



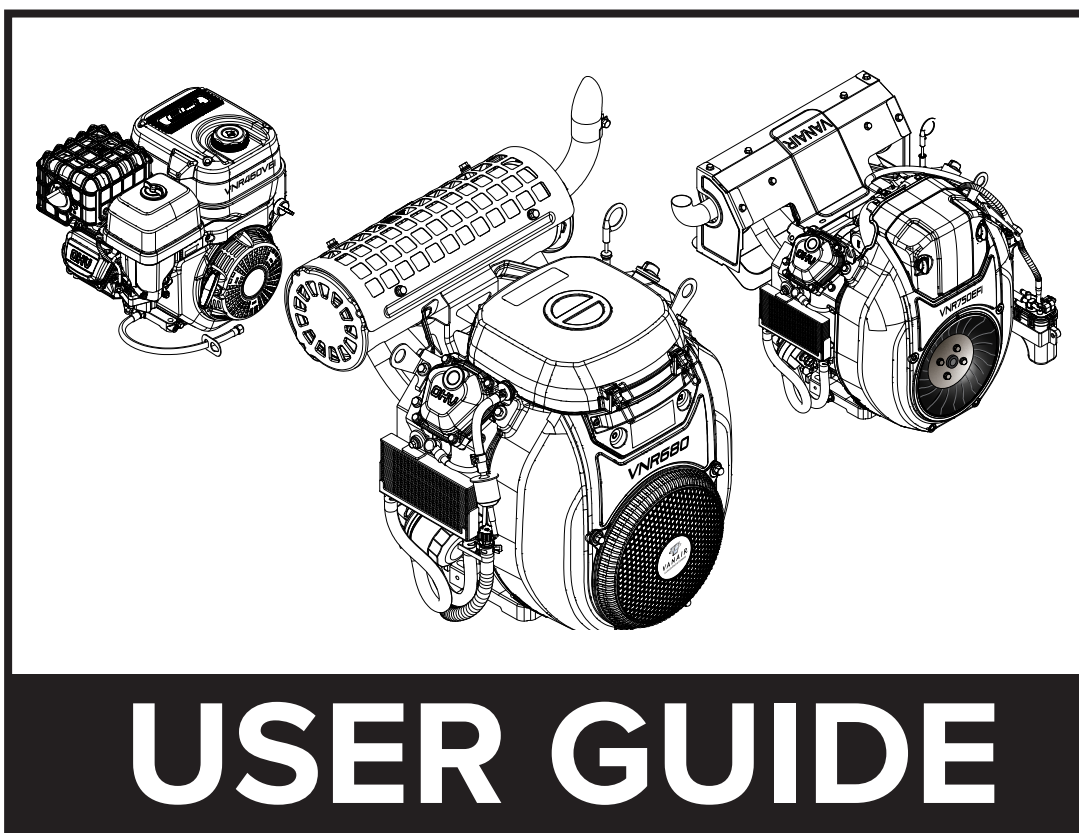
VANAIR®

A Lincoln Electric Company

VNR460VEI • VNR680 • VNR750EFI

VANAIR® VNR GASOLINE-POWERED INTERNAL COMBUSTION ENGINE MANUAL

PART NUMBER 090234_R1



OPERATIONAL AND REFERENCE MANUAL KEEP THE MANUAL WITH THE VEHICLE

NOTE: Read this manual before installing, operating or servicing this equipment. Failure to comply with the operation and maintenance instructions in this manual will VOID the Equipment Warranty.

This publication contains the latest information available at the time of preparation. Every effort has been made to ensure accuracy. Vanair®, a Lincoln Electric Company, reserves the right to make design changes, modifications or improvements without prior notification.

Making unauthorized modification to the system components Will Void the Warranty! Always contact Vanair® before making any changes to the system.



VANAIR® VANTAGE WARRANTY

This limited warranty supersedes all previous Vanair® warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY—Subject to the expressed terms and conditions set forth below, Vanair®, a Lincoln Electric Company ("Vanair"), of Michigan City, Indiana (USA), warrants to the original retail purchaser of new Vanair® equipment that such equipment is free from defects in materials and workmanship when shipped by Vanair®.

Vanair® must be notified in writing within thirty (30) days of any such defect or failure. **All warranty or returns must be pre-authorized in writing prior to performing warranty work.** Call Vanair® for process and forms. Vanair® will provide instructions on the warranty claim procedures to be followed.

Warranty will commence upon receipt of the Warranty Registration. If the Warranty Registration is not received within six (6) months of shipment from Vanair®, the warranty commencement date shall be thirty (30) days from the date of shipment from Vanair®. Records of warranty adherence are the responsibility of the end user.

For warranty claims received by Vanair® within the applicable warranty periods described below, Vanair® will repair or replace, at its option, any part that is proven to be defective in material or workmanship under normal operation during the applicable warranty time period. Warranty repairs and replacements will be made without charge for parts and labor. Anything replaced under warranty becomes the property of Vanair®, a Lincoln Electric Company. Any parts repaired or replaced will be considered as part of the original product and any warranty on those parts will expire when the product's original warranty expires. Vanair® is not responsible for time or labor to gain access to the machine to perform work. **WARRANTY WILL BE VOID IF GENUINE VANAIR® PARTS AND FLUIDS ARE NOT USED.**

1. 3 Years Parts – 1 Year Labor
 - VNR460VEI
 - VNR680
 - VNR750EFI

This Limited Warranty shall not apply to:

1. Consumable components, such as spark plugs, fuel filters, air cleaner elements, recoil starter rope, oil, and oil filters or parts that fail due to normal wear and use.
2. Equipment that has been modified by any party other than Vanair® or equipment which has not been used and maintained in accordance with Vanair's specifications.
3. Equipment which has been improperly installed and/or improperly operated, based upon Vanair's specifications for the equipment or industry standards.
4. Equipment installed by non-authorized or third party personnel. Vanair® products are intended for purchase and use by commercial/industrial users and persons trained and experienced in the use and maintenance of industrial equipment.

In the event of a warranty claim covered by this Limited Warranty, the exclusive remedies shall be, at Vanair's sole discretion: (i) repair; or (ii) replacement; (iii) where authorized in writing by Vanair® in appropriate cases, the reasonable cost of repair or replacement at an authorized Vanair® service facility; or (iv) payment of (or credit for) the purchase price (less reasonable depreciation based upon actual use) upon return of the equipment at the warranty claimant's risk and expense. Vanair® will pay standard ground freight for any warranty item shipped to and from Vanair® or (Vanair® designated facility) within the first year of the applicable warranty period. Any additional expedited freight cost is the responsibility of the purchaser.

TO THE GREAT EXTENT PERMITTED BY APPLICABLE LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES APPLICABLE TO THE VANAIR® EQUIPMENT. IN NO EVENT SHALL VANAIR® BECOME LIABLE FOR DIRECT, INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT OR LOST BUSINESS OPPORTUNITY), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY. IN NO EVENT SHALL VANAIR® BECOME OBLIGATED TO PAY MORE ON ANY WARRANTY CLAIM THAN THE PURCHASE PRICE ACTUALLY PAID BY THE ORIGINAL RETAIL PURCHASER.

THIS LIMITED WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER WARRANTY OR GUARANTEE ARISING BY OPERATION OF LAW. ANY WARRANTY NOT EXPRESSLY PROVIDED HEREIN, IMPLIED WARRANTY, GUARANTEE AND ANY REPRESENTATION REGARDING THE PERFORMANCE OF THE EQUIPMENT, AND ANY REMEDY FOR BREACH OF CONTRACT, IN TORT, OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE, OR COURSE OF DEALING ARE EXCLUDED AND DISCLAIMED BY VANAIR®.

Some states in the United States of America do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, and as such, the above limitations and exclusions may not apply to you. This warranty provides specific legal rights. Other rights may be available to you, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be saved, the limitations and exclusions set out forth above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.



VANAIR®
A Lincoln Electric Company

**ALL WARRANTY OR
RETURNS MUST BE
PRE-AUTHORIZED PRIOR
TO PERFORMING
ANY WARRANTY WORK.**

(844) VAN - SERV

SERVICE@VANAIR.COM

PARTS@VANAIR.COM

**10896 W. 300 N.
MICHIGAN CITY, IN 46360**

(800) 526-8817

VANAIR.COM

EFFECTIVE: JUNE 26, 2026

Warranty and Claims Procedure

WARRANTIED VANAIR® PARTS

This process must be used by owners of Vanair® equipment in situations where a warrantied item needs repair or replacement under the terms of the purchase warranty. **Do Not** return items to Vanair® without prior authorization from the Vanair® Warranty Administrator.

PROCEDURE:

Customers needing assistance in troubleshooting a system and/or returning parts, please follow the steps below.

1. Locate the machine's serial number(s).
See **Section 5.9, Figure 5-23**.
2. Make a list of the symptoms/condition/malfunctions noticed along with any applicable temperature and pressure readings, and also the number of operational hours available:
3. Note that the above information will also need to be included on the Return Material Authorization Form; this form is necessary for warranty processing if the warranty claim is deemed valid by the service case review.
4. Contact the Vanair® Service Department by phone (1-844-VANSERV or 1-219-879-5100) to speak with a Service Technician.
5. Vanair® Service will troubleshoot the problem based on the information provided by the customer, and attempt to return the unit to service as quickly as possible.
6. If the unit cannot be returned to service, and Vanair® determines this matter is a warranty issue, the Service Technician will assign an RMA (Return Material Authorization) number that will provide for the return of the item to Vanair® for analysis and a final determination as to the item's warranty status.
7. Warranty Claims are solicited via a Case Number. This form can be obtained via download from the web site, or requested directly from the Vanair® Service Department.

Once a Case Number has been obtained, follow the instructions given on the form to fill in the information needed. This form is used for the purpose of requesting a warranty case.

! IMPORTANT !

If the part is not returned by the customer to the Vanair® Service Department within 30 days, the RMA becomes void and any claims will be denied.

All labor claims or invoices must be approved by the Vanair® Warranty Administrator prior to starting repair work along with the cost of the repair. All paper work associated with the returned item and warranty repair cost must reference the RMA number issued against the part, and be forwarded to Vanair® within 30 days of the completion of work.

The RMA number must appear on the outside of the package where it can be seen before being returned.

NOTICE

Before sending a warranty part to a customer, Vanair® will need a P.O. or credit card number to cover the initial cost of the part and shipping.

After the part is analyzed and it is deemed to be covered under warranty, Vanair® will issue a credit back to the customer. All parts eligible for warranty must have the RMA number on the order at the time of purchase.

No items can be returned "freight collect". Freight costs will be addressed at the time the claim is closed. The customer pays any additional costs for warranty parts delivered using expedited services (i.e., Next Day, Second Day, Priority, etc.).

