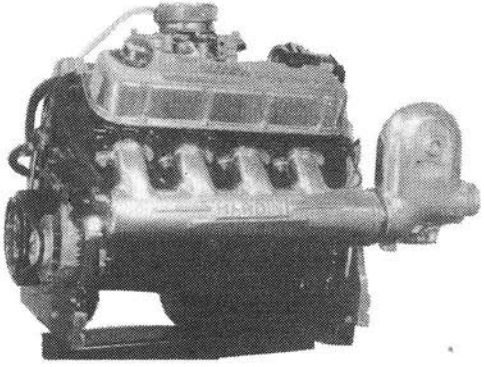
HARDIN MARINE Engines

OWNER MANUAL



Models

H205 H225 H260
H280 H320 H333
H400 H405 H425
H430

FORWARD

The operating instructions and maintenance recommendations in this manual will help you get acquainted with, and get the most satisfactory performance from your new Hardin Marine Engine. How well your engine will deliver the performance it has built into it depends in the care it receives. This manual contains a listing of maintenance procedures that should be performed at recommended intervals. The operator or service personnel responsible for the care of this engine should be thoroughly familiar with these procedures.

This manual covers the full line of Hardin Gasoline Engines. These engines have many differences, however the operation and service is the same on all these engines. In this manual we will cover the basic operation and service as well as some of the differences between engine models.

Hardin Marine takes pride in producing engines of quality for a wide variety of marine applications. Engines that have been created through a great deal of research using high quality parts to achieve the upmost in performance and durability.

Should a need for replacement parts or service develop, contact Hardin Marine or the Hardin Marine Authorized Dealer near you.

TABLE OF CONTENTS

IMPORTANT INFORMATION IS POINTED OUT BY BOLD RED TYPE.

IMPORTANT OWNER REGISTRATION INFORMATION

WARRANTY FORM

Included with this manual is a warranty form which must be filled out and mailed to Hardin Marine to initiate the warranty on your new Hardin engine and/or drive.

This form is pre-addressed to Hardin Marine and should be filled out by you and your dealer at the time of purchase. Please fill out the card completely, including the **engine model and serial number** and mail it within 10 days of purchase date.

NOTE: The Federal Boat Safety Act of 1971 requires that registration lists of marine products sold in the United States be maintained by the manufacturers and dealers of these products. Therefore, it is extremely important that we receive your registration form both for warranty purposes and to comply with federal regulations. This product owner information will also enable us to contact you should it become necessary to change or improve the product to protect the well being of you, the owner and operator.

WARRANTY CARD

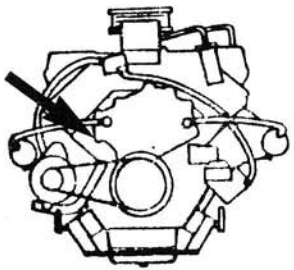
When the completed warranty form is received by Hardin Marine, a plastic Owner's Warranty Card will be made and sent directly to you. This warranty card is your only valid identification for warranty work and must be presented to a Hardin Authorized Service Dealer for warranty work.

FAILURE TO RETURN WARRANTY FORM CONSTITUTES A WAIVER OF ANY NOTIFICATION AS DESCRIBED IN THE 1971 FEDERAL BOAT SAFETY ACT.

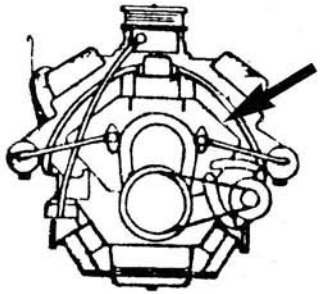
ENGINE SERIAL NUMBER

The serial number should be recorded on the warranty form supplied with this manual and should be referred to in any correspondence concerning your engine. This number will be imprinted on your warranty card which must be used whenever any warranty repairs are made on this engine.

The engine serial number is stamped onto the engine block or head on the port (left) side of the front of the engine as indicated by the arrows below. (See figure 1).



MODEL
H320



MODELS
H205, H225, H260
H280, H333, H400
H405, H425, H430

FIGURE 1

The selling dealer should assist you in being properly equipped according to Coast Guard requirements and local regulations. He should also assist you in water testing the boat to permit you to familiarize yourself with the handling and operation of the boat.

The dealer should conduct a pre-delivery inspection of your boat prior to delivery to you. The following items are to be checked:

1. Engine Oil Level
2. Tightness of fuel and oil lines
3. Battery charge
4. All water hoses tight
5. Tightness of all exhaust manifold nuts
6. Control adjustments
7. All drain petcocks closed
8. Alternator belt tension
9. Exhaust hose and clamps
10. Alternator for charge
11. Engine idle speed
12. Bilge area for water leaks

OWNERS RESPONSIBILITIES

A. With the ownership of a new boat you receive certain responsibilities. By law you are now responsible for all occupants of your boat. It is required that you meet U.S. Coast Guard Personal Flotation Device (PFD) requirements. Instruct at least one other person aboard in the basic handling skills of your boat to enable that person to operate the boat in case of an emergency.

You should observe the rules and regulations of the area in which you are going to operate your boat in order to protect your passengers as well as yourself. For additional information contact the local U.S. Power Squadron, American Red Cross or the State Boating Authorities.

B. As a boat owner, you are responsible for the normal maintenance and replacement of service items. These are not considered defects in material and workmanship within the terms of the warranty.

OWNER'S RESPONSIBILITIES

10 HOUR INSPECTION

To insure that you receive the maximum service from your Hardin equipment you should ask your Hardin Dealer about a 10 hour service and inspection after the first 10 hours of operation. ALTHOUGH THE 10 HOUR SERVICE IS NOT COVERED UNDER THE WARRANTY POLICY, the cost to you will be minimal and should a malfunction be found and corrected at this time, the inspection will pay for itself many times over.

The following is a list of items to check or service:

1. Check for oil, fuel or water leaks.
2. Drain oil and replace filter (see oil change). pg. 15-17
3. Check and re-tighten engine mount bolts.
4. Check fuel line fittings for tightness.
5. Check hose clamps and hoses.
6. Check the alternator belt for correct tension.
7. Check throttle linkage.
8. Check the flame arrestor.
9. Check the fuel filter.
10. Check all electrical connections for tightness.
11. Check exhaust manifold bolts for tightness.
12. Check the bilge pump and blower for operation.
13. Check all switches, lights, and other equipment for operation.
14. Launch the boat.
15. Start the engine and check the timing and dwell of the distributor.
16. Check the operation of all the instruments.
17. Check the carburetor adjustments.
18. Check for overheating at maximum RPM's, and at idle RPM's.
19. Check the operation of the steering and shifting system.

If any deficiencies, malfunctions or signs of abuse exist in the 10-hour inspection, it should be noted, brought to your attention, and corrected at that time.

NOTE: If defects are found in the equipment that is not supplied by Hardin Marine, please contact that manufacturer for service information.

ENGINE SPECIFICATIONS

	H 205	H 225	H 260	H 280	H 320
Net Horsepower**	205	225	260	280	320
Bore	4.000	3.74	4.00	4.00	4.36
Stroke	3.480	3.48	3.48	3.48	3.850
Displacement	262 C.I.	305 C.I.	350 C.I.	350 C.I.	460 C.I.
Compression Ratio	9.3:1	8.5:1	9:1	9:1	8:1
Fuel Requirements	Reg. 87 Oct.	Reg. 87 Oct.	Reg. 87 Oct.	Reg. 87 Oct.	Reg. 87 Oct.
Fuel Pump Pressure	6-7 PSI	4-7 PSI	4-7 PSI	4-7 PSI	5-7 PSI
Idle RPM In Water Jet	850 RPM	800 RPM	800 RPM	800 RPM	900 RPM
Idle RPM I/O		750 RPM	750 RPM	800 RPM	750 RPM
V or Direct Drive					
Max. Recommended RPM	4600 RPM	4400 RPM	4400 RPM	5000 RPM	4600 RPM
Point Dwell	39°	26° Each	26° Each	26° Each	31°
Timing	8° BTDC@600 RPM	8° BTDC@700 RPM	8 BTDC@700 RPM	8 BTDC@700 RPM	8 BTDC@550 RPM
Spark Plugs	AC MR 43 T	MR 43 T	MR 43 T	MR 43 T	ARF 32
Plug Gap	.035	.035	.035	.035	.035
Firing Order	165432	18436572	18436572	18436572	15426378
Normal Oil Pressure @ 1500 RPM	35-45 PSI	30-45 PSI	30-45 PSI	30-45 PSI	35-65 PSI
Oil Viscosity and Type	SAE 30 Class SF, SE	SAE 30 Class SF.SE	SAE 30 Class SF.SE	SAE 30 Class SF.SE	SAE 30 Class SF.SE
Oil Capacity with Filter	5 Quart Approx.	6 Quart	6 Quart	6 Quart	6 Quart
Oil Filter Model	AC PF 51	AC PF 25	AC PF 25	AC PF 25	CIAZ 6731 A
Transmission Oil	See Note	See Note	See Note	See Note	See Note
Viscosity and Type	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2
Minimum Battery Rating	73 Amp	73 Amp	73 Amp	73 Amp	73 Amp
Alternator Rating	35 Amp	35 Amp	35 Amp	35 Amp	35 Amp
Alternator Model	8 MR 2051 F	8 MR 2051 F	8 MR 2051 F	8 MR 2051 F	8 MR 2051 F
Distributor Model	Prestolite	YL 670AV 2	YL 670AV 2	YL 670AV 2	D3JL 12100
Normal Water Temp.	120°-180°F	120°-180°F	120°-180°F	120°-180°F	120°-180°F
Maximum Temp.	200°F	200°F	200°F	200°F	200°F

