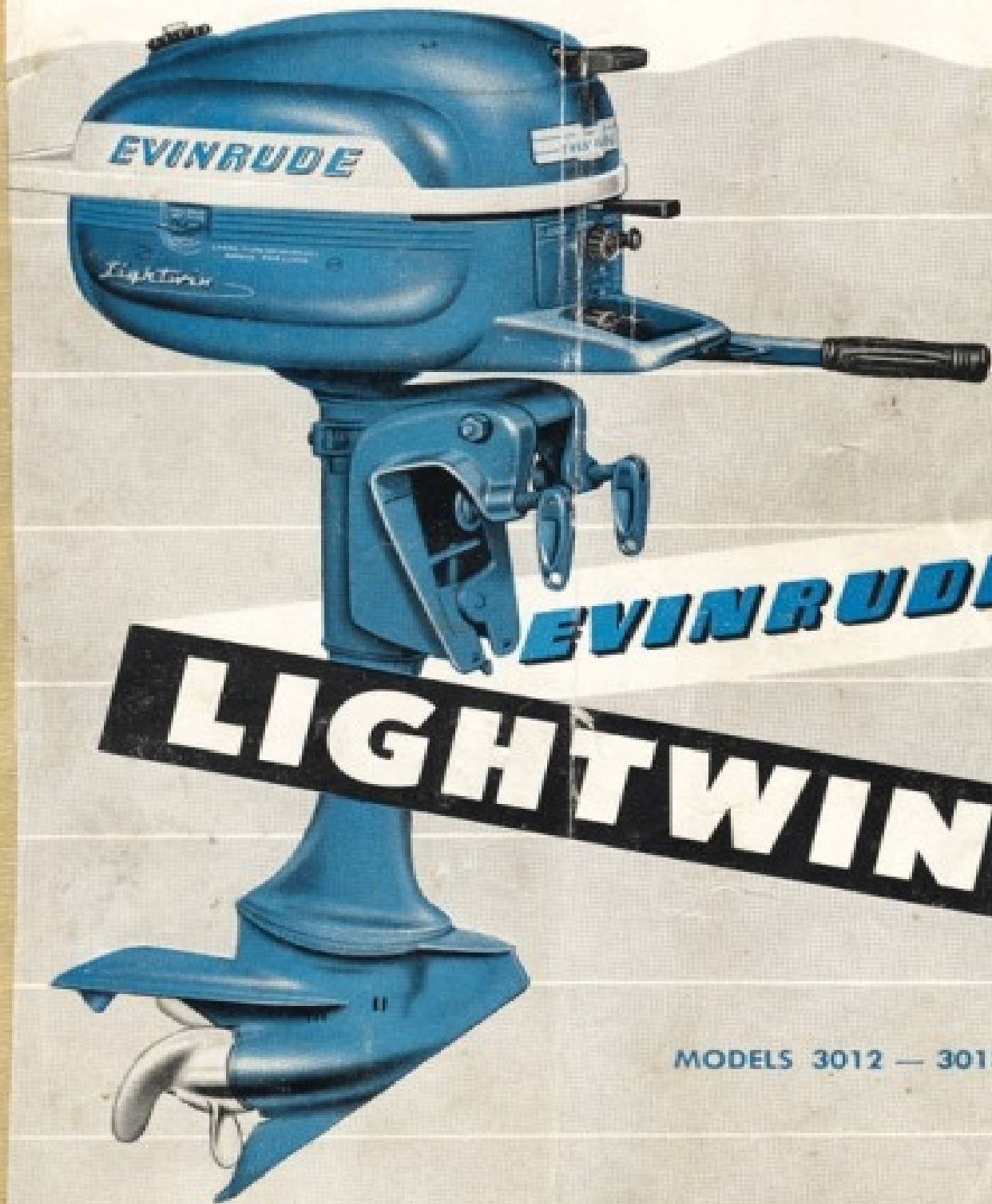


Operating and General

Instructions



MODELS 3012 — 3013

OPERATING AND GENERAL INSTRUCTIONS

EVINRUDE LIGHTWIN

LIGHTWIN MODELS 3012-3013

(For Mechanical Specifications See Page 27)

FOREWORD The Evinrude Lightwin is simple to understand, easy to operate, and built to give first-class service, but before you attempt to operate motor, read pages 2 to 8 carefully. The remaining instructions are for later reference and may be read at leisure.