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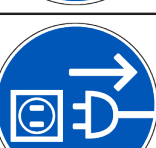
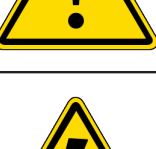
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SECTION 1: Safety

1.1 SAFETY/WARNING SYMBOLS AND MEANINGS

	WEAR EYE PROTECTION (Flying debris or other eye hazard may be present).		EXPLOSIVE MATERIAL OR EXPLOSIVE HAZARD (Conditions or materials may exist that can cause explosion).
	WEAR HEARING PROTECTION (Harmful sound volume may be present).		HOT SURFACE WARNING (Surfaces may be hot. Use caution, proper protection or allow to cool before handling).
	READ INSTRUCTIONS OR MANUAL		ROTATING OR MOVING PARTS WARNING (Moving/rotating parts present, may cause damage or physical injury).
	DISCONNECT POWER (Disconnect from power to avoid accidental start or avoid electrical current).		HAND ENTANGLEMENT WITH BELT DRIVE WARNING (Belt drive present. Use caution to avoid pinch points and personal injury).
	WEAR PROTECTIVE GLOVES (Chemical, thermal or harmful conditions may exist that may be harmful to bare hands).		AUTOMATIC START UP WARNING (Equipment can start up/run automatically without warning).
	DO NOT USE WATER TO EXTINGUISH ELECTRICAL FIRES (Water conducts electricity. This may spread, cause harm or added damage when used on certain types of fires. Use a Class C rated fire extinguisher for electrical fires.)		BURST/PRESSURE RELEASE WARNING (High pressure condition may exist that can cause equipment to burst or cause bodily injury).
	GENERAL CAUTION OR WARNING (Important information regarding cautions or warnings).		BATTERY CHARGING WARNING (Beware of heat, leaks and harmful gas around certain types of batteries being charged).
	ELECTRICAL SHOCK/ELECTROCUTION HAZARD (Electricity and electrical circuits present that may cause electrical shock or sparking).		FLAMMABLE MATERIAL/FIRE HAZARD WARNING (Conditions and/or materials exist that may be flammable or cause a fire).

SAFETY/WARNING SYMBOLS AND MEANINGS (CONT.)

	WEAR EAR and EYE PROTECTION (Loud noise level and flying debris or other eye hazard may be present).
	ASPHYXIATING ATMOSPHERE DANGER Area is/or may contain a dangerous gas that creates an unbreathable environment. Ventilate area.)
	HEALTH HAZARD (Magnetic fields produced by this machine may affect Pacemakers).
	BEWARE FALLING UNIT CAN CAUSE INJURY (When transporting or moving, please note falling unit can cause severe injury or death).

1.2 GENERAL INFORMATION

The products provided by Vanair®, a Lincoln Electric Company are designed and manufactured for safe operation and maintenance. But it is ultimately the responsibility of the users and maintainers for safe use of this equipment. Part of this responsibility is to read and be familiar with the contents of this manual before operation or performing maintenance actions.

1.2.1 DANGERS, WARNINGS, CAUTIONS, AND NOTES

NOTICE

Additional information (or existing information) which should be brought to the attention of operators/maintenance technicians affecting Safety, Operation, Maintenance or Warranty requirements.

DANGER

Identifies action or conditions which, if not avoided, will result in serious bodily injury or death.

WARNING

Identifies actions or conditions which, if not avoided, may result in serious bodily injury or death.

CAUTION

Identifies action or conditions which, if not avoided, could cause minor to moderate bodily injury.



1.3 INTERNATIONAL SAFETY SYMBOL

Many of the symbols and meanings shown in **Section 1: Safety** are used to call attention to and identify possible hazards that may be encountered using powered equipment.

International Warning Symbols are used on all decals, labels and signs that concern information pertaining to bodily harm. When you see the International Warning Symbol, pay extremely careful attention, and follow the given instructions or indications to avoid any possible hazard.



1.4 FUMES AND GASES CAN BE HAZARDOUS

- **DO NOT** breathe fumes produced during engine operations.
- If ventilation is poor, wear an approved air-supplied respirator.
- **DO NOT** block filter or airflow to unit.
- Read and understand the Material Safety Data Sheets (MSDS) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasing agents.

DANGER

Do Not OPERATE IN AN ENCLOSED SPACE.
Running any combustion engine in an enclosed space may result in Carbon Monoxide (CO) poisoning. Carbon Monoxide (CO) build-up may cause death! Overheating can ignite surrounding materials resulting in fire and/or explosion which can cause injury, death or equipment damage.



1.5 HOT PARTS CAN CAUSE SEVERE BURNS

- **Do Not** touch hot parts bare-handed.
- Allow all hot work and equipment to cool before handling or working on equipment. To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



1.6 NOISE CAN DAMAGE HEARING

- Noise from engine can damage hearing.
- Wear approved ear protection when exposed to high noise levels.



1.7 BATTERY EXPLOSION CAN BLIND

- Always wear a face shield, rubber gloves, and protective clothing when working on a battery.
- Stop engine before disconnecting or connecting battery cables or servicing battery.
- Avoid touching terminals with metal tools that may cause sparks when working on a battery.

- **DO NOT** use weld mode to charge batteries or jump-start vehicles.
- Observe correct polarity (+ and -) on batteries.
- **Connect Negative (-)** cable first and **Disconnect Negative** last to reduce risk of electrical arcing.



1.8 ENGINE HAZARDS

1.8.1 GASOLINE CAN BE A SOURCE OF FIRE OR EXPLOSION

- Stop engine and let it cool off before checking or adding fuel.
- Keep gas nozzle in contact with unit's fuel tank when filling to reduce risk of static electric arc.
- **DO NOT** add fuel while smoking or if unit is near any sparks or open flames.
- **DO NOT** fuel equipment while using electronic devices, these can ignite gas fumes.
- **DO NOT** overfill tank, or fill to the very top of tank. Allow room for fuel to expand.
- **DO NOT** spill fuel. If fuel is spilled, clean up before starting engine.
- Dispose of rags in a fireproof container.



1.8.2 MOVING PARTS CAN CAUSE INJURY

- Keep away from fans, belts, and rotors. Keep all doors, panels, covers, and guards closed and securely in place.
- Stop engine before installing or connecting unit.
- Have only qualified people remove doors, panels, covers, or guards for maintenance and trouble-shooting as necessary.

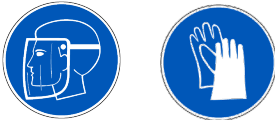
Vanair® VNR Engines

- Disconnect **Negative** (–) battery cable from battery to prevent accidental starting during servicing.
- Keep hands, hair, loose clothing, and tools away from moving parts.
- Reinstall doors, panels, covers, or guards when servicing is finished and before starting engine.
- Before working on generator, remove spark plugs or injectors to keep engine from kicking back or starting.
- Block flywheel so that it will not turn while working on generator components.



1.8.3 ENGINE EXHAUST GASES CAN KILL

- **DO NOT** install or operate the engine in an enclosed space.
- If the unit must be used in an enclosed area, vent the engine exhaust outside and away from any building or unit air intakes.



1.9 BATTERY ACID CAN BURN SKIN AND EYES

- Wear protective gloves and eye protection
- **DO NOT** tip the battery.
- Replace damaged battery.
- If fumes or liquid from battery get in your eyes or on your skin immediately flush with water.

1.10 ENGINE HEAT CAN CAUSE FIRE

- **DO NOT** locate unit on, over, or near combustible surfaces or flammables.
- Keep exhaust and exhaust pipes way from flammables.



1.10.1 EXHAUST SPARKS CAN CAUSE FIRE

- Use an approved engine exhaust spark arrester in required areas.
(See all applicable codes.)



1.11 READ OPERATING INSTRUCTIONS

- Read Owner's Manual before using or servicing unit.
- Stop engine and release air pressure before servicing.
- Use only genuine Vanair® replacement parts.



1.12 ADDITIONAL SYMBOLS

1.12.1 FALLING UNIT CAN CAUSE INJURY

- Use lifting bail to lift unit and properly installed accessories only.
- Lift and support unit only with proper equipment and correct procedures.
- If using forklift to move unit, ensure forks are long enough to extend beyond opposite side of unit.



1.13 OVERHEATING CAN DAMAGE MOTORS

- Turn off or unplug equipment before starting or stopping the engine.
- **DO NOT** let low voltage and frequency caused by low engine speed damage electric motors.



1.14 FLYING SPARKS CAN CAUSE INJURY

- Wear a face shield to protect eyes and face.
- Sparks can cause fires.
- Keep flammables away from work area.



1.15 CALIFORNIA PROPOSITION 65 WARNING

- **WARNING:** This product contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code §25249.5 et seq.)

1.16 PRINCIPAL SAFETY STANDARDS

- National Electrical Code, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, web site: www.nfpa.org and www.sparky.org).
- Practice For Occupational And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 11West 42nd Street, New York, NY10036-8002 (phone: 212-642-4900, web site: www.ansi.org).
- Standard for Fire Prevention During **Hot Work**, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, web site: www.nfpa.org).
- OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart

J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices; phone for Region 5, Chicago, is 312-353-2220, web site: www.osha.gov).

WARNING

DO NOT REMOVE OR COVER ANY SAFETY LABEL OR DECAL.

Replace any Safety labels that become damaged or illegible.

For machine packages that ship with labels, these are to be affixed upon arrival. All Safety decals **MUST** be placed on the machine in their proper locations, as shown on the decal pages in

Section 7 of this machine's manual.



1.17 SAFETY DECALS

Safety decals are placed onto, or located near, system components that can present a hazard to operators or service personnel.

All information provided on these decals is provided for the safe operation of the unit, for the safety of the operator and the public. Decals also inform operators of safety precautions and/or hazardous conditions that may exist while using this product. Always heed the information noted on the unit's safety decals.



1.18 DISPOSING OF MACHINE FLUIDS

- Always dispose of machine fluids under the guidance of all applicable local, regional and/or federal law.
- Vanair® encourages recycling when permitted. Consult the product's container labeling for more information.

SECTION 2: Specifications

2.1 GENERAL INFORMATION

The Vanair® VNR Engines are overhead valve gasoline engines that are used to power various Vanair® equipment. **See Table 2A for Vanair® VNR Engine Specifications.**

NOTE: The engine parameters can vary with different specifications and configurations and may be changed at any time without prior notice. For mounting specifications, see **Figure 2-1: Mounting Dimensions.**

TABLE 2A: VANAIR® VNR ENGINE SPECIFICATIONS

Category	Item	VNR460VEI	VNR680	VNR750EFI
Main Structure Parameters	Valve arrangement	Overhead valve	Overhead valve	Overhead valve
	Number of cylinders	1	2	3
	Cylinder diameter	3.622 in (92 mm)	3.071 in (78 mm)	3.23 in (82 mm)
	Piston stroke	2.717 in (69 mm)	2.795 in (71 mm)	2.795 in (71 mm)
	Total displacement	28.00 in3 (459 cc)	41.435 in3 (679 cc)	45.77 in3 (750 cc)
	Compression ratio	9.5:1	8.5:1	8.8:1
	Rated power kW/RPM	12.0/3600	14.5/3600	18.0/3600
	Direction of rotation	Counterclockwise (From PTO end)	Counterclockwise (From PTO end)	Counterclockwise (From PTO end)
	Ignition advance angle	/	25° ±2°	Variable
	Intake valve clearance	0.003 -0.0059 in (0.10-0.15 mm)	0.003 -0.0059 in (0.10-0.15 mm)	0.003 -0.0059 in (0.10-0.15 mm)
	Exhaust valve clearance	0.0039 -0.0059 in (0.10-0.15 mm)	0.0059 -0.0078 in (0.15-0.20 mm)	0.0059 -0.0078 in (0.15-0.20 mm)
	Spark gap (mm)	0.6-0.8	0.6-0.8	0.6-0.8
Fuel and Oil	Lubrication oil type	SAE 10W-30	SAE 10W-30	SAE 10W-30
	Fuel supplier	EFI	Carburetor	EFI
	Fuel capacity	1.585 gal (6.0 L)	N/A	N/A
	Oil capacity	1.16 qt (1.1 L)	1.6 qt (1.5 L)	1.8 qt (1.7 L)
Dimension and Mass	Dimension (in/mm)	19.09" L x 13.78" W x 17.76" H (485 L x 350 W x 451 H)	18.27" L x 16.85" W x 17.95" H (464 L x 428 W x 456 H)	18.27" L x 16.85" W x 17.95" H (464 L x 428 W x 456 H)
	Net weight	81.57 lb (37.0 kg)	95.9 lb (43.5 kg)	95 lb (43.1 kg)
Charge Amperate		20 AMPS	20 AMPS	25 AMPS