**Horsepower Figures Are Approximate And May Vary With Each Installation.

1. Borgwarner Transmission ATF Dexiron.
2. Twin-Disc Transmission SAE 30 Detergent.

ENGINE SPECIFICATIONS

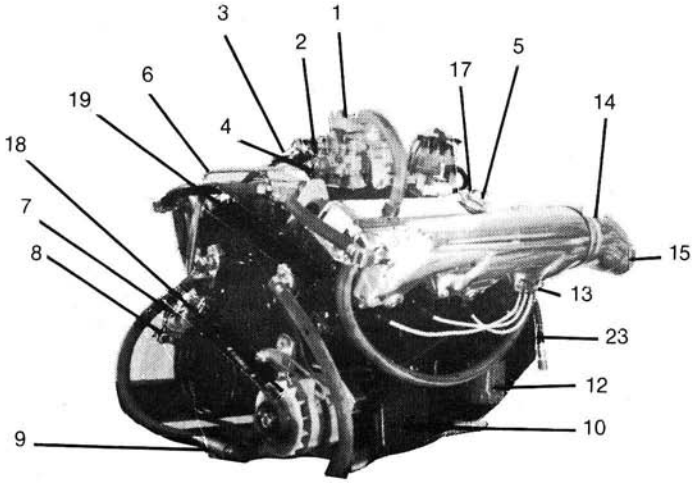
	H 333	H 400 OS	H 405	H 425 OS	H 430 OS
Net Horsepower**	333	400	360	425	430
Bore	4.25	4.25	4.25	4.25	4.25
Stroke	4.0	4.0	4.0	4.0	4.0
Displacement	454 C.I.	454 C.I.	454 C.I.	454 C.I.	454 C.I.
Compression Ratio	8:1	8.8:1	8.8:1	8.8:1	8.8:1
Fuel Requirements	Reg. 87 Oct.	Reg. 87 Oct.	Reg. 87 Oct.	Reg. 87 Oct.	Reg. 87 Oct.
Fuel Pump Pressure	4–7 PSI	4.7 PSI	4.7 PSI	4.7 PSI	4.7 PSI
Idle RPM In Water Jet	850 RPM	850 RPM	850 RPM	850 RPM	850 RPM
Idle RPM I/O V Or Direct Drive	750 RPM	750 RPM	750 RPM	800 RPM	800 RPM
Max. Recommended RPM	4600 RPM	5000 RPM	5000 RPM	5200 RPM	5200 RPM
Point Dwell	26° Each	26° Each	26° Each	26° Each	26° Each
Timing	8 BTDC@700 RPM	8 BTDC@700 RPM	8 BTDC@700 RPM	8 BTDC@700 RPM	8 BTDC@700 RPM
Spark Plugs	MR 43 T	MR 43 T (AC)	MR 43 T (AC)	MR 43 T (AC)	MR 43 T (AC)
Spark Plug Gap	.035	.035	.035	.035	.035
Firing Order	18436572	18436572	18436572	18436572	18436572
Normal Oil Pressure @ 1500 RPM	30–45 PSI	30–45 PSI	30–45 PSI	30–45 PSI	30–45 PSI
Oil Viscosity and Type	SAE 30 Class SF.SE	SAE 30 Class SF.SE	SAE 30 Class SF.SE	SAE 30 Class SF.SE	SAE 30 Class SF.SE
Oil Capacity with Filter	6 Quart	11 Quart	6 Quart	11 Quart	11 Quart
Oil Filter Model	AC PF 25	Fram HP 1	AC PF 25	Fram HP 1	Fram HP 1
Transmission Oil Viscosity and Type	See Note 1 or 2	See Note 1 or 2	See Note 1 or 2	See Note 1 or 2	See Note 1 or 2
Minimum Battery Rating	73 Amp	73 Amp	73 Amp	73 Amp	73 Amp
Alternator Rating	35 Amp	35 Amp	35 Amp	35 Amp	35 Amp
Alternator Model	8 MR 2051 F	8 MR 2051 F	8 MR 2051 F	8 MR 2051 F	8 MR 2051 F
Distributor Model	YL 670AV 2	YL 670AV 2	YL 670AV 2	YL 670AV 2	YL 670AV 2
Normal Water Temp.	120°–180°F	120°–180°F	120°–180°F	120°–180°F	120°–180°F
Maximum Temp.	200°F	200°F	200°F	200°F	200°F

**Horsepower Figures Are Approximate And May Vary With Each Installation.

1. Borgwarner Transmission ATF Dextron.
2. Twin-Disc Transmission SAE 30 Detergent.

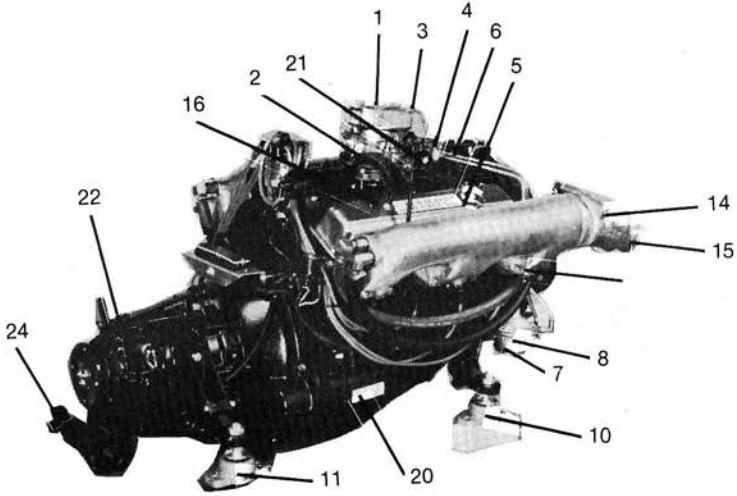
ENGINE SPECIFICATIONS

MODELS H205, H225, H260, H280 Jet



1. Flame Arrestor
2. Carburetor
3. Fuel Pump Vent
4. Fuel Filter
5. Oil Filler Cap
6. Fuel Line
7. Fuel Pump Inlet
8. Fuel Pump
9. Water Inlet
10. Front Mount
11. Rear Mount
12. Oil Filter

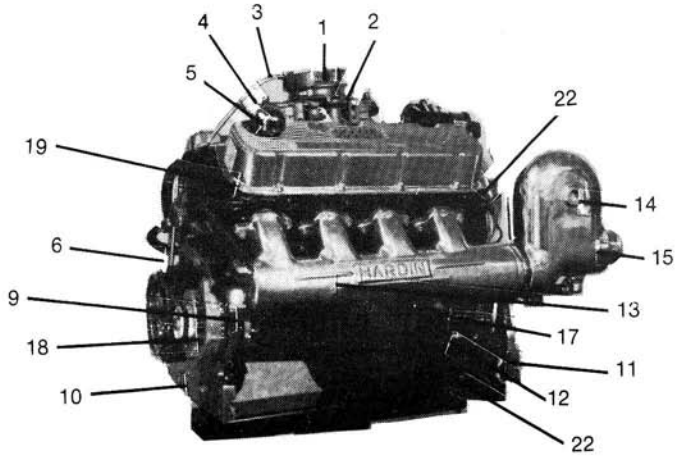
MODELS H225, H260, H280 V-Drive



13. Exhaust Manifold Drain
14. Exhaust Riser
15. Exhaust Outlet
16. PCV Valve
17. Oil Pressure Sender
18. Alternator
19. Engine Serial Number
20. Starter
21. Oil Dipstick
22. Trans Oil Dipstick
23. Oil Drain Hose
24. Trans Oil Cooler

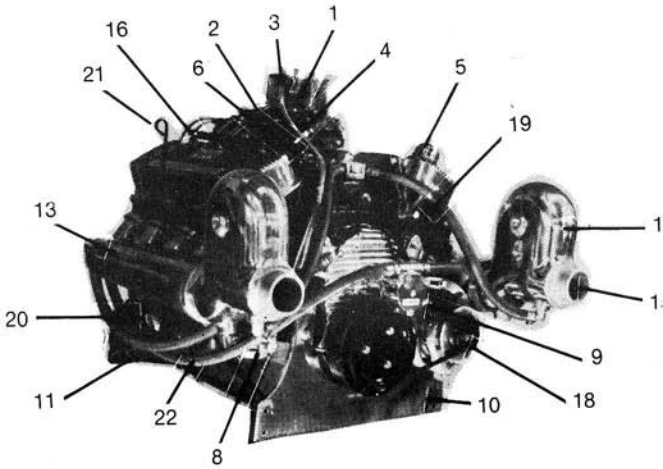
ENGINE SPECIFICATIONS

MODELS H333, H405 Jet



1. Flame Arrestor
2. Carburetor
3. Fuel Pump Vent
4. Fuel Filter
5. Oil Filler Cap
6. Fuel Line
7. Fuel Pump Inlet
8. Fuel Pump
9. Water Inlet
10. Front Mount
11. Rear Mount
12. Oil Filter

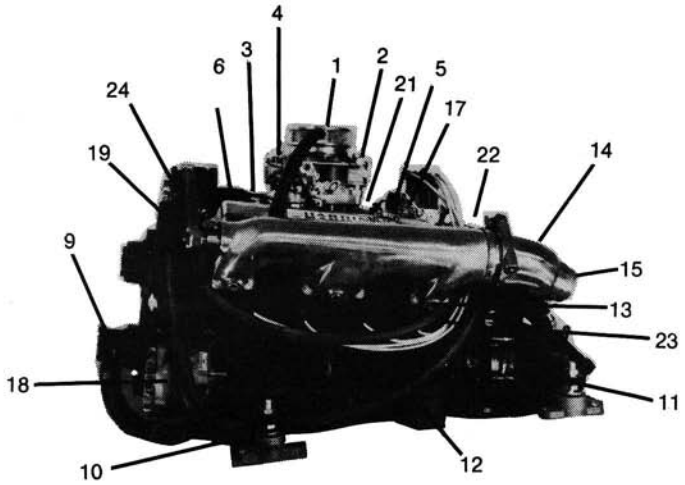
MODELS H333, H405, V-Drive



13. Exhaust Manifold
14. Exhaust Riser
15. Exhaust Outlet
16. PCV Valve
17. Oil Pressure Sender
18. Alternator
19. Engine Serial Number
20. Starter
21. Oil Dipstick
22. Oil Drain Hose