MAKE WARRANTY EFFECTIVE NOW MAKE OUR WARRANTY ON YOUR MOTOR EFFECTIVE by filling out Registration Card (packed in tool bag) and mailing immediately. BE SURE CORRECT MOTOR NUMBER, located on port side of stern bracket, appears on card.

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ASSEMBLY INSTRUCTIONS Starboard (right) and port (left) are designated while facing bow (front). The motor as packed for shipment, comes completely assembled ready to be attached to boat. The spark plugs are in place in cylinders and wires are properly attached. Gear housing has been filled with OIL.

TOOLS AND EQUIPMENT A screw driver, pliers, spark plug wrench, feeler gauge, shear pins and propeller nut cotter pins are enclosed in the tool kit.

ATTACHING MOTOR TO BOAT Our motors are designed for transoms that conform to S.A.E. boat standards. (See illustration, Fig. 1.) "A" denotes pitch or angle; "B", maximum transom thickness; "C", vertical transom height, not including keel.

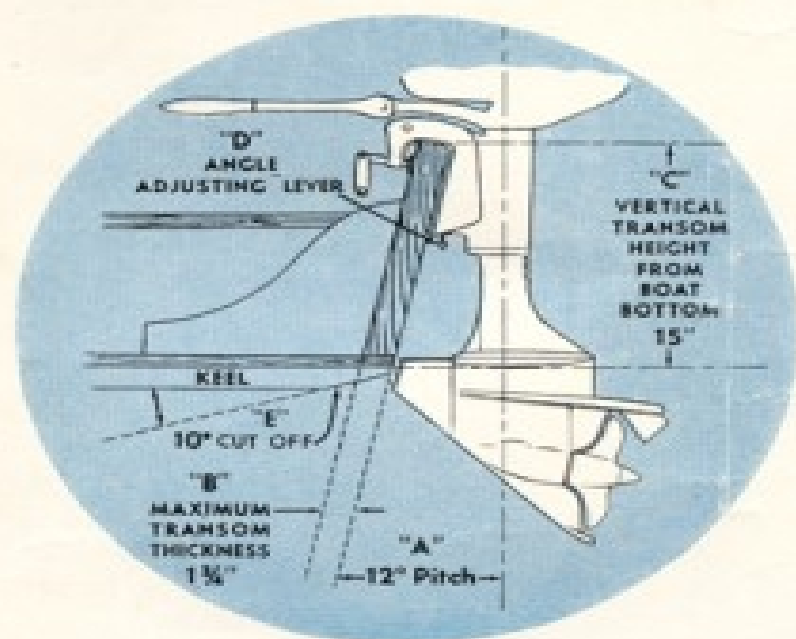


Fig. 1

It is advisable not to use a transom over 15 inches high, as this may cause (cavitation) propeller slippage. However, if boat has an extremely high transom and it is not desirable to cut to 15 inches, a Lightwin with 5 inch longer shaft is offered at moderate extra cost.

With boat afloat, place motor on transom, preferably in center, and **SECURELY TIGHTEN CLAMP SCREWS BY HAND. USE NO TOOLS FOR THIS.**

CAUTION: It is "good insurance" to tie motor to boat with stout rope so that if motor becomes loose accidentally, rope will prevent its loss overboard. There is a hole provided for this purpose on front of motor bracket.

Holes are provided in clamp screw handles through which a padlock may be applied.

FISHERMAN DRIVE HOUSING: The angle of this housing requires that motor be operated in a vertical position; therefore, a provision for adjusting angle has been made. See illustration "D" ANGLE ADJUSTING LEVER (Transom trigger). By tilting motor slightly and then lifting up on the lever and moving it either ahead or back, motor can be instantly adjusted to the desired angle.

Where weeds are exceptionally thick, it is even better to have housing tilted slightly away from boat transom as this permits weeds to slide downward and not clump or gather on leading edge of housing. It is also best to operate motor at a reduced speed especially in very thick weeds.

Should weeds gather on leading point of housing, this indicates that point is too low, thus bringing it below line of boat bottom. Therefore, it is important that boat transom measures not **LESS** than 15 inches, as illustrated.

On some boats it may be necessary to correct angle adjustment when changing from one to more passengers to maintain motor in a vertical position. Always try to arrange load so boat runs on an even keel.

LUBRICATION AND FUEL INSTRUCTIONS Correct lubrication is the most important factor in the operation of an internal combustion engine, as it insures longer life and satisfactory performance.

In the Lightwin's two-cycle engine, the lubrication of pistons, cylinders, crankshaft and connecting rod bearings is solely supplied by oil which must be thoroughly MIXED with gasoline BEFORE it is poured into fuel tank. NEVER POUR CLEAR GASOLINE OR OIL INTO FUEL TANK.

