any particles enter the compressor through the air inlet, they can contaminate roller bearings, gears and the rotors in the compressor. Contamination will cause severe, rapid damage to components.



Never run the compressor, drive the vehicle or even allow the vehicle to sit parked without the recommended air filter and filter cover installed.

Maintenance Schedule

The following maintenance schedule should be observed to assure good performance and long service life. The hours indicated are those displayed on the Compressor Control Panel. Service should be performed at the lesser of the two intervals, whichever occurs first.

For replacement part numbers, please check the appropriate Illustrated Parts List for your application or call a dealer near you.



Always use a VMAC oil filter that is designed to withstand the high pressures, not an automotive filter.

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50 hours or 1 week:

Check the drive belt

Check pressure relief valve function

200 hours or 6 months:

Replace the air filter, oil filter and change oil

Use service kit #A700019 (VR70)

#A700059 (VR150)

400 hours or 1 year:

Replace the air filter, oil filter, coalescing element, pressure relief valve, muffler and change oil

Use service kit #A700020 (VR70)

#A700060 (VR150)

Inspect the Drive Belt

Check the drive belt carefully for evidence of glazing, missing portions of the ribs or damage to the belt edges and surface. If the belt is damaged, install a new drive belt.

Inspect all pulleys and idlers for damage. If any component shows cracks, chipping, impact damage or any other indications of physical damage, replace the pulley or idler.

If the damage indicates possible misalignment, check pulley alignment. If the pulleys are not properly aligned, check all fasteners to ensure that they are properly torqued and that there are no loose components.

Inspect the Muffler

Visually inspect the muffler for evidence of corrosion or loss of functionality. Ensure the muffler allows the blowdown cap to function. This can be tested by turning the system on and have it reach operating pressure. Turn the system off and listen for the pressurized air to blowdown through the muffler. If the muffler is showing signs of blockage, contact your local authorized VMAC dealer for a replacement part.

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Inspect the Pressure Relief Valve

Inspect the pressure relief valve for signs of corrosion or loss of functionality. To test the pressure relief valve functionality, turn the system on and bring it up to operating pressure. Pull the ring on the pressure relief valve to depressurize the system. Turn the system off, and ensure the system comes back to operating pressure when the system is restarted. If the pressure relief valve is showing loss of functionality, contact your local authorized VMAC dealer for a replacement part.



Relief valve failure can result in air/oil tank over pressurization leading to system failure or rupture.

Replacing the Air Filter

If the system has been just operated, shut off the engine and wait at least 30 seconds for the air pressure to vent before working on the system.

1. Clean loose debris from the area around the compressor and the filter cover to prevent contamination entering the compressor.
2. Remove the filter cover retaining nut, the filter cover and the filter element.
3. Immediately cover the air inlet opening by masking with tape or with a clean cloth to prevent contamination. Do not use compressed air or perform any other tasks around the compressor until the filter and cover are replaced.
4. Clean the inside of the filter cover with a clean, dry cloth. Do not use flammable solvents to clean the inside of the cover. If you do use solvent, rinse the inside of the cover thoroughly with fresh water and dry it before installing the cover.
5. Remove the cloth or masking and install a new air filter. Make sure that the filter fits over the machined step on the housing.
6. Replace the cover and secure it with the cover bolt. Do not over-tighten the bolt.



Never attempt to clean the filter element with compressed air. Replace the filter element.

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Replacing the Oil Filter

If the system has been just operated, shut off the engine and wait at least 30 seconds for the air pressure to vent before working on the system.



Do not attempt to change the oil filter until the oil has cooled. Hot oil can cause severe burns.

1. Clean the area around the tank and the filter to prevent contamination.
2. Remove the drain plug and drain the oil into a container large enough to hold at least 1.32 USG (5 liters) for the VR70 and 2.38 USG (9 liters) for the VR150.
3. Install and tighten the plug.
4. Remove the filter by turning it counterclockwise. Before discarding the filter, check to make sure that the threaded nipple did not unscrew with the filter. If the nipple is in the filter, remove it carefully to avoid thread damage and replace it in the tank housing.



