Model VD5000
Diesel Generator

User's Manual
January 2015

VOLTMASTER®

PREFACE

This manual covers the operation and preventive maintenance of the VD5000 diesel generator. This manual is primarily concerned with the generator specifications, function, troubleshooting and repair.

All information in this publication is based on the latest product information available at the time of approval for printing.

If a problem should arise or if you have any questions about the generator, consult an authorized Voltmaster service center.

Our generators are designed to give safe and dependable service if operated according to instructions. Read and understand the operation manual before operating the generator. Failure to do so could result in personal injury or equipment damage.

Several preventive maintenance procedures require background knowledge in diesel engines. Be sure to consult an authorized service center when necessary. A service manual and parts breakdown are available at www.voltmaster.com.

CONTENTS

1. SAFETY INFORMATION

WARNING!

Failure to properly follow these precautions can result in property damage, serious injury or DEATH!

■ Read all labels and the owner's manual before operating this generator.

■ Operate only in well ventilated areas. Exhaust gas contains carbon monoxide, a poisonous, colorless, odorless gas and can be deadly.

■ Always stop the engine before refueling. Wait 5 minutes before restarting.

■ Check for spilled fuel or leaks. Clean and/or repair before use.

■ Keep any source of combustion away from fuel tank at all times.

■ Do not operate near flammable materials or in an explosive atmosphere.

■ Do not operate this unit in wet conditions or with wet hands. Use of a generator in rain, snow or near water can result in electrocution.

■ Keep the generator dry at all times. The VD5000 comes with a weather resistant, not not weatherproof enclosure.

■ Connections for standby power to a building's electrical system must be made by a qualified electrician and must comply with all applicable laws and electrical codes. Improper connections can allow electrical current from the generator to back feed into the utility lines. Such back feed may electrocute utility company workers or others who contact the lines during a power outage and when utility power is being restored; the generator may explode, burn, or cause fires in the building’s electrical system.

WARNING!

1. TO PREVENT FIRE

■ Never add fuel to the fuel tank while the engine is running.

■ Wipe off any overflow of diesel fuel with a clean cloth. Keep explosives and other flammable products away from the generator set.

■ To prevent fire and to provide adequate ventilation, keep the generator at least three feet (one meter) away from buildings and other equipment during operation.

■ Operate the generator on a level surface.

■ Do not put the generator indoors while the engine is hot.

2. TO PREVENT EXHAUST INHALATION

Exhaust gas contains poisonous carbon monoxide which is harmful to your health and possibly fatal. Never use the generating set in confined spaces or poorly ventilated areas.

3. AVOID BURN INJURIES

The muffler and the engine body are very hot while the engine is running and remains so for a time after the generator has been shut off. Do not touch these parts to prevent possible severe burns.

4. ELECTRIC SHOCKS

To avoid electric shocks or short circuits, do not touch the generating set when your hands are wet. The generator is not waterproof so it should not be used in a place exposed to rain, snow or water spray. Use of the generator in a wet location can cause short circuits and electrical shocks during operation.

■ The generator should be grounded to prevent electrical shocks from faulty loads. Connect a length of heavy wire between the generator set ground terminal (on the control panel) and an external ground source.

■ Do not hook up tools or other appliances to the generator before it has been started. If equipment is plugged in and the circuit breakers are on, the generator starting motion may cause sudden movements of the equipment and possibly result in injuries. Be sure to disconnect any tool or appliance from the generator prior to starting.

CAUTION
■ Most appliance motors require more than their rated current for start-up. ■ Do not exceed the specified current limit of any receptacle. ■ Do not connect the generator set to a household circuit without an approved transfer switch. This could cause damage to the generating set and to electrical appliances in the house.