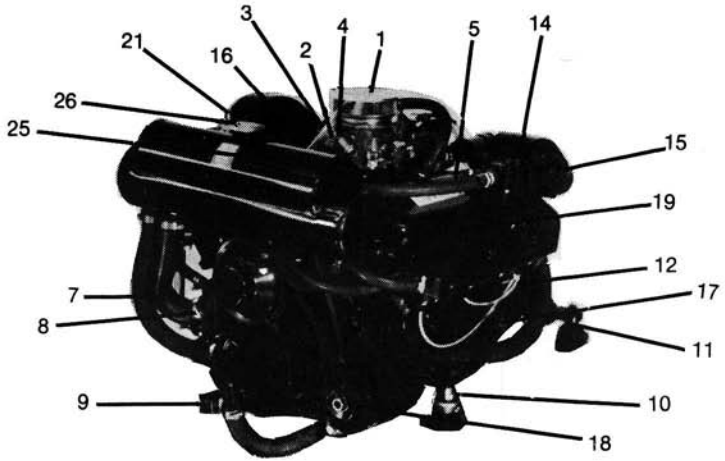
ENGINE SPECIFICATIONS

MODELS H260, H280 Tournament Skier



1. Flame Arrestor
2. Carburetor
3. Fuel Pump Vent
4. Fuel Filter
5. Oil Filler Cap
6. Fuel Line
7. Fuel Pump Inlet
8. Fuel Pump
9. Water Inlet
10. Front Mount
11. Rear Mount
12. Oil Filter

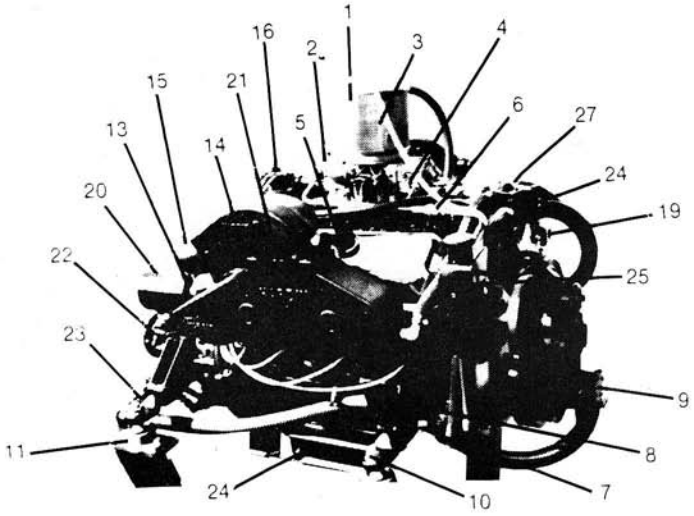
MODELS H225, H260, H280, H333, H405 Inboard Fresh Water Cooling



13. Exhaust Manifold Drain
14. Exhaust Riser
15. Exhaust Outlet
16. PCV Valve
17. Oil Pressure Sender
18. Alternator
19. Engine Serial Number
20. Starter
21. Oil Dipstick
22. Trans Oil Cooler
23. Trans Oil Dipstick
24. Oil Drain Hose
25. Heat Exchanger
26. Radiator Cap

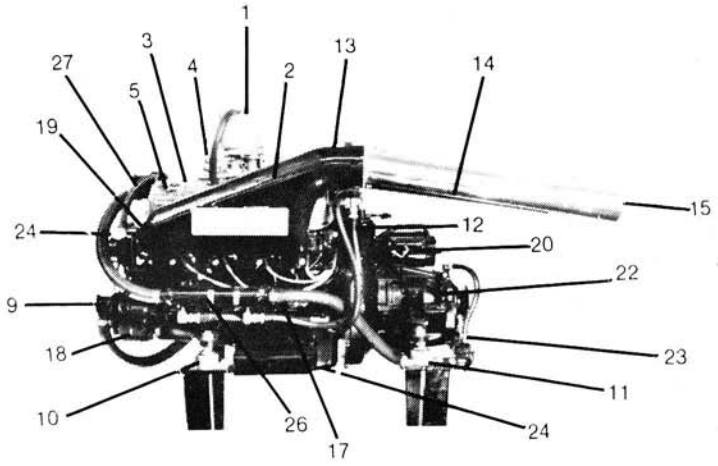
ENGINE SPECIFICATIONS

MODELS H333, H405 Inboard Iron



1. Flame Arrestor
2. Carburetor
3. Fuel Pump Vent
4. Fuel Filter
5. Oil Filler Cap
6. Fuel Line
7. Fuel Pump Inlet
8. Fuel Pump
9. Water Inlet
10. Front Mount
11. Rear Mount
12. Oil Filter
13. Exhaust Manifold
14. Exhaust Riser (Pipe)

MODELS H400, H425, H430 Off Shore



15. Exhaust Outlet
16. PCV Valve
17. Oil Pressure Sender
18. Alternator
19. Engine Serial Number
20. Starter
21. Oil Dipstick
22. Trans Oil Dipstick
23. Trans Oil Cooler
24. Oil Drain Hose
25. Power Steering Unit
26. Oil Cooler
27. Thermostat Housing

FILLING THE FUEL TANK

CAUTION: GASOLINE VAPORS ARE EXPLOSIVE. ALWAYS USE SAFETY MEASURES WHEN FUELING AND STARTING YOUR ENGINE.

1. Insure that all electrical equipment is turned off.
2. Extinguish all open flame and all smoking material.
3. The filler hose nozzle should be in contact with the fill pipe to prevent sparks.

BEFORE STARTING

1. Check engine, transmission or outdrive for proper oil level.
2. Check fuel supply.
3. Operate bilge blower for at least 4 minutes prior to cranking the engine to remove any possible gasoline fumes from the engine compartment.
4. Check that all the engine and exhaust manifold drain plugs on the engine are closed tight.

STARTING

A. Boats equipped with single lever control such as Morse "MV-J"

1. Place lever in neutral detent.
2. Pull button out or pull outward on lever to disengage shifter.
3. Pump throttle by moving shift lever full forward and return two or three times to prime a cold engine. **Do not** pump throttle if engine is hot. Throttle should be at idle when starting engine.
4. Turn ignition key to start and as soon as engine starts, release key and allow switch to return to run position.

DO NOT OPERATE STARTER FOR MORE THAN 15 SECONDS WITHOUT PAUSING TO ALLOW STARTER MOTOR TO COOL FOR 2 MINUTES.

B. Boats equipped with Foot Throttle

1. Place shift lever in approximate neutral and place one hand on lever while starting. This will enable you to keep the boat in neutral when the engine starts.
2. Pump throttle as in an automobile to start cold engine.
3. Use starter limitation as listed previously.

AFTER ENGINE STARTS

1. Check oil pressure — It should be at or above 10 lbs. at idle RPM on a cold engine.
2. Run engine at close to idle until a rise in temperature can be detected on the temperature guage.
3. Place throttle in neutral and push button in to engage shift cable. You are now ready to get underway.
4. Move shift lever forward to place drive in forward and as lever continues to move forward, throttle will be advanced.

JET DRIVE ENGINES MAY BE RUN WITH BOAT OUT OF WATER ONLY IF WATER IS SUPPLIED TO THE INLET WATER HOSE FOR ENGINE COOLING. DO NOT RUN OVER 2000 RPM OR FOR MORE THAN 1 MINUTE OR DAMAGE MAY OCCUR IN THE SEAL AREA OF THE JET DRIVE. IF WATER IS NOT SUPPLIED TO THE ENGINE IT MAY BE STARTED, BUT SHOULD ONLY BE ALLOWED TO RUN FOR A FEW SECONDS. DO NOT START V-DRIVE, I/O OR DIRECT DRIVE ENGINES WITHOUT A WATER SUPPLY AS DAMAGE MAY BE DONE TO THE WATER PUMP.

OPERATING INSTRUCTIONS

CAUTION: KEEP PASSENGERS AWAY FROM HEADER AT ALL TIMES. FAILURE TO DO SO COULD RESULT IN SEVERE INJURY.

C. Boats equipped with Water Injected Headers

1. The Gate Valve:
   The gate valve (see fig. 8) is necessary so that you can regulate the amount of water that passes through the headers.
2. Operating the Gate Valve:
   A. Turn valve clockwise to allow more water to headers.
   B. Turn valve counter clockwise to restrict the amount of water to headers.
   C. General rule to follow: The faster the boat speed, the more the valve should be turned clockwise. The slower the boat speed, the more the valve should be turned counter clockwise.
3. When running boat on trailer, make sure nose of boat is elevated. Always follow this procedure:
   START ENGINE, TURN ON WATER. TURN OFF WATER, STOP ENGINE ON JETS ONLY.
4. For V-Drive engines or engines equipped with an engine driven water pump follow this procedure:
   TURN ON WATER, START ENGINE. STOP ENGINE, TURN OFF WATER.
5. Water injected headers are DRY and HOT at idle. They are also hot the first 6 inches out from the head to the water inlet fitting and the chrome will blue to this point.
6. Failure to do any of above, or if system is not working correctly could result in SEVERE ENGINE DAMAGE.
7. In short, allow only enough water to pass through headers to keep the rest of the chrome from blueing.
8. Keep belongings and passengers away from header and engine at all times.

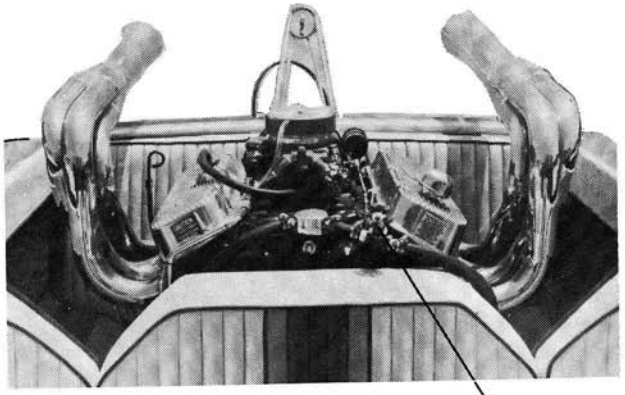


Figure 8

OPERATING HINTS FOR BOAT OWNERS

A. When launching your boat, **do not** back the trailer in at a fast pace and "hit the brakes" to "shoot the boat off the trailer". This launching technique could force water up the exhaust port and into the engine which could cause severe damage to the engine. The flappers in the exhaust ports and the risers on the exhaust manifold are designed to prevent this from happening under normal use. (See figure 9).

