

OPERATOR'S MANUAL

For

Westerbeke Marine Diesel

Models

W52, W58, W70, W100

Publication Number 33507

Printed in USA



WESTERBEKE CORPORATION
MYLES STANDISH INDUSTRIAL PARK
150 JOHN HANCOCK ROAD, TAUNTON, MA 02780-7319

FOREWORD

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

This manual describes the procedures for proper handling and routine maintenance of:

W52, W58, W70, W100

Marine Diesel Propulsion Engines


To obtain best operating condition and longest life, it is important to use it sensibly and carry out operation and maintenance according to this manual.

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

If, within 60 days of the receipt of your engine, you have not received a Customer Identification Card (see below) registering your warranty, please contact the factory.

We look forward to your continued patronage.

from: J.H. Westerbeke Corp.
Avon Industrial Park
Avon, MA 02322

| | | |
|---|---|----------------|
|  | J. H. WESTERBEKE CORP. <small>AVON INDUSTRIAL PARK, AVON, MASS. 02322</small> | |
| CUSTOMER IDENTIFICATION | | |
| W-58 | 1234C205 | Pleasure Craft |
| expires | 6/19/83 | |
| Adam Smith | | |
| 85 Maple Street | | |
| Alden, IN 12234 | | |

Mail To:

PN

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GENERAL SPECIFICATIONS

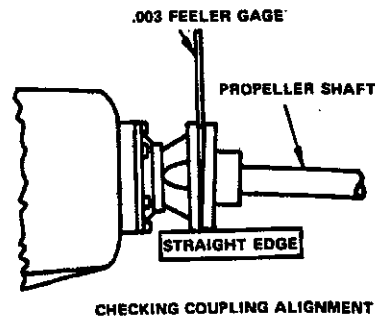
ENGINE

| SPECIFICATION | W52 | W58 | W70 | W100 |
|--|-----------------------------|---------------------|---------------------|---------------------|
| # Cylinders | 4 | 4 | 4 | 6 |
| Bore & stroke | 3.5" X 3.51" | 3.5" X 4" | 3.74 X 4.13 | 3.62" X 4" |
| Displacement | 135 CID | 154 CID | 182 CID | 247 CID |
| Compression R | 21:1 | 21:1 | 21:1 | 21:1 |
| Combustion Chamber | Swirl Type | | | |
| Injection Pump | Bosch Distributor Type | | | |
| Lubrication | Pressure feed | | | |
| Cooling | Fresh Water Cooled | | | |
| Cold Starting Aid | Glow Plugs | | | |
| Electric System | 12 Volt | | | |
| Valve Mechanism | Rotating Type | | | |
| Fuel Lift Pumps | See Page 14 of this manual. | | | |
| Priming System | See Page 14 of this manual. | | | |
| Engine Shut down | See Page 10 of this manual. | | | |
| Maximum Torque | 93ft/lbs @ 2500 | 118ft/lbs @ 2200 | 148ft/lbs @ 1800 | 195ft/lbs @ 1800 |
| 1 Hour Rating | 53HP @ 3000 | 62HP @ 3000 | 73HP @ 3000 | 103HP @ 3000 |
| Continuous Rating | 45HP @ 3000 | 53HP @ 3000 | 62HP @ 3000 | 88HP @ 3000 |
| Spec Fuel Consumption | .43lb/HP/hr | .42lb/HP/hr | .41b/HP/hr | .41b/HP/hr |
| Lube Oil Capacity | nominal 5.3 qts. | nominal 6.3 qts. | nominal 6.5 qts. | nominal 11 qts. |
| (Since angle of installation has effect always go by dipstick marking) | | | | |
| Coolant capacity | 10.5 qts | 10.5 qts | 10.5 qts | 11.5 qts |
| Mounting Centers | 18,20,22½ | 18,20,22½ | 22½ only | 22½ only |

INSTALLATION AND SUPPLY CAUTIONS

* Check important aspects of installation before operating engine.

- (1) Alignment (Error to be no more than one thousandth of an inch per inch of coupling diameter)
- (2) Provide sufficient ventilation
- (3) Provide adequate service room around engine (See warranty clauses)



- * Fill fuel tank with CLEAN #2 diesel from a reputable manufacturer.
- * Fill lubricating oil to full mark on dipstick (Select readily available lubricating oil of grade CC or CD).
- * Fill water with suitable mixture of water and antifreeze to suit your temperature zone. See page 16.
- * Plug-in Panel Harness Connection. After assembly, joint should be taped to prevent corrosion or, preferably, assembled using a silicon grease which can be obtained at an electronic store such as Radio Shack.

SAFETY PRECAUTIONS

- * Never operate engine with inadequate ventilation. Confirm no exhaust leaks inside engine compartment.
- * Do not touch moving parts during operation.
- * Do not touch hot parts such as exhaust pipe, and do not place combustible materials near.
- * 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.
- * If coolant recovery system is used, follow instructions on page 6. If coolant recovery system is not installed, never remove the manifold pressure cap until water temperature has fallen enough to prevent a steam burn.
- * Always use tools that fit correctly and use caution during servicing.
- * Be sure that current carrying wires are protected from abrasion and that all connections are tight.

BREAKING IN YOUR NEW ENGINE

While your engine has had individual test operations sufficient to demonstrate accurate assembly and correct operation of all systems, it still requires break in time.

Service life of your engine is dependent on how your engine is operated and serviced during initial hours of operation.

Your new engine needs twenty hours of conditioning operation for breaking in each moving part, thus maximizing performance and life of engine. Perform this conditioning carefully, keeping the following points in mind.

1. Start engine, run idle while checking that all systems are functioning - sea water pump, oil pressure, battery charge.
2. Warm engine, preferably by running propeller at fast idle while tied down, until water temperature gauge moves into the 130 - 140 degree range.
3. Then use engine at moderate load (60% \pm) for first five hours.
4. Avoid rapid acceleration.
5. Use caution not to overload engine. Grey or black smoke is a sign of overload.
6. Next fifteen hours may be run at 70 - 75% load.

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, nor by varying loads with intervals of fast acceleration and/or excessive speed.