2.2 VANAIR® VNR ENGINE PART NUMBERS:

- **285274:** Engine, Gas VNR460VEI 16HP
- **283769:** Engine, Gas VNR680 20HP
- **283847:** Engine, Gas VNR750EFI 25HP

2.3 VANAIR® VNR ENGINE KIT NUMBERS:

KIT1536 for VNR460VEI 16HP

- **285374-01,** Air Filter
- **285374-02,** Spark Plug (2x)
- **844300-001-QT** Oil (QTY 2)

KIT1504 for VNR680 20HP

- **283769-01,** Oil Filter
- **283769-02,** Air Filter
- **283769-03,** Spark Plug (2x)
- **283769-04,** Fuel Filter
- **844300-001-QT** Oil (QTY 2)

KIT1512 for VNR750EFI 25HP

- **283769-01,** Oil Filter
- **283769-03,** Spark Plug (2x)
- **283769-04,** Fuel Filter
- **283847-02,** Air Filter
- **844300-001-QT** Oil (QTY 2)

TABLE 2B: VNR460VEI REPLACEMENT PARTS

VNR460VEI		
PN	DESCRIPTION	KIT #
265909	FUSE, ATO 15 AMP BLUE	-
285374-01	FILTER, AIR VNR460VEI	KIT1536
285374-02	PLUG, SPARK VNR460VEI	KIT1536
285374-05	PUMP, FUEL INJECTOR VNR460VEI	-
285374-06	GASKET, ENGINE EXHAUST VNR460VEI	-
285374-07	GASKET, HEAD VNR460VEI	-
285374-09	CAP, OIL FILL VNR460VEI	-
285374-10	DIPSTICK, OIL ENGINE VNR460VEI	-
285374-11	ROCKER, VALVE/ARM ASSY VNR460VEI	-
285374-12	GUIDE, PLATE PUSHROD VNR460VEI	-
285374-14	GASKET, VALVE COVER VNR460VEI	-
285374-16	STARTER, ENGINE VNR460VEI (500W)	-
285374-17	SOLENOID, STARTER VNR460VEI	-
285374-18	COIL, IGNITION MODULE + WIRE VNR460VEI	-
285374-19	MODULE, ECU (THROTTLE BODY) VNR460VEI	-
285374-22	COIL, RECTIFIER CHARGE VNR460VEI	-
285374-23	STATOR, CHARGING (20A) VNR460VEI	-
285374-24	HARNESS, WIRE ENGINE VNR460VEI	-
285374-25	COVER, AIR FILTER VNR460VEI	-
285374-26	ASSY, PULL START VNR460VEI	-
285374-27	HOSE, ENGINE OIL DRAIN 15" [381MM] VNR460VEI	-
285374-28	MUFFLER, ENGINE VNR460VEI (INCLUDES GUARD)	-
285374-40	GASKET, CRANKCASE VNR460VEI	-
285374-44	KEY, ENGINE VNR460VEI	-
285374-45	SWITCH, IGNITION VNR460VEI	-
285374-46	CAP, GAS VNR460VEI	-
285374-47	KNOB, AIR FILTER COVER VNR460VEI	-
285374-49	TANK, FUEL VNR460VEI	-
285374-50	DISPLAY, DIGITAL FUEL/OIL VNR460VEI	-
285374-51	FAN, COOLING VNR460VEI 16HP	-

TABLE 2C: VNR680 REPLACEMENT PARTS

VNR680		
PN	DESCRIPTION	KIT #
283769-01	FILTER, OIL, ENGINE, VNR680 + VNR750	KIT1504
283769-02	FILTER, AIR, ENGINE, VNR680	KIT1504
283769-03	PLUG, SPARK, VNR680 + VNR750	KIT1504
283769-04	FILTER, FUEL, VNR680 + VNR750	KIT1504
283769-05	FUSE, 30A ATM	-
283769-06	PUMP, FUEL LOW PRESSURE VNR680	-
283769-07	GASKET, ENGINE EXHAUST VNR680 & VNR750EFI	-
283769-08	GASKET, VALVE COVER VNR680	-
283769-09	GASKET, HEAD VNR680 & VNR750EFI	-
283769-10	SENSOR, TEMPERATURE VNR680	-
283769-11	SENSOR, OIL PRESS VNR680 & VNR750EFI	-
283769-12	STARTER, ENGINE VNR680	-
283769-13	SOLENOID, STARTER RELAY VNR680	-
283769-14	COIL, IGNITION MODULE + WIRE VNR680	-
283769-15	MODULE, ECU (THROTTLE & CHOKE CONTROL) VNR680	-
283769-16	CONTROL, THROTTLE & CHOKE (STEP MOTOR ASSY) VNR680	-
283769-17	CARBURETOR, ENGINE VNR680	-
283769-18	COIL, RECTIFIER CHARGE VNR680	-
283769-19	STATOR, CHARGING (20A) VNR680	-
283769-20	HARNESS, WIRE ENGINE VNR680	-
283769-21	CAP, OIL FILL VNR680 & VNR750EFI	-
283769-22	COVER, AIR CLEANER VNR680	-
283769-23	COVER, ENGINE BLACK VNR680	-
283769-24	DIPSTICK, OIL ENGINE VNR680 & VNR750EFI	-
283769-25	ROCKER, VALVE/ARM ASSY VNR680 & VNR750EFI	-
283769-26	GUIDE, PLATE PUSHROD VNR680 VNR750EFI	-
283769-27	GUARD, FAN COVER VNR680	-
283769-28	HOSE, ENGINE OIL DRAIN VNR680 (13")	-
283769-29	MUFFLER, ENGINE VNR680 (INCLUDES GUARD)	-
283769-30	PIPE, MUFFLER ELBOW VNR680	-
283769-31	CARBURETOR, KIT, ENGINE VNR680 (8000FT +/- 3000FT ALTITUDE)	-
283769-32	COVER, ENGINE SMALL BLACK VNR680	-
283769-33	FAN, COOLING ENGINE VNR680	-
283769-34	INTAKE, AIR FILTER ELBOW TO CARB	-
283769-35	BOLT, M6x90	-
283769-36	ASSEMBLY, AIR FILTER BASE VNR680	-
283769-37	GASKET, CARBURETOR VNR680	-
283769-38	SPACER, INTAKE GASKET INSULATOR VNR680	-

TABLE 2D: VNR750EFI REPLACEMENT PARTS

VNR750EFI		
PN	DESCRIPTION	KIT #
283769-01	FILTER,OIL ANA-V (PRIVATE LABELED)	KIT1512
283769-03	PLUG, SPARK ANA-V (2X)	KIT1512
283769-04	FILTER,FUEL ANA-V	KIT1512
283769-05	FUSE, 30A ANA-V	-
283769-06	PUMP,FUEL L.P. ANA-V	-
283769-07	GASKET,ENGINE EXHAUST ANA-V	-
283769-09	GASKET,HEAD ANA-V	-
283769-11	SENSOR,OIL PRESS ANA-V	-
283769-21	CAP,OIL FILL ANA-V	-
283769-24	DIPSTICK,OIL ENGINE ANA-V	-
283769-25	ROCKER,VALVE/ARM ASSY ANA-V	-
283769-26	GUIDE,PLATE PUSHROD ANA-V	-
283847-02	FILTER,AIR ANA300V	KIT1512
283847-08	GASKET,VALVE COVER ANA300V	-
283847-10	SENSOR,TEMPERATURE ANA300V	-
283847-12	STARTER,ENGINE ANA300V	-
283847-13	SOLENOID,STARTER RELAY ANA300V	-
283847-14	COIL,IGNITION MODULE + WIRE ANA300V	-
283847-15	MODULE,ECU ANA300V	-
283847-18	COIL,RECTIFIER CHARGE ANA300V	-
283847-19	STATOR,CHARGING (25A) ANA300V	-
283847-20	HARNESS,WIRE ENGINE ANA300V	-
283847-22	COVER,AIR CLEANER ANA300V	-
283847-23	COVER,ENGINE BLACK ANA300V	-
283847-28	HOSE,ENGINE OIL DRAIN 15" [381MM] ANA300V	-
283847-29	MUFFLER,ENGINE (EXCLUDES GUARD) ANA300V	-
283847-30	PUMP,FUEL HIGH PRESSURE ANA300V	-
283847-31	HOUSING,REMOTE OIL FILTER ANA300V	-
283847-32	COOLER,OIL ANA300V	-
283847-39	THROTTLE BODY, EFI ASSEMBLY W/ECM ANA300V	-
283847-40	ELBOW,EXHAUST 90 DEG 300V (COMPACT)	-
283847-41	GASKET,CRANKCASE VRN750	-
283847-42	GASKET,VALVE COVER VNR750	-

SECTION 3: Operation

3.1 CHECK ITEMS BEFORE USE

WARNING

All problems found during use, or visual inspection, must be corrected before continued use of the engine. Uncorrected problems may lead to property damage, severe personal injury and even death.

3.1.1 OPERATING LOCATION

Only use OUTSIDE and place the engine in a well-ventilated area. Also, carefully consider wind direction and air currents. (**DO NOT** place exhaust near air intake of building, for example.) Place the engine on a level surface before operating.

DANGER

DO NOT OPERATE IN AN ENCLOSED SPACE. Running any combustion engine in an enclosed space may result in Carbon Monoxide (CO) poisoning and may cause overheating, which may result in fire and/or explosion.

Carbon monoxide (CO) build-up may cause death! Overheating can ignite surrounding materials resulting in fire and/or explosion which may cause injury, death and equipment damage.

3.1.2 HIGH ALTITUDE

- For the **VNR460VEI** and **VNR750EFI** engines with electronic fuel injection (EFI): The electronic fuel injection (EFI) control system can automatically adjust the fuel injection quantity without replacing any parts. However, be aware the engine horsepower will decrease about 3.5% for each 1,000 ft (300 m) increase in altitude.
- For the **VNR680** engine: If operating the engine regularly at altitudes above 5,000 ft (1,500m) the engine may require a high altitude carburetor kit (Vanair® p/n 2873769-31) to ensure correct operation. Consult your dealer or Vanair® Customer Service.

CAUTION

Operating the Vanair® VNR680 engine at altitudes below 5,000 ft (1,500 m) WITH a high altitude carburetor kit installed may cause the engine to overheat, resulting in serious engine damage.