Fuel tank capacity .7 Gallons or approximately 5½ pints.

TYPE OF GASOLINE: Use a good grade of regular gasoline (such as used in automobiles). High octane or leaded fuel gives no advantage.

LUBRICANT: We recommend a high grade straight mineral oil of S.A.E. 30 body, such as Mobiloil Outboard or another outboard oil, or a REGULAR (NOT PREMIUM) type.

QUANTITY OF OIL REQUIRED: Mix ½ pint of oil to each gallon of gasoline. Do not run motor faster than ¾ speed for first four hours.

STRAIN ALL FUEL: Due to condensation, water is often present in gasoline when you get it from the vendors. But it may also accumulate in your own fuel container from condensation due to changes in temperature.

Because the presence of water in fuel is a frequent cause of hard starting, all fuel should be poured through a fine mesh strainer. This will eliminate the water and also the dirt which might otherwise clog fuel passages. USE METAL CONTAINERS ONLY.

GEAR LUBRICATION The Lightwin's new design Fisherman Drive gear housing uses oil instead of grease. Remove plug on starboard side marked "LUB" (Fig. 2). Also remove the lower drain or vent plug on same side (Fig. 2)

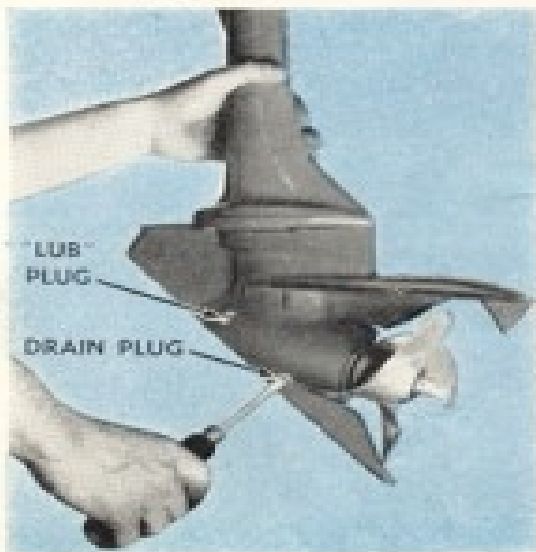


Fig. 2

and with motor in a vertical position, permit housing to drain. Lay motor on its side and after replacing drain plug, fill housing with Mobilube GX-90, or any other good grade of oil suitable for automotive hypoid gears meeting U. S. Army spec. No. 2 — 105B grade 90. If hypoid gear oil is not available use a high grade oil of S.A.E. 30 body such as Mobiloil Outboard or comparable straight mineral oil, until possible to replace with suitable hypoid lubricant. Check gear housing for oil after the first 5 hours of operation, to be sure grease seals are tight, then periodically at least every 50 hours. The housing should be drained and refilled at the end of the season, before storing motor.

DO NOT USE GREASE.

EQUIPMENT NECESSARY WHEN OUTBOARDING

Although the following articles may not always be needed, it is advisable to have them aboard when motoring.

An extra can of fuel, properly mixed. The fuel capacity is about 5½ pints and should run motor from 1 to 1½ hours depending upon type of boat and boat load.

Funnel with strainer. Rope to tie motor to boat.
Tools. Extra spark plug.
Starting cord (see page 8, Fig. 7).

Oars and any equipment required by law when outboarding in federal waters. See page 25.

TILTING OF MOTOR The tilting feature becomes very necessary in many situations. It is designed to permit self tilting when striking any submerged object while running in forward position. Care, however, should be taken in obstructed waters, not to operate motor at too high a speed. This tilting feature is also used when motor is not in operation, as in boat launching, beaching, rowing in shallow waters, etc.

Tilting is accomplished by grasping rear handle and pulling motor toward you. Never try to tilt motor by bearing down on steering handle. Before tilting motor make sure fuel valve and vent screw are closed.

TILTING FRICTION Proper tilting friction is set at factory, but through continued use, friction may have to be increased occasionally, so motor will retain a tilted position. To increase friction, tighten the friction nut on starboard side of stern bracket (Fig. 17).

STARTING AND OPERATING INSTRUCTIONS

1. Open fuel valve located on starboard side of motor all the way (Fig. 3).
2. Open vent screw on top of filler cap by turning counter-clockwise (Fig. 3).
3. Pull out choke knob (located at port side of motor) (Fig. 3) all the way.
4. Turn High speed knob (located directly back of carrying handle) (Fig. 3) to No. 4.