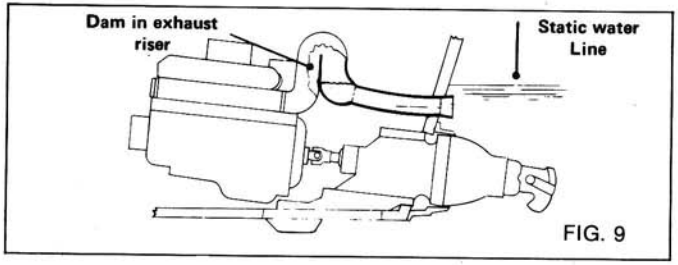


FIG. 9

NOTE: If the engine should develop a hydro-static lock (water drawn into the cylinder through the exhaust system) the following steps should be taken:

1. Loosen the connection between the exhaust riser and the exhaust manifold. This will allow any water that is trapped inside the exhaust chamber to drain out. Retighten the riser.
2. Remove all spark plugs, remove the center wire of the coil, and crank engine for 15 seconds.
3. Squirt approximately 1 teaspoon of motor oil in each cylinder and crank engine again for 15 seconds.
4. Replace spark plugs, re-install the coil wire, and start engine.
5. If engine does not sound normal, do not continue to operate your engine until your Hardin Marine Dealer has checked it out thoroughly.

B. If your boat is a low profile type boat with an open engine compartment, you should be aware of the "following wake" of your boat when you are slowing down and the boat settles back into the water as it comes off plane. A little nudge of power from your engine just as the wake approaches the stern of your boat will prevent water from splashing over the transom and into the engine compartment.

C. Before turning your engine off, insure the following:

1. The boat speed is below 2 MPH. This will help prevent the "following wake" from forcing water up the exhaust ports.
2. The engine is at idle. This will prevent exhaust water from being drawn into the manifolds by a coasting engine.

D. At full throttle and top boat speed a jet obtains water from 2" below the bottom of the boat. However, if full throttle is suddenly applied at zero boat speed, a jet is capable of pulling in water and debris from up to 6 feet below the jet intake. This is especially true when operating in reverse. Therefore when maneuvering your jet boat in shallow water (6 feet or less) **do not** use a large burst of power (above 1500 RPM) unless you are getting under way. For propeller drive boats, be sure to maintain an adequate depth to prevent fouling the propeller.

OPERATING INSTRUCTIONS

ENGINE 10 HOUR BREAK-IN PERIOD

All Hardin engines have been test run at the factory for a short period of time to make adjustments and check out all the systems. This is not to be considered a break-in of the engine. The proper break-in is essential to assume minimum oil consumption and maximum engine performance and service.

1. First 10 minutes - Idle RPM and check for oil pressure, leaks, proper cooling, and proper control adjustment.
2. Next 15 minutes - Minimum planning RPM.
3. Next 35 minutes - Up to 4000 RPM with no sudden acceleration.
4. Next 60 minutes - Varied RPM up to maximum RPM momentarily, with no sudden accelerations.
5. For the remainder of the first 10 hours of your engine's life vary the RPM with no full throttle accelerations.
6. Conduct 10 hour check and operate engine in accordance with normal procedures.

CAUTION:
DO NOT PULL SKIERS OR OPERATE UNDER HEAVY LOADS DURING THE 10 HOUR BREAK-IN PERIOD.

OBSERVE INSTRUMENTS CAREFULLY DURING BREAK-IN PERIOD TO INSURE PROPER OPERATION OF ENGINE.

7. Also check for:
   a. Correct oil level
   b. Proper cooling
   c. Oil, water or fuel leaks
   d. Abnormal vibration or noise
   e. Loose mountings, fittings, bolts, nuts and clamps
8. Change oil and filter at the end of the 10 hour break in period.
9. Change fuel filter.

If (after initial break-in period) you wish to operate your engine at or near maximum RPM's in rough water conditions wherein the craft may become temporarily air-borne, it is recommended that a RPM Limiter be installed on your engine to protect your investment. The RPM Limiter that is available from your Hardin Dealer is set at Maximum Rated RPM. This is only to prevent the engine from going to extreme RPM's should the engine suddenly unload under full throttle. It is not designed to be a governor and the same RPM limitations for normal operation should be observed.

CAUTION FOR HIGH RPM: AT NO TIME SHOULD THE ENGINE BE OPERATED BEYOND THE SPECIFIED MAXIMUM RPM RATING. ENGINE FAILURE WHICH IS A RESULT OF EXCESSIVELY HIGH RPM WILL NOT BE REPAIRED UNDER THE WARRANTY.

MAXIMUM RECOMMENDED RPM IS AS FOLLOWS:

H205–4600 RPM	H320–4600 RPM	H405–5000 RPM
H225–4400 RPM	H333–4600 RPM	H425–5200 RPM
H260–4400 RPM	H400–5000 RPM	H430–5200 RPM
H280–5000 RPM		

INSTRUMENTS

A good habit to form is that of checking your engine gauges every few minutes. They are the best source of information on the performance of your engine.

Oil Pressure Gauge

Oil pressure should be checked each time the engine is started and at intermittent times during operation. Normal oil pressure is between 30-40 PSI at 1500 RPM. Minimum oil pressure at 900 RPM when the engine is throughly warm is 10 PSI.

Water Temperature Gauge

The water temperature should be observed closely during the break-in period. Normal operating range is from 120°F to180°F. Maximum operation temperature is 195°F. During break-in period special attention should be given to engine temperature at idle. If necessary, idle the new engine higher than normal to provide adequate cooling during break-in period.

Ammeter

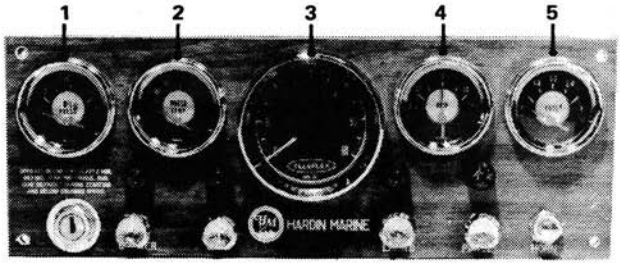
The ammeter indicates the difference between alternator output and current "draw". Should the ammeter indicate discharge when the engine is running above 1000 RPM, have your dealer check the circuit as soon as possible. Normal ammeter reading at average current draw is 20 amps at 1500 RPM. Higher readings will be seen if the battery has a very low charge.

Voltmeter

Your boat may be equipped with a voltmeter in place of an ammeter. The voltmeter indicates battery and alternator conditions. With switch on, the voltmeter indicates battery conditions of 11 to 12 volts. During normal operation the voltmeter should indicate 12.5 to 14 volts. During starting, 9.5 volts is normal. Should voltage drop to 7 while cranking or remain at 12 volts during normal operation see your Hardin Dealer for an electrical check up.

Tachometer

This indicates the RPM at which the engine is running. A decrease in maximum RPM indicates a loss of horsepower from the engine and may be an indication of need for a tune-up. An increase from the normal maximum RPM would be an indication that the jet drive or V-drive may not be functioning properly.



1. **Oil Pressure**
2. **Water Temperature**
3. **Tachometer**
4. **Ammeter or Voltmeter**
5. **Fuel Guage**

ENGINE LUBRICATION

ENGINE OIL

Use only SF engine oil (SF oil meets quality standard GM-61636-M and FMC-M2C101-C). It is recommended that SAE 30 be used at all times. The oil change interval and the new engine warranty are based on the use of oil which meets these requirements. Oil conforming to these standards contain detergent anti-wear additives.

NON DETERGENT AND LOW QUALITY OILS ARE SPECIFICALLY NOT RECOMMENDED. THE USE OF PROPER ENGINE OIL AND OIL CHANGE INTERVALS IS EVEN MORE IMPORTANT IN A MARINE ENGINE DUE TO THE HIGHER LOADS AND RPM THAT CAN BE APPLIED TO THE ENGINE FOR EXTENDED PERIODS OF TIME.

The oil and filter that were installed at the factory should be changed at the 10 hour inspection. Oil and filter changes should be made every 50 hours of operation or every 60 days thereafter, whichever occurs first.

ENGINE OIL DRAINING PROCEDURE

There are two basic procedures which can be used for draining or removing oil from the engine's crankcase.

Method A: Remove Oil Through the Oil Pan Drain

1. With coolant water flowing through the engine and transmission or jet drive in neutral: start engine and allow to reach normal operating temperature but do not run longer than 5 minutes. Shut off engine.
2. Remove oil drain plug located in engine crankcase oil pan and drain oil in suitable container. Replace drain plug.

NOTE: If you are unable to drain the oil through the oil pan drain plug: remove the oil dip stick and pump the oil out of the engine via a plastic tube inserted in the dip stick tube. (See Figure 10)

NOTE: Beginning in 1985 all Hardin Engines will be equipped with an oil drain hose. To drain the oil on these engines simply remove the brass cap at the end of the hose and drain in to a suitable container.

3. Remove the oil filter. Coat seal on face of new filter with clean engine oil and install new filter. Tighten 2/3 turn past finger tight.
4. Pour fresh oil into engine through filler cap on top of engine. (SAE 30)
5. Start engine and turn on water. Check for oil pressure and run at idle for 2 minutes. Check for leaks.
6. Stop engine and check oil level with oil dip stick. Add oil if necessary to bring level up to the full mark.

When checking oil level, the engine should be near level, the dip stick pushed down fully and sufficient time should be allowed for the oil to drain back into the oil pan area.

OIL PAN PLUGS MUST BE TORQUED TO 25 FT. LBS. TO PREVENT WATER DILUTION OF OIL.

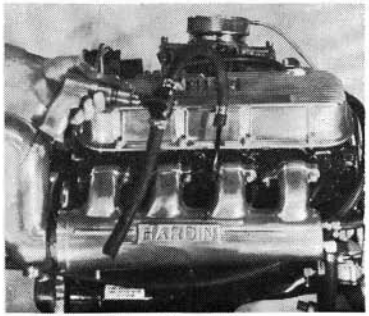


Figure 10

Method B: Remove Oil Through Oil Pressure Fitting at Front of Engine

1. With coolant water flowing to engine and transmission or jet drive in neutral: start engine and allow to reach normal operating temperature, but not longer than 5 minutes. Shut off engine.
2. Remove oil pressure sender from engine block.
3. Install a threaded nipple into the sender fitting. (see Figure 11)
4. Install rubber hose over nipple and place other end into an oil drain pan.
5. Start engine and run at 1000 RPM until oil stops running out rubber hose. Normally, this takes about 25 seconds. In all cases, do not run engine for more than 60 seconds with oil pressure sender removed.