Do not fully thread the nipple into the tank as this could inhibit the oil cross drilling causing system failure and potential compressor damage.

5. Check the gasket-sealing surface on the front of the tank for contamination, old gasket material or damage.
6. Apply a thin coating of compressor oil to the filter-sealing gasket and fill the filter with VMAC compressor oil.
7. 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 sealing gasket.



Never over-tighten the filter, as this may damage the seal or the filter.

8. Remove the filler plug from the air inlet control valve and pour VMAC compressor oil into the oil filler hole on the inlet control valve using a funnel.



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

9. Turn the compressor clutch clockwise to speed the fill process.
10. Allow 5 minutes for the oil to drain into the tank, then check the level at the sight glass at the front of the tank. Continue adding oil until the level is correct.



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

11. Install the fill plug in the inlet control valve and tighten it securely.
12. Place the manual transmission in neutral or the automatic transmission in park and fully apply the park brake.
13. Start the engine and allow it to reach operating temperature.
14. Press the “ON” button on the control box, allow the system to pressurize and return to preset base idle speed.
15. Press the “OFF” button on the control box.
16. Allow the system to settle for 5 minutes, and then check the oil level through the sight glass. The level must be between the minimum and maximum level indicators.
17. Check for oil leaks.

Changing Compressor Oil

If the system has just been operated, shut off the engine and wait at least 30 seconds for the air pressure to vent before working on the system. Also allow sufficient time for the oil to cool.

1. Clean the area around the oil drain plug on the front of the air/oil tank to prevent contamination.
2. Remove the drain plug and drain the oil into a container large enough to hold at least 5 litres (1.32 U.S. gal.) for the VR70 and 9 litres (2.38 U.S. gal.) for the VR150.

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3. Install and tighten the plug.
4. If you are replacing the oil filter, follow filter replacement procedures.
5. Remove the filler plug from the air inlet control valve and pour VMAC compressor oil into the oil filler hole on the inlet control valve using a funnel.



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

6. Turn the compressor clutch clockwise to speed the fill process.
7. Allow 5 minutes for the oil to drain into the tank, then check the level at the sight glass at the front of the tank. Continue adding oil until the level is correct.



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

8. Install the fill plug in the inlet control valve and tighten it securely.
9. Place the manual transmission in neutral or the automatic transmission in park and fully apply the park brake.
10. Start the engine and allow it to reach operating temperature.
11. Press the “ON” button on the control box, allow the system to pressurize and return to preset base idle speed.
12. Press the “OFF” button on the control box.
13. Allow the system to settle for 5 minutes, and then check the oil level through the sight glass. The level must be between the minimum and maximum level indicators.
14. Check for oil leaks.

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Changing the Coalescing Filter