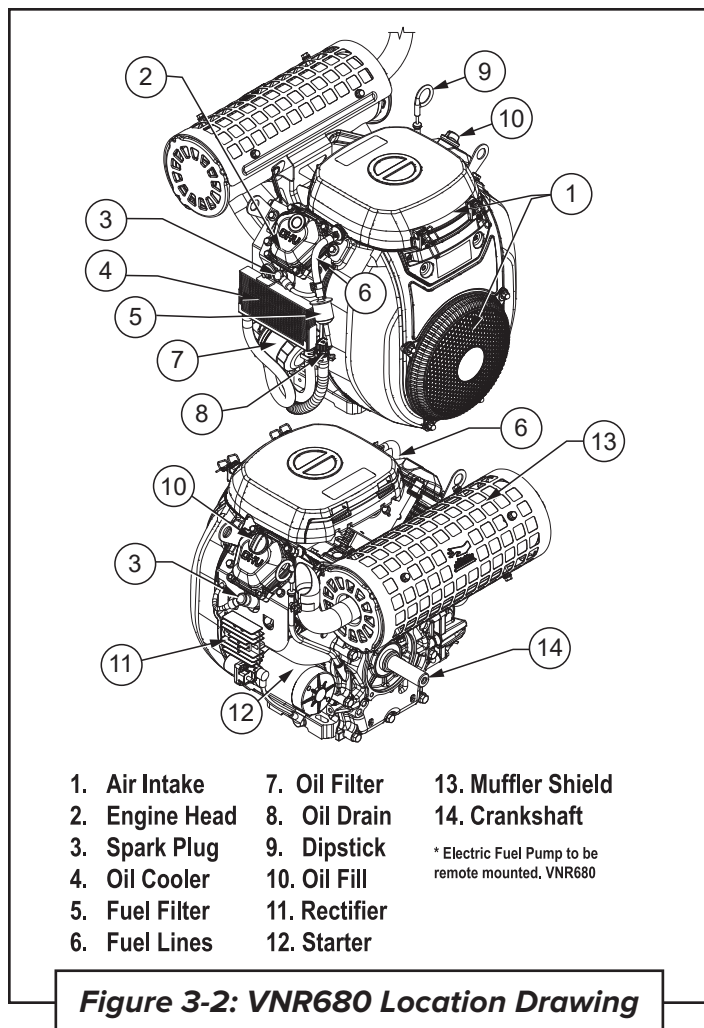
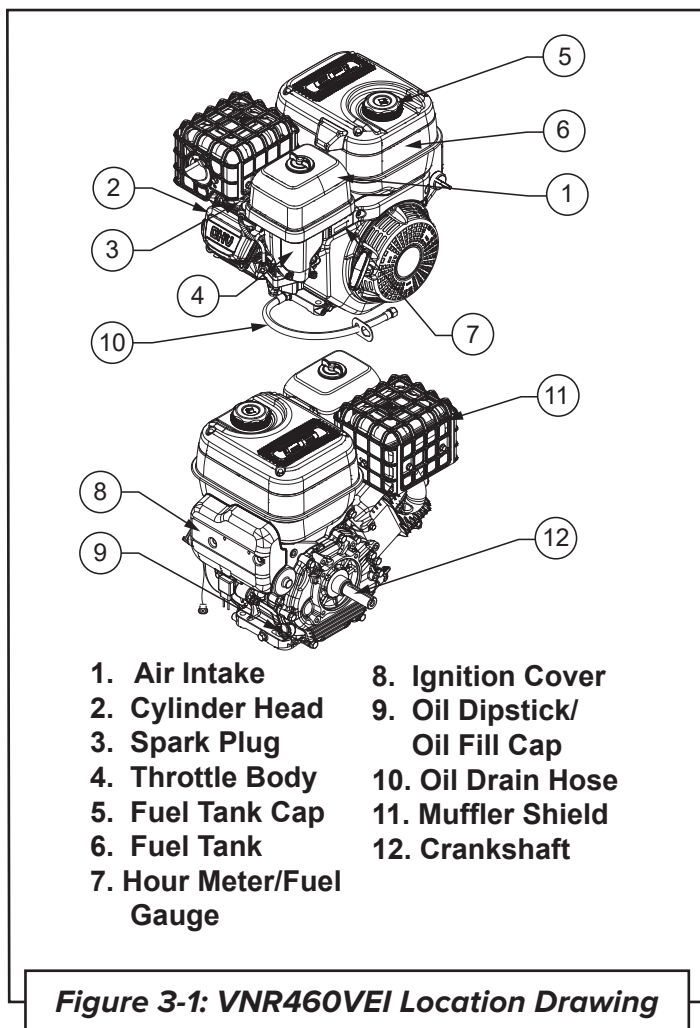
3.2 OPERATING CONDITIONS

Inspect equipment and engine prior to use.

1. Check for loose fasteners, fittings or damaged parts and look for such things as oil or fuel leaks or other abnormal conditions that can affect the operation of the engine.
2. Repair or replace all damaged or defective parts prior to use.
3. Clean off any dirt or debris on the engine surface, especially around the muffler and hand starter.
4. Refer to the instructions of the equipment attached to the engine for more operation information.
5. Do not operate the engine beyond its maximum limit ratings. Refer to the specifications **Figure 3-3: VNR750EFI Location Drawing** for more information. Identification of Parts.
6. Please see **Figure 3-1, Figure 3-2, Figure 3-3** on the following pages for location and identification of major parts for the VNR Engines.

WARNING

The engine is **NOT** filled with oil before it leaves the manufacturer. Before trying to start or rotate the crankshaft, correctly fill engine with recommended oil type and quantity. Starting the engine or rotating crankshaft prior to adding oil can cause permanent damage to the engine and will lead to voiding the engine's warranty.



WARNING

Engine oil is an important factor affecting the performance and lifetime of the engine.

Please use the four-stroke engine oil recommended in the section of Maintenance.

3.3 ENGINE OIL

Before starting, check the engine's oil level.

1. Remove the dipstick (oil level gauge) and wipe it clean.
2. Insert the oil level gauge back into the engine. Do not tighten at this time.
3. Take out the oil level gauge again and see where the oil level is on the dipstick.
4. The oil level must reach the lower limit of the scale on the dipstick.
5. (See **Figure 3-4: VNR460VEI Oil Level Gauge** and **Figure 3-5: VNR680/VNR750EFI Dipstick**.)

6. If the oil level is low, fill with the recommended oil to the upper limit of the oil level gauge. Replace the dipstick in the filler and screw it back in.
7. Please refer to the **Maintenance Section** for more information on oil filling.
8. Engine oil volume is specified under **Figure 3-3: VNR750EFI Location Drawing**.
9. Fuel volume is listed in Specifications. See **Figure 3-3: VNR750EFI Location Drawing**.

CAUTION

10. **Pressure will be formed within the tank due to volatilization of the gasoline. Allow the engine to cool for at least 2 minutes before removing the fuel cap. Loosen the fuel cap slowly to release any pressure within the tank.**

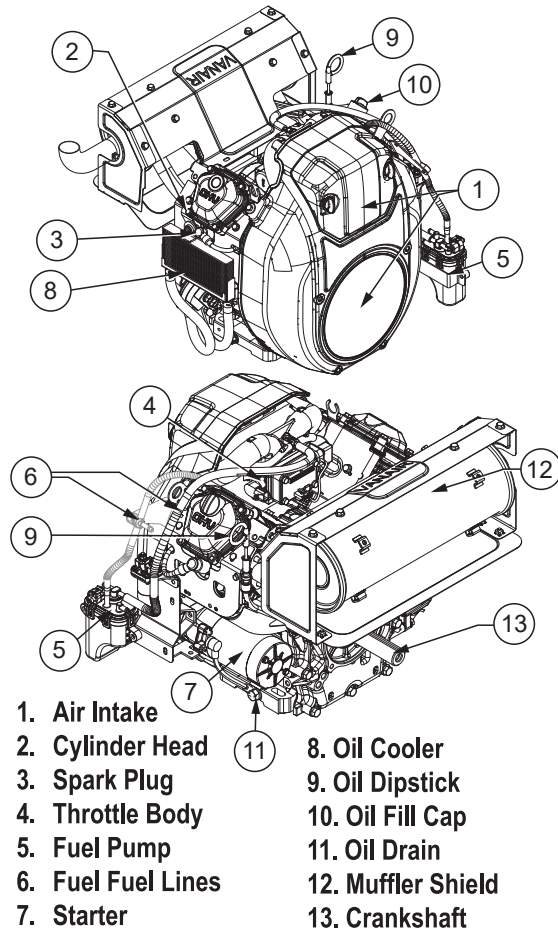


Figure 3-3: VNR750EFI Location Drawing

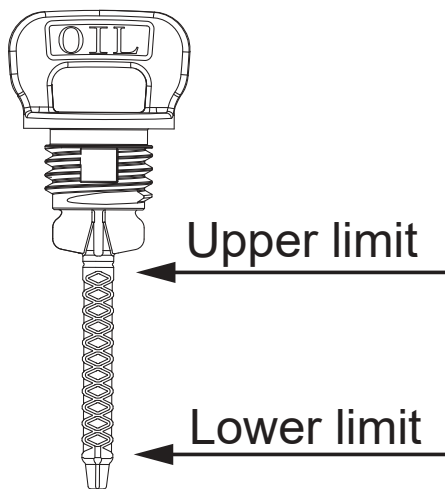


Figure 3-4: VNR460VEI Oil Level Gauge

3.4 ENGINE FUEL

1. Check the fuel level when the engine has cooled and is in shutdown state. Please fill fuel if required.

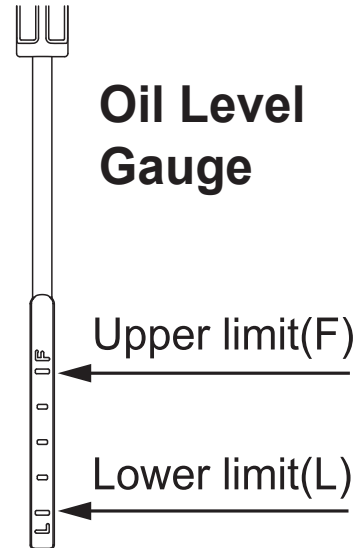


Figure 3-5: VNR680/VNR750EFI Dipstick

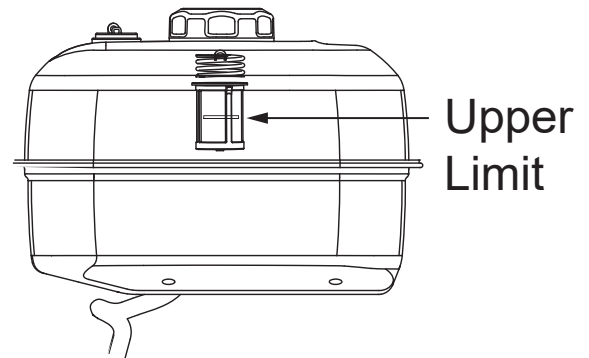


Figure 3-6: VNR460VEI Fuel Level

2. Use fresh and clean unleaded gasoline.
3. **DO NOT** mix engine oil with the fuel.
4. **DO NOT** exceed the upper limit of the reserve filling mark to ensure that the gasoline has room for expansion.

NOTICE

There is a fuel level indicator in the VNR460VEI fuel tank. Do not overfill beyond the upper limit, as shown by the indicator mark. (See Figure 3-6: VNR460VEI Fuel Level) Fuel tank volume is 1.58 gal (6L).

- Use approved and proper fuel storage containers and processing measures when handling or storing gasoline.
- Please provide fire extinguishers nearby to extinguish any small fire should it occur.

- Do not use cleaning agents for engines or carburetors in the fuel tank or it will form deposits of colloids on the parts of the fuel system (e.g. carburetors, fuel filters, fuel lines and fuel tank) during the process of storage and cause permanent damage.
- Also be aware that gasoline-alcohol blended fuels (such as, ethanol or methanol) will absorb water when stored, leading to the formation of an acidic liquid.
- If fuel becomes acidic - this can damage the fuel system and its components while in storage. Review Storage information in **Maintenance Section**.
- When using gasoline/alcohol blended fuel: Fuel with a volume ratio of no more than 10% alcohol and 90% unleaded gasoline is recommended.
- Damage caused by using old, dirty, fuel that does not meet the required standard is not covered under the scope of the engine's warranty.

DANGER

FIRE OR EXPLOSION

Gasoline is highly flammable and explosive.

Do not fill fuel tank when indoors or when engine is running or hot.

Please refuel the tank outdoors in a well ventilated environment with the engine shut off. Wipe off any spilled fuel each time when the filling is completed.

Check for any damage or leaks from the fuel system regularly. It is prohibited to operate the engine when there is a fuel system leakage!