NOTE: Running procedure for Jet Drive Engines:
START ENGINE, TURN ON WATER. TURN OFF WATER, STOP ENGINE.

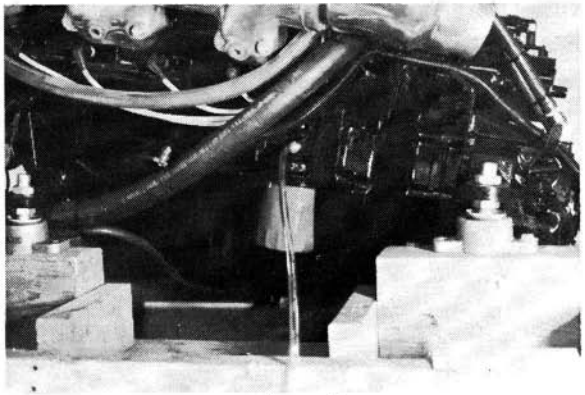


Figure 11

6. Remove oil filter. Coat seal on face of new filter with clean engine oil or grease and install new filter. Tighten 2/3 turn past finger tight. Reinstall oil pressure fitting.
7. Pour fresh oil into engine through filler cap on top of engine. (SAE 30)
8. Start engine and turn on water. Check for oil pressure and run at idle for 2 minutes. Check for leaks.

An optional oil filter relocator which aids in the removal of the oil filter and an oil drain kit are available. Ask your Hardin Dealer for further details.

NOTE: Running procedure for V-Drive, Out Drive or Engine Driven Water Pump Engines.
TURN ON WATER, START ENGINE. STOP ENGINE. TURN OFF WATER.

ENGINE LUBRICATION

UNIVERSAL JOINT

Use a hand grease gun at the Zerk fittings on each cross of the universal joint. Do not overgrease these as the seals may be damaged by excess grease. Use a 150 weight EP2 automotive chassis type grease, but do not use a high pressure gun such as that used in a service station.

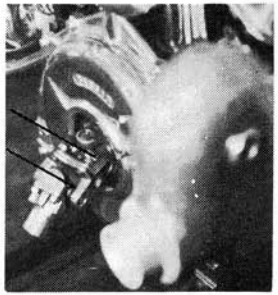


Figure 12

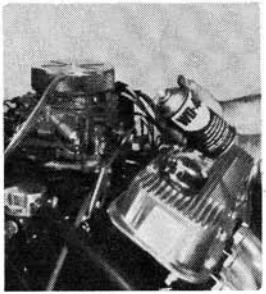


Figure 13

THROTTLE CABLE

Spray WD40 or light weight oil on exposed end of the throttle cable at the engine end and work the cable in and out to lubricate.

CRANKCASE BREATHER FILTER

The crankcase breather filter is located on the left hand valve cover on engine models H225, H260, H280, H333 and H405. (See Figure 14). On engine model H320 the crankcase breather filter is located on the right hand valve rocker cover. Should this filter become plugged, blow-by fumes would be condensed in the crankcase, resulting in the formation of acid, sludge build-up, oil dilution, oil blow-by, higher oil consumption and rust.

Any of these conditions could shorten the life of your Hardin engine. To prevent this, remove the filter at each oil change and wash in solvent, re-oil lightly with clean engine oil and replace.

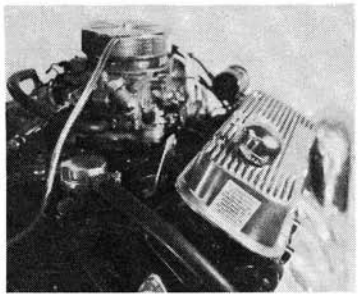


Figure 14

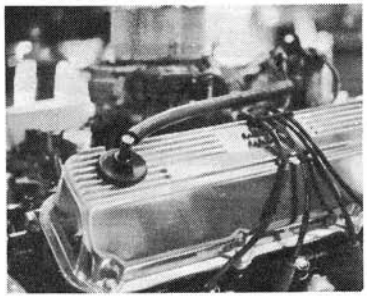


Figure 15

PCV Valve

A positive crankcase ventilation valve is located on the right hand valve rocker cover of the engine (left side on the H320). This valve should be replaced at least every 24 months. (See Figure 15).

ENGINE MAINTENANCE CHART

Service	First 10-Hours	Every 50-Hours	Every 100-Hours	At Least Once A Year	Maintenance Log Date
Change engine oil	X	X		X	
Change oil filter	X	X		X	
Inspect for fuel, oil or water leaks	Every	time	engine	is used	
Clean crankcase vent filter		X			
Replace PCV Valve			X		
Replace carburetor fuel filter	X	X	X		
Check battery	X		X	X	
Clean battery cables			X	X	
Clean flame arrestor			X	X	
Cooling system hoses & clamps	X		X	X	
Check alternator belt tension	X	X			
Lubricate U-joint	X	X			
Engine tune-up			X	X	

COOLING SYSTEM

Hardin engines are offered with three types of engine cooling systems.

1. Free system which is standard on all Hardin engines.
2. Recirculating system which is optional on all Hardin engines.
3. The closed system which is optional.

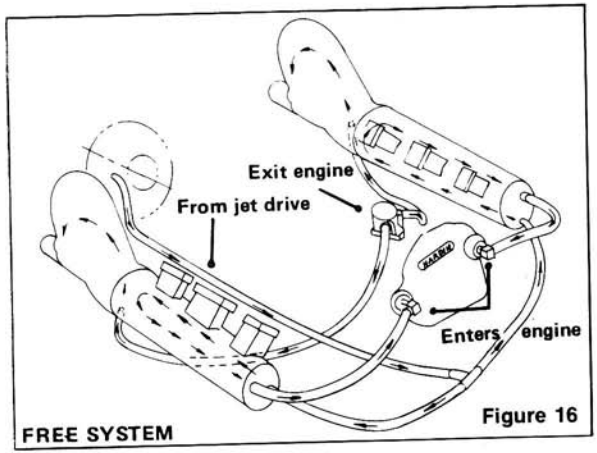
FREE SYSTEM

Water is supplied to the engine from the jet drive or from an engine driven water pump when coupled to a transmission.

1. Water enters the front of the exhaust manifold and is preheated as it passes through the manifolds on the way to the engine.
2. The water is routed from the exhaust manifold to the front cover plate of the engine and through the block and exits through the water dome on top of the engine.
3. The water then passes through the risers and is dumped into the exhaust hose at the rear of the engine, or directly into the exhaust in the case of some V-drives.

NOTE: When the jet is the source of water for the engine, particular attention should be given to the idle RPM of the engine. If the idle is set too low (below 900 RPM in the water) the jet will not develop the pressure required to cool down an engine after a hard run.

Maximum temperature for this engine is 195° F. The engine should be run around 140° F under full throttle.



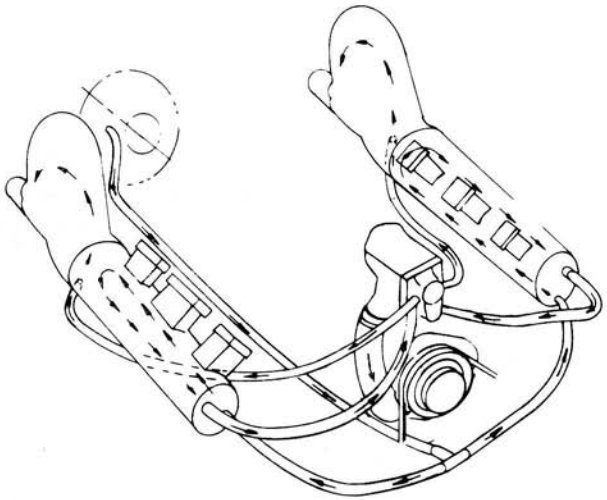
FREE SYSTEM Figure 16

RECIRCULATING SYSTEM

Water is supplied to the engine from the jet drive, or from an engine driven water pump, and is recirculated through the engine by a recirculating pump. The temperature of the engine is controlled by a thermostat located on the upper front section of the engine.

1. Water enters the front of the exhaust manifold and is preheated as it passes through the manifolds on the way to the engine.
2. The water is routed from the exhaust manifold to the bottom of the thermostat housing. The thermostat determines what portion of the water is used to cool the engine and the rest exits at the top of the thermostat housing.

3. The water in the block is circulated through the block by the recirculating pump located below the thermostat housing.
4. Water is routed from the top of the thermostat housing through the risers and dumped into the exhaust hose at the rear of the engine.



RECIRCULATING SYSTEM Figure 17

CLOSED SYSTEM

Water is supplied to the engine by the jet drive or an engine driven water pump. This water passes through the heat exchanger located at the front of the engine and into the exhaust risers. The manifolds and engine are cooled by a closed system much like an automotive system with the heat exchanger working as a radiator.

This system allows you to keep the engine protected from salt water if operating in salt water areas and also protects from sand and dirt build-ups if you are operating in extremely silty or shallow water.

SALT WATER OPERATING

When the engine is operated in salt or silty water, it is recommended to flush engine with fresh water after each days use. If salt water is allowed to stay in the engine, deposits from salt build-up and corrosion could build up to the point of shutting off the flow of engine cooling water which could result in severe engine damage.

COOLING SYSTEM

FLUSHING PROCEDURE

1. Disconnect hose at coupling in front of drive unit or install an approved flushing attachment and connect a garden hose.

   a. On Free System run water through system until water is clear or salt free coming out of the exhaust ports.

   b. If Recirculating System is used, the engine should be started and run at idle at operating temperature, while flushing water is being applied. This allows the water to pass through the thermostat housing and recirculation pump for complete flushing. **Do not** run longer than 5 minutes.

2. If engine has been operated in silty water for several hours, it is a good practice to flush the block for sand deposits.

   a. With engine running, open petcock on the side of the block and apply flushing water to the engine (See Figure 18).

   b. Open drain plugs in manifold and close engine drain petcocks and apply more flushing water. Manifold drains are located in the lower rear portion of the manifold (See Figure 19).

   c. If equipped with an optional oil cooler or transmission oil cooler, remove plug in cooler and allow water to flush through engine. (See Figure 20).