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

As indicated above, use a short warm up at idle and put engine under moderate load and speed for the first five hours of operation. For the next fifteen 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 CC 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:

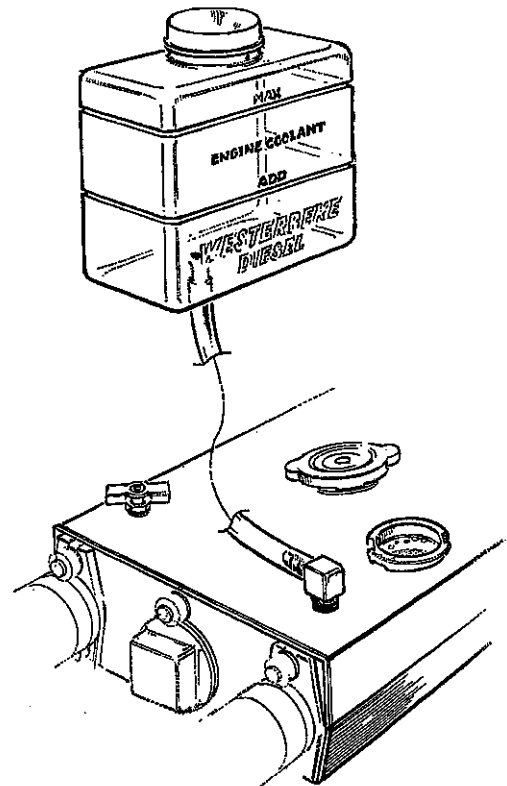
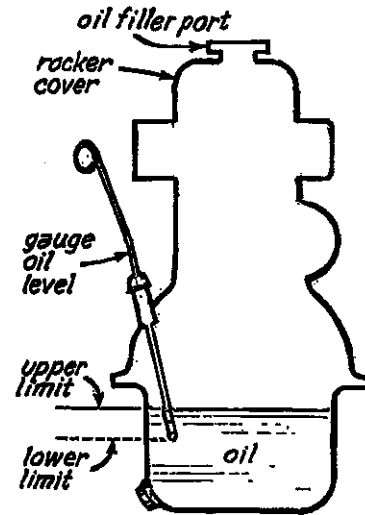
a) Fill engine completely to the neck of the manifold cap.

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.

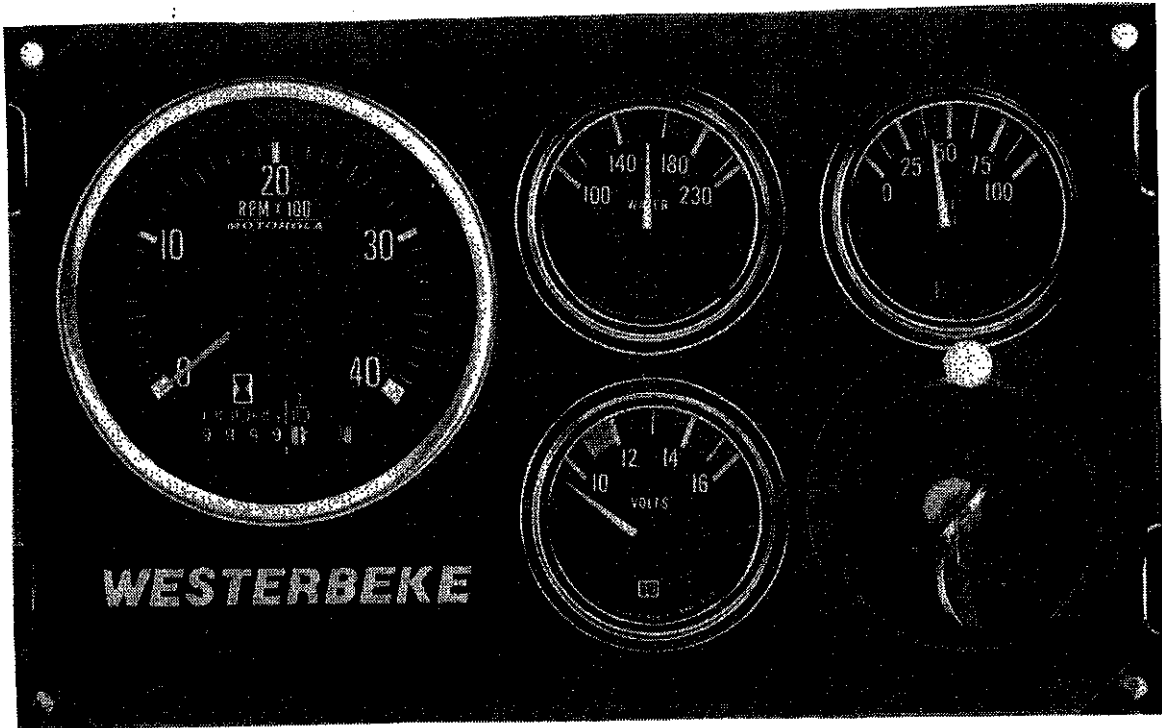
c) In winter add antifreeze as described on page 16. Antifreeze may be used year round if changed annually.

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.

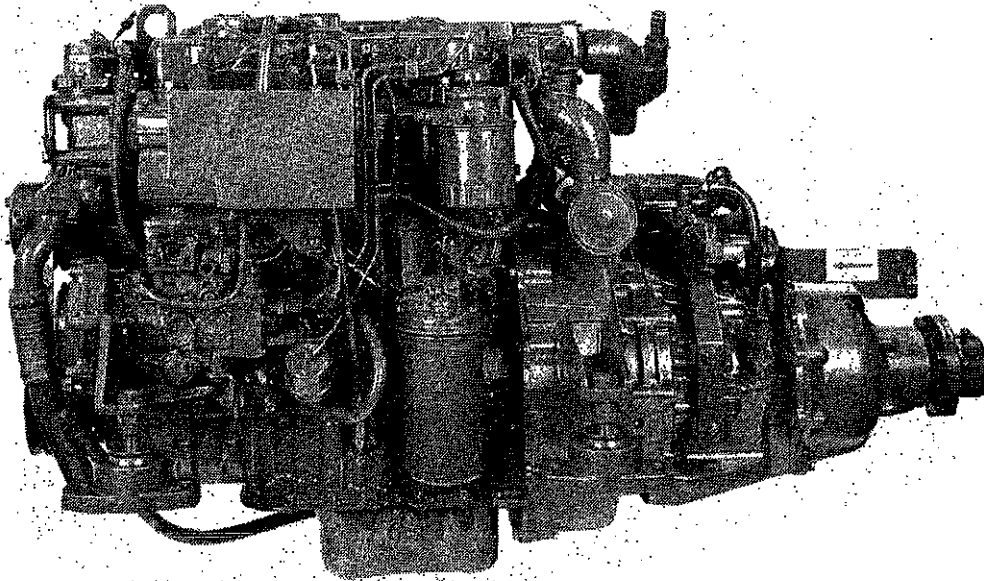
4. Engine oil, coolant and transmission levels should be checked at least once a day prior to engine use.



INSTRUMENT PANEL Description and use of:



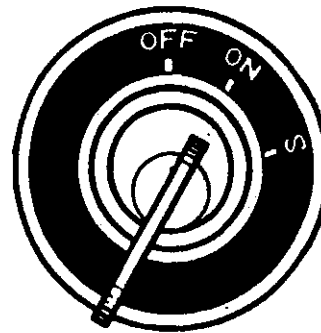
- Note 1: When engine is stopped after use, the water temperature and oil pressure gauges may stay at their running readings.
- Note 2: When engine is next to be used, turn start switch to "ON". The temperature and pressure gauges will "ZERO" and the voltmeter will register battery voltage. The electric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



W-70 with Warner 2:1

STARTING PROCEDURES

1. Turn the starter switch to the "ON" position. If making an initial start after lay-up, fuel filter servicing or repairs, allow fuel pump to work 15-25 seconds to purge the system of any air. Check that clutch is in neutral and that throttle is in full forward.