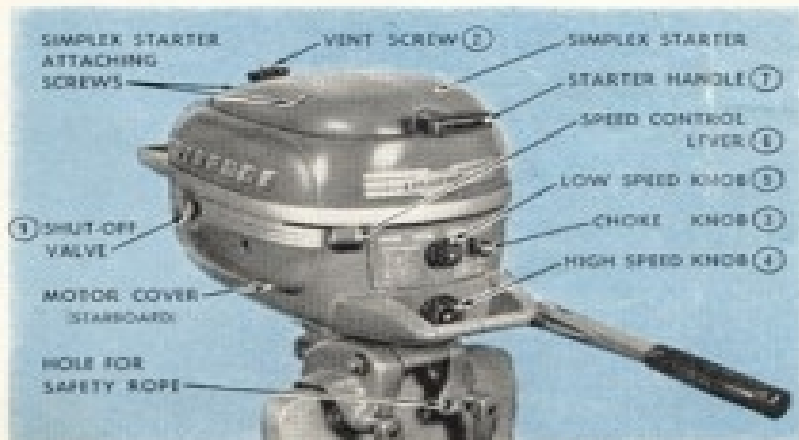


Fig. 3

5. Turn Low speed knob (located at upper front of motor) (Fig. 3) ½ turn from closed position.
6. Set speed control lever (Fig. 3) to "START" position.
7. Pull starter handle slowly until starter engages, then pull forcibly. (Do not pull cord out more than 30 inches) Repeat until motor starts. Allow starter cord to rewind before you release grip. Premature release of grip may injure starter or cord.

8. After motor starts, push in choke knob (Fig. 4).
9. Move speed control lever (Fig. 4) towards "FAST" as indicated on motor cover and slowly adjust High speed knob (Fig. 4) until motor runs smoothly.



Fig. 4

10. To control speed, move speed control lever (Fig. 4) in directions "FAST" or "SLOW" as indicated on motor cover.
11. To STOP motor, move speed control lever to extreme direction "STOP" as indicated on motor cover.

KEEP FUEL VALVE CLOSED when motor is not in operation.

FLOODING Flooding is a condition which can be created by **OVER-CHOKING** or sometimes cranking a warm or hot motor which may cause too much fuel to be drawn into crankcase and cylinders. The fuel mixture thus becomes too rich for combustion.

To correct, first note the approximate setting of the carburetor **HIGH SPEED Knob**, then close both High Speed Knob and Fuel Valve (Fig. 4) and pull Starter Handle until motor starts, allowing motor to run until it stops. Now, open Fuel Valve, reset **HIGH SPEED Knob** back to its original setting and follow instructions relative to starting **WARM** motor.

STARTING WARM MOTOR Do not disturb High Speed Knob (Fig. 3) otherwise above instructions apply.

PROPER CARBURETOR ADJUSTMENTS Although both **HIGH** and **LOW** speed carburetor Knobs (located on front of motor) (Fig. 5) are adjusted at the factory, due to difference in altitudes, climatic conditions and a possible change in fuel mixture, it may be necessary to re-adjust them under actual running conditions to obtain best performance. After motor gets under way, with Speed Control Lever fully advanced it is advisable to adjust the **HIGH** Speed Knob (Fig. 4) by slowly turning clockwise for leaner mixture and counter-clockwise for richer mixture, until motor runs smoothly at its highest speed.

To adjust **LOW SPEED Knob** (Fig. 4) slowly move **SPEED CONTROL** lever toward "SLOW" position, then adjust the **LOW SPEED Knob** by slowly turning clockwise or counter-clockwise until motor runs smoothly at its lowest speed.

It may be necessary to again slightly re-adjust the **HIGH SPEED Knob** after **LOW SPEED Knob** is properly adjusted.

CAUTION: To eliminate the necessity of re-adjusting the carburetor adjusting knobs every time motor is used, it is advisable to measure the quantity of lubricating oil mixed with the gasoline very accurately. Also care should be taken that the same grade and type of both oil and gasoline are always used.

REVERSE The Lightwin motor permits full 360° steering. Reversing is accomplished by turning motor one-half turn. First raise the steering handle and then turn motor either left or right by the handle. A special lock arrangement built into the drive housing locks the motor against tilting while reversing. **CAUTION**, it is advisable to reduce motor to approximately $\frac{1}{2}$ speed or less before reversing. Use extra care while running in reverse, so as not to strike any obstruction, thus avoiding possible damage to lower unit parts, as tilting feature functions only in "FORWARD" position.