CAUTION: IF BOAT HAS OVER TRANSOM EXHAUST, MAKE SURE NOSE OF BOAT IS UP. START ENGINE THEN TURN ON WATER. SHUT OFF WATER, STOP ENGINE. (JETS ONLY)

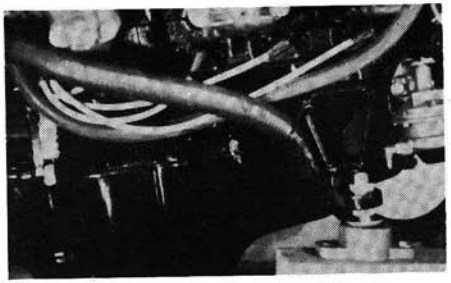


Figure 18

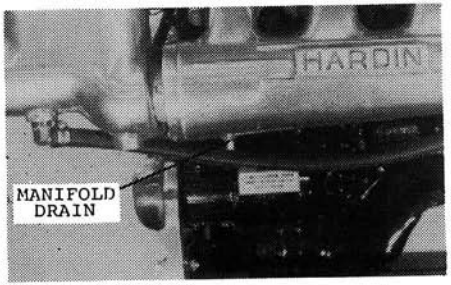


Figure 19

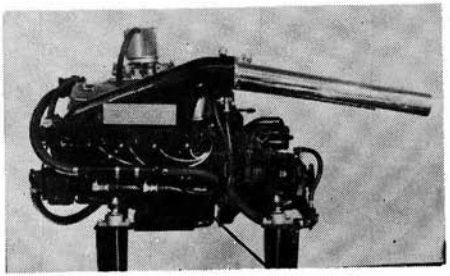


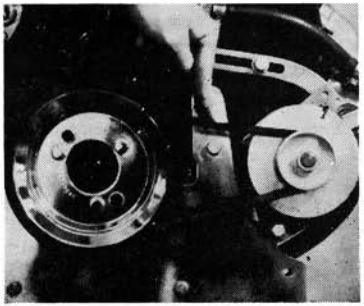
Figure 20

The electrical system of your Hardin engine consists primarily of an alternator, transistorized voltage regulator, battery and distributor.

ALTERNATOR

The Hardin engine is equipped with a Motorola Marine alternator with a built in solid-state voltage regulator which requires no adjustment. The output of this alternator is 37 amperes at 1500 RPM and above. Hardin engines which are shipped from the factory prewired have a 35 amp circuit breaker, which protects the electrical system. This breaker is located on top of the engine bellhousing and should it trip, you may reset it. Should it continue to trip, consult your Hardin Authorized Dealer to determine the cause.

Alternator belt tension may be checked by pressing the belt down midway between the pulleys. Under proper tension, the belt should be displaced about ½ inch. To tighten belt, loosen the top bolt on the alternator and the bolt in the sloted bracket at the bottom and adjust to proper tension and retighten both bolts. Belt tension should be checked after the first 10 hours and several times a season thereafter.



BATTERY — 73 AMPERE HOUR RATING

Your boat should be equipped with a 12 volt, minimum 73 ampere hour rating battery. Battery cables should be as short as possible. If the combined length of the positive and negative cables is 8 feet or less, number 2 gauge cables are required to enable you to crank your engine properly.

Periodically check water level in each cell and use only pure distilled water when replenishing the supply. Make sure battery is fully charged when stored below 32°F. This will prevent freezing.

Battery acid should be handled with care. If it is spilled or splashed on any part of the body, immediately flush the exposed area liberally with water.

Keep battery clean, particularly the top of the battery. Clean by washing with a solution of baking soda and water, making sure neither soda solution nor water get into the battery cells. Flush with clean water. A light coat of oil will help retard corrosion on battery posts.

When connecting a battery, insure that the negative (—) terminal is grounded. When connecting a booster battery or charger, make certain the connections are plus to plus and minus to minus. Failure to do this could damage the battery.

SPARK PLUGS

To obtain the maximum performance from your engine use only the recommended spark plugs.

ELECTRICAL SYSTEM

1. Refer to tune-up chart, page 5, for proper spark plugs for your engine.
2. Remove and inspect each plug for broken, glazed or blistered insulators.
3. Replace all plugs which are not serviceable.
4. Be sure all plugs that are installed are of the same make and number as other plugs in the engine.

FUEL SYSTEM

Fuel Pump

An externally vented marine type fuel pump is installed on Hardin engines. A clear plastic hose is routed from the pump to the flame arrestor. If fuel appears in this hose, it indicates that a malfunction in the fuel pump has occurred. Consult your Hardin Service Dealer as soon as possible for corrective service.

Under no circumstances should an automotive type fuel pump be used on any of the Hardin engines.

Fuel Filter

A pleated paper filter is installed in the fuel intake fitting of the quadrajet carburetor. This filter should be replaced once a season, or whenever it becomes contaminated. This filter will not allow water to pass and will need replacing should any water be picked up. When checking the filter for dirt, inspect the inside portion of the filter, since the fuel flows from the inside toward the outside.

A bronze filter is used in the Holley carburetors. This filter should be washed in carburetor cleaner and blown dry, or replaced.

FUEL REQUIREMENTS

Hardin engines are designed to operate on low-lead or unleaded regular fuel of 91 octane Research Method or higher.

NOTE:

Research Method		Motor Method		Road Method
91 octane	=	83 octane	=	87 octane

(Road Method rating is posted on gas pumps).

Gasoline Containing Alcohol or Gasohol

The use of Gasohol is not recommended in your Hardin Engine.

Carburetor Adjustments

The carburetor has been adjusted at the factory and should not need adjusting. However, change in fuel, altitude and climate may make it necessary to re-adjust.

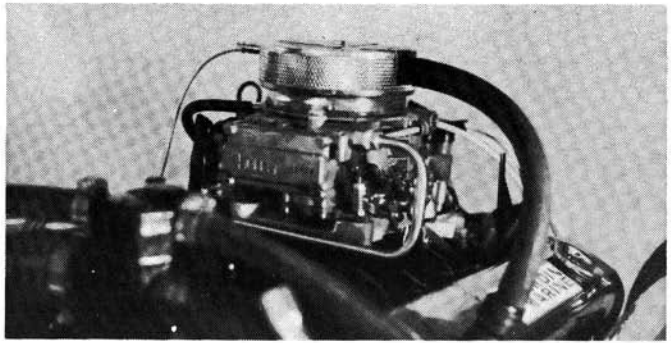
Idle Mixture

With the engine at operating temperature and at idle RPM, adjust idle mixture.

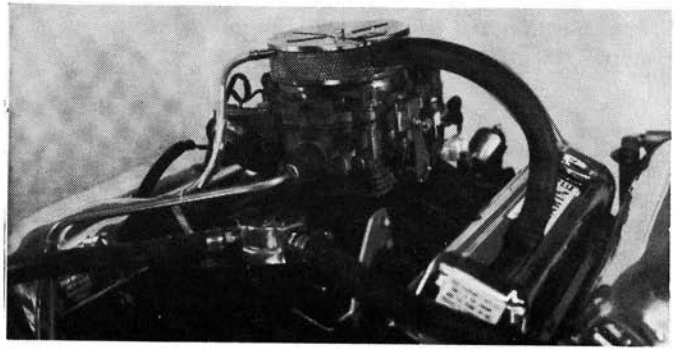
Turn adjustment screw ¼ turn at a time until the maximum RPM is indicated on the tachometer.

Idle Speed

After both idle mixtures have been adjusted on engines coupled to jet drive, adjust the idle RPM to 900 RPM if the boat is in the water. On engines coupled to transmission set idle RPM to 850 RPM in neutral. Insure that the choke is fully open before setting idle RPM.



HOLLEY CARBURETOR
Figure 20



QUADRAJET CARBURETOR
Figure 21

TROUBLE SHOOTING CHART

TROUBLE	POSSIBLE CAUSE	WHAT YOU CAN DO
1. Engine will not **crank**	A. Neutral start switch B. Loose or corroded battery cables and/or wiring harness plug. C. Low Battery D. Ignition Switch E. Hydrostatic Lock (water in engine cylinder)	A. Make sure shift control lever is in neutral B. Tighten cables on battery. If corroded, clean as described under Electrical System. C. Check level of electrolyte and refer to Electrical System D. Replace switch E. Remove spark plugs and turn engine over by hand. See Hardin Dealer if engine is damaged
2. Engine cranks **but will** not start.	A. Empty fuel tank B. Tank vent clogged C. Shut off valve closed D. Clogged fuel filter E. Choke stuck open F. Engine flooded G. Fouled spark plugs or improper gap H. Distributor points burned or misadjusted	A. Fill tank B. Free vent of obstruction C. Open valve D. Inspect fuel filter. Replace, if necessary as outlined under Fuel System E. Free choke valve and linkage F. Open throttle full open and **do not** attempt to start engine for at least 5 minutes G. Inspect spark plugs, Clean or replace H. See your Hardin Dealer for replacement of points

TROUBLE	POSSIBLE CAUSE	WHAT YOU CAN DO
3. Idles rough or misses while idling	A. Idle speed low	A. Adjust idle to specifications
	B. Vacuum leaks	B. Correct leaks in hoses; intake manifold or carburetor mounting bolts.
	C. Spark plugs fouled	C. Clean or replace
	D. Mositure or cracks in distributor cap	D. Clean or replace
	E. Burned or sticking valves	E. See Hardin Dealer
	F. Incorrect distributor advance or point dwell	F. Adjust or see Hardin Dealer
	G. Incorrect idle mixture	G. Adjust
4. Engine hesitates on acceleration or sluggish	A. Fuel filter dirty	A. Replace filter
	B. Accelerator pump inoperative	B. Have Hardin Dealer check
	C. Incorrect distributor advance or point dwell	C. Adjust or see Hardin Dealer
	D. Ignition coil bad	D. Have Hardin Dealer check
	E. Ignition wiring cracked or corroded wire ends.	E. Clean or replace
	F. Spark plugs fouled	F. Clean or replace.
	G. Throttle not fully opened	G. Adjust throttle cable

TROUBLE SHOOTING CHART

TROUBLE	POSSIBLE CAUSE	WHAT YOU CAN DO
5. Loss of RPM under full throttle	A. Fuel filter dirty B. Foreign material or water in fuel C. Spark plugs fouled D. Incorrect dwell E. Incorrect timing F. Distributor points burned G. Stuck power piston in carburetor H. Partially closed choke	A. Replace B. Replace fuel filter and clean fuel system C. Clean or replace D. Adjust E. Adjust F. See Hardin Dealer G. See Hardin Dealer H. Free linkage or adjust choke
6. Engine backfires	A. Spark plug wires installed wrong B. Engine starving for fuel	A. Correct wiring order B. Check fuel supply system
7. Alternator will not charge or has low output.	A. Drive belt loose or broken B. Wiring connections on alternator loose, corroded or broken C. Battery has no charge D. Circuit breaker tripped (if installed)	A. Adust or replace belt B. Clean and tighten connections and check wiring C. Check battery conditions D. Reset

WINTER STORAGE

Long periods of storage can adversely effect the internal parts of your engine unless methods of preservation are used. Your Hardin Authorized Dealer is equipped to provide this service for you.