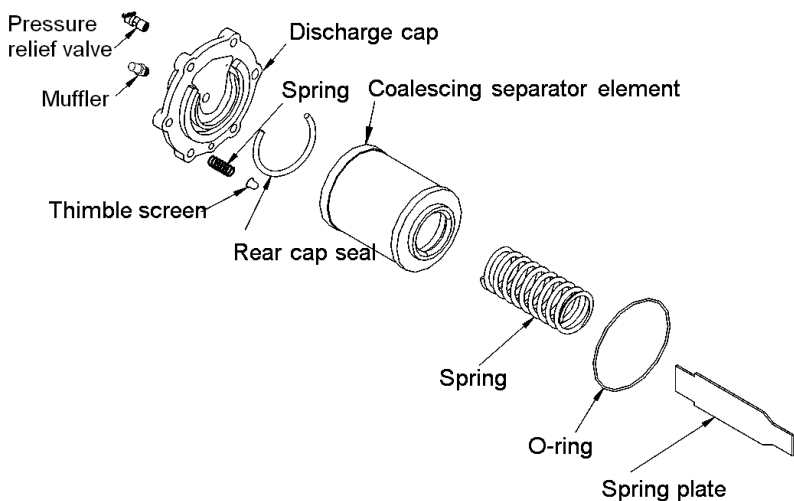
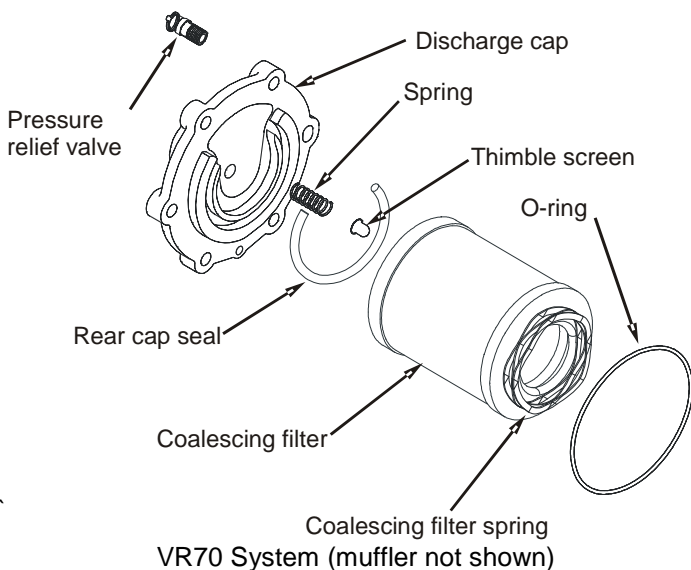
If the system has just been operated, shut off the engine and wait at least thirty seconds for the air pressure to vent before working on the system. Also allow sufficient time for the oil to cool.

In some applications, you may have to remove the tank from the frame and lower the back end to access the back of the tank.

1. Clean the front and back of the tank to prevent contamination.
2. Remove the drain plug and drain the oil into a container large enough to hold at least 5 litres (1.32 U.S. gal.) for the VR70 and 9 litres (2.38 U.S. gal.) for the VR150.
3. Install and tighten the plug.
4. If you are replacing the oil filter, follow filter replacement procedures.
5. Disconnect the air outlet line, 1/4 inch and 5/16 inch lines from the back of the tank.
6. Remove the bolts holding the discharge cap from the back of the tank and remove the cap and small spring.
7. Remove the coalescing filter with wave spring attached (or on the VR150, the large coil spring and spring plate) from inside the tank.



On older VR70 systems, remove and discard the large coil spring.



VR150 System



Check the inside of the tank for any evidence of metal filings or contamination; if found, flush the tank, hoses and cooler. Metal filings will damage the compressor.

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8. Remove and discard the O-ring seal and the rear cap seal.
9. Wipe out the inside of the tank
10. Remove the thimble screen and spring and clean the discharge cap.



If you use solvents for cleaning, thoroughly rinse the parts with hot water to remove all solvent residues.

11. Clean the thimble screen spring and clean or replace the thimble screen.
12. Install a new O-ring and rear cap seal.
13. Thoroughly clean the large spring and spring plate. Remove any rust or contaminants.
14. Install the large spring or wave spring (with spring plate on 150 systems – tapered end away from the filter) and a new coalescing filter. Make sure that the spring is in place, as it holds the coalescing filter tight against the rear cap seal.



The large spring or wave spring also prevents electrostatic buildup by grounding the coalescing filter. If the spring is not installed, an electric arc may occur, which could result in an explosion, potential tank rupture or fire.

15. Install the discharge cap and torque the bolts to specifications.
16. Install the lines on the back of the tank.
17. Remove the filler plug from the air inlet control valve.
18. Pour compressor oil into the oil filler hole on the inlet control valve using a funnel.



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

19. Turn the compressor clutch clockwise to speed the fill process.

20. Allow five minutes for the oil to drain into the tank, then check the level at the sight glass at the front of the tank. Continue adding oil until the level is correct.