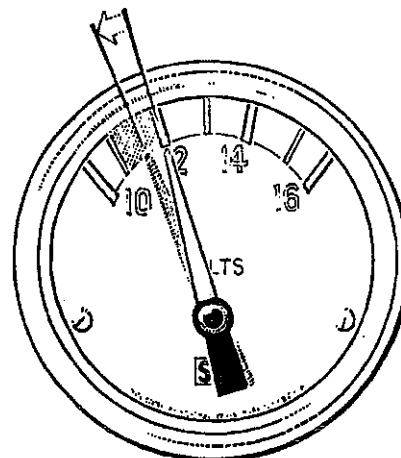
2. Glow plug preheating

With key in "ON" position, push in about 1/4 inch or enough so that voltmeter indicates discharge. Hold key in depressed position until glow plugs are sufficiently hot. Follow Table below for preheating time.

Glow Plug Use Data

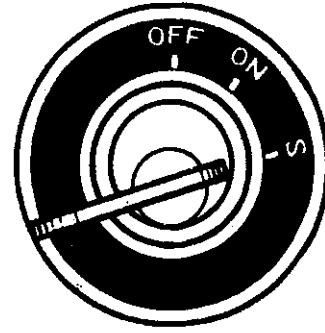
| Atmospheric temperature | Preheating time |
|------------------------------|-----------------|
| +5°C (+41°F) or higher | Approx. 10 sec. |
| +5°C (+41°F) to -5°C (+23°F) | Approx. 20 sec. |
| -5°C (+23°F) or lower | Approx. 30 sec. |
| Limit of continuous use | 1 minute |

3. 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).



4. Starting

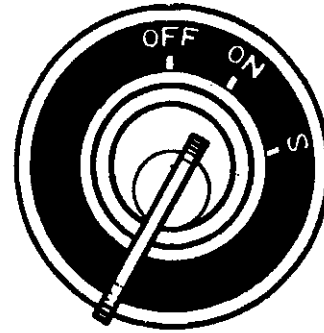
Continuing to hold the key depressed, turn to the "START" position. The starter motor will run thereby cranking the engine. Hold throttle open until engine runs and then reduce throttle.



Should the engine not start even when the starter switch is left at "S" position for 10 seconds, take your hand off the starter switch for 30 seconds, and then attempt to start the engine again by sufficiently preheating the glow plug. The starter motor should never be allowed to run for more than 30 seconds at a time.

5. Operation

As soon as the engine has started, release the key. The key will automatically return to the "ON" position. Leave the key at "ON" during operation. Check that with engine running, oil pressure and battery charge voltage are registering and that raw water is discharging with the exhaust.



During engine operation, do not turn the key to "S" position. This may damage the starter motor.

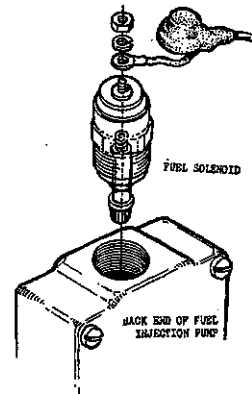
6. Warm-up operation

Run a few minutes at "IDLE" position to assure that all functions are operating. Then operate under reduced load until water temperature rises into the 140-150° range.

STOPPING PROCEDURE

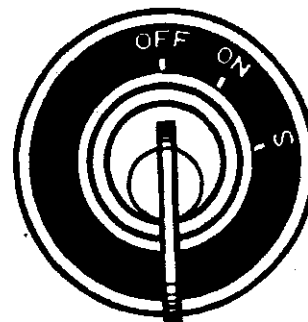
1. Stop

Each of the engines covered by this manual has an electric solenoid mounted on the injection pump. It is so mounted and wired that, when de-energized, it will shut off the flow of fuel, thus stopping the engine. Therefore, to stop your engine, simply turn the keyswitch to OFF position.



2. Starter switch off

With the engine stopped it is advisable to remove the key. If the key should inadvertently be returned to the ON position and left ON, the instrument panel, fuel solenoid and the electric fuel lift pump would be energized resulting in a discharged battery. While an engine alarm buzzer is provided to warn the operator if this happens, the best precaution is always to remove the key.



CAUTIONS ON STARTING AND OPERATION

1. Normal starting

Follow the procedures below for routine starting of your engine.

- 1) Check the engine and transmission oil levels 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 viscosity is proper for the prevailing atmospheric temperature. Check the oil also for deterioration. (Study page 12.)

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 conditions.

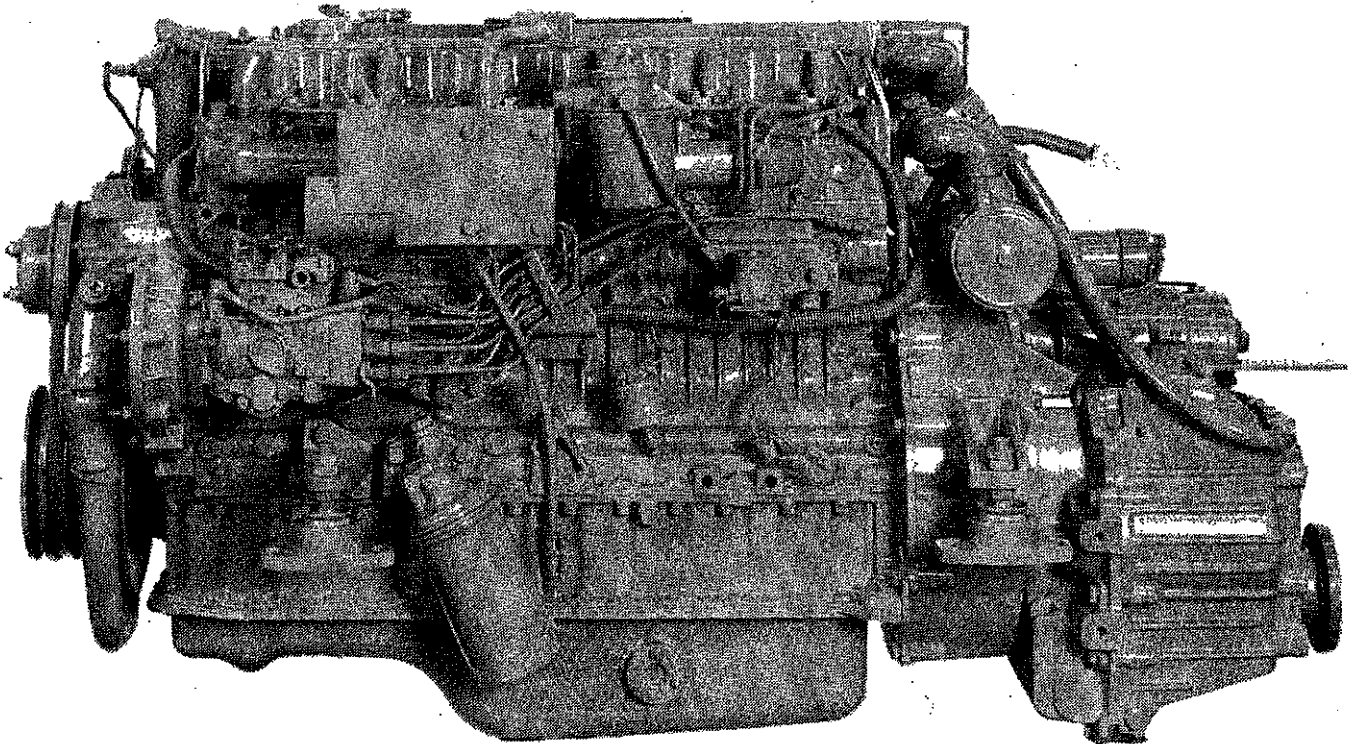


Photo above is left hand side of W100 with Hurth 2:1 reverse and reduction gear. This engine mounts on 22½ inch centers only.

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) to 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 40 and 60 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. Always observe old oil as it is removed. A yellow/grey emulsion indicates presence of water in the oil. While this condition is rare, it does require prompt attention to prevent serious damage.

5. Replacement of oil filter

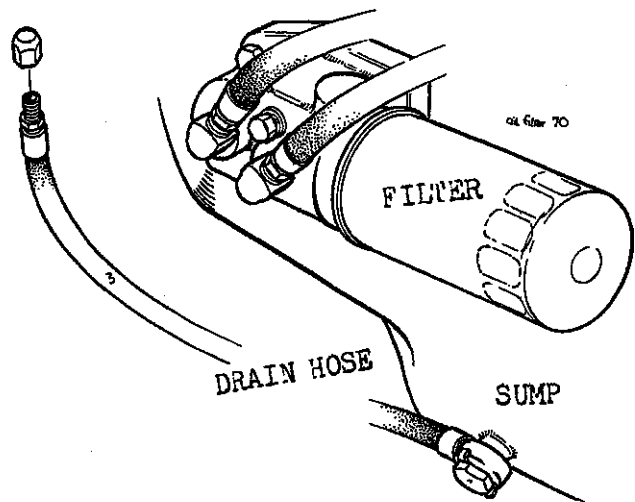
Being a replaceable cartridge type, the oil filter requires no cleaning inside.

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

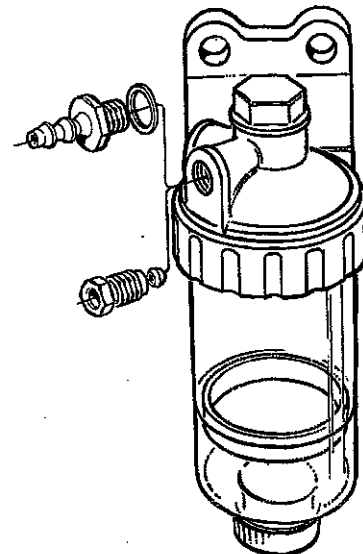
1. Diesel fuel

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

In cold weather particularly, water vapor is produced by condensation when 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.

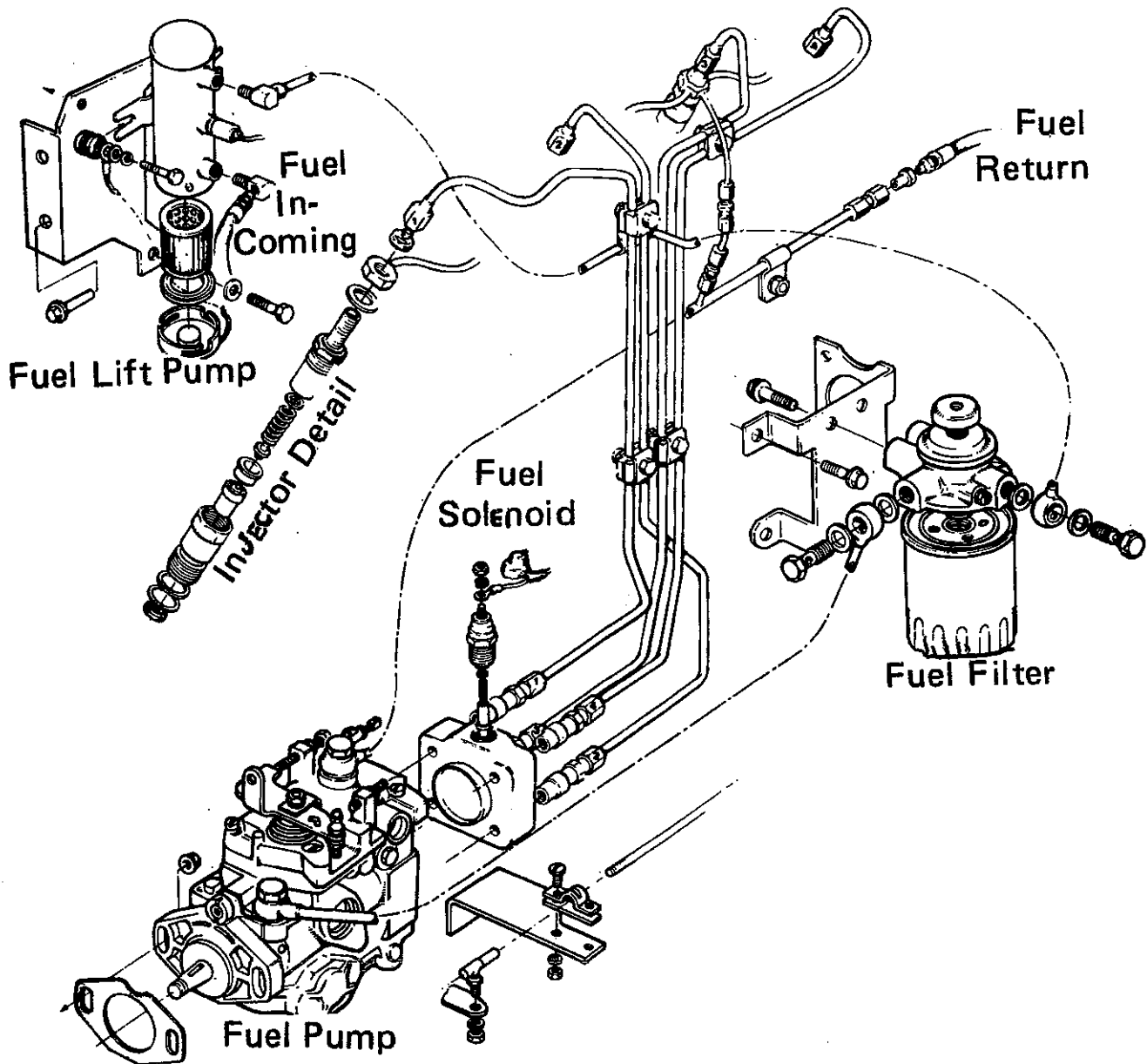
2. It is required that a primary fuel filter of the water entrapment type be installed between the fuel tank and the engine. Such a filter, shown here, is available under Part #32974 from your local Westerbeke representative or your boat builder. This filter, adapted for boat builder use, comes complete with fittings for either hose or metal tubing. Mount in an accessible place, inspect often and drain off water accumulation frequently.