5. WHEN CHARGING THE BATTERY

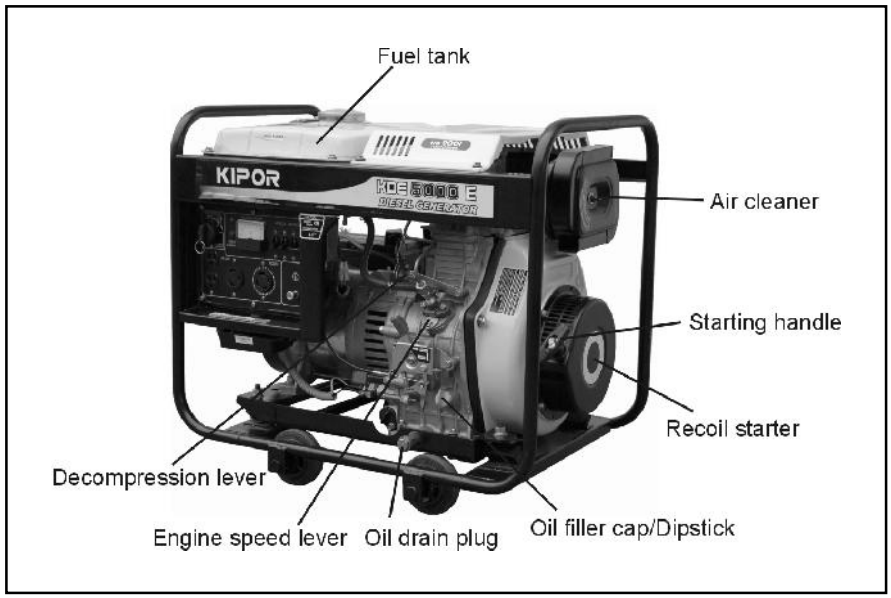
Your generator is equipped with a wet acid style battery. Leakage of battery electrolyte is possible if the case is penetrated or the battery is upended. Battery electrolyte contains sulfuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and get prompt medical attention. Batteries generate hydrogen gas which can be highly explosive. Do not smoke or allow flames or sparks near a battery at any time. Charge the battery only in a well-ventilated area.