PROPELLER SLIP CLUTCH (Fig. 18) The propeller is driven by a circular serrated rubber slip clutch located inside the propeller hub. Upon striking any underwater obstruction, this clutch absorbs the shock by momentarily disengaging the propeller, then firmly engaging again after obstacle is past.

A drive pin fits inside the propeller hub, which also acts as an additional safety measure against breakage of underwater parts.

Should the propeller for some reason not declutch this pin will shear, disengaging the propeller from the driving mechanism, thus preventing the gears, shafting and other mechanism from being damaged.

When this happens, the motor continues to run without the propeller rotating. Naturally, the boat does not move. In such a case, stop motor immediately. Remove the propeller nut and cotter pin (Fig. 18) from the end of shaft. Remove propeller and propeller clutch hub and drive out the sections of the sheared pin and insert a new pin, several of which are included in the motor tool kit. If you have no spare pin, use a nail in emergencies. Fragments of the old pin, may also be used by placing large section in one side of hole in shaft and the two smaller sections on the other side. Replace propeller clutch hub, propeller, propeller washer, propeller nut and cotter pin.

Drive pin size is $\frac{3}{8}$ " x $1\frac{1}{2}$ " long. No. 416 Stainless Steel.

SIMPLEX STARTER . . . EMERGENCY STARTING



Fig. 5

This starter is built to give the best possible service. However, should starter failure occur, motor can still be continued in service by removing starter. This is accomplished by removing the four screws holding starter and fuel tank to tank support. (Fig. 5). After starter has been removed replace screws holding fuel tank to support. A length of $\frac{1}{4}$ " cord with a knot in one end can be placed into notched pulley atop flywheel, wound clockwise, and motor started in usual manner (Fig. 7).

If trouble appears to be in starter, we recommend it be sent to dealer for repairs while motor continues in use.

REMOVING MOTOR FROM BOAT When removing motor from boat keep powerhead higher than lower unit to prevent water from entering into cylinders and crankcase through exhaust ports.

Therefore, while lifting motor off boat, hold in an upright position until all water has drained from lower unit.

OPERATION OF FUEL VALVE The FUEL VALVE, (Fig. 3) located on starboard side of motor, when closed stops flow of fuel from fuel tank to carburetor. This VALVE and Vent screw on top of Filler Cap should always be closed when motor is not in operation, when transported or during storage.

TO AVOID FUEL LEAKAGE WHEN CARRYING OR HANDLING MOTOR It is important that the FUEL VALVE (Fig. 3) and vent screw are fully closed.

Toward end of run, just before stopping motor, close the FUEL VALVE and then permit motor to run for a minute or two, until it stops. This will drain the carburetor and motor can then be carried without leakage. For complete safety, always empty fuel tank when transporting motor.

WRITE US If you are in need of information see your dealer or write us immediately for service on your motor. Our Service Department is always ready to cheerfully and promptly answer your letter, and to make helpful suggestions.

When writing, be sure to give Motor Model, Name and Serial Number.

The following instructions to be read at leisure.

CYLINDER CONSTRUCTION The Lightwin cylinder construction

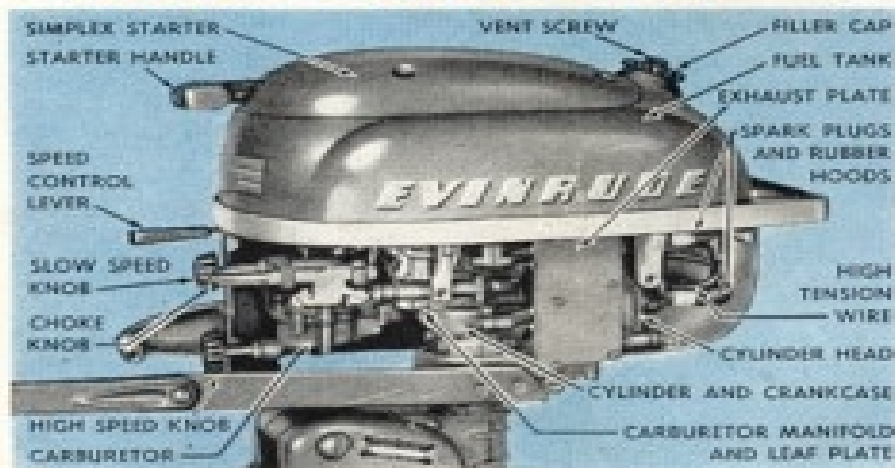


Fