

# **OPERATOR'S MANUAL**

**for**

## **WESTERBEKE DIESEL GENERATOR SETS**

**4 KW - 7.7 KW - 11 KW - 12.5 KW**

**Publication Number 32461  
Printed in U.S.A.**

## FOREWORD

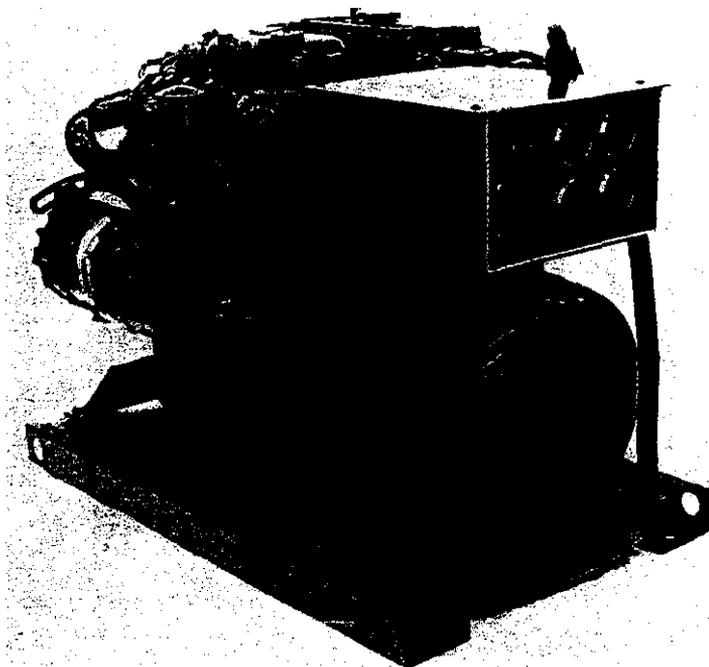
Thank you for having selected a Westerbeke Diesel Generator for your use.

This manual describes the procedures for proper handling and maintenance of the Generator Set Models of 4, 7.7, 11 and 12.5 KW rating.

To maintain your engine always in its best operating condition and to enable it to perform best, it is important to handle it properly and carry out complete maintenance according to this manual.

If you have any questions about your equipment or in the event of a failure, please contact your nearest distributor or dealer.

We look forward to your continued patronage.



4 KW WITH MOUNTED INSTRUMENT PANEL

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GENERAL SPECIFICATIONS

ITEM	CHARACTERISTIC	4 KW	7.7KW	11KW	12.5KW
	Type	Vert., 4 cycle, water cooled diesel engine			
	Combustion chamber	Swirl chamber type			
	No. of cylinders	2	3	4	4
ENGINE	Bore & stroke (inches)	2.76x3.07	2.87x3.07	2.87x3.07	3.07x3.07
	Cu. In. displacement	37	60	80	91
	Compression ratio	23	23	23	23
	Firing order	1-2	1-3-2	1-3-4-2	1-3-4-2
	Dry weight, std. (lbs)	298	374	434	498
	Fuel	#2 diesel fuel only			
		Injection pump	Bosch type		
	Nozzle	Throttling type			
FUEL SYSTEM	Injection pressure	All models: 1707 lbs.			
	Governor	Centrifugal weight type			
LUBE OIL	Lubrication system	Pressure lubrication			
	Oil filter	Filter paper type			
	Engine oil capacity	2.5 qts	4.0 qts	4.0 qts	4.2 qts
		For accuracy, depend on dipstick markings			
COOLING	Cooling system	Forced circulation, water cooling by heat exchanger			
	Coolant capacity	6 qts	5 qts	8 qts	8 qts
		Always fill to top of filler neck			
STARTING	Starter V-HP	12-2	12-2	12-2	12-2
	Alternator V-A	12-50	12-50	12-50	12-50
	Glow plug	Sheathed type - all models			
	Battery capacity	60 AH	75 AH	90 AH	90 AH
RATINGS	Rating	4 KW	7.7KW	11KW	12.5KW
	Deductions	3% for each 1000 feet above sea level			
		1% for each 10° above 85°F			
		10% for continuous duty			

## CAUTIONS IN HANDLING ENGINE

- \* Always use proper engine oil and watch oil pressure during operation.
- \* Use clean fuel, free from impurities and water content.
- \* Prevent entry of air and water into the fuel system.
- \* In case the starter motor pinion fails to engage with the ring gear at the time of starting, turn on the starter switch again after the starter motor has come to a complete stop.
- \* Prevent the temperature of cooling water from falling too low.
- \* Pay attention to the color of exhaust gas.
- \* Clean or replace the fuel filter and oil filter periodically.
- \* Replenish or replace oil as specified.

## SAFETY PRECAUTIONS

- \* Install unit in a properly ventilated space.
- \* Do not touch moving parts during operation.
- \* Do not touch hot parts such as exhaust pipe, and do not place combustible materials there.
- \* Inspect and adjust parts of the engine only after it is stopped.
- \* Check and refill engine oil, cooling water and fuel after the engine is brought to a stop.
- \* Check water level in the coolant recovery tank. Do not remove pressure cap on manifold if engine is hot.
- \* Always use tools of proper sizes and full caution during servicing.
- \* Be sure that current carrying wires are protected from abrasion and that all connections are tight.

## BREAKING IN

Service life of your generator is dependent upon how the engine is operated and serviced during the initial 10 hours of operation!

Your new engine needs at least 10 hours of conditioning operation for breaking each moving part in and maximizing performance and life of engine. Perform this conditioning carefully, bearing the following points in mind:

1. Since generator sets operate at 1800 RPM to obtain 60 cycle current, your control of the breaking in process is limited to control of load.
2. Do not ever attempt to BREAK IN your generator set by running at NO LOAD.
3. Immediately on starting the set, add approximately 25% load to cause a fast warm up.
4. For the first 10 hours of operation, run between 20 and 60 percent load.
5. After 10 hours, you may load as needed, except that:
6. You must avoid overload at all times. Overload is signalled by smoky exhaust and/or a reduction in speed and voltage.

### Explanation:

"Breaking in" a new engine is basically a seating of the piston rings to the cylinder walls. This is not accomplished by long periods of running idle, nor by early running under full load.

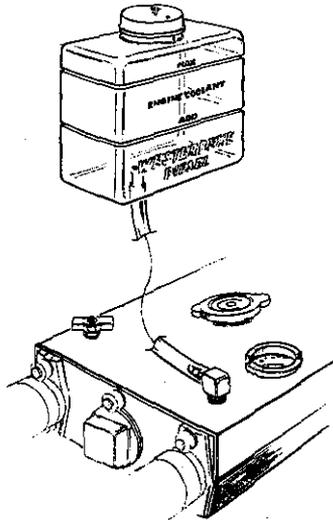
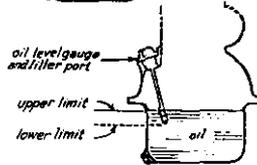
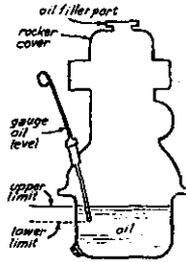
Idle running may glaze the cylinder walls causing oil consumption and smoky operation. Excessive loads may score cylinder walls with similar results.

As indicated above, use a short warm up period under moderate load for the first ten hours of operation. For the next forty hours, use approximately 70% load. This kind of careful operation will result in best results from your engine.

## PREPARATIONS

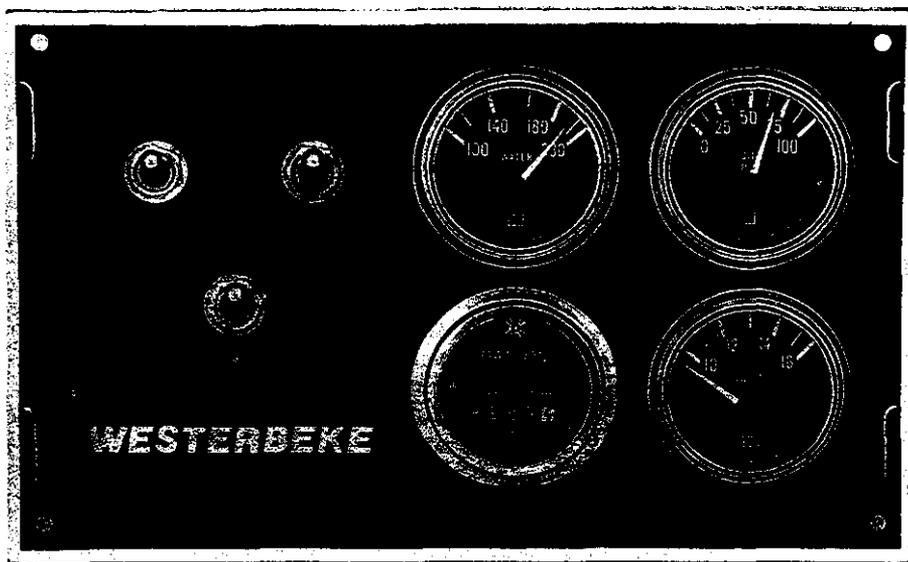
Take steps as shown below in starting your engine for the first time or after a prolonged shut-down.

1. Fill your engine with oil up to or near the upper limit on the dipstick. Use a good grade of oil with API specification of **XC** or better. For quantity of oil, you may refer to the General Specifications page. However, it is best always to be guided by dipstick measurement as angle of installation has some effect.
2. Your engine is supplied with a coolant recovery system to which the following instructions apply:
  - a) Fill engine completely to the neck of the manifold cap.
  - b) Then fill the recovery tank to the bottom level line. Need for adding coolant is indicated when a cold engine has coolant level below the bottom level line.
  - c) In winter add antifreeze as described on page 16. Antifreeze may be used year round if changed annually.
3. Fill the fuel tank with Diesel fuel. The interior of the fuel tank must be maintained clean. Be careful not to allow introduction of dirt when filling fuel.
4. Engine oil, coolant and transmission levels should be checked at least once a day prior to engine use.



## STARTING PROCEDURES

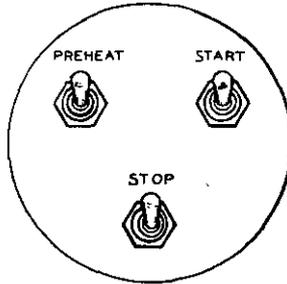
Instrument panel, description and use of:



- Note 1: When generator is stopped after use, the water temperature and oil pressure gauges may stay at their running readings.
- Note 2: When generator is next to be used, depress preheat switch. The temperature and pressure gauges will "ZERO" and the voltmeter will register battery voltage. The electric fuel pump, mounted on the engine, will also begin to operate, purging any air accumulated in the system.
- Note 3: The generator is now prepared for starting. See next page for specific instructions.

### STARTING PROCEDURES

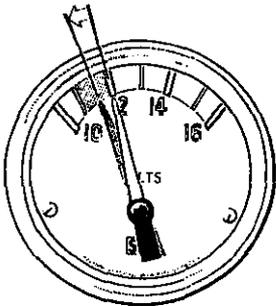
1. If making an initial start after lay-up, fuel filter servicing or repairs, depress the preheat switch for 15 to 25 seconds. This will energize the fuel pump allowing it to purge the system of any accumulated air. This will preheat the glow plugs at the same time. (See table below for preheating time.)



#### Quick-heat type (Y114T)

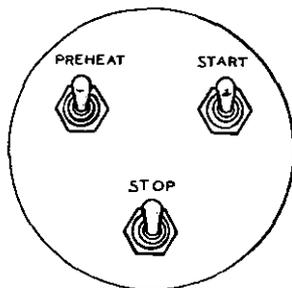
Atmospheric temperature	Preheating time
+5°C (+41°F) or higher	Approx. 10 sec.
+5°C (+41°F) to -5°C (+23°F)	Approx. 20 sec.
-5°C (+23°F) or lower	Approx 30 sec.
Limit of continuous use	1 minute

2. Proper glow plug function is indicated by voltmeter drop when key is depressed. This drop will be slight but discernible. If no voltage drop is noted, it may indicate defective glow plugs or a faulty preheat circuit (check for loose connection).



### 3. Starting

While still holding preheat switch depressed, depress the start switch. The starter motor will run thereby cranking the engine. As soon as the engine runs, release the start switch which will return to its normally open position. Continue holding the preheat switch depressed for 2 or 3 seconds. This defeats the low oil pressure shutdown until the engine oil pressure rises to normal running pressure. Now release the preheat switch.



Should the engine not start when start switch is depressed for 10 to 12 seconds, wait 30 seconds and repeat "3" with adequate preheat time. Never run the starter motor for more than 30 seconds at a time.

### 5. Operation

With the engine running, check that oil pressure and battery charge voltage are registering and that raw water is discharging with the exhaust. During engine operation, do not depress start switch as this will damage starter motor.

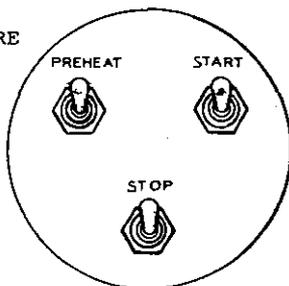
### 6. Warm-up operation

Operate at reduced load until water temperature rises to the 140 to 150 degree range.

## STOPPING PROCEDURE

### 1. Stop

To stop the generator, depress the stop switch until engine stops completely and then release.



## CAUTIONS ON STARTING AND OPERATION

### 1. Normal starting

Follow the procedures below for routine starting of your engine.

- 1) Check the engine oil level and refill if necessary.
- 2) Insure that you have sufficient fuel. Keep tank as full as possible.
- 3) Check cooling water level, and refill if necessary.  
Note: Check for leaks of water or oil, particularly when signs of such leak are found on the bottom of the engine or in the drip tray.
- 4) Start the engine in accordance with the procedures given on the preceding pages.
- 5) Allow the engine to warm up to 140°-150° F before placing the engine under heavy load.

### 2. Starting under cold conditions

The following three adverse conditions concur as the atmospheric temperature drops exceedingly, and the engine must, under such conditions, be started by taking steps described below:

**LUBRICATING OIL TURNS VISCOUS** - Make certain that oil used is adequate for the prevailing atmospheric temperature. Check the oil also for deterioration.

**VOLTAGE ACROSS BATTERY TERMINALS DROPS** - Check that the battery is fully charged.

**THE TEMPERATURE OF INTAKE AIR IS LOW AND COMPRESSION TEMPERATURE DOES NOT RISE ENOUGH** - Allow the glow plug to operate sufficiently to aid starting. See table on page 8.

### 3. Cautions during operation

Confirm that the oil pressure is normal during normal operation.

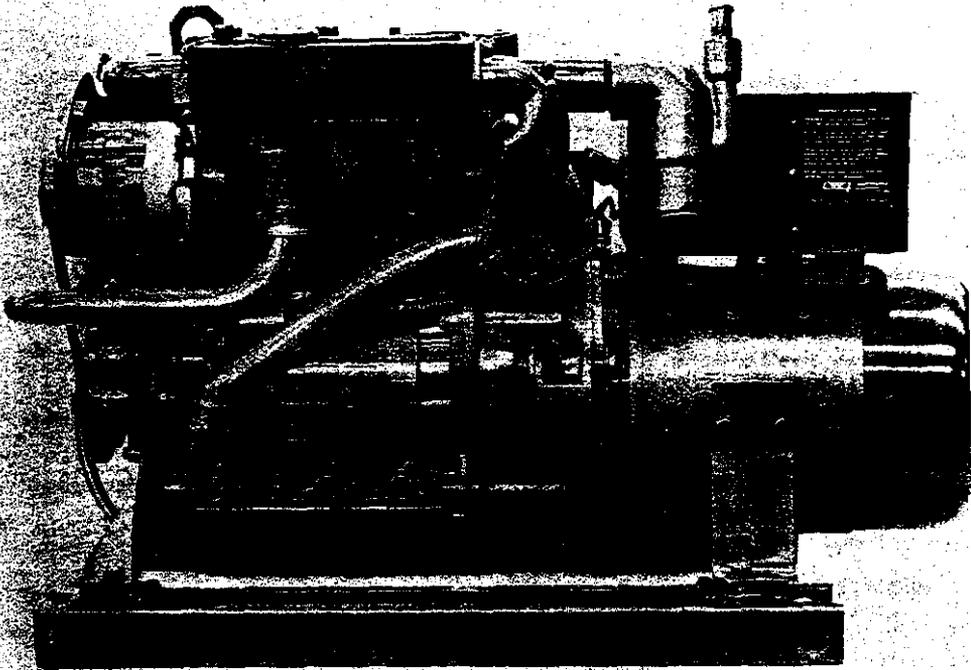
Confirm that exhaust gas is as follows:

- \* While engine is cold.....White smoke
- \* When the engine grows warm.....Almost smokeless
- \* When the engine is overloaded.....Some black smoke

Check for abnormal noise such as knocking, friction or leaking sounds, and vibration and blow-back sounds.

Check for leaks of fuel and engine oil.

A knocking sound is heard while the engine is cold, during quick acceleration and at idle. Confirm that no knocking sound is heard in other cases.



7.7 KW

## REQUIREMENTS FOR PROPER OPERATION

### LUBRICATION SYSTEM

#### 1. Engine oil

For engine lubrication, use diesel engine oil. Diesel engine oils are classified according to the API Specifications into grades CA, CB, CC and CD. Any one of them is usable, but use of CC or higher grades prepared by well-known makers is recommended.

#### 2. Engine oil viscosity

Use oil having viscosity best suited to the atmospheric temperature. Use of an all-season oil SAE10W-30 with minimum viscosity change under different temperatures is suggested.

Atmospheric temperature	Viscosity
20°C (68°F) or higher	SAE 30 or 10W-30
5°C (41°F) - 20°C (68°F)	SAE 20 or 10W-30
5°C (41°F) or lower	SAE 10W-30

#### 3. Oil pressure

The oil pressure during operation of the engine is indicated by the oil pressure gauge.

During normal operation.....Oil pressure will range between 50 and 70 PSI.

At the time of cranking.....Pressure will rise proportionately with speed.

#### 4. Engine oil change

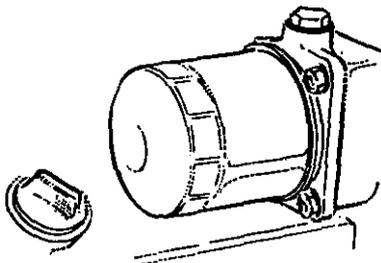
To renew engine oil, discharge old oil through the sump drain hose attached at front of engine while engine is still warm. Drain old oil completely, replace the hose, plug the end securely and add fresh oil through the oil inlet port on the valve cover. After refilling oil, idle the engine for several minutes and stop. Then check the quantity of oil by the oil level gauge. Fill to but not over the high mark on the dipstick.

## 5. Replacement of oil filter

Being a replaceable cartridge type, the oil filter requires no cleaning inside.

In installing the oil filter, apply engine oil thinly on to the O-ring, and then tighten it by hand firmly.

When removing the used filter, cover over with a plastic bag. This will allow both filter element and spilled oil to be collected cleanly without spilling oil in the bilge.



Note A: After market filters are not recommended since the material standard or diameters of important items might be entirely different from genuine parts.

Note B: Immediately after filter change and oil fill, run engine to ensure that oil pressure is normal and that there are no oil leaks.

## FUEL SYSTEM

### 1. Diesel fuel

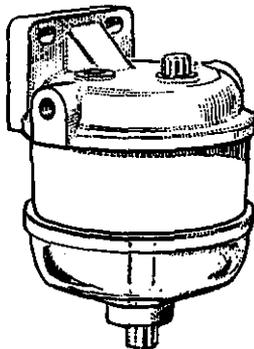
USE #2 DIESEL FUEL. NEVER USE KEROSENE OR HEAVY OIL.

In cold weather, particularly, much water vapor is produced when much air is present in the fuel tank. The tank, therefore, should be kept full as much as possible.

The fuel tank, furthermore, needs to be kept completely free of dirt and water.

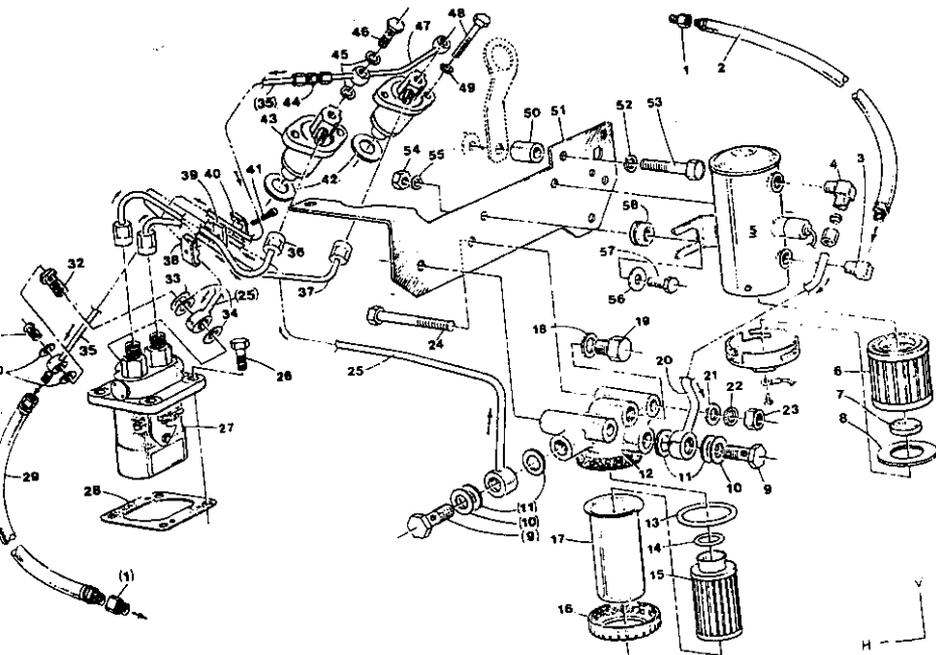
2. To this end, it is most desirable that a primary fuel filter of the water entrapment type be installed between the fuel tank and engine. Such a filter is available under part #24985. (See your local dealer.)

Water entrapment filter #24985 is shown opposite. Inspect frequently for presence of water in the clear bowl. Drain it off by loosening the air vent and opening the drain.



### 3. Notes on fuel system

See below a typical exploded view of a fuel system. The one shown is for the 4 KW. Those for the 7.5, 11 and 12.5KW are similar except for the number of cylinders.



The Westerbeke self-bleeding fuel system is automatic in operation. Therefore, it is unlikely that the operator will be forced to service the system at sea.

For that unlikely possibility, however, it is recommended that the following parts be carried onboard.

- Banjo washers 11, 30, 31, 33, 34, 45
- Injector seat washers 42
- Lift pump filter and gaskets 6, 7, 8
- Fuel filter element and gaskets 13, 14, 15

If a leak should develop at a banjo or washer that cannot be remedied by a simple tightening of the screw, renew the washers.

The engine can be started by taking the steps described on pages 8 and 9. In cases where the engine cannot be started easily, loosen two injection nuts on the nozzle side, turn the starter motor and then tighten the nuts firmly.

#### 4. Cleaning fuel filter and replacing filter element

After the first 50 hours of operation, loosen the retainer ring #16 and discard filter element #15. Clean bowl #17 and re-install new filter, using new gasket #13 and #14.

This same treatment is required of the filter element #6 in the fuel lift pump. Similarly, replace new filter element #6 using new gasket #7 and #8.

After the first 50 hour change, the change period may be increased to 200 hours or once per season.

#### 5. Fuel injection pump

The fuel injection pump is one of the most important components of the diesel engine and thus it calls for the utmost caution in handling. Furthermore, the fuel injection pump has been thoroughly shop-adjusted and should never be readjusted carelessly.

Such adjustment, whenever necessary, should be performed at an authorized service station as a precision pump tester and skills are required.

To obtain long and satisfactory use of your injection pump:

Always use fuel which is free from impurities.  
Clean and renew the fuel filter periodically.  
Inspect water entrapment filter regularly.

### COOLING SYSTEM

#### 1. Cooling water

As cooling water, use soft water with least impurity content such as tap water (potable water) or rainwater.

#### 2. Antifreeze

In cold districts, care should be taken to prevent cooling water from freezing. Cooling water when frozen expands to break the heat exchanger and the cylinder block, and it is essential that antifreeze be added to cooling water in a quantity being propor-

\*Antifreeze of poor quality will cause corrosion of the cooling system, and thus always use antifreeze containing rust inhibitor and prepared by a reliable maker, and never use it mixed with antifreeze of a different brand.

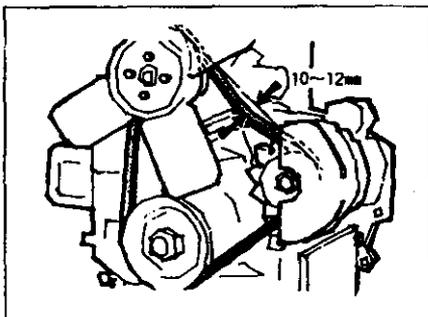
#### ANTIFREEZE ADDITION DATA

Antifreeze Concentration %	13	23	30	35	45	50	60
Freezing temperature (°C)	-5	-10	-15	-20	-30	-40	-50
Freezing temperature (°F)	(23)	(14)	(5)	(-4)	(-22)	(-40)	(-58)

Note: It is advisable that antifreeze concentration be selected on the basis of a temperature which is about 5°C (10°F) lower than the actual atmospheric temperature.

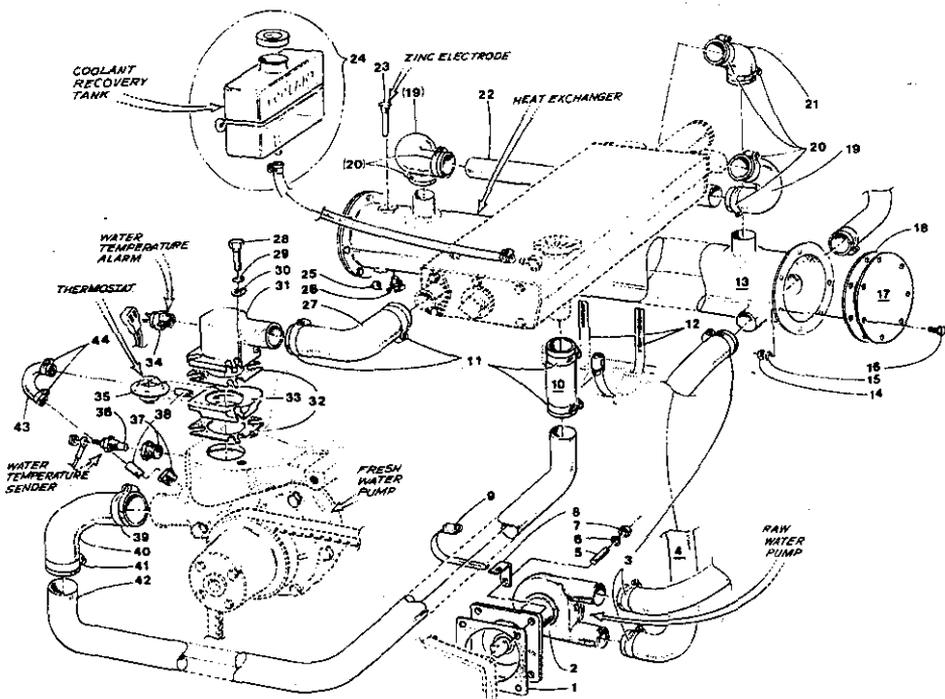
### 3. Alternator belt tension

The alternator belt is properly tense if it deflects 10 to 12 mm (0.39 to 0.47 in) as it is depressed with a finger between the pulley and pulley of the long distance side. Excessive tension can cause quick wear of the belt and bearings of the water pump and the alternator. Excessive slackness or presence of oil on the belt, on the other hand, can lead to engine overheating and insufficient charging due to a slipping belt.



#### CAUTION:

Never attempt to adjust tension of the fan belt while the engine is in operation.



#### 4. Fresh water cooling system (See Note 5 on page 6.)

The system consists of a sea water pump which pumps raw sea water through a heat exchanger to remove heat from the coolant. The raw water is discharged overboard through the exhaust line.

The engine coolant (fresh water with or without antifreeze) is circulated by the fresh water pump in continuous circuit. Pumped through the cylinder block, cylinder head, heat exchanger and back to the fresh water pump.

The total system is very reliable and requires only a daily check of the water level in the system plus routine check of hose clamps and fittings.

It is likely that zinc electrodes will waste away from contact with sea water. It is also possible for the raw water pump impeller to fail due to lack of sea water or deterioration. An early sign of impeller failure is less water and more steam at the exhaust through hull fitting.

It is recommended, therefore, that zinc electrodes, an impeller kit, a pump belt and a thermostat with gasket be kept onboard at all times. These parts should be ordered from your nearest stocking dealer and used as inspection dictates.

## WIRING DIAGRAM FOR ENGINE SYSTEM

Your engine is of 12V system and its electric circuit is as shown in the diagram in pocket of back cover.

For installing electrical parts, connect them correctly by referring to the diagram and at the same time check for damaged wire sheathing and confirm that grounding is provided properly. Care must always be taken while working on the electrical system.

Never shut the engine battery switch off while the engine is running. Damage to the battery charging alternator will result should this be done.

## GENERATOR COMPONENT OF GENERATOR SET

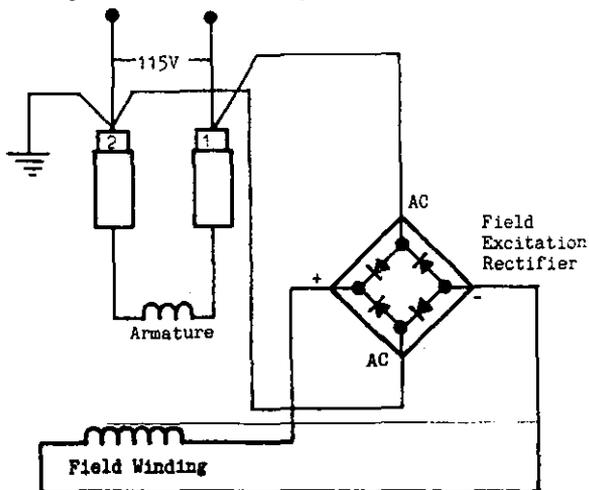
All generators for the inherently regulated series (4, 7.5, 11, 12.5) are identical in design and alike except for length of the various sizes.

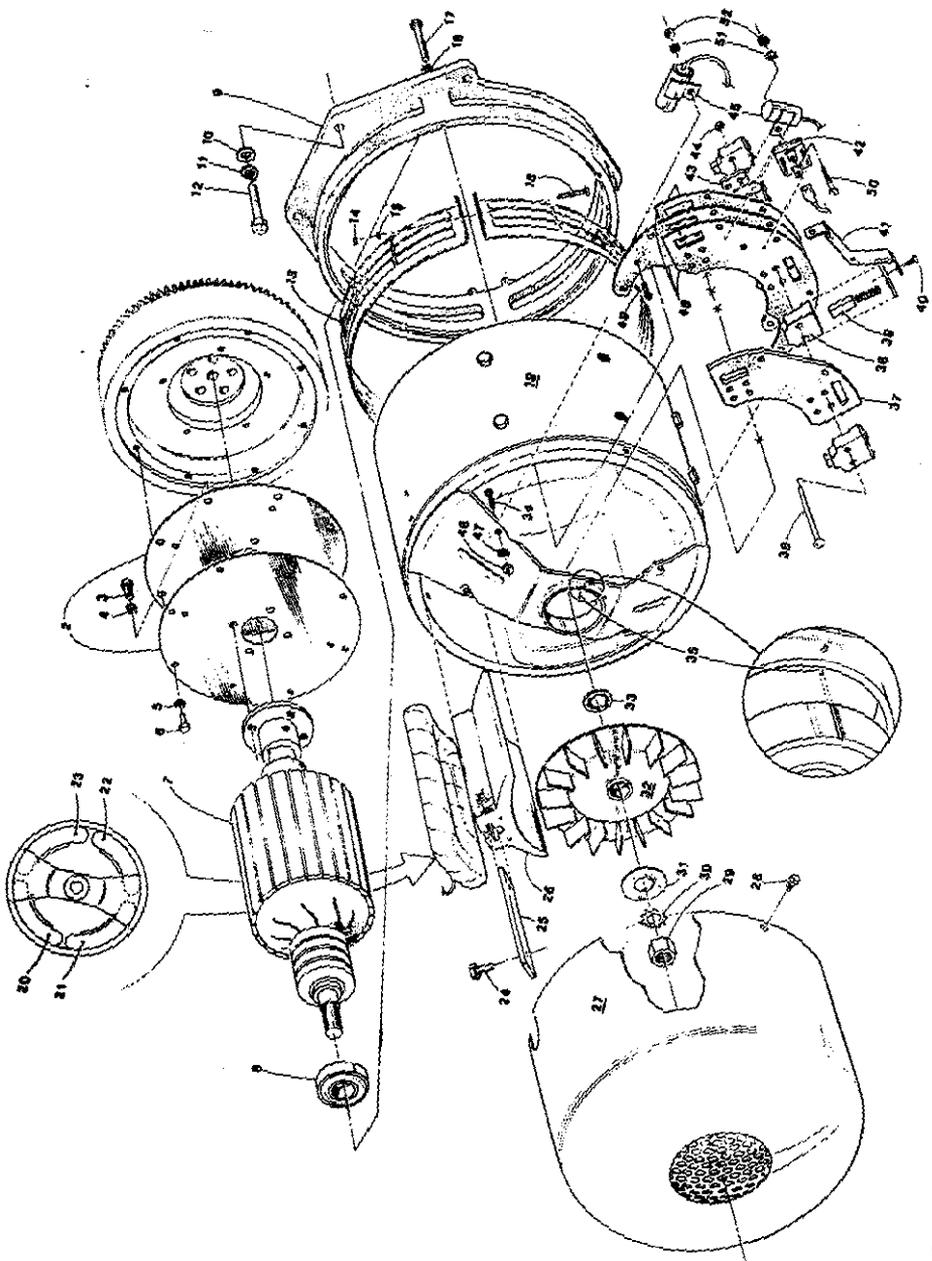
Wearing and replaceable parts are similar throughout. Brushes (39), bearings (8), rectifier (42), capacitor (45) all bear a high degree of commonality. (See page opposite.)

It is necessary only to give correct model and serial number to obtain correct parts from your local Dealer or Distributor.

Occasionally when a generator set is started, there will be no voltage build-up. When this occurs, the fields must be flashed to restore residual magnetism. The fields may be flashed with a 6 or 12 volt battery as follows: stop the engine; remove the generator end cover.

You will notice the positive (+) lead from the field coil is connected to the + terminal of the rectifier (Part 42, opposite page), the negative lead from the field coil is connected to the opposite negative unmarked terminal of the rectifier. Using alligator clips, connect field coil positive to battery positive and field coil negative to battery negative for approximately 10 seconds. The set will then build voltage and output. (Be careful not to connect on the AC terminals as this will destroy the rectifier.)





## GENERAL INFORMATION AND CARE OF GENERATORS

### 1. Use of Electric Motors

The power required to start an electric motor is considerably more than is required for keeping it running after it is once started. Some motors require much more current to start them than others. Split phase (A.C.) motors require more current to start them, under similar circumstances, than other types. They are commonly used on easy starting loads, such as washing machines or where loads are applied after the motor is started such as small power tools. Since they require 5 to 7 times as much current to start as to run, their use should be avoided whenever possible if the electric motor is to be driven by a small generator. Capacitor and repulsion-induction motors require from 2 to 4 times as much current to start them as to run them. The current required to start any motor varies with the load connected to it. An electric motor connected to an air compressor, for example, will require more than a motor to which no load is connected.

In general, the current required to start 115 volt motors connected to medium starting loads will be approximately as follows:

MOTOR SIZE	AMPS FOR RUNNING	AMPS FOR STARTING
1/6	3.2	6.4 to 22.4*
1/4	4.6	9.2 to 32.2*
1/3	5.2	10.4 to 72.8*
1/2	7.2	14.4 to 29.2
3/4	10.2	20.4 to 40.8
1	13	26 to 52

\*Note that in the above table the maximum "amps for starting" is more for some small motors than for larger ones. This is because the hardest starting types (split-phase), are not made in larger sizes.

Because the heavy surge of current required for starting motors is required for only an instant, the generator will not be damaged if it can bring the motor up to speed in a few seconds of time. If difficulty is experienced in starting motors, turn off all other electrical loads and, if possible, reduce the load on the electric motor.

### 2. Required Operating Speed

Although individual units and models may vary slightly, the normal voltage and frequency of typical 60 cycle engine-driven generators described in this book are approximately as follows when run first

with no load applied, then at half the generator capacity and finally when loaded to its full capacity as rated on the nameplate.

Load Applied	Speed 4 pole	Frequency	Generator Voltage	
			115v. Plants	230v. Plants
None	1830	61	129	258
Half	1800	60	120	240
Full	1755	58½	115	230

The output voltage should be checked periodically to insure proper operation of the generating plant and appliances. If the generator is not equipped with a voltmeter, it can be checked with a portable meter.

### 3. Maintenance

See the engine instruction book for engine maintenance.

**BRUSHES** - Check the brushes for wear after about 1000 hours of operation and every few hundred hours of operation thereafter. They should be replaced when worn down to one half inch. Whenever replacing brushes or removing them to do other service work, remove one brush at a time and put the screws back into the brush holder to hold the wire terminals in place so there will be no difficulty replacing the wires correctly.

**COMMUTATOR** - A commutator in good condition has a glossy finish and is brownish in color. If it gets greasy, rough or dirty, it may be cleaned with very fine sandpaper. (Do not use emery cloth.)

**BEARINGS** - All ball bearings used in these generators are packed with grease before assembly - no further greasing is required. If they become rough or worn they should be replaced.

## RECOMMENDED ENGINE MAINTENANCE

Check and service your engine at specified intervals to maintain it in its best conditions and permit it to perform as it should. As for those asterisked items, it is suggested that you have them performed by an authorized distributor or dealer.

### 1. Daily inspection before use

#### A. Checkup of engine oil level and refilling

No refill is required if the level is near the upper limit line of the gauge.

#### B. Checkup of cooling water and refilling

Refill up to the filler cap neck.

#### C. Check your fuel supply

#### D. Checkup of gauges and meters

After starting your engine, check oil pressure, water temperature and voltage reading.

#### E. Checkup for loose parts (fan belt or bolt, etc.), damage and leaks

#### F. Checkup for abnormality with exhaust gas, noise and vibration

### 2. Servicing following initial 50 hours of operation

#### A. Renewal of engine oil

#### B. Replacement of oil filter

#### C. Renewal of cooling water

#### D. Adjustment of valve clearance (See SERVICE DATA)

#### \*E. Tightening of bolts and nuts

#### \*F. Adjustment of engine idle

### 3. Servicing at every 100 hours of operation

#### A. Renewal of engine oil

#### B. Replacement of oil filter

- C. Cleaning of fuel filter
- D. Adjustment of engine idle

4. Servicing at every 200 hours of operation

- A. Replacement of engine mounted fuel filter elements
- B. Replacement of fuel filter (cartridge type)

5. Servicing at every 400 hours of operation

- A. Cleaning of fuel tank
- \*B. Adjustment of valve clearance
- \*C. Checkup of starter motor, alternator and regulator

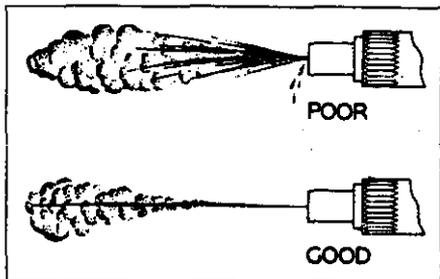
Check the brush and surface of commutator for the degree of wear. Replace the brush if it is worn beyond the limits of wear.

- \*D. Checkup of glow plugs  
Check the glow plugs for blow-out.
- E. Removal of cooling water and flushing is suggested.

6. Servicing at every 800 hours of operation

- \*A. Checkup of nozzles

Set the injection starting  
+142  
pressure to 1707 -0 psi  
and eliminate undesirable  
injection conditions in-  
cluding "after dripping".



**\*B. Checkup of compression pressure**

Remove each glow plug and check cylinders, one by one, using a compression pressure gauge. If the pressure differs by more than 2.5 kg/cm<sup>2</sup> (35.6 psi) between cylinders or if the cylinder pressure is less than 26 kg/cm<sup>2</sup> (369.8 psi) at 320 RPM for the 4 KW and at 280 RPM for the 7.5 KW, 11 KW and 12.5 KW correct it.

**\*C. Fuel injection adjustment**

In case of severe vibration during idling, have it repaired at an authorized distributor or dealer which is equipped with a pump tester.

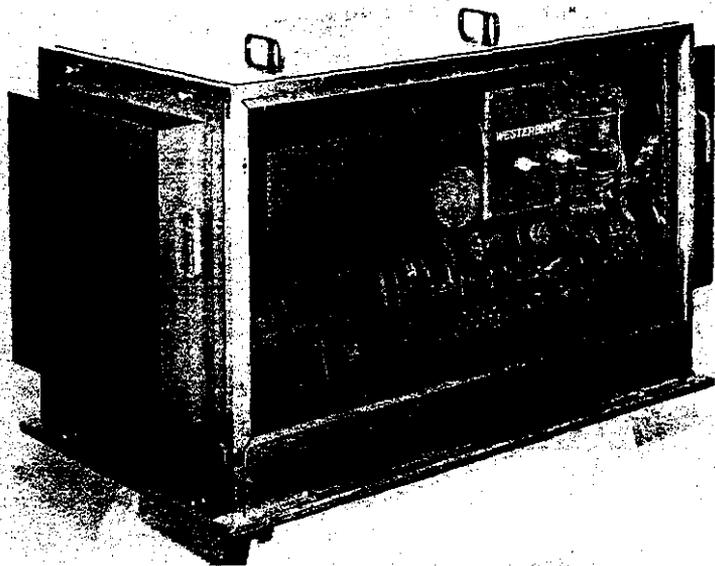
**\*D. Checkup of alternator and regulator**

Regulate the voltage and current by use of a circuit tester.

**\*E. Checkup of starter motor pinion and flywheel ring gear**

Rectify the chamfered area that has been severely damaged by use of an oil stone or some pencil grinder, and replace the part if it is damaged all over.

**\*F. Tightening of bolts and nuts**



7.7 KW ENCLOSED IN SOUND GUARD

## TROUBLESHOOTING

### 1. ENGINE DOES NOT START

PROBLEM	REMEDY
a. Starting switch is defective	Correct connections and contacts
b. Deficient drive torque of the starter motor	The battery is exhausted, trouble with the starter motor, or dirty or loose wiring
c. Improper viscosity of engine oil	Check the viscosity and renew oil if necessary
d. Engine too cold	Use glowplug starting aid
e. Seizure of moving parts	Rectify
f. Air present in fuel system	Purge thoroughly with electric fuel pump
g. No fuel in fuel tank	Refill
h. Fuel filter clogged	Clean or renew

### 2. ENGINE STALLS WHILE IN OPERATION

PROBLEM	REMEDY
a. Fuel tank is empty	Refill
b. Fuel filter clogged	Clean or renew
c. Air present in fuel system	Retighten fuel line connections to allow electric fuel pump to run long enough to purge air thoroughly

### 3. IMPROPER OIL PRESSURE

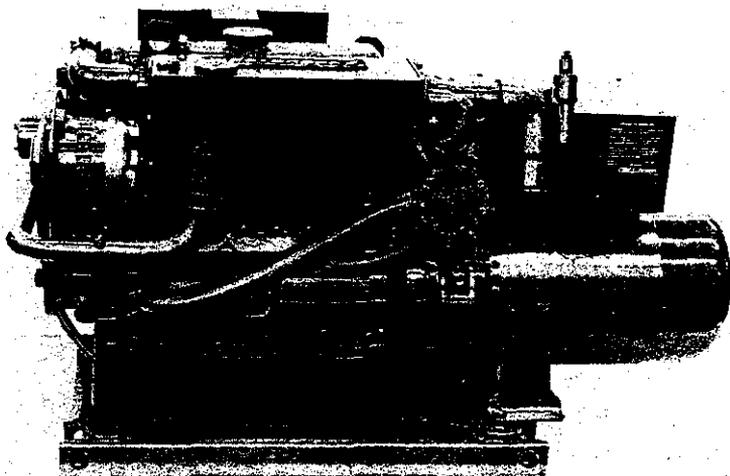
PROBLEM	REMEDY
a. Oil shortage	Refill
b. Oil leak through connections	Repair
c. Oil pressure switch defective	Replace

#### 4. ENGINE OVERHEATING

PROBLEM	REMEDY
a. Cooling water shortage	Refill
b. Water leaks	Repair
c. Belt loose or smeared with oil	Clean or renew
d. Raw water pump defective	Repair or renew

#### 5. BATTERY IS UNDERCHARGED

PROBLEM	REMEDY
a. Belt tension improper	Rectify
b. Faulty wiring circuit	Rectify
c. Alternator not functioning (observe voltmeter)	Replace
d. Battery faulty	Replace
e. Faulty voltage regulator	Repair or renew



12.5 KW

### SERVICE DATA

- |   |                   |                                  |
|---|-------------------|----------------------------------|
| 1. Valve clearance (engine cold)<br>(both intake and exhaust)                           |                   | 0.25 mm (0.010 in.)              |
| 2. Compression pressure   |                   |                                  |
|   | 4 KW              | 32 kg/cm <sup>2</sup> at 320 RPM |
|   | 7.7 - 11 - 12.5KW | 32 kg/cm <sup>2</sup> at 280 RPM |
| 3. Engine oil capacity (including<br>oil filter   |                   |                                  |
|   | 4 KW              | 2.8 liters (0.74 U S gal)        |
|   | 7.7KW             | 3.5 liters (0.93 U S gal)        |
|   | 11KW              | 4.5 liters (1.19 U S gal)        |
|   | 12.5KW            | 5.0 liters (1.32 U S gal)        |
| 4. Firing order   |                   |                                  |
|   | 4 KW              | 1-2                              |
|   | 7.7KW             | 1-3-2                            |
|   | 11 - 12.5KW       | 1-3-4-2                          |
| 5. Injection timing - BTDC of compression stroke when started at<br>smoke set position. |                   |                                  |
|   | Marine Engine     | 23° ± 1.5°                       |
|   | Generator         | 19° ± 1.5°                       |
| 6. Injection starting pressure  |                   | +142                             |
|   |                   | 1707 0 psi                       |
| 7. Cooling water capacity (in engine<br>body alone)                                     |                   |                                  |
|   | 4 KW              | 2.1 liters (0.56 U S gal)        |
|   | 7.7KW             | 3.0 liters (0.79 U S gal)        |
|   | 11KW              | 3.5 liters (0.92 U S gal)        |
|   | 12.5KW            | 3.7 liters (0.98 U S gal)        |



## WESTERBEKE GENUINE PARTS

"WESTERBEKE GENUINE PARTS" are superior and reliable because they have been produced under an excellent quality control system and have passed the standard after strict inspection.

After market parts are not recommended from the viewpoint of their material standard and manufacturing method which may be entirely different from those of genuine parts.

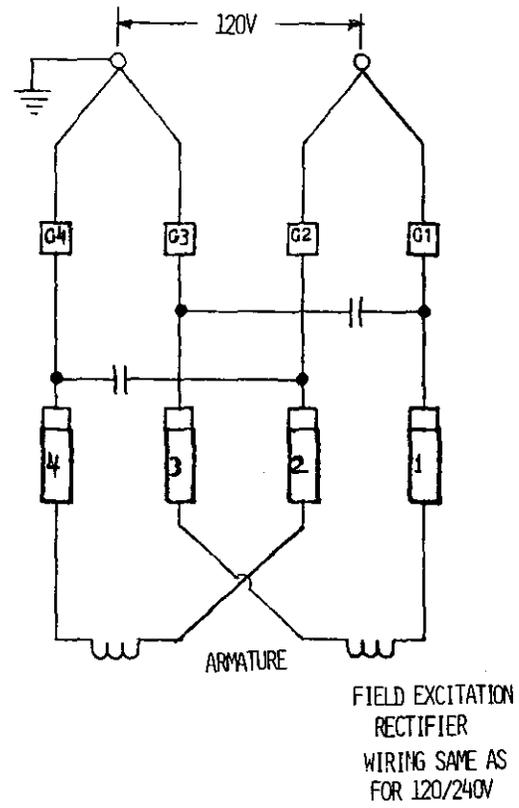
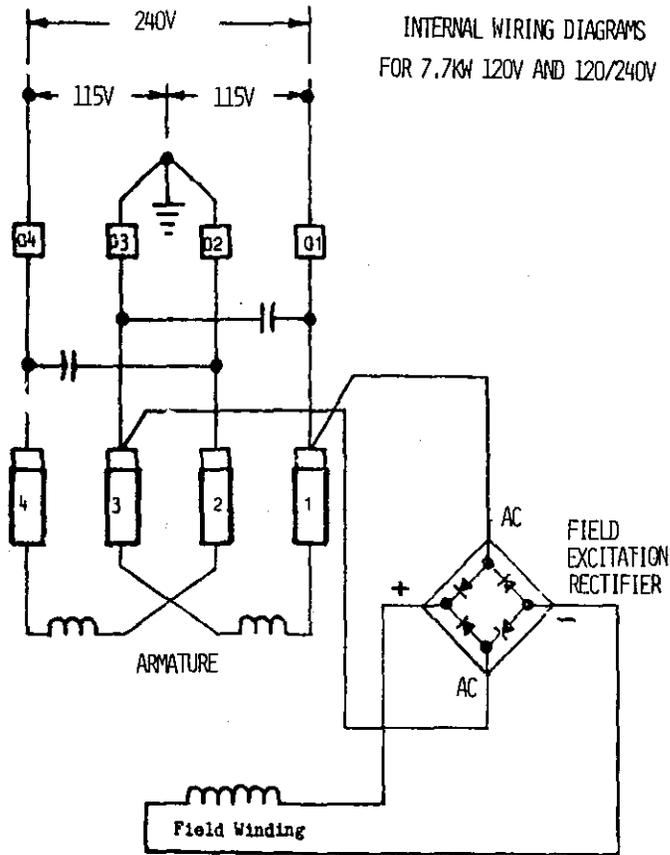
"WESTERBEKE GENUINE PARTS" are available from our authorized distributors and dealers. Please order your spare parts from your nearest distributor or dealer.

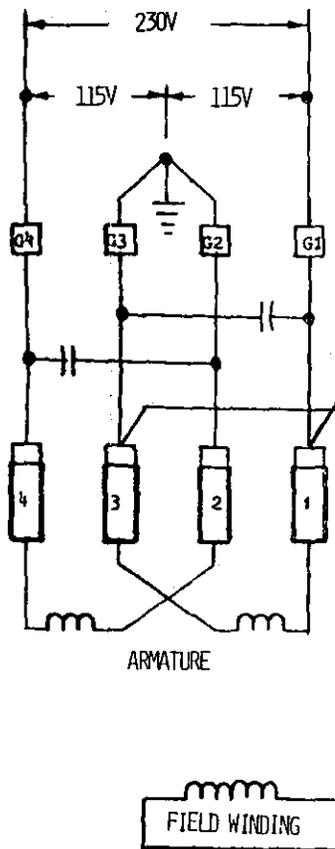
This operators manual is your guide for day to day operation and maintenance of your engine.

For those who desire more complete repair and parts data the following may be ordered from your nearest Westerbeke Distributor or Dealer.

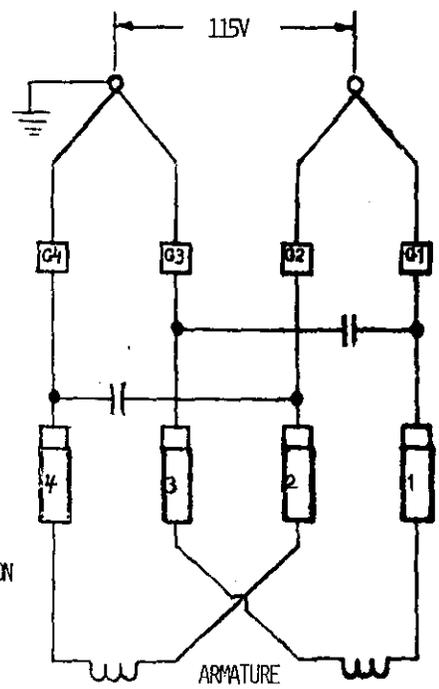
Technical Manual.....Publication #30041

Part List.....Publication #32139





INTERNAL WIRING DIAGRAMS  
FOR 11 + 12.5 KW



FIELD EXCITATION  
RECTIFIER WIRING  
SAME AS FOR 230V