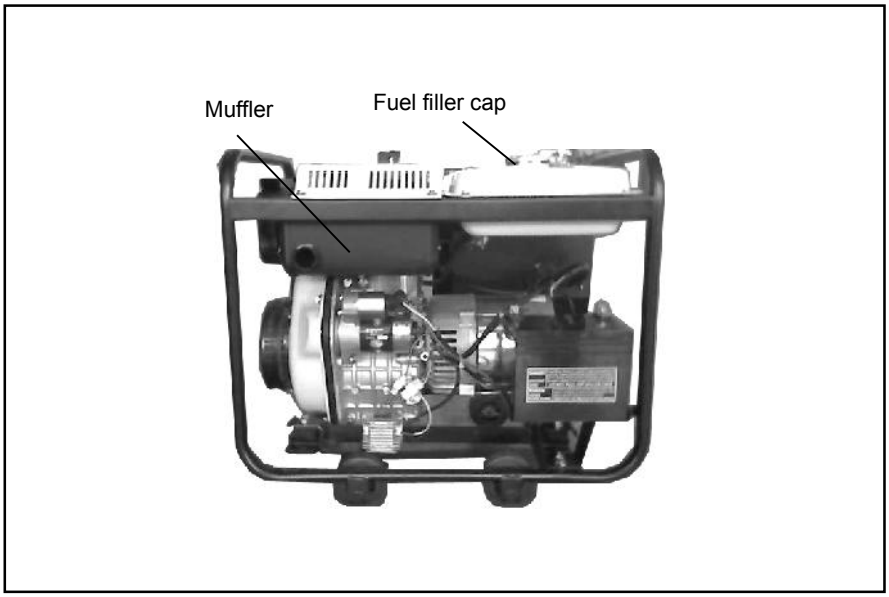
MAIN TECHNICAL SPECIFICATIONS AND DATA

Item	Model	VD5000
Generating set	Rated frequency (Hz)	60
	Max power (kVA)	5.0
	Rated power (kVA)	4.5
	Rated voltage (AC)	120/240
	Rated current (AC)	37.5/18.8
	Rated speed (rpm)	3600
	Phase	single phase
	Power factor	1.0
	Excitation mode	self excitation constant voltage(AVR)
	Structure mode	Open Frame
	Gross weight lbs. (kg)	286.6 (130)
	Dimensions (LxWxH) in (mm)	28.4x18.9x33.3 (720x480x845)
Engine	Model	KM186FB
	Type	Vertical, 4-stroke, single-cylinder, air-cooled, direct injection diesel engine
	Continuous output(kW/rpm)	6.3
	Max. Power (kW /rpm)	6.6
	Bore x stroke in. (mm)	3.39x2.95 (86x75)
	Displacement cu in. (cc)	17.17 (436)
	Cooling system	Forced air-cooled system
	Valve Clearance	Intake/Exhaust .15 mm
	Lubricating system	Pressure splash combined type
	Lube oil capacity qt.(L)	1.45 (1.65)
	Starting system	recoil/electric
	Fuel	Diesel
	Fuel capacity gal. (L)	3.96 (15)
	Low oil pressure alarm	included

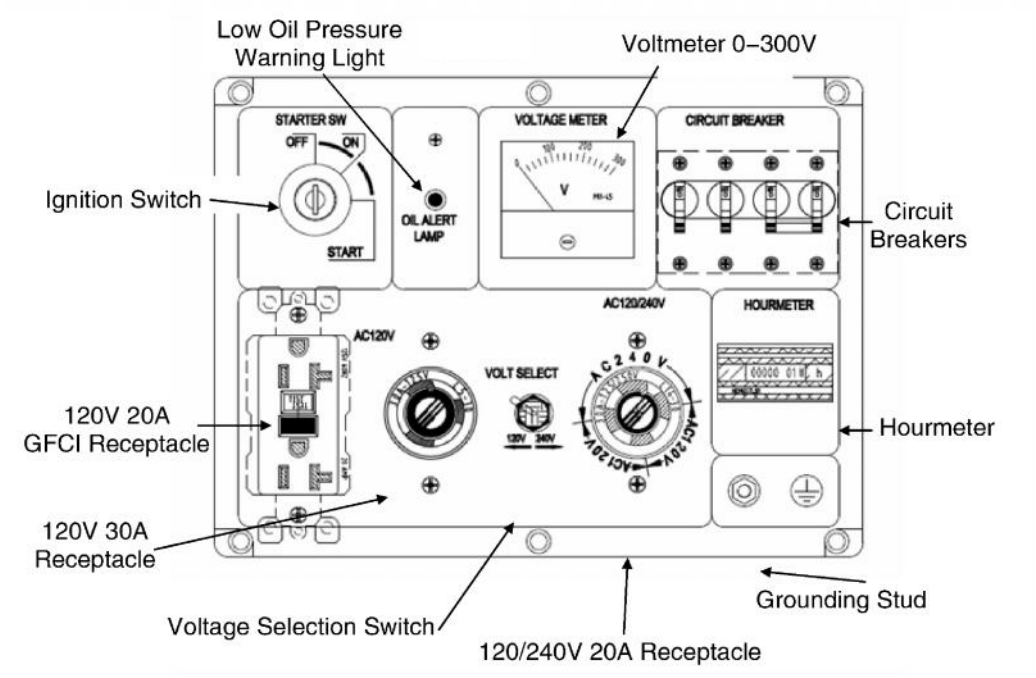
2. COMPONENT IDENTIFICATION

2.1 Component Locations VD5000





2.3 Control panel



2.5 Serial number and bar code identification and location

The generator serial number identifies your particular unit and is important when ordering parts and accessories. A serial number bar code sticker is placed on the generator and on the shipping carton. Additionally, it is engraved onto a metal serial number tag riveted to the generator.

3. PREPARATION FOR STARTING

3.1 Selection and handling of diesel fuel

■ Selection of diesel fuel

Your diesel engine is designed to run on ultra-low sulfur diesel fuel. ATSM 2-D is the most suitable for the engine at temperatures above 32°F (0°C). ATSM 1-D is recommended for temperatures below 32°F (0°C). A Cetane rating of at least 45 is recommended for reliable starting. Winter fuels are often blended by refineries so for optimum performance, don't use stored winter fuel in warmer weather.

■ Keep dust and water out of the fuel

When filling the fuel tank from drums, make sure that no dust or water is mixed in the fuel. Serious fuel injection pump and injector problems will result.

■ Do not overfill

Overfilling is very dangerous. Do not fill the tank beyond the top of the red plug inside the fuel strainer.

■ Below 15 degrees F, wax crystals begin to form in diesel fuel. These will clog the fuel filter and stop the engine as the temperature drops toward 0 F. Any good "winter fuel conditioner" for diesel fuel will keep the fuel moving to at least -20 degrees. Follow the manufacturer's instructions.

WARNING

■ Refuel in a well-ventilated area with the engine stopped.
■ Do not smoke or allow flames or sparks in the area where the engine is refueled or where the fuel oil stored.
■ Do not overfill the tank; make sure the filler cap is securely closed after refueling.
■ Be careful not to spill fuel when refueling. If any fuel is spilled, make sure the area is dry before starting the engine.

3.2 Check and refill the engine oil

WARNING

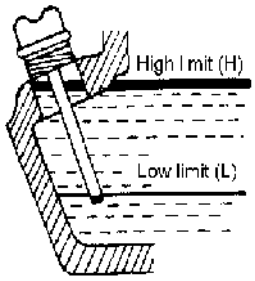
■ Always check the engine oil level with the generator on a level surface before starting and refill if necessary.
■ The engine may be damaged if operated with insufficient engine oil; it is also dangerous to overfill the oil level.

CAUTION

The VD5000 generator is equipped with a low oil pressure warning and shutdown system. This system stops the engine automatically when the oil pressure falls below a safe level and prevents catastrophic engine failure. Do not operate the generator with this system disabled.

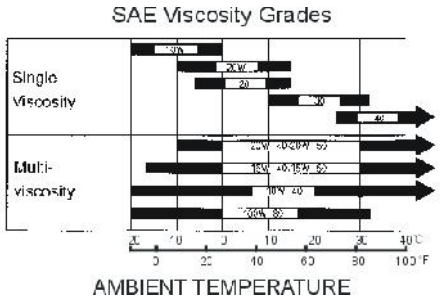
■ Check the oil level

Take out the oil filler cap and clean the indicator stick with a clean lint free rag. Reinsert the oil filler cap without rotating it. Remove the oil filler cap and examine the oil level. If the oil level is at or below the lower level, refill the oil to the upper limit mark. Reinsert the oil filler cap and tighten securely. The oil capacity of the engine is 1.45 qt. (1.65 L)



■ Engine Oil Selection

It is very important to select the proper engine oil to maintain good performance and life of the generator. If an inferior engine oil or oil of the wrong grade is used or if your engine oil is not replaced periodically, the risk of piston seizure, piston ring sticking and accelerated wear of the cylinder liner, bearings and other moving parts increases significantly and the life of the generator is shortened. The recommendation is for an API classification of CH-4, CG-4, or CF-4. The rating may be in combination with SJ, SH, or SG (for example CH-4/SJ). Choose the applicable viscosity oil according to local ambient temperature.

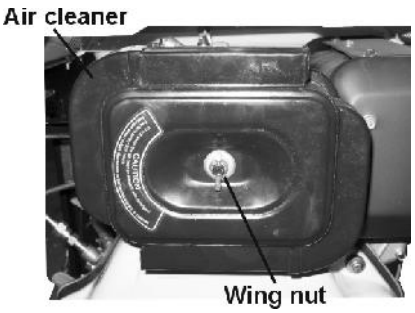


3.3 Connect the Battery

To connect the battery, first connect the positive (red) cable to the positive (+) post of the battery. Use the fasteners provided and ensure the connection is secure. Next connect the negative (black) cable securely to the negative (-) battery terminal.
Use the reverse order when disconnecting the battery.