3.5 EQUIPMENT INSPECTION

Inspect the equipment driven by this engine. Please refer to the instruction provided by the manufacturer of the equipment for relevant safety and operating information that should be followed before starting the engine.

WARNING

Do not tamper with or use this engine in an application beyond the scope for which it was designed and manufactured. Consult your local dealer for questions regarding the scope or application.

CAUTION

KICKBACK

Rapid retraction of the starter cord may pull the hand and arm towards the engine faster than user can let go. Unintentional startup can result in accidental injury.

3.6 STARTING THE ENGINE

1. Review all previous items above prior to use.
2. Inspect the condition of the starter cord before trying to use it. Do not use if frayed or severely worn. Have a damaged pull-cord repaired or replaced prior use.

For Engine with a Recoil Starter - Manual Start

1. Turn the engine switch to the ON position and hold for 3-5 seconds.
2. Grab the recoil starter handle and pull slowly until resistance is felt. Then pull rapidly to avoid kickback.
3. Repeat as needed until engine starts.

For Engines with Electric Start

1. Turn the engine switch to the ON position and hold for 3-5 seconds before turning to the START position.
2. After the engine starts, release the engine switch, allowing it to return to the ON position.

CAUTION

If the engine does not start after three attempts, check that the engine is sitting level and has enough oil.

If the engine is equipped with a low-level oil level sensor, this sensor will prevent the engine from starting if the oil level is too low.

Make checking the oil a routine inspection prior to starting the engine, and during the first use. See recommended maintenance intervals in the maintenance and servicing sections.

WARNING

Do not continuously hold the starter for more than 15 seconds while attempting to start the engine. If the engine fails to start, cool the starter for at least 1-minute before resuming start attempts to avoid damaging the starter motor.

- If the engine does not rotate using the electric starter, turn off the starter. Do not attempt to restart the engine before troubleshooting,
- If engine speed is raised to the speed over the starter but does not keep running (or fails to start), then the engine must completely stop before starting again.
- If the flywheel starts to rotate automatically but the starter is engaged, there may be a conflict between the flywheel external gear and the starter position, which may cause damage to the starter.

3.7 STOPPING THE ENGINE

1. Remove any load prior to turning off the engine, if applicable.
2. Reserve a few minutes' time to run the unit in an unloaded state to stabilize the engine temperature.
3. Turn the engine switch to the OFF position to stop the engine.

SECTION 4: Maintenance

4.1 GENERAL

It is the owner/operator's responsibility to complete all scheduled maintenance in a timely manner. Correct any issues before operating the engine. Always follow the inspection and maintenance recommendations and any scheduled maintenance in this manual.

Before servicing the engine, stop the engine, disconnect all electrical devices and battery (if equipped) and allow the engine to cool.

WARNING

Improper maintenance or failure to correct a problem before operation can cause a malfunction which can result in property damage, serious injury or even DEATH.

NOTE: Improper maintenance will void the warranty.

DANGER

Accidental starts can cause severe injury or death. Remove and ground the spark plug wire before performing any service.

CAUTION

The air filter elements may contain Polycyclic Aromatic Hydrocarbons (PAHs). PAHs can be harmful to your health. Please wear gloves for protection when performing maintenance on the air filter.

4.2 MAINTENANCE SCHEDULE

1. Stop the engine before performing any servicing. Disconnect all electric devices and battery (if equipped) and allow the engine to cool down.
2. Follow the service intervals indicated in the chart on the next page.
3. Contact your dealer for your engine/equipment and maintenance needs.

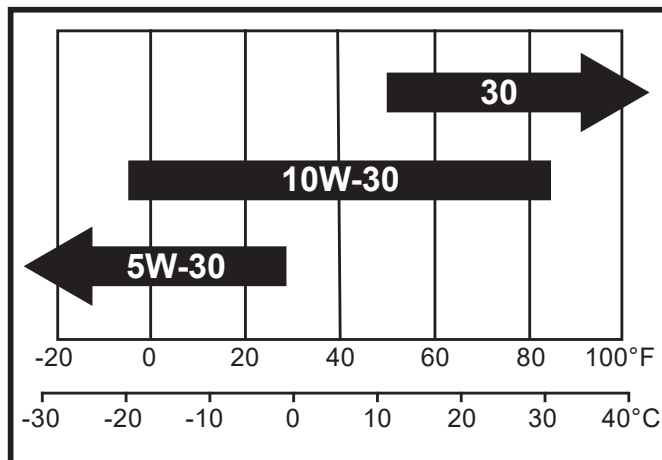
CAUTION

CHECKING THE OIL LEVEL

Remove dipstick and wipe clean.

Insert the oil level gauge into the engine oil filler again but leave it at the neck of the filler.

Pull it out again to check the oil level.



Ambient Temperature

4.3 ENGINE OIL

SAE 10W-30 is generally recommended for use in regular and full temperature range.

Engine oil of other viscosities can be selected according to the actual average ambient temp and the information shown in the chart below.

4.3.1 ENGINE OIL FILLING

1. Place the engine on a horizontal surface.
2. Remove the oil level gauge/dipstick and wipe it clean. (See **Figure 4-5: VNR460VEI Air Cleaner Diagram**, **Figure 4-1: Oil Change**, **Figure 4-3: VNR750EFI Location Diagram** and **Figure 4-4: VNR460VEI Oil Level Gauge**, and **Figure 4-1: Oil Change**.)
3. Remove oil fill cap and fill engine with oil of recommended type to the upper limit of the filling scale indicated on dipstick.
DO NOT over fill.
4. Replace dipstick and tighten.

TABLE 4A: MAINTENANCE SCHEDULE

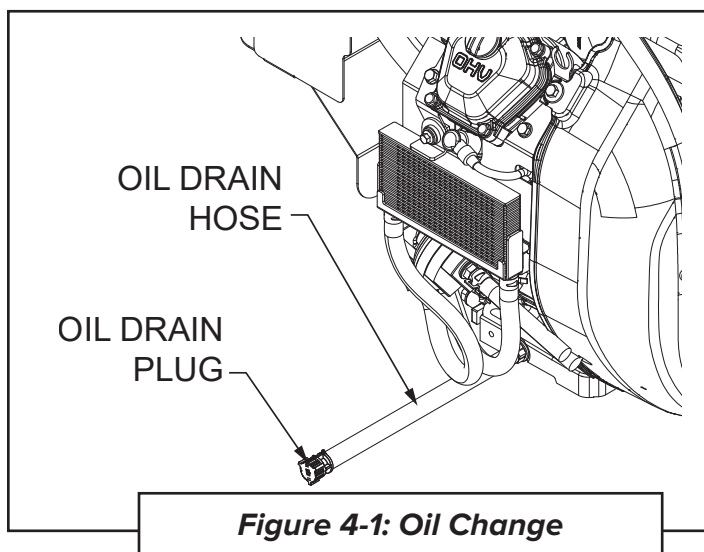
ITEM		REGULAR SERVICE PERIOD*
Engine Oil	Check	Each time before use.
	Replace	After initial 20 hours/Every 6 months, or 100 hours.
Oil Filter (VNR680 and VNR750EFI)	Replace	Annually or 100 hours. (Or when changing oil).
Air Filter	Inspect/Clean	Every 3 months or 50 hours. ^a
	Replace	Annually or 200 hours. ^a
Spark Plug	Check-Adjust	Every 6 months or 100 hours.
	Replace	Annually or 300 hours.
Fuel Filter	Check	Every 3 months or 50 hours. ^a
	Replace	Every 6 months or 100 hours. ^a
Spark Arrester (if equipped)	Clean	Every 6 months or 100 hours.
Fuel/Oil	Drain	When storing for 2+ months.
Valve Clearance	Check-Adjust	Annually or 300 hours. ^b
Cooling Fan	Inspect/Clean	Annually or 100 hours. ^b
Fuel Line	Check	Every 2 years (Replace as needed) ^b

* Perform at interval that comes first in the table. (Months or hours.)

^a Service more frequently under severe, dusty or dirty conditions as needed.

^b To be performed by knowledgeable, experienced maintenance or the dealer.

For **Engine Maintenance Kit Part Numbers and Descriptions**, see **Specifications Section**.



4.3.2 OIL CHANGE

Before changing the engine oil, run the engine for a few minutes to warm the engine and engine oil. Warm oil drains easier. Turn engine off.

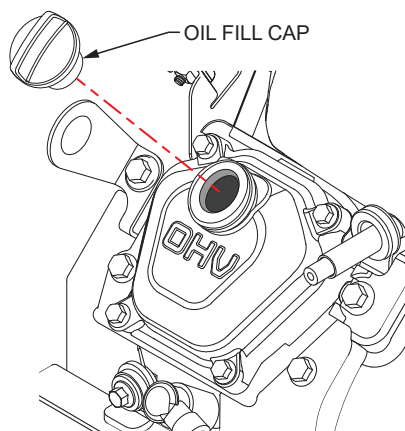
Preliminary steps:

1. Place the engine on a flat, level surface.
2. Clean the area around the dipstick and oil drain plug.
3. Remove the engine's oil fill cap.

4. Find the oil drain hose. Using an appropriate container, remove the oil drain plug and drain the used oil. (Refer to **Figure 4-1** through **Figure 4-4**.)

Procedural steps:

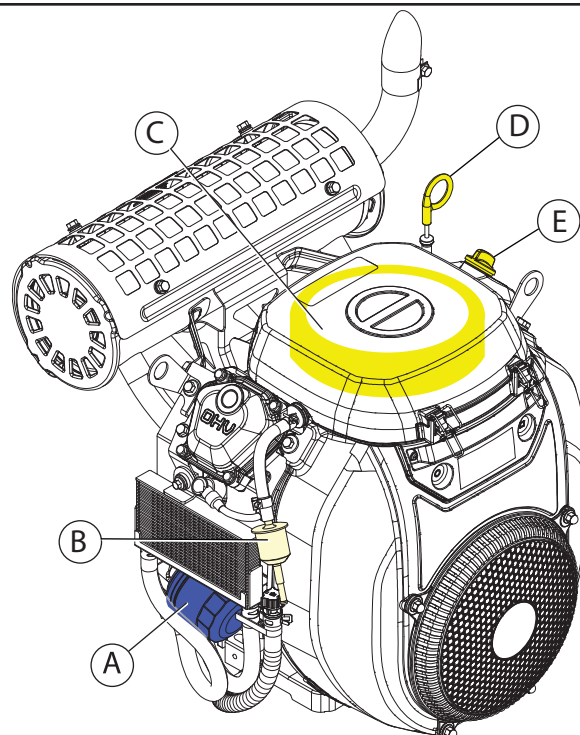
1. Place the oil drain plug back and tighten securely.
2. Fill with the recommended engine oil to the upper limit on the oil level gauge shown on the dipstick.
3. Replace and tighten the oil fill cap (or oil level gauge on VNR460VEI) completely.
4. Run the engine for 2-3 minutes. Check oil level again. Adjust engine oil level as needed.
5. Please recycle when possible, and dispose of used oil in accordance with all state, local and federal laws.