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

21. Install the fill plug in the inlet control valve and tighten it securely.
22. Place the manual transmission in neutral or the automatic transmission in park and fully apply the park brake.
23. Start the engine and allow it to reach operating temperature.
24. Press the “ON” button on the control box, allow the system to pressurize and return to preset base idle speed.
25. Press the “OFF” button on the control box.
26. Allow the system to settle for five minutes, and then check the oil level through the sight glass. The level must be between the minimum and maximum level indicators.
27. Check for oil leaks.

Problem Diagnostics / Troubleshooting

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

- accurately identify the problem by operating the system yourself
- determine possible causes for the problem by understanding how the system operates
- isolate the potential causes by accurate testing using the correct, recognized procedures
- perform proper repairs using the correct procedures and the recommended replacement parts
- perform proper post-repair testing to ensure that the repairs were effective
- do not use test practices that are potentially harmful to people or the equipment
- electrical testing should be performed according to the processes described in the troubleshooting chart. For accurate diagnosis, refer to the electrical circuit diagram in the installation manual.

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Always ensure that manual transmissions are in neutral or automatic transmissions are in park with the park brake applied before starting the engine or operating the system

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Compressor does not run	Oil temperature too high.	Turn compressor off, allow to cool for 30 minutes, retry.
	Oil level is too low.	Park on level ground, check level at sight glass, add as necessary.
	Drive belt is broken.	Install new compressor belt. Check alignment of pulleys. Replace automatic tensioner.
	No power to the clutch.	Check for 12 V at the clutch, check fuse, check for broken wires or failed switch.
	Bad clutch ground.	With 12 V applied to the clutch check for voltage between the clutch stator housing and the engine. If voltage is present, ground the stator.
	Open clutch stator windings.	With compressor switch off and clutch wire disconnected, check resistance between the input wire and ground. Resistance (less lead resistance) should be 2.5 ohms to 3.0 ohms. If outside this range replace the stator.
Frequent over-temperature shutdowns.	Low oil level.	Check oil on level ground, add as required.
	Restriction in the compressor oil hoses.	Check for kinked or pinched oil hoses.
	Compressor oil filter plugged.	Replace oil filter.
	Heat exchanger not functioning or is fouled with deposits.	Remove and clean or replace heat exchanger.
	Engine cooling system failure (high engine temperature).	Correct engine cooling problems.
	Engine fan clutch slipping.	Replace fan clutch.
	High ambient temperatures.	Reduce duty cycle.
	Oil temperature probe failure.	Replace if defective.
	System needs service	Perform recommended service

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SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Excessive air pressure	Pressure regulator valve too high.	Reduce system pressure by adjusting pressure regulator valve.
	System return line blocked or frozen	Clear or replace the line.
Engine stalls when compressor is activated.	System is under pressure.	Allow sufficient time for blow-down.
	Blow-down valve not working.	Replace blow-down valve.
	RPM setting too low or throttle not set correctly.	Readjust RPM and throttle settings for optimum operation.
	Throttle control not connected properly at foot pedal	Check for proper connections.
Belt squeals when compressor switch is activated.	System is under pressure.	Allow 10 seconds for blow-down.
	Blow-down valve not working or muffler is plugged.	Replace blow-down valve or clean muffler.
	Improper belt tension.	Check belt tensioner.
	Belt is glazed.	Replace belt.
Frequent relief valve operation.	Pressure regulator setting too high.	Adjust pressure regulator setting below 160 PSI / 1103 KPA.
	Pressure control line plugged or frozen.	Remove the pressure control line and clear any obstructions. (Blow out.)
	Relief valve defective.	Replace relief valve.
Power fuse blows.	Short to ground in the control circuit.	Locate and correct short or replace control panel.
	Incorrect fuse.	Install correct OEM fuse.
	Incorrect wiring.	Repair wiring according to wiring diagram.
Low air pressure.	Air flow is too high.	Reduce consumption.
	Throttle control set too low.	Increase maximum RPM settings.
	Pressure regulator valve set too low.	Increase pressure by adjusting pressure regulator valve.
Engine RPM excessive on initial startup and during operation.	Maximum RPM setting is too high.	Reduce maximum RPM setting throttle control or reset cable nipple.
	Idle-down pressure is too high.	Reduce idle-down setting of the throttle control.