3.4 Service the air cleaner

1. Unscrew the wing nut, remove the air cleaner cover and take out the element.



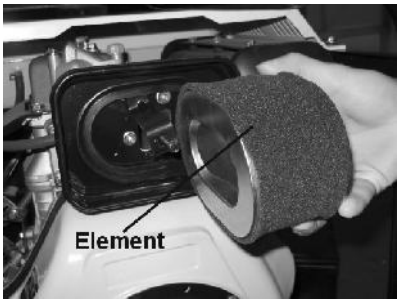
CAUTION:

■ Do not wash the element with detergent.

■ Replace the element when dirty or the paper is torn.

■ Never run the generating set without the element or rapid engine wear will result.

2. Reattach the air cleaner cover and tighten the wing securely,



3.5 Check the generating set

1. Turn off all circuit breakers and disconnect any loads.

WARNING

■ The generator should be grounded to prevent electric shocks.

3.6 Break-in period

The first 20 hours are considered a break-in period for the engine. Please observe the following instructions:

■ Warm up the engine 5 minutes upon the initial start. Run the engine with no load until the engine becomes warm.

■ Avoid applying any heavy loads during the break-in period. No more than a 50% load (2500 watts) is recommended.

■ Replace the engine oil while the engine is warm after the initial 20 hour run time.

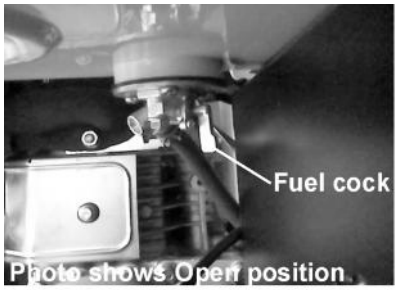
4. STARTING THE GENERATOR

WARNING

■ Do not plug in any tools or appliances into the generator before starting.

4.1 Recoil starting

Start the engine according to the following procedures:



1. Open the fuel cock.

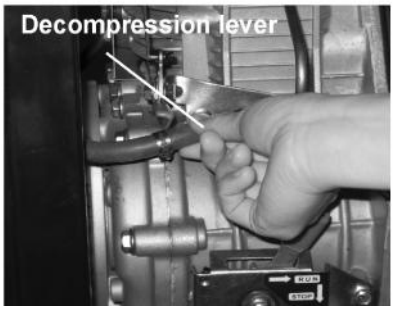
2. Set the engine speed lever at the RUN position.

3. Pull out the recoil starter handle.

■ Pull out the handle until you feel the resistance then return it back to the initial position.

■ Press down the decompression lever. It will return automatically when the recoil starter is pulled.

■ Firmly pull the recoil starter handle



CAUTION

■ Do not allow the handle grip to snap back against the engine. Return it gently to prevent damage to the starter mechanism.

■ When the engine is difficult to start in cold weather, remove the screw plug from the cylinder head cover and add 2cc engine oil. Be sure to replace the plug to prevent moisture and dirt from entering the engine.

■ The use of aerosol starting fluids is prohibited. Severe piston damage may result.

4.2 Electric starting

1. Starting (The preparations for electric starting are the same as for the recoil starting.)

■ Open the fuel cock.

■ Set the engine speed lever at the "RUN" position.

■ Turn the starting key clockwise to "START" position.

Remove your hand from the key as soon as the engine starts.

If the starting motor does not start after 10 seconds, wait 15 seconds before starting it again.

5. OPERATING THE GENERATOR

5.1 Operate the generator

Warm up the engine without load for three minutes.

5.2 Check while running

1. Abnormal sound or vibration;
2. Engine misfiring or rough running
3. Heavy exhaust smoke especially blue or black.

If you notice any of the above-mentioned conditions, stop the engine and correct the problems before running the generator.

5.3 AC application

1. After switching on the circuit beakers, observe the voltmeter on the control panel or digital display. Do not operate the generator if a reading other than 120 ± 5 volts is observed.
2. Connect the equipment to the generating set in order i.e. the appliances with the highest current load first.

CAUTION
■If overloading of the circuit trips an AC circuit breaker, reduce the electrical load on the circuit and wait a few minutes before resuming operation.

3. The generator is designed to permit simultaneous 120 and 240 volt operation.

5.4 Voltage Selection Switch

The voltage selection switch has two positions: AC120V and AC120/240V.

1. When the voltage selection switch is in the 120/240V position, the generator supplies both 120V and 240V AC power. If you operate the generator with the switch in this position, the electric current is limited to 15 amps to the 120V receptacles although it can provide 15 amps at 240V from the 120/240V receptacle.
2. When the voltage selection switch in the 120V position, the generator supplies 120V AC only. It can supply a full 30 amps to the 30 Amp receptacle or 20A to the GFCI receptacle. Total current is limited to 33 amps at rated load.

5.5 GFCI Receptacle

The GFCI (ground fault circuit interrupter) shuts off power to the protected receptacles if a ground fault or current imbalance between two conductors is detected. If the reset button pops out, the appliance connected to the receptacle may be defective. If the appliance appears to be in good condition, press the reset button until a click is heard. This will restore power. If the reset button pops out again, disconnect all appliances disconnected immediately and have them inspected by a qualified electrician before attempting to use them again.

6. STOPPING THE GENERATOR

1. Disconnect all loads.
2. Turn off all circuit breakers.
3. Run the generating set without load for 3 minutes. Do not stop the engine suddenly or the temperature will increase abnormally

- ■ Press down on the stop lever.
- ■ Turn the key to "OFF".
- ■ Place the fuel cock lever to "S" position.

WARNING

- ■ If the engine keeps on running after the speed lever is placed in the "STOP" position, turn the fuel cock to the "CLOSE" position.
- ■ Do not stop the engine with the decompression lever.
- ■ Do not stop the generating set with load applied. Stop it after the load removed.

7. PERIODIC MAINTENANCE

Periodic maintenance is very important to keep the generator in optimum running condition. The chart below indicates what checks and adjustments are necessary and at what interval.

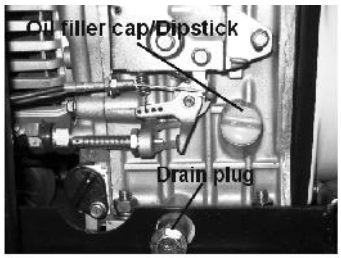
Item \ Interval	Daily	First 20 Hours	100 hours or three months	500 hours or six months	1000 hours or every year
Check Battery and cables	○				
Check Fuel Level	○				
Check Oil Level	○				
Replace engine oil		○	○		
Check Air Filter Element	○				
Replace air cleaner element *				○	
Clean oil filter				○ (replace if necessary)	
Clean fuel filter				○	
Replace Fuel Filter					○
Check fuel injection pump					●
Check fuel injector					●
Check fuel lines				● (replace if necessary)	
Adjust valve clearance					●
Check carbon brush and slip rings					●

*service more frequently in dirty or dusty conditions

Note: "●" indicates special tools and/or knowledge required. Contact an authorized Voltmaster service center as necessary.

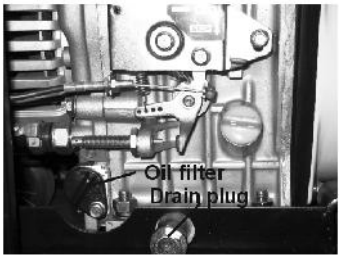
7.1 Changing the engine oil

Remove the oil filler cap. Remove the drain plug and drain the old oil while the engine is still warm. The plug is located on the bottom of the cylinder block. Tighten the drain plug and refill with the recommended oil.



7.2 Clean the engine oil filter

	Every 6 months or 500 hours

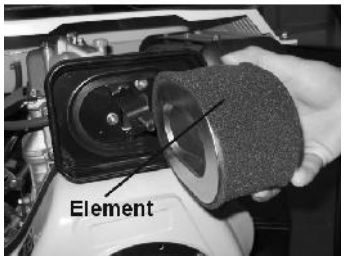


7.3 Replace the air cleaner element

Do not clean the air cleaner element with detergent.

7.4 Clean and replace fuel filter

The fuel oil filter also has to be cleaned regularly to insure maximum engine output.

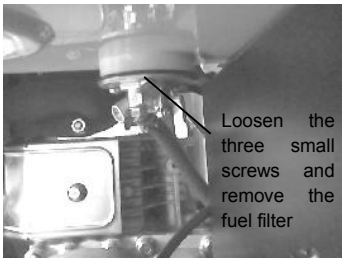


Clean	Every 6 months or 500 hours
Replace	Every year or 1000 hours

1. Drain out the fuel from the fuel tank.

Remove the small screw of the fuel cock and pull out the filter from the filler port.

3. Wash the filter thoroughly with diesel fuel. Loosen the fastening nut, bottom cover and delivery discs for cleaning any deposits.

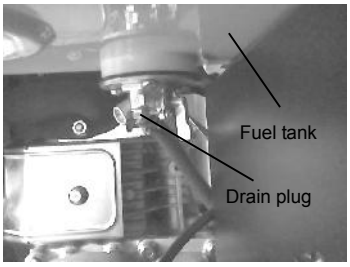


7.5 Check the injection nozzle and fuel injection pump

Consult the service manual

7.6 Check the generating set carbon brush and slip ring

Consult the service manual

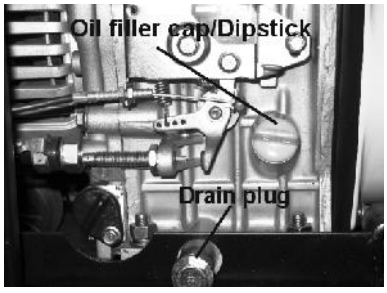


8. STORAGE AND EXERCISE

8.1 Short Term Storage

1. Add oil to the maximum level without overfilling.
2. Fill tank with fresh diesel fuel. Treat with a quality diesel fuel conditioner.
3. Exercise the generator every 30 days. Run it with at least a 50% load (2500 watts) for 30 minutes. This will serve to lubricate the injection pump and bake out any moisture that has accumulated in the generator windings.

8.2 Long Term Storage



If storing the generator for periods exceeding 30 days, perform the following steps:

1. Operate the engine for about 3 minutes and then stop.
2. Drain the engine oil while the engine is warm and fill with fresh oil.
3. Remove the screw plug on the cylinder head cover and add 2cc of clean engine oil then replace the plug.
4. ■Recoil starting:

Push the decompression lever down (Non-compression position) and hold it while you pull the recoil starter 2~3 times. (Do not start the engine.)

■ Electric starting:

Turn the engine 2~3 seconds with the decompression lever set at the non-compression position and the starting key at the "START" position. (Do not start the engine.)

5. Wipe off any oil and dirt from the engine and store in a dry place.

9. TROUBLESHOOTING

9.1 The diesel engine will not start or is difficult to start

Fault:	Remedy:
Deteriorated diesel fuel in the tank	Drain the tank and refuel with fresh diesel fuel
Fuel filter is clogged	Clean or replace fuel filter
Fuel Cock is not in the Start position.	Turn it to the START position
The governor lever of the engine throttle is not in the start position	Switch to the start position
Oil filter is clogged causing low oil pressure switch to activate	Clean or replace oil filter
Low oil pressure switch failure	Check wiring and replace switch as necessary
Air in the fuel lines (often occurs after running out of fuel)	Consult the service manual for bleeding procedure
Valves out of adjustment	Check valve adjustment and reset as necessary (refer to service manual)
Insufficient battery voltage to energize starter and/or fuel solenoid valve	Check battery state and terminals and cables