**Figure 4-2: VNR680/VNR750EFI
Oil Fill Cap**

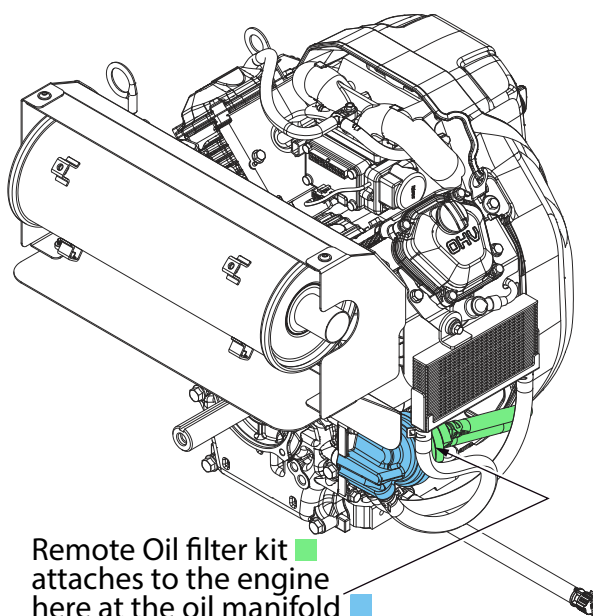
4.4 OIL FILTER (VNR680 AND VNR750EFI ONLY)

1. Drain the oil, then replace and re-tighten the drain bolt. (It is recommended to change the oil filter during the oil change procedure after draining the oil.) Refer to **Figure 4-3, 4-4. NOTE: the VNR750EFI and ANA300 unit use remote-mounted oil filters.**
2. Using a properly sized oil filter wrench, loosen and carefully remove the oil filter. Pour any remaining oil inside the old filter into a suitable waste oil container. Put the used oil and used filter into a suitable container.
3. Clean the mounting base of any dirt or debris. Also clean the seal ring of the new oil filter using new oil.
4. Start threading the new oil filter properly. Tighten by hand until the seal comes into contact with the mounting base, then tighten the new filter with the oil filter wrench. **Torque filter to 9.6 ft-lb to 11 ft-lb. (13 Nm to 15 Nm.)**
5. Reinstall the drain bolt and the oil fill cap and fill engine with the recommended engine oil.
6. Start the engine and check for oil leaks. Stop the engine and use the dipstick to re-check the oil level. Make sure the oil is still within the recommended level. If oil is too low, add oil up to the prescribed level.



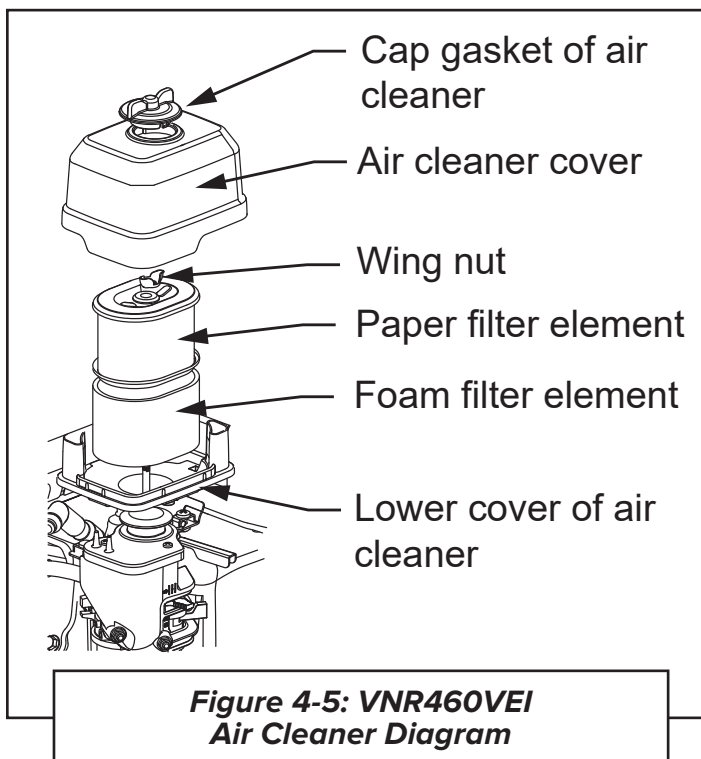
A	ENGINE OIL FILTER
B	FUEL FILTER
C	AIR FILTER
D	OIL DIP STICK
E	OIL FILL PORT

Figure 4-3: VNR680



Remote Oil filter kit ■
attaches to the engine
here at the oil manifold ■

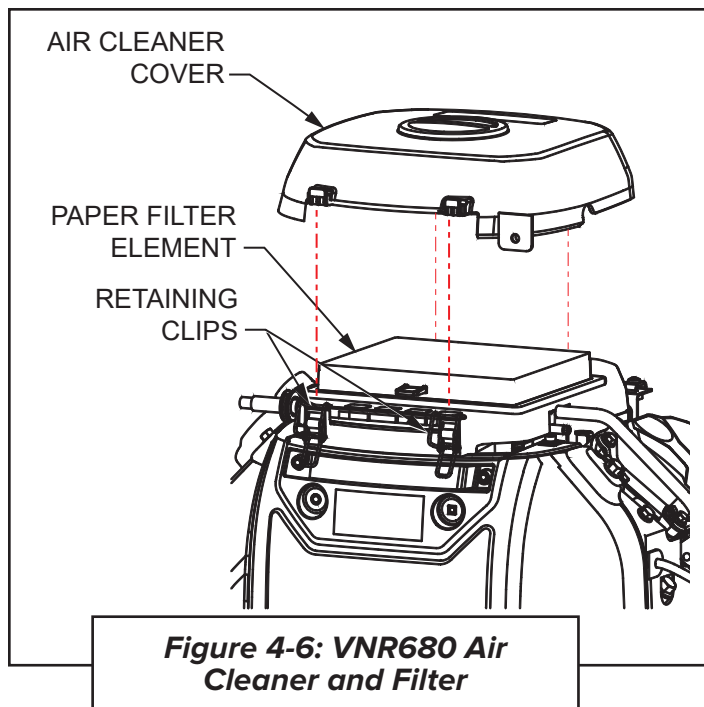
Figure 4-4: VNR750EFI



4.5 AIR FILTER

4.5.1 VNR460VEI AIR FILTER

1. Unscrew the nut and remove the cover of the air cleaner. (See **Figure 4-5: Air Cleaner Diagram**.)
2. Remove the wing nut holding the air filter in place and remove the air filter element.
3. **Foam Filter Element:** Place and wash the foam filter element in liquid detergent and warm water. Rinse it well with clean water. Wrap it in a clean cloth and squeeze it dry. Then soak it in clean engine oil. Take foam filter out of the oil, and wrap it in a clean cloth and squeeze out the excess oil.
4. **Paper Filter Element:** Tap the edges of the paper filter element against a hard surface to dislodge any loose dirt and debris.
5. **DO NOT** use a brush or air compressor (which may cause small tears and ruin the filter). Hold the clean paper element before a light source. Light should be able to pass through. If any areas of the filter are clogged with dirt and obscured the paper element needs to be replaced with a new element.



6. Replace both paper and foam air filter elements back in the air cleaner assembly.
7. Put the air cleaner cover in place and hand-tighten nuts.

4.5.2 VNR680 AIR FILTER

1. Clean area around the air filter from loose dirt and debris.
2. Release retaining clips from the air cleaner cover and remove. (See **Figure 4-6: VNR680 Air Cleaner and Filter**) Then remove the paper air filter element.
3. Check the condition of the rubber seal around the air cleaner opening, Replace if needed.
4. To clean the paper filter element, gently tap it several times on a sturdy flat surface to loosen dirt. Do not use brushes or compressed air as it may cause small rips or tears in the filter element, which will require replacement.
5. If the filter is too dirty or any areas are clogged and block out light from passing through, the element should be replaced with a new one.
6. Replace the clean or new filter element into place. Carefully reinstall the air cleaner cover according to reference shown in **Figure 4-7: Replacing VNR680 Air Cleaner**

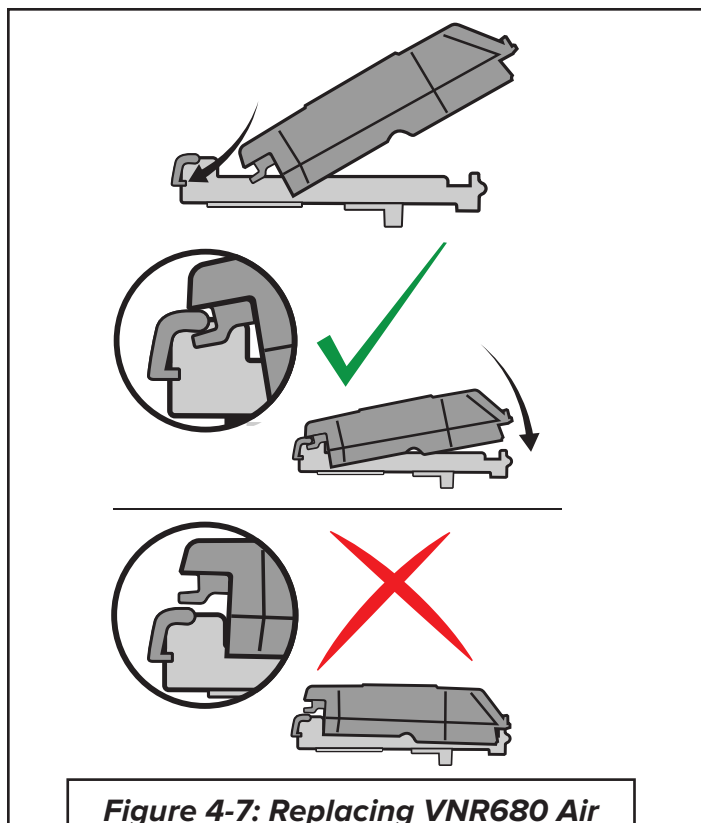


Figure 4-7: Replacing VNR680 Air Cleaner Cover

7. Re-fasten the retaining clips to secure the air cover.

4.5.3 VNR750EFI AIR FILTER

1. Clean area around the air filter from loose dirt and debris.
2. Loosen the two air filter bolts on the air cleaner cover and remove. (See **Figure 4-8: VNR750 Air Cleaner Cover**.)
3. Remove the air filter element inside.
4. Carefully remove the outer foam filter element from around the paper element cylinder. (See **Figure 4-9: VNR750 Air Cleaner Elements**.)
5. **Paper Filter Element:** to clean the paper filter element, gently tap it several times on a sturdy flat surface to loosen dirt. Do not use brushes or compressed air as it may cause small rips or tears in the paper filter element, which will then require replacement.
6. If the filter is dirty and has clogged areas that block out any light from passing

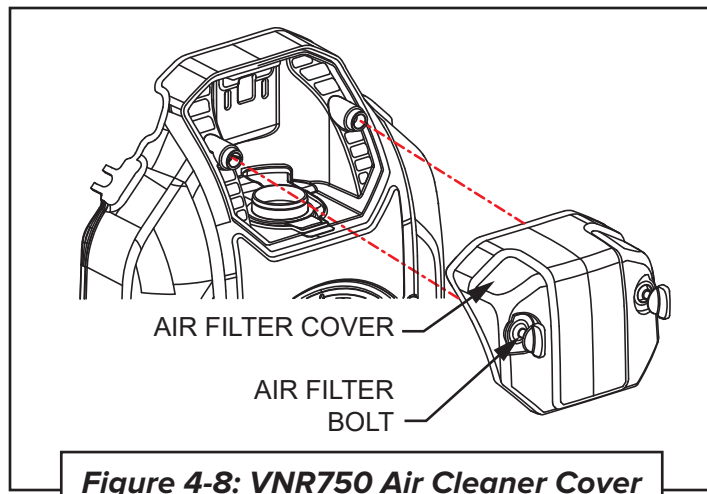


Figure 4-8: VNR750 Air Cleaner Cover

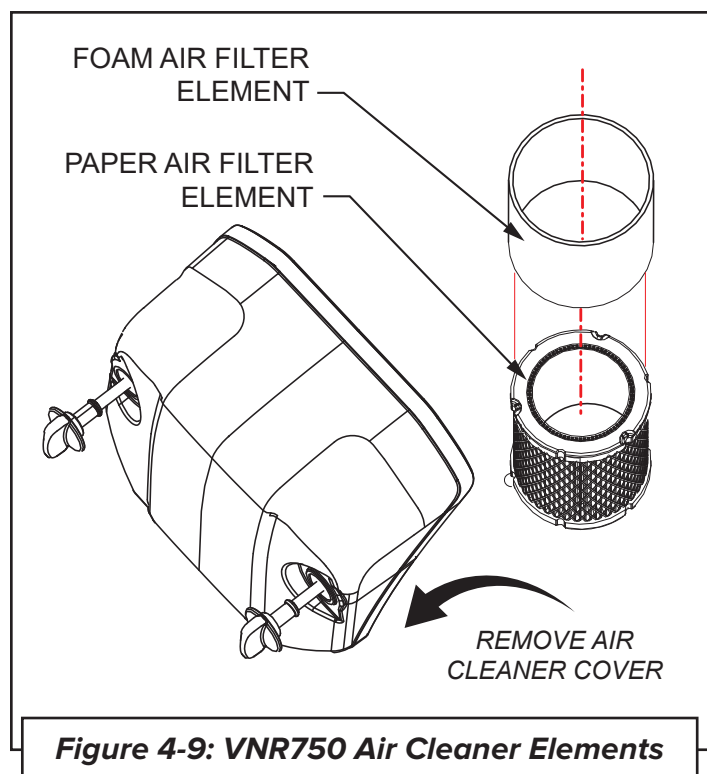


Figure 4-9: VNR750 Air Cleaner Elements

through, the element should be replaced with a new one.

7. **Foam Filter Element:** Place and wash the foam filter element in water and liquid detergent. After washing, rinse it well with water. Wrap it in a clean cloth and squeeze it dry.
8. Replace both the air filter elements back into their original location.
9. Re-fasten and hand-tighten the filter cover bolts to secure the air filter cover.

WARNING

Use a spark plug of recommended type or its equivalent. It is prohibited to use a spark plug with an improper heat value range.

4.6 SPARK PLUG

1. Clean away any dirt from around the cap and bottom of the spark plug.
2. Remove the cap from the spark plug.
3. Use a spark plug socket and wrench to loosen and remove the spark plug.
4. Observe the spark plug and the spark plug gasket and replace it with a new one if it is damaged or worn.
5. If the spark plug will be reused, use a small wire brush to carefully clean the spark plug contacts and threads.
6. Check the spark plug gap with a feeler gauge or gap tool and bend the contact to adjust it to the proper clearance if needed. (See **Figure 4-10: Spark Plug Gap**.)
7. Carefully start the spark plug threads by screwing it into the engine by hand.
8. After the spark plug is threaded properly, tighten it with the spark plug socket. **Proper torque for the spark plug is 14.7-18.4 ft-lbs or (20-25 Nm).**
9. Install the spark plug cap on the spark plug.

4.7 SPARK ARRESTER (IF EQUIPPED)

1. Allow the engine to cool completely before checking the spark arrester.
2. Remove the two (2) screws attached to the fixed cover plate, which connects to the end of the spark arrester and affixes it to the muffler,
3. Remove the spark arrester screen.
4. Use a wire brush to carefully remove carbon deposits from the spark arrester screen. (See **Figure 4-11: Clean Spark Arrester**.)
5. If the spark arrester is damaged it should be replaced.
6. Install the spark arrester on the muffler and re-attach with the two (2) screws.

*Set the gap
as follows:*

0.6 - 0.8mm
(0.024 - 0.031 in)

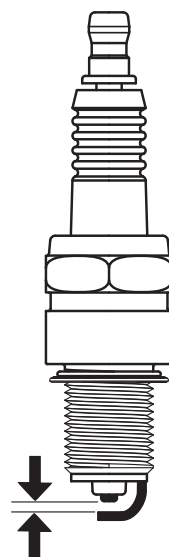


Figure 4-10: Spark Plug Gap

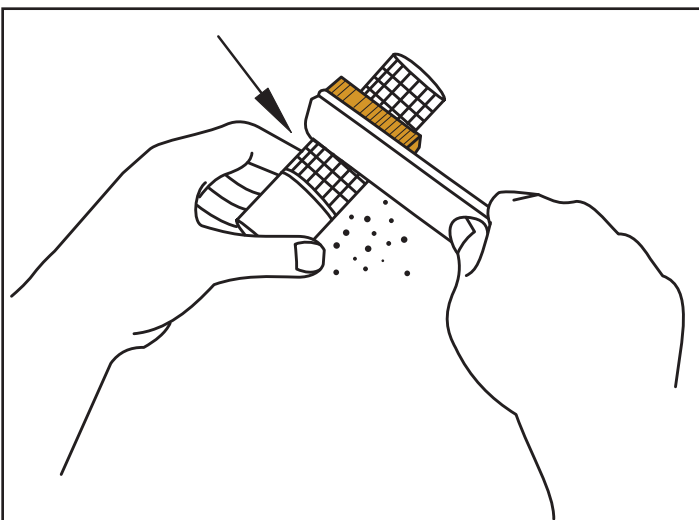


Figure 4-11: Cleaning Spark Arrester

WARNING

Adjusting engine speed or factory settings without authorization can damage the engine and the equipment it is attached to! This may VOID the warranties of both the engine and any attached equipment!

4.8 IDLE SPEED

The idle speed has been preset in the factory and rarely requires adjustment. Please contact your dealer or Vanair® Support before making any adjustments or tamper with the engine settings if you suspect this is an issue.

4.9 STORAGE AND TRANSPORTATION

4.9.1 STORAGE

The engine should be started at least once every two weeks, and allowed to run for at least 20 minutes.

Follow the instructions below for longer term storage if the engine will be out of service for 2 months or more.

4.9.2 TRANSPORTATION

To prevent fuel from spilling during transporting or temporary storage, the engine should be secured in an upright position in its normal operating position, with the engine switch OFF. The fuel switch should be turned OFF.

WARNING

WHEN TRANSPORTING:

Do not overfill fuel tank. When placing the engine on a vehicle for transport, avoid placing the engine in a location that will be directly exposed to sunlight for many hours.

If engine is placed inside a vehicle during transport, high temperatures that can be reached inside the vehicle may cause fuel to vaporize resulting in possible explosion.

Do not drive on rough roads for an extended period of time with the engine on board. If you must transport the engine on rough roads or terrain, drain the fuel from the engine beforehand.

CAUTION

Take care not to drop or strike the engine when transporting. DO NOT place heavy objects on the engine.

SECTION 5: Troubleshooting

5.1 GENERAL

Should the engine experience abnormal behavior, or malfunction during use please cross-reference **Figure 5-4: VNR750EFI Circuit Diagram** for possible causes and solutions.

For additional troubleshooting information contact your dealer or Vanair® Customer Service.

5.2 FAULT LIGHTS (VNR460VEI ENGINE ONLY)

If you have an electronic fuel injection engine, confirm that the engine fault light is not flashing before starting the engine to ensure safety.

When the engine fails to start, suddenly stops during operation, or runs abnormally, please check for a flashing fault status light when the power is turned on and the engine is not running. Refer to **Table 5A: Fault Lights** to determine what the fault indicator means.

1. Normally, the system will perform a self-check after the engine is powered on. The fault light will light up for 4 seconds as part of the self-test before going out.
2. When the engine malfunctions during self-test or during operation, the fault light will illuminate to notify the user. Please observe the fault light flashing when operation has been stopped and it is safe to do so.
3. The fault light turns on for 1.2 seconds and turns off for 0.5 seconds (slow flashing), it indicates a digit in the tens column; The fault light turns on for 0.25 seconds and turns off for 0.5s (quick flashing) is a single digit. For example, the fault light flashes 2 slow flashing and 7 quick flashing you determine this is the number is "27". Referring to the fault table, it shows 27 is a fault code for *Throttle Stuck*.

Another example: If the flash code shows 3 quick flashes (single digit) and no others, it is a "3", - cylinder temperature is too high.

4. Should multiple engine faults occur, the interval between individual flashing fault code numbers is 2 full seconds.
5. After the current flashing fault code (or codes) is shown, the fault light will remain on for 4 seconds, then it will repeat.

5.2.1 FAULT LIGHT DETAILS

1. The Fault Lights cannot be used to replace the *Engine Maintenance Schedule*. The engine should be checked and maintained according to the manufacturers instructions.
2. Explanation of Fault Levels.
 - **Level 0:** the fault does not affect the normal operation of the engine and can be ignored or will correct itself.
 - **Level 1:** the fault will affect system performance to some degree, but is not fatal. In this case, the fault light will alarm and the engine will keep running.
 - **Level 2:** the ECU controls the engine to cut off fuel and ignition to stop the engine, with the fault light flashing; In this case, please DO NOT restart the engine. Follow the instructions in **Table 5A: Fault Lights** for troubleshooting.
3. If the engine malfunctions, please read and remember the flashing code(s) of the fault light for quick problem diagnosis.
4. If the engine does not start please refer to **Table 5B: Troubleshooting**.

TABLE 5A: FAULT LIGHTS

Flashing Code	Fault Level	Fault Description	Solution
2	2	Throttle Position Sensor Fault	Contact your authorized dealer for servicing.
3	1	Cylinder Temperature Too High	Stop the machine and check that the oil was properly added, or if there are any obstructions around the engine that may affect the engine's ability to dissipate heat (after machine cools down). After checking, restart the engine. If the fault cannot be cleared, contact your authorized dealer.
5	0	Low Battery Voltage	Recharge the battery. If the fault cannot be eliminated, contact your authorized dealer.
6	2	System Voltage Too High	Contact your authorized dealer for servicing.
7	2	Cylinder Overheating/High Temperature Alarm	Stop the machine and check that the oil was properly added, or if there are any obstructions around the engine that may affect the engine's ability to dissipate heat (after machine cools down). After checking, restart the engine. If the fault cannot be cleared, contact your authorized dealer.
11	2	Fuel Injection Fault	Contact your authorized dealer for servicing.
13	2	Fuel Pump Fault	Stop the machine to check if the fuel is sufficient. If the fault cannot be eliminated after adding fuel, contact your authorized dealer for servicing.
15	2	Ignition Coil Fault	Contact your authorized dealer for servicing.
17	2	ECU Fault	Contact your authorized dealer for servicing.
18	0	Interference From Crankshaft Position Sensor	Disconnect the power and restart. If the fault cannot be eliminated, contact your authorized dealer for servicing.
19	0	System Reset	Disconnect the power supply, check the circuit for poor contact and restart after troubleshooting. If the fault cannot be eliminated, contact your authorized dealer for servicing.
22	2	Engine Overspeed Fault	Contact your authorized dealer for servicing.
23	2	Speed Control Switch Fault	Contact your authorized dealer for servicing.
25	2	CO Sensor Alarm	Please immediately ventilate and move personnel to an outdoor ventilated area. Move the machine to a well-ventilated location and restart.
27	2	Throttle Stuck	Contact your authorized dealer for servicing.
28	0	Unable to Start	Retry.

5.3 TROUBLESHOOTING

For engine starting issues please refer to **Table 5B: Troubleshooting Table** for additional troubleshooting information.

TABLE 5B: TROUBLESHOOTING TABLE

Failure/Issure	Secondary Condition	Possible Cause	Solution
Engine Does Not Start		• Engine Switch is in the OFF position	Set the engine switch to the ON position.
		• No Fuel	Refuel the tank according to the instruction in this manual.
		• Engine Oil Level Low	Check the engine oil volume. Some engines are equipped with a low oil sensor and will not start if the oil level is below the low oil limit.
		• No Ignition	Remove the spark plug cap. Clean away any dirt or debris from around the base of the spark plug so no dirt falls through the spark plug opening when it is removed. Remove the spark plug from the engine using a spark plug socket, then reinsert it into the spark plug cap. Set the engine switch to the ON position and connect the electrode with any earth ground terminal of the engine. Pull the recoil starter and look for sparks between gap of the spark plug. If there are no sparks, the spark plug needs replacing. Reinstall the spark plug according to the instructions in this manual. Please consult with your dealer if needed or contact Vanair® Customer Service.
Abnormal Behaviour During Opeation			
Low Engine Speed, Inadequate Power Output		• Part/parts wear. • Low ignition energy. • Cylinder carbon deposits. • Mechanical clearance for valve and rocker arm too large. • Only one cylinder working.	• Replace worn part(s). • Remove carbon deposits. • Replace spark plug or flywheel. • Adjust or replace related parts. • Check spark of cylinder that is not working.
Popping		• Wide/narrow spark plug clearance.	• Check spark plug gap.
Hunting		• Governor assembly needs adjustment. (Contact dealer.) • Spark plug issue.	• Adjust governor assembly. • Adjust spark plug gap.
Abnormal Noise		• Clearance between valve and rocker arm is too large. • Cam gear damage.	• Adjust or replace related part or parts. • Replace cam.
Hard Start or Will Not Start			
Weak/No Spark At Spark Plug	Current is Present	• Spark plug carbon deposits. • Spark plug insulation is damaged. • Spark plug gap too wide/narrow.	• Remove carbon build-up from spark plug. • Replace spark plug. • Adjust spark plug gap to 0.6-0.8mm.
	No Current Present	• Spark plug damaged. • Trigger or wiring harness is damaged. • Regulator damage.	• Replace spark plug. • Replace trigger or wiring harness. • Replace regulator.
	Intermittent or No Current Present	• Bad connection between ignition wire and spark plug. • Malfunction or short-circuit of Stop Switch.	• Properly connect ignition wire to spark plug. • Adjust or replace switch.
Ignition/ Fuel Supply Present	Good Compression	• Cylinder is flooded. • Fuel quality poor, or water/ contaminants in fuel.	• Clean spark plug. • Drain and Change fuel.
	Adequate Fuel Supply, Low Compression	• Piston ring worn. • Spark plug loose. • Cylinder Head Gasket leakage. • Mechanical clearance between rocker arm and valve too large. • Timing issue.	• Replace rings. • Tighten plug. • Replace gasket and reassemble head. • Adjust valve clearance. • Adjust timing.
	Ignition/Fuel Supply Work Properly	• Bad connection between ignition wire and spark plug. • Malfunction or short-circuit of stop switch. • Low oil level.	• Properly connect ignition wire to spark plug. • Adjust or replace switch. • Check oil level.
Note: If the solutions provided here do not solve the issue/problem, or you have questions, please contact your dealer or Vanair® Customer Service.			

5.4 ENGINE CIRCUIT DIAGRAMS

Please see the following engine circuit diagrams for the VNR460VEI, VNR680 and VNR750EFI engines.

Figure 5-1: VNR460VEI Circuit Diagram, Figure 5-2: VNR680 Circuit Diagram, and Figure 5-3: VNR750EFI Circuit Diagram.



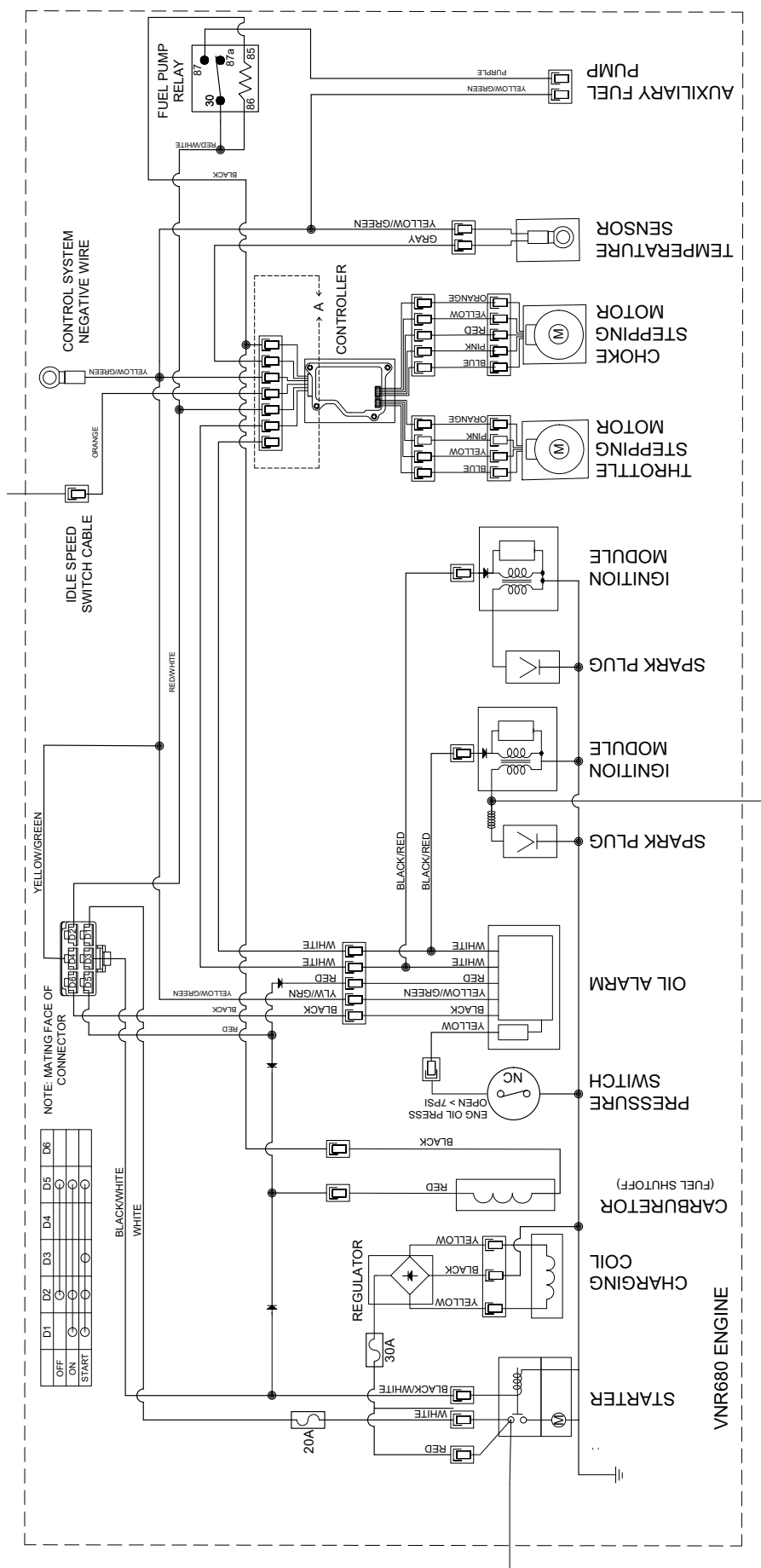


Figure 5-2: VNR680 Circuit Diagram

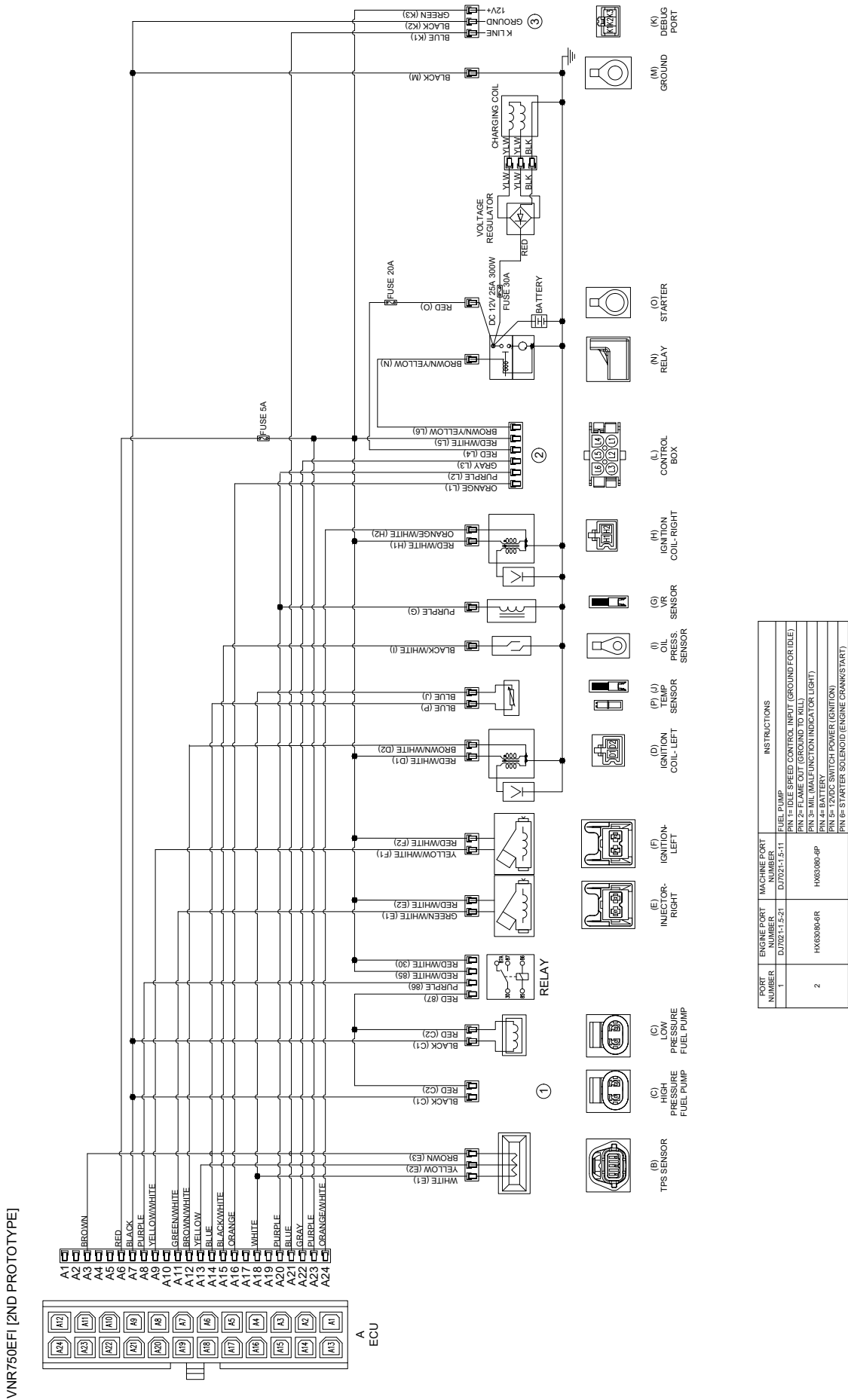


Figure 5-3: VNR750EFI Circuit Diagram

PORT NUMBER	MACHINE PORT	INSTRUCTIONS
1	DJ7021-1.5-21	FUEL PUMP PIN 1= IDLE SPEED CONTROL INPUT (GROUND FOR IDLE) PIN 2= FLAME OUT (GROUND TO KILL) PIN 3= ML (MALFUNCTION INDICATOR LIGHT) PIN 4= BATTERY (GROUND TO KILL) PIN 5= STARTER SWITCH POWER (IGNITION) PIN 6= STARTER SOLENOID (ENGINE CRANKS START)
2	HX63080-6R	



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090234-OP_r01 VNR Engines (September 2026)