If a water trap type filter (see page 13) is not interposed between the fuel tank and engine lift pump, any entrained water will tend to lay in the bottom of the electric lift pump. Internal metal parts of the lift pump will rust. Particles will pass on to filters and eventually to injection pump and injectors with damaging and expensive results. It is well to remember that water damage to the fuel system is not covered by warranty!

While many boat builders do supply a water trap filter, there are some who do not. It is to prevent such omission that Westerbeke offers a sediment/water trap filter as a desirable optional extra at moderate cost. It is supplied with fittings for either hose piping or metal tube piping.

Priming and self bleeding. All engines covered by this manual have a fuel filter with hand priming pump in the head casting for emergency use. The main priming source is the electric lift pump mounted on the cylinder head front.



3. Notes on fuel system

See on facing page a typical exploded view of a fuel system for these engines. It is also illustrative of the self-bleeding and priming system used by Westerbeke.

The Westerbeke self-bleeding fuel system is automatic in operation. While it is unlikely that the operator will be forced to service the system at sea, the possibility does exist. Therefore, it is recommended that banjo washers, injector seat washers, lift pump filter and gasket, fuel filter and gasket be carried on board at all times. Select the column for your engine on page 25 and purchase spares from your local Westerbeke Dealer or Distributor. For example, hardware kit #32050 will supply fuel system washers for Model W52.

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 speed control lever to "full open" position, turn the starter motor and then tighten the nuts firmly.

4. Replacing filter elements

After the first 50 hours of operation, unscrew and discard fuel filter element. Re-install new filter.

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

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 filters 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, and never use hard water or foul water. Use of hard water or water containing much impurity will lead to collection of scale in the engine and heat exchanger with resultant decline in cooling effects.

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 proportional to the lowest temperature of the district. It is recommended that the antifreeze mixture be used throughout the year.

*Antifreeze of poor quality or without rust inhibitor will cause corrosion of the cooling system. Always use antifreeze prepared by a reliable maker, and never use it mixed with antifreeze of a different brand.

*Make sure that the cooling system of the engine is cleaned well before adding antifreeze.

*Recommended antifreeze for year round use is ZEREX or PRESTONE with rust inhibitor.

ANTIFREEZE ADDITION DATA

| Antifreeze Concentration % | 13 | 23 | 30 | 35 | 45 | 50 | 60 |
|-------------------------------|------|------|-----|------|-------|-------|-------|
| Freezing °C | -5 | -10 | -15 | -20 | -30 | -40 | -50 |
| 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 expected.

3. Fresh water cooling system

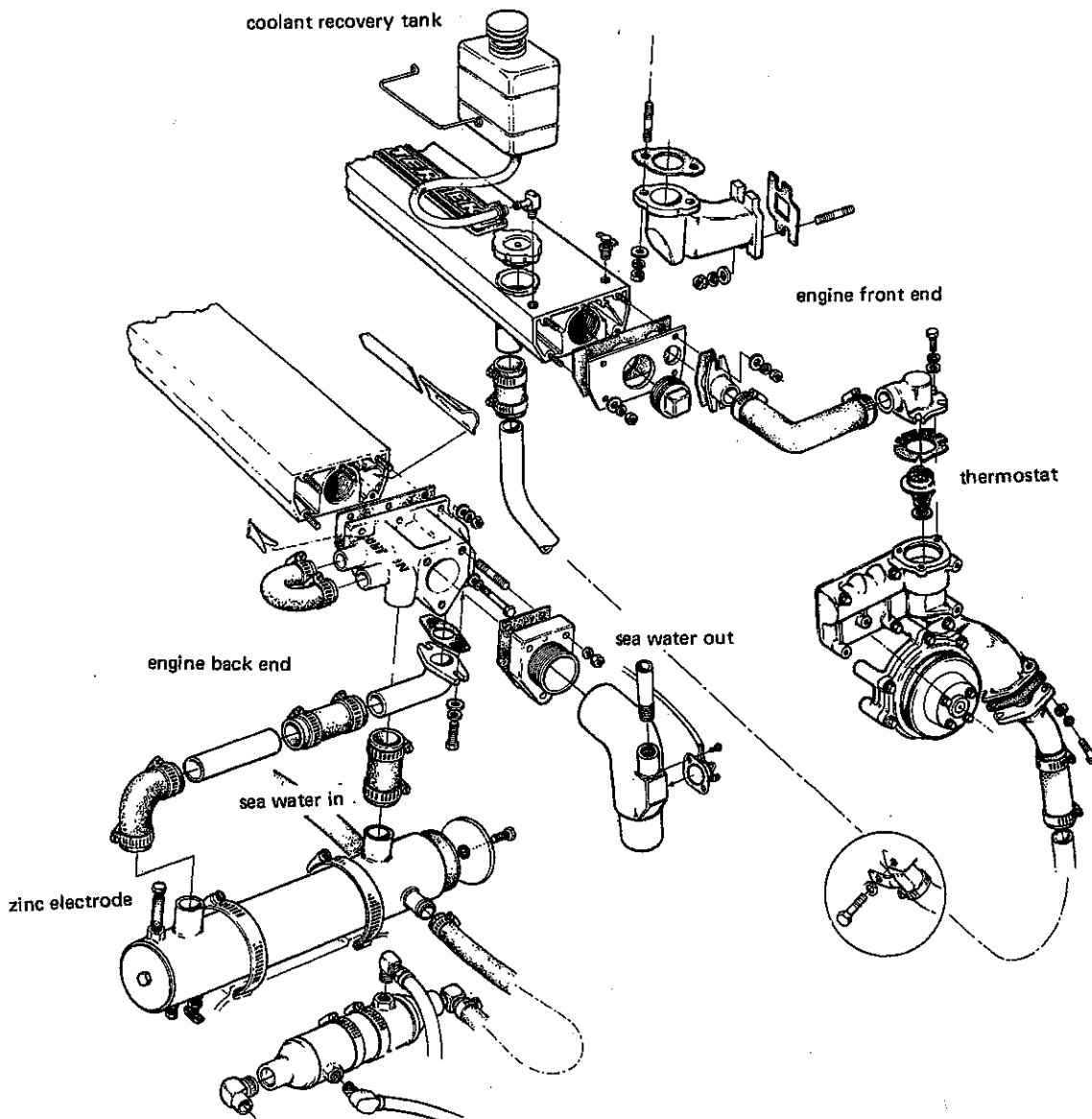
The system consists of a sea water pump which pumps raw sea water through a heat exchanger to remove heat from the coolant. The raw water is discharged overboard through the exhaust line.

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.

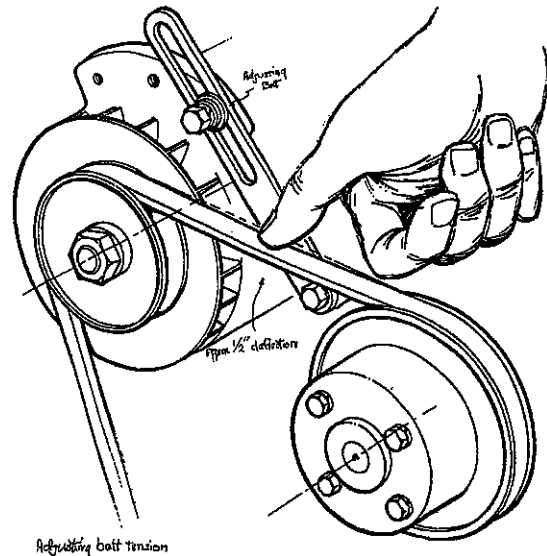
It is likely that zinc electrodes will waste away from contact with sea water. It is also possible for the raw water pump impeller to fail due to lack of sea water or deterioration. An early sign of impeller failure is less water and more steam at the exhaust through hull fitting.

It is recommended, therefore, that zinc electrodes, water pump belt, alternator belt, sea water pump assembly and sea water impeller kit be carried onboard at all times. These parts should be ordered from your nearest stocking dealer and used as inspection dictates. The part numbers for these may be taken from the parts list on page 25.



Alternator belt and water pump tension

The belts are properly tense if they deflect 10 to 12 mm (0.39 to 0.47 in) as they are 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.

WIRING DIAGRAM

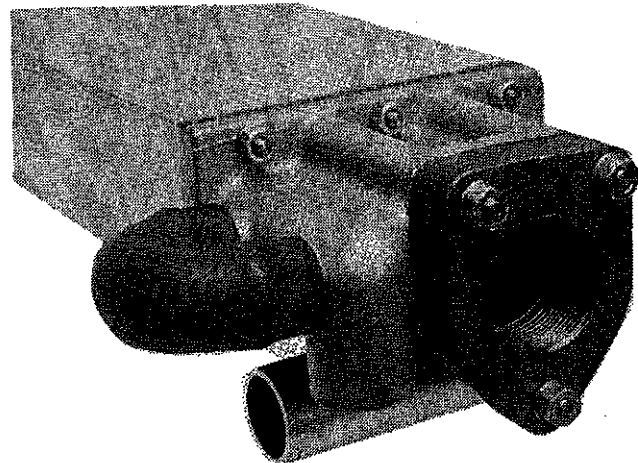
Your engine is of 12V system and its electric circuit is as shown in diagram #24666 shipped loose with this manual.

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.

DOMESTIC HOT WATER

Photo at right shows FLOW-CONTROLLER mounted on end of two pass exhaust manifold. This device is standard equipment on all marine propulsion engines. To use FLOW-CONTROLLER, remove the hose u-bend bypass and connect your water heater as described on the following page. Study the instructions carefully.



Models W52, W58, W70 and W100 come complete with FLOWCONTROLLER which, when properly connected to a heater tank, produces domestic hot water from waste engine heat.

Principle: There are two 7/8" hose connections at rear of the engine which provide a parallel flow of engine cooling water to and from the heater. These connections are part of the FLOWCONTROLLER which assures a flow of hot water through the heater at all times and yet precludes excessive restriction of engine cooling water flow caused by the heater - all simply and automatically.

Installation: Remove the hose connecting the 7/8" spuds on rear of engine as shipped from the factory (see illustration preceding page). Connect these spuds to the heater with 7/8" ID wire inserted hose. The spud on thermostat housing is the flow FROM the engine and should connect to lower fitting on heater. The spud on manifold is the flow RETURNING to the engine and should connect to the upper connection on heater.

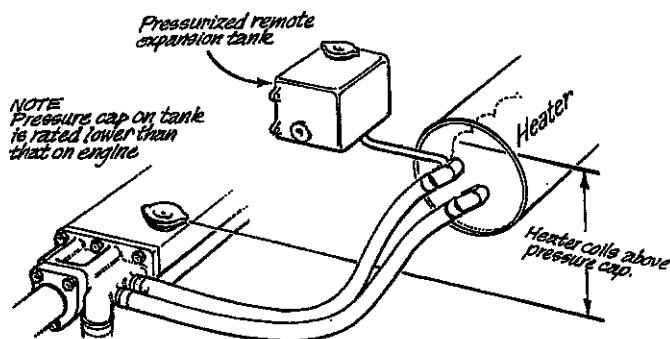
Hoses should rise continuously from their low point at the heater to the engine so that trapped air will rise naturally from the heater to the engine. If trapped air can rise to the heater, then an air bleed petcock must be installed at the higher fitting on the heater for bleeding air while filling the system. Avoid loops in hose runs which will trap air.

If any portion of the engine cooling water circuit to or from the heater rises above the engine's own pressure cap, then the pressurized remote expansion tank must be installed in the circuit to become the highest point. The tank kit Part Number is 24177. Install the remote expansion tank in a convenient location such as a sail locker for ease of checking fresh water coolant level.

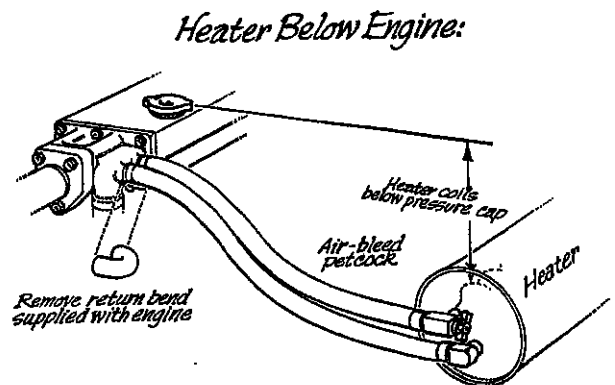
The cap on the engine mounted expansion tank/manifold should not be opened once the remote system is installed and filled.

The hose connection from the heater to the remote expansion tank should be routed and supported so as to rise continuously from the heater to the tank enabling any air in the system to rise.

Illustrations below are of FLOWCONTROLLER adapted to our two pass manifolds.



Heater Above Engine:



Heater Below Engine:

RECOMMENDED MAINTENANCE SERVICE

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 lube and fuel filters

*C. Adjustment of valve clearance (See SERVICE DATA)

*D. Tightening of bolts and nuts

3. Servicing at every 100 hours of operation

A. Renewal of engine oil

B. Replacement of oil filter

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. Adjustment of engine idle, if necessary
- *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.

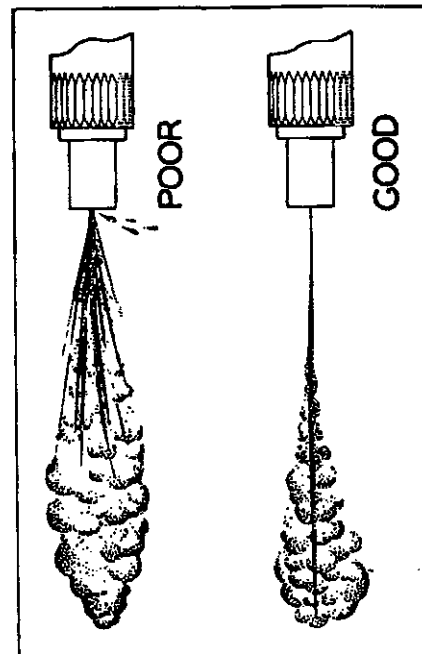
6. Servicing at every 800 hours of operation

- *A. Checkup of nozzles

Set the injection starting
+71
pressure to 1920 -0 psi
and eliminate undesirable
injection conditions in-
cluding "after dripping".