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SYMPTON	POSSIBLE CAUSE	CORRECTIVE ACTION
Objectionable noise level.	Excessive gear wear.	Contact the nearest dealer to replace compressor/gearbox assembly. Refer to the dealer.
	Maximum RPM setting higher than necessary to meet air demand requirements.	Reduce maximum RPM settings.
	Operating with the hood open	Close the hood.
Engine RPM stays at base idle when compressor runs.	Mechanical throttle control receiving power, housing is acting as a chassis ground.	Test and correct connections.
	Throttle control not adjusted properly.	Adjust throttle controls.
	Poor electrical connections.	Test and correct connections.
	Throttle control not functioning.	Replace throttle control.
	Pressure sensor defective or disconnected.	Check connections or replace pressure sensor.
Engine RPM over-revs when compressor is activated.	Throttle controls not connected properly.	Check and correct connections.
	Throttle control not setup properly.	Adjust high idle screw.
	Pressure sensor defective or disconnected.	Check connections or replace pressure sensor.
Engine RPM does not return to base idle.	Wiring fault.	Check and correct wiring according to wiring diagram.
	Throttle not properly adjusted.	Adjust idle down screw.
Engine RPM stays at maximum whenever the compressor is running.	Idle-down setting is too high.	Reset idle-down pressure.

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SYMPTON	POSSIBLE CAUSE	CORRECTIVE ACTION
Excessive oil in the air.	Failed coalescing separator element.	Replace element.
	Clogged scavenge line screen.	Clean or replace parts as required.
	High oil level.	Correct oil level.
	Poor fit between coalescing filter and tank – lack of seal at O-rings.	Replace parts as required.
	Vehicle is not within requirements of 15 degrees of level.	Level vehicle and check for oil in the air.
	Compressor was turned off while running at high speed.	Allow engine RPM to drop before turning the compressor off.
	Wing tank – volume shutting down under load.	Clean or replace parts as required.
Oil blows out of compressor air filter on compressor shutdown.	Shutting the engine off while running at high speed.	Allow engine to idle-down before shutting down the compressor. Turn off any air tools before shutting down compressor.
Oil drips from clutch after shutdown.	Seal leaking.	Contact the nearest dealer to replace gearbox input shaft seal.

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VMAC Warranty

1. GENERAL PROVISIONS AND LIMITATIONS

- 1.1 VMAC, Division of Mangonel Investments Corporation, (hereafter "VMAC") warrants to each original retail purchaser (hereafter "Buyer") of its new Underhood Air Compressor Systems (hereafter "Product(s)") from VMAC or its authorized Dealers that such Product(s) are, at the time of delivery to the Buyer, free of manufacturer defects in material and workmanship.
- 1.2 Product Warranty – Underhood Air Compressors applies to Products(s) manufactured on or after January 1, 2005. (System ID numbers ending with TA001 or greater).

2. NO WARRANTY IS MADE WITH RESPECT TO

- 2.1 Any Product(s) which have, in VMAC's judgment, been subject to negligence, accident or improper storage, installation, application, operation or maintenance, or have been repaired or altered in such a way that affects the Product(s) adversely.
- 2.2 Components or accessories manufactured, warranted and serviced by others.
- 2.3 Damages caused from normal maintenance service and repairs and corrections with minimum action, such as adjustments and inspections, or replacement of items, such as service filters, belts, seals and service kits.
- 2.4 Consequential damages caused by Product(s) failure.
- 2.5 Any Product(s) if other than VMAC's genuine components are used in the Product(s).
- 2.6 Normal wear and tear of Product(s).