The following procedures will give you maximum protection:

1. Warm up engine to normal operating temperature with cooling water flowing through engine.
2. Change engine oil and filter - See Lubrication System.
3. Run engine a few minutes to distribute fresh oil throughout engine. Shut off engine and check oil level to insure it is at the full mark.
4. Shut off fuel supply and remove and clean flame arrestor.
5. Start engine and run a fast idle of 1000-1200 RPM while slowly pouring 1 cup of SAE 20W oil (or rust preventative for this use) into the carburetor while the fuel in the carburetor and fuel line is being burned. Stall the engine by dumping the last few ounces rapidly into the carburetor. Turn ignition off and replace flame arrestor.
6. Drain fuel from fuel tanks to prevent gumming of the fuel.
7. Loosen alternator belt.
8. Flush engine - see Flushing Procedures.

If a sand or silt deposit is allowed to remain in the block for an extended period of time, it may become important to flush the engine prior to lay-up rather than after the lay-up period.

9. Drain engine to protect from freezing during storage. Hardin does not recommend draining your engine with the boat in the water. A 50% mixture of antifreeze and water may be added to all systems after draining to help minimize the chance of freezing.

a. **Free System**

1. Remove the hoses from the water inlet manifold dome on top of the engine. See Figure 22. This will prevent vacuum from holding water in the block.
2. Remove plugs on port and starboard manifolds. See Figure 23.

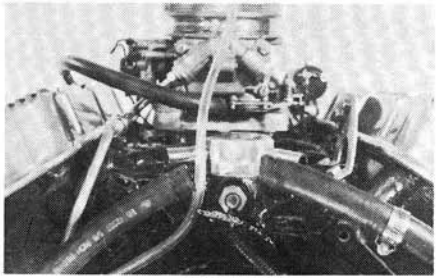
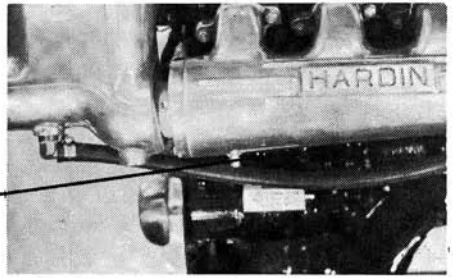


Figure 22



Exhaust Manifold Drain Plug

Figure 23

3. Open petcocks on port and starboard side of the engine. See Figure 24.

b. **Recirculating System**
Same as above plus disconnect large water pump hose and crank engine over to empty recirculating pump.

c. **Closed System**
   1. Drain heat exchangers.
   2. Add anti-freeze to system to prevent freezing.

10. Drain oil cooler, if installed.
11. Remove the battery from the boat, clean posts, check electrolyte level and store in a ventilated area that is not exposed to children. The battery should be fully charged when stored to prevent damage from freezing, and should be recharged periodically if stored for an extended period of time. (over 3 months).
12. Coat all engine electrical connections with a light coating of rust preventative.
13. Cover the intake area of the flame arrestor and exhaust ports with tape to minimize condensation inside the engine.

NOTE:

The preceding procedure is intended for preparation of your boat for dry storage. Hardin Marine does not recommend leaving a Hardin equipped boat in the water for an extended period of time if you do not intend to operate the boat on a regular basis. For more information on leaving your Hardin equipped boat in the water, consult the Hardin dealer in your area.

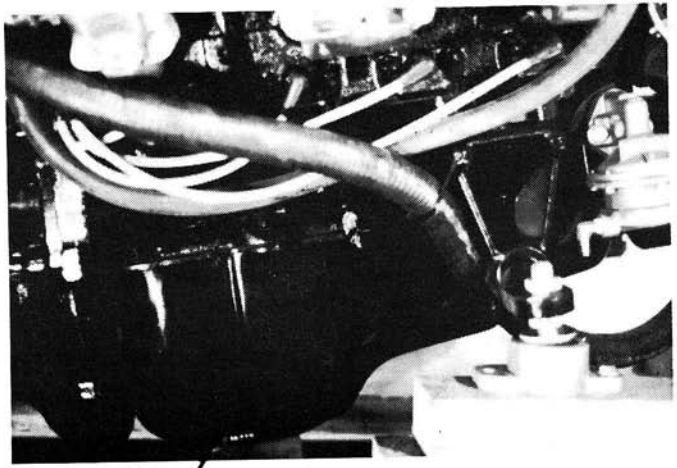
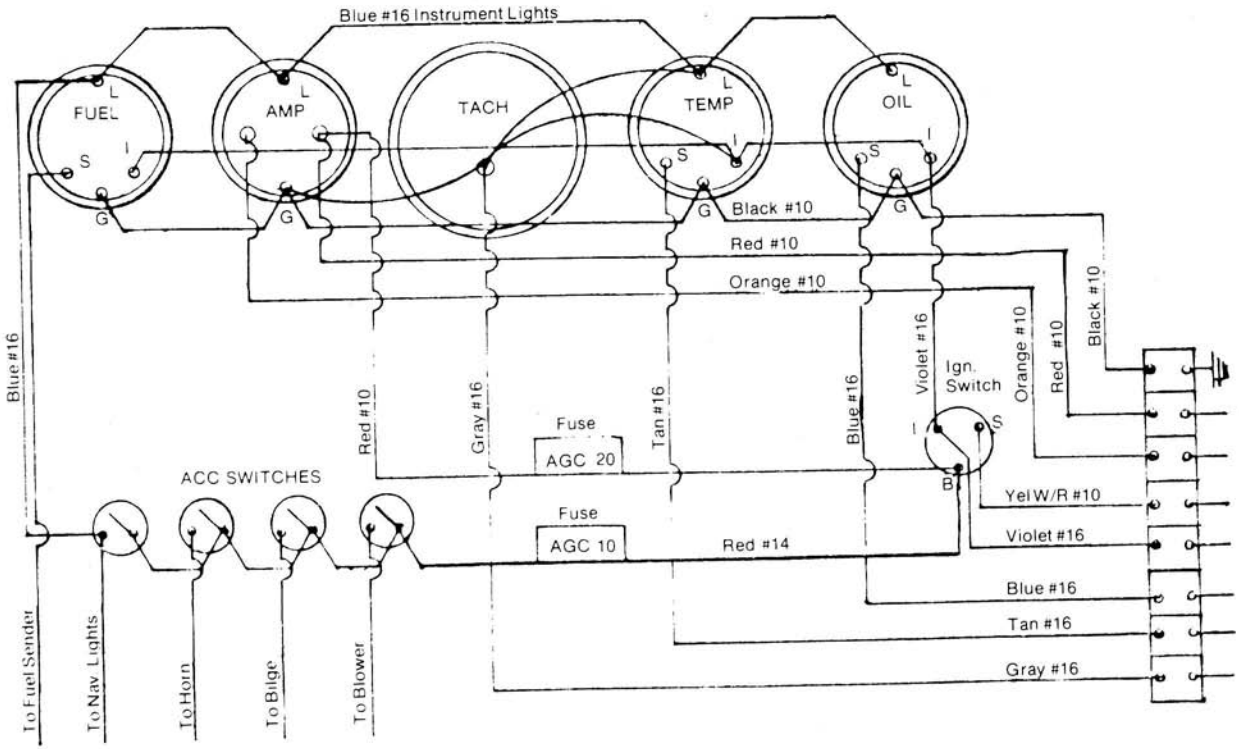