- *B. Check compression pressure

Remove each glow plug and
check cylinders, one by
one, using a compression
pressure gauge. If the
pressure differs by more
than 3.0 kg/cm^2 (42.7 psi)
between cylinders or if
the cylinder pressure is
less than 30 kg/cm^2
(427.0 psi) at 200 RPM,
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. Check tightness of nuts and bolts

TRANSMISSIONS

All HBW models turn right hand propellers.

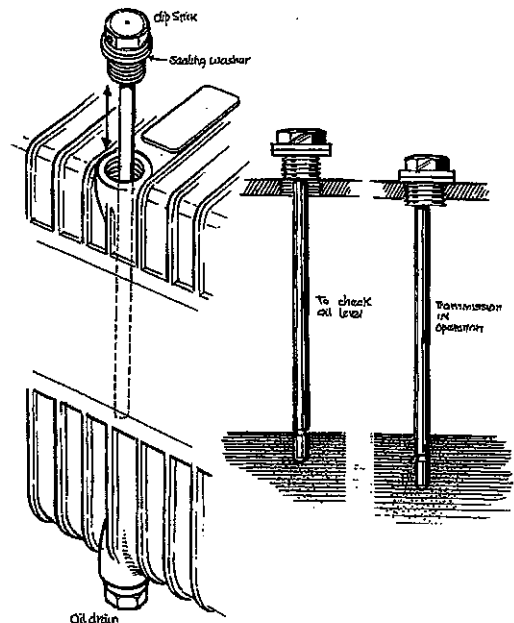
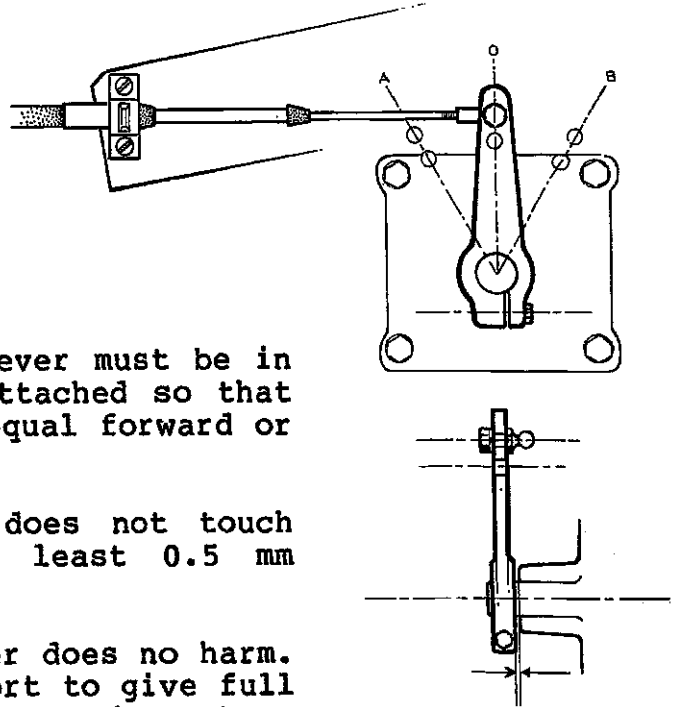
All HBW models have their own oil sumps and dipsticks.

All HBW models use ATF lubricant.

All HBW models should be shifted into gear in one swift motion - not allowed to slip in slowly.

Control of gearbox -

1. The gearbox is suitable for single lever remote control using 33C cable.
2. The cable should attach at right angles to the actuating lever using the cable bracket supplied.
3. Both gear box lever and remote lever must be in neutral position when cable is attached so that travel of gearbox lever will be equal forward or reverse.
4. Check that actuating lever hub does not touch cover plate hub. Maintain at least 0.5 mm (0.002") clearance.
5. Over travel of the actuating lever does no harm. However, if the travel is too short to give full engagement, premature wear, excessive heat generation and gear failure may result.
6. The position of the cover plate underneath the actuating lever is factory adjusted to ensure equal lever travel from neutral to A and B. DO NOT LOOSEN THE CAPSCREWS HOLDING THIS ASSEMBLY. Doing this so voids warranty.
7. Fill gearbox with automatic transmission fluid to the level indicated by the dipstick mark. (Study illustrations adjacent.)
8. Note that to check oil level, the dipstick drops on the housing. It does not screw in.



TROUBLESHOOTING

| PROBLEM | REMEDY |
|---|---|
| 1. ENGINE DOES NOT START | |
| 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 | |
| a. Fuel tank is empty | Refill |
| b. Fuel filter clogged | Clean or renew |
| c. Air present in fuel system | Retighten fuel line connections and allow electric fuel pump to run long enough to purge air thoroughly |
| 3. IMPROPER OIL PRESSURE | |
| a. Oil shortage | Refill |
| b. Oil leak through connections | Repair |
| c. Oil pressure switch defective | Replace |
| 4. ENGINE OVERHEATING | |
| 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 | |
| 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 |

**TORQUE SPECIFICATIONS
(IN LB/FT)**

| | W52 | W58, W70 | W100 |
|---------------------------|-----------------------|----------|----------|
| Cylinder head | 80 - 85 | 85 - 90 | 80 - 85 |
| Cylinder head cover | 2 - 3 | 2 - 3 | 2 - 3 |
| Connecting rod cap | 50 - 54 | 59 - 65 | 55 - 60 |
| Main bearing cap | 80 - 85 | 80 - 85 | 80 - 85 |
| Camshaft thrust plate | 12 - 17 | 12 - 17 | 12 - 17 |
| Camshaft gear | 45 - 51 | 46 - 69 | 45 - 51 |
| Idler gear | 17 - 23 | 17 - 23 | 17 - 23 |
| Injection pump drive gear | 29 - 51 | 29 - 51 | 29 - 51 |
| Rocker arm assembly | 80 - 85 | 80 - 85 | 80 - 85 |
| Timing gear case | 12 - 17 | 12 - 17 | 12 - 17 |
| Timing gear cover | 12 - 17 | 12 - 17 | 12 - 17 |
| Rear oil seal cap | 11 - 15 | 11 - 15 | 11 - 15 |
| Oil pan | 12 - 17 | 12 - 17 | 12 - 17 |
| Oil pump cover | 5 - 9 | 6 - 9 | 6 - 9 |
| Oil pump pipe | 6 - 9 | 6 - 9 | 6 - 9 |
| Fresh water pump | 12 - 17 | 12 - 17 | 12 - 17 |
| Crankshaft pulley | 145 -181 | 253 -289 | 282 -304 |
| Glow plug | 7 - 11 | 7 - 11 | 7 - 11 |
| Injector to head | See explanation below | | |
| Injection nozzle to body | 18 - 22 | 58 - 72 | 29 - 36 |
| Injection pipe flare nut | 12 - 17 | 18 - 22 | 18 - 22 |
| Intake manifold | 12 - 17 | 12 - 17 | 18 - 22 |
| Exhaust manifold | 12 - 17 | 12 - 17 | 12 - 17 |
| Back plate | 24 - 45 | 24 - 35 | 24 - 35 |
| Flywheel | 95 -137 | 95 -137 | 95 -137 |
| Damper | 14 - 20 | 14 - 20 | 14 - 20 |

W52 and W70 use an injector screwed into the head for which the torque value is 42 - 51 lb/ft.