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3. WARRANTY PERIOD

- 3.1 The warranty period will commence upon installation of the Product(s). The returned warranty registration form marks the date of installation. If the warranty registration form has not been received by VMAC within 6 months from the date of installation of the Product(s), then the warranty period will be deemed to commence 30 days from date of shipment from VMAC. For the full warranty period to apply, installation of Product(s) must be completed within 36 months from the date of shipment of the Product(s) from VMAC.
- 3.2 The following components of Product(s) are warranted against manufacturer defects in materials and workmanship for a period of 24 months or 2,000 hours of operation, whichever expires first: Compressor, Brackets, Air/Oil Separator Tank and Oil Cooler.
- 3.3 All other components of Product(s), not listed in 3.2, are warranted against manufacturer defects in materials and workmanship for a period of 12 months or 1,000 hours of operation, whichever expires first.
- 3.4 Replacement components of Product(s) listed in 3.2, excluding VMAC factory rebuilt components, shall be warranted for the remainder of the original warranty period. If the original warranty period has expired, replacement components of Product(s) listed in 3.2 and purchased by Buyer, excluding VMAC factory rebuilt components, shall be warranted for a period of 12 months or 1,000 hours of operation, whichever expires first.
- 3.5 VMAC factory rebuilt components shall be warranted for a period of 6 months from date of shipment from VMAC.
- 3.6 Replacement components of Product(s) listed in 3.3, shall be warranted for the remainder of the original warranty period. If the original warranty period has expired, replacement components of Product(s) listed in 3.3 and purchased by Buyer, shall be warranted for a period of 12 months or 1,000 hours of operation, whichever expires first.

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4. VMAC OBLIGATIONS

- 4.1 VMAC's obligation is limited to repairing or, at VMAC's option, replacing, during normal business hours at an authorized service facility of VMAC, any component, which in VMAC's judgment is proven to be defective as warranted.
- 4.2 VMAC's obligation is limited to Product(s) proven to be warranted. No liability is accepted for any consequential damages, injuries or expenses directly or indirectly related to Product(s) failure.

5. BUYER OBLIGATIONS

- 5.1 Buyer shall notify VMAC of the alleged defect within 10 days of initial discovery and return the allegedly defective component(s) within 30 days of initial discovery.
- 5.2 The Buyer must prepay all costs associated with the warranty claim and submit receipts and/or invoices to VMAC for evaluation.
- 5.3 If required by VMAC, the Buyer must return components claimed under this warranty to a facility designated by VMAC for evaluation, to establish a claim under this warranty.
- 5.4 Buyer shall maintain and service VMAC Product(s) in accordance with the VMAC Product(s) Owner's Manual.

6. WARRANTY REGISTRATION VALIDATION

- 6.1 A warranty registration form is provided to the Buyer with the Product(s). The form must be fully completed by the Buyer and returned to VMAC upon completion of the installation of the Product(s) to validate the warranty. Warranty registration can also be completed online on the VMAC website at <http://www.vmac.ca/index.php?warrantyregistration>. Warranty claims will not be processed unless VMAC has received a fully completed warranty registration form.

7. DISCLAIMER AND WARRANTY SERVICE

- 7.1 Any labor costs claimed in excess of VMAC's set rate and/or times are not provided by this warranty. If applicable, any labor costs in excess of VMAC rate schedules caused by, but not limited to, location or inaccessibility of the equipment, travel time or labor provided by unauthorized service personnel are not provided by this warranty.
- 7.2 This warranty is in lieu of all other warranties or obligations express or implied. VMAC expressly disclaims all implied warranties of merchantability or fitness for a particular purpose.
- 7.3 Warranty claims must be pre-authorized by VMAC, and the components returned via prepaid freight using the designated "Returned Merchandise Authorization" number and form.