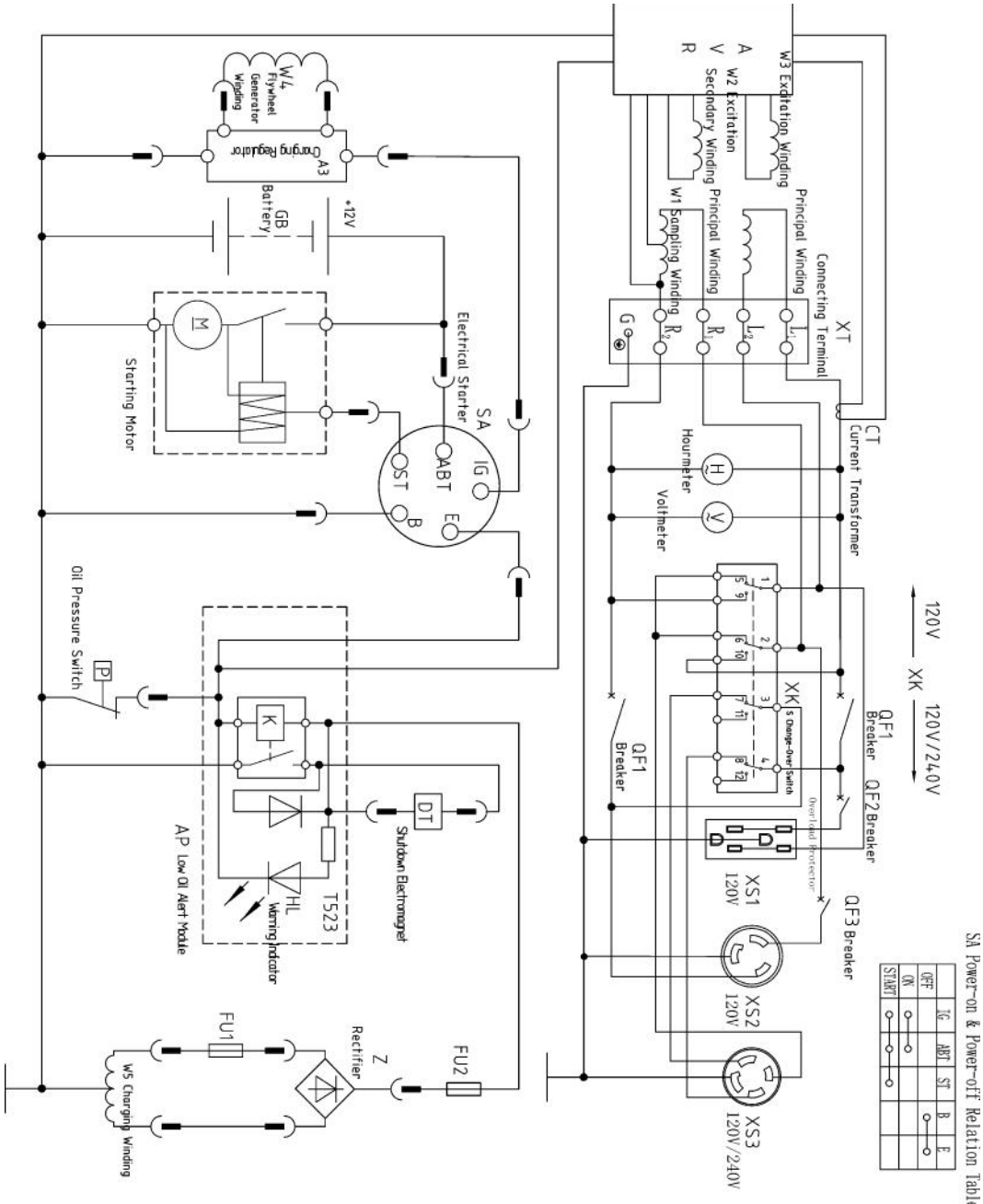
9.2 Engine speed is unstable, too high or too low

Fault:	Remedy:
Engine governor spring is defective	Replace governor spring
Valves out of adjustment	Check valve adjustment and reset as necessary (refer to service manual)
Governor out of adjustment	Adjust governor (refer to service manual)

9.3 No AC output

Fault:	Remedy
Circuit Breakers closed	Open circuit breakers
Receptacle is defective	Check wiring and check or replace receptacle

10. Wiring Diagram



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