W58 and W100 use an injector bolted to the head for which the torque value is 12 - 17 lb/ft. per bolt, tightened evenly.

Certain parts should be carried on board at all times. These include consumable items like filter elements and zinc electrodes. There are other items whose life is indeterminate such as alternator and pump belts, thermostats, raw water pump impeller kits, injectors, injector hardware kits, etc. on which the owner must make his own decisions based on use and local supply of parts. Page 25 contains a list of parts from which a judicious selection can be made.

COMMON PARTS BY NUMBER

| | W52 | W58 | W70 | W100 |
|-------------------------|-----------|-----------|-----------|-----------|
| Alternator | 24684 | 24684 | 24684 | 24684 |
| Belt, Alternator Std. | 16001 | 11672 | 32977 | 32544 |
| Sea Water Pump | - | 31152 | 16446 | 11400 |
| Filter, Lube Oil | 16655 | 16655 | 32874 | 32874 |
| Fuel Oil | 24363 | 24363 | 24363 | 24363 |
| Elec. Lift Pump | 30548 | 30548 | 30548 | 30548 |
| Gasket Set, Top | 32051 | 24575 | 32555 | 32559 |
| Complete | 32082 | 24576 | 32556 | 32560 |
| Glow Plug | 24353 | 24353 | 24353 | 32899 |
| Injector | 32743 | 24563 | 32743 | 24563 |
| Hardware Kit (1) | 32050 | 24574 | 33094 | 33095 |
| Nozzle | 32744 | 24565 | 32744 | 24565 |
| Pump, Fresh Water | 32213 | 24557 (6) | 32711 | 32895 |
| Mounting Gasket | 31036 | 24478 | 32712 | 32855 |
| Rebuilding Kit | 31054 | 24538 | - | - |
| Pump, Sea Water | 16423 | 24102 | 11353 | 11353 |
| Mounting Gasket | 11143 | - | - | - |
| Repair Kit | 18172 | 24652 | 33329 | 33329 |
| Impeller Kit | 33104 | 33112 | 11907 | 11907 |
| Impeller | 11418 | 11764 | 11418 | 11418 |
| Cover Gasket | 15153 | 24646 | 11419 | 11419 |
| Seal | 18159 | 24649 | 14774 | 14774 |
| Pump Fuel Lift (2) | 24831 | 24831 | 24831 | 24831 |
| Solenoid, Fuel Shut-Off | 24338 (7) | 24338 (7) | 24338 (7) | 24338 (7) |
| Pre-Heat | 24639 | 24639 | 24639 | 24639 |
| Spare Parts Kit A (3) | 32052 | 24572 | 32557 | 32561 |
| B (4) | 32053 | 24573 | 32558 | 32562 |
| Starter, Propulsion | 16762 | 16762 | 31227 | 31227 |
| Generator Set | 23953 | 23953 | 23953 | 31226 |
| Solenoid | 33328 | 33328 | 33328 | 33328 |
| Thermostat | 24690 | 24690 | 24690 | 32872 |
| Mounting Gasket | 33373 | 33373 | 33373 | 32153 |
| Valve Cover Casket | 30984 | 24343 | 32639 | 32755 |
| Voltage Regulator (5) | 24579 | 24579 | 24579 | 24579 |
| Zinc | 11885 | 11885 | 11885 | 11885 |

NOTES

- (1) Engine Set of Banjo and Injector Washers
- (2) Electric Fuel Pump with Filter
- (3) Minor Kit
- (4) Extended Cruising Kit
- (5) Integral Part of Alternator
- (6) Excludes Body
- (7) O-Ring 24339

WESTERBEKE LIMITED WARRANTY

1. Warranty Obligation and Duration

Westerbeke warrants to the original consumer purchaser that all standard Westerbeke marine engines and generator sets manufactured or supplied by us will be free from defects in material and workmanship for a period of one year: from date of commission, or date of purchase on repower, OR fifteen hundred (1500) hours on Commercial Generators, only (whichever occurs first).

2. Remedy

Westerbeke will elect to repair or replace free of charge to you any product or part returned to our factory transportation costs prepaid which we adjudge defective in materials or workmanship. Alternatively, we may reimburse at our discretion a portion of labor costs incurred to repair defective parts or products on site. If you request shipment of replacement parts to you prior to our determination of cause of failure, such shipment will be sent C.O.D.

3. Notification

If you encounter a problem with your Westerbeke engine or generator set within the warranty period as stated above, contact your nearest authorized Westerbeke Master Distributor directly, by telephone or letter.

Be prepared to furnish the following information:

- a. number of hours on unit
- b. date of commission, date of purchase
- c. owner's office and home telephone
- d. model number, serial number
- e. name of vessel
- f. present location of vessel or product
- g. name and address of builder
- h. boat model name
- i. who performed prior servicing, installation
- j. description of current problem
- k. any service outlet consulted and their diagnosis

4. Exclusions

This warranty shall not apply to:

- a) failures due to wear and tear, misuse, accident or negligence, including but not limited to improper storage or installation, inadequate maintenance, overloading and insufficient lubrication;
- b) consequential harm caused by overheating of engine cooling water or loss of engine lubricating pressure (these conditions should be constantly monitored by engine instruments and/or alarms);
- c) consequential harm caused by improper installation or failure of accessories attached to our product, such as water heaters and refrigeration compressors;
- d) products altered or modified in a manner not authorized in writing by Westerbeke;
- e) products damaged in transit;
- f) replacement of engine fluids, filter elements or vee belts, engine tune-up, valve adjustment, oil and water leaks, or any other normal service items;
- g) specially manufactured products provided to customer specifications;
- h) fuel systems, cooling systems, exhaust systems, electrical systems and cable control systems beyond the connection points on the product.

5. Application of Warranty

THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY WARRANTY IMPLIED BY LAW, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS, IS IN EFFECT ONLY FOR THE DURATION OF THE EXPRESS WARRANTY SET FORTH IN THE FIRST PARAGRAPH ABOVE. NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR WESTERBEKE ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS. WESTERBEKE WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OR INSTALLATION OF ITS PRODUCTS.

SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSIONS OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS AND EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

P/N 21479

6/1/83



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