Figure 24

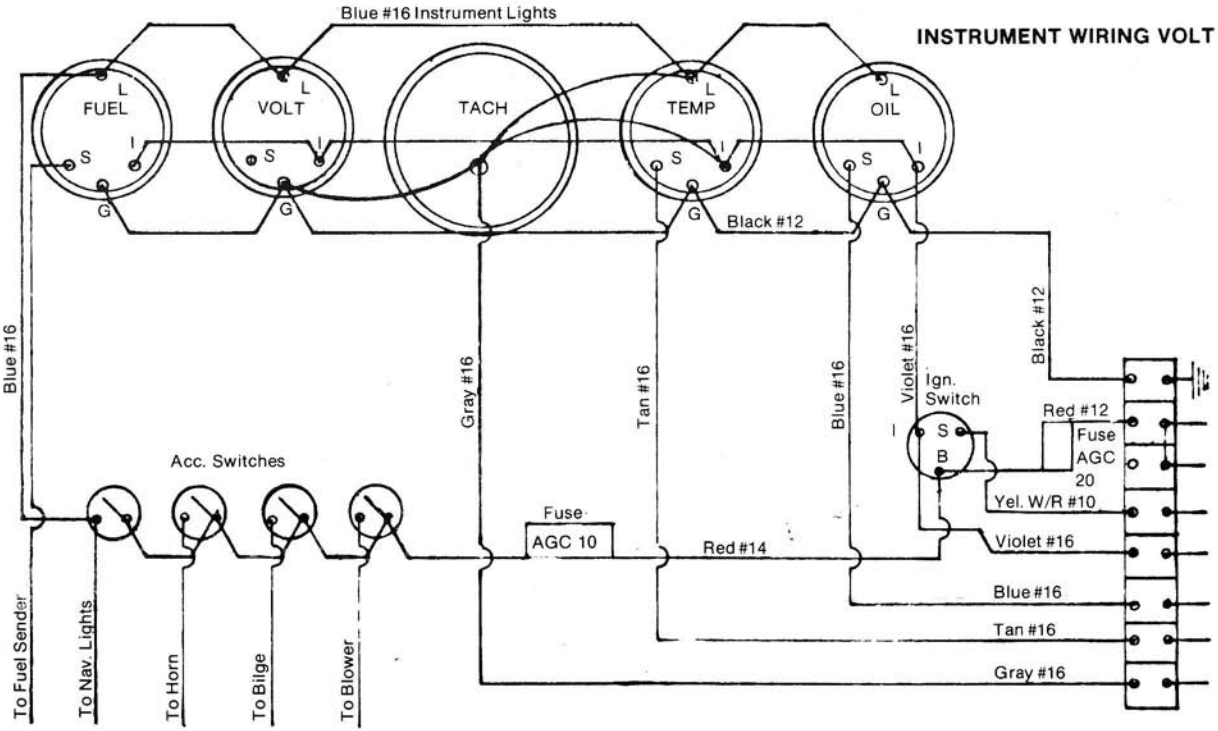
PREPARATION OF ENGINE FOR SERVICE

1. Close petcock drains; 1 port side and 1 starboard side of the block.
2. Replace drain plugs - 1 port side and 1 starboard side of manifolds.
3. Replace plug in oil cooler if oil cooler is used.
4. Connect water hoses and check all hose connections.
5. Clean battery end of cables and install fully charged battery. Insure positive cable is connected to positive post. Apply light coat of oil to battery post.
6. Fill fuel tank with fresh fuel and turn fuel valve on.
7. Remove tape from flame arrestor and exhaust ports.
8. Remove spark plugs. Clean and gap, crank engine over for 15 seconds to insure all reciprocating parts are free, and fresh oil is being pumped throughout the engine. Install spark plugs, and take care to connect plug wires in proper order.
9. Install new carburetor fuel filter.
10. Check engine and drive for any foreign objects; loose nuts, etc. . .
11. Air out engine compartment thoroughly and start engine. See engine starting procedures on page 10.

INSTRUMENT WIRING AMMETER



INSTRUMENT WIRING VOLT METER

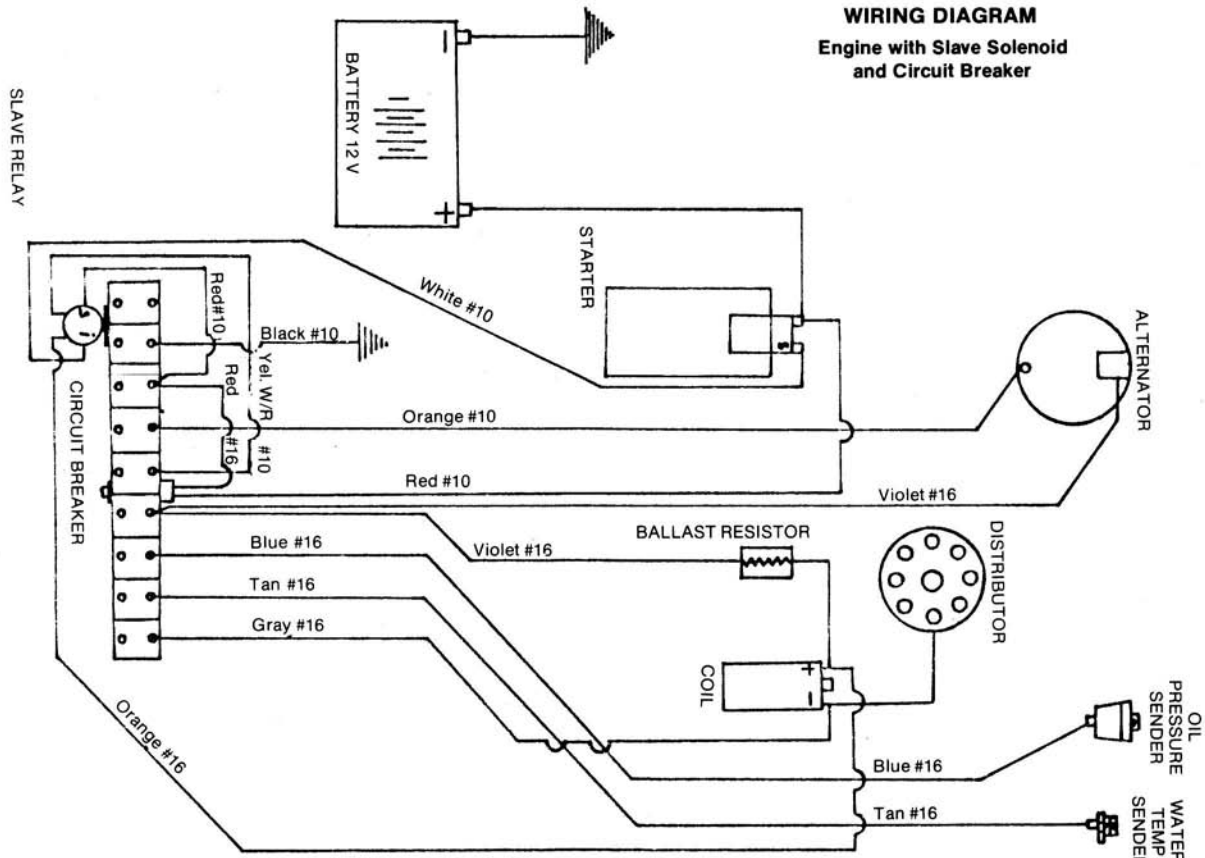


NOTE:

1. This diagram depicts voltmeter usage. The use of the old style ammeter is not recommended.
2. Do not connect 12 volt power source to any "s" terminal.
3. Do not connect any wire to voltmeter "s" terminal.
4. Hardin tachs may be used for 4,6 or 8 cylinder engines. Insure jumper wire is connected to proper pin.
5. These instruments are compatible with all Hardin engines.

WIRING DIAGRAM

Engine with Slave Solenoid and Circuit Breaker



IMPORTANT FACTS ABOUT YOUR WARRANTY

1. **A Warranty Form is sent with the engine and/or drive. This form must be filled out by you and your dealer and sent to Hardin Marine for product registration within 10 days of purchase. A Warranty Card will then be sent to you.**
2. **A Warranty Card must be presented to a Hardin Marine Authorized Dealer before any warranty service is begun.**
3. **The engine must be delivered to a Hardin Marine Authorized Dealer's place of business during regular business hours for warranty repairs.**

The following items are not covered by the warranty:

a. Normal tune-up (points, plugs, condenser, carburetor adjustments, or wiring).

b. Malfunctions due to improper maintenance or lack of maintenance.

c. Additional service work which is requested by you that is not necessary to repair the defect.

d. Damage from use of lower octane fuel than that specified or use of contaminated fuel.

e. Damage to the engine electrical system due to incorrect wiring of harness, instrument panel or electrical equipment not provided by Hardin Marine.

f. Damage to engine from submersion or freezing.

g. Damage from water reentering engine through exhaust system.

h. Engine failure from excessive RPM.

i. Engines used for racing, or subject to accident neglect, alterations or imporper installations.

j. Repairs for normal wear, rust or corrosion, or failure of non-authorized parts.

k. Pick-up and delivery of boat; mechanic's travel, time, or haul-out charge.

l. Subsequent owners are not covered under the warranty.

Basically, this warranty is designed to protect you from bearing the cost of repair of a Hardin engine, drive unit or trans where that repair is caused by Hardin's neglect. This warranty is not designed to protect you if your engine is not maintained and operated properly.

HARDIN MARINE
LIMITED ENGINE WARRANTY

1. Hardin Marine warrants, to the first original retail purchaser, each new engine assembly manufactured by Hardin Marine to be free from defects in material and workmanship.
2. The warranty period shall commence on the date the product is first placed in service, or the date of purchase by the first retail purchaser, whichever comes first, and shall continue for a period of one year from that date under normal, non commercial use. In the case of commercial use, this warranty shall be effective for a period of 90 days from the date of purchase by the original retail purchaser. Hardin Marine's limited warranty on engine model H425 OS shall be for a period of three months from the date of original retail purchase.
3. Claims under this warranty shall be made by returning the defective part to an authorized service dealer of Hardin Marine nearest to the purchaser's residence, the address of which will be furnished by Hardin Marine upon your request, or by returning the defective part to Hardin Marine at the address below. Hardin Marine will not pay for labor and/or materials furnished by other than Hardin Marine or its authorized service dealers.
4. Any product determined by Hardin Marine to be defective in either material or workmanship during the warranty period will be repaired or replaced, at Hardin Marine's option, without charge for parts or labor. Hardin Marine's liability hereunder shall be limited to repairing or replacing parts found to be defective during the warranty period.
5. Hardin Marine reserves the right to change or improve the design of any Hardin Marine product without assuming any obligation to modify any such units previously manufactured.

EXCLUSIONS AND LIMITATIONS

This warranty *does not* apply to:

1. Any part, accessory or product not manufactured by Hardin Marine, and for which a manufacturer's warranty has been supplied to the consumer by the respective manufacturer.
2. Normal maintenance items such as tune-up, lubrication, filters and adjustments necessary as a result of normal wear and tear.
3. Any engine assembly or part which has been modified, altered, or repaired by other than Hardin Marine;
4. Products damaged as a result of misuse, neglect, negligence, accident, freezing, normal wear and tear, corrosion, improper installation, operation with fuels, oils, or lubricants which are not suitable for use with the engine, failure to operate and maintain the product in accordance with the owner's manual supplied with each new Hardin Marine product, products used for racing, damage resulting from water or other substances entering through the exhaust manifold or carburetor, operating the engine at RPM in excess of the maximum rated RPM as stated in the owner's manual, or any cause other than a defect in the manufacture, material, or assembly of a Hardin Marine Product.
5. Hardin Marine shall not be liable for any incidental, consequential or other damages whatsoever, including but not limited to: loss of use, loss of time, inconvenience, cost of returning the defective product to an authorized Hardin Marine service dealer or Hardin Marine, travel, lodging, or loss or damage to personal property.
6. Some states do not allow the *exclusion* or *limitation* of incidental or consequential damages, so the above limitations may not apply to you.
7. This warranty is the only express warranty applicable to Hardin Marine Products, and is in lieu of any other express or implied warranties, including warranties or merchantability and fitness for a particular purpose. All implied warranties are limited in duration to the minimum period required by State law. Hardin Marine neithe. assumes nor authorizes any other person to assume for it any other liability or warranty in connection with its products.
8. Some states do not allow *limitations* on the duration of implied warranties, so the above limitation may not apply to you.
9. This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state.

HARDIN MARINE, INC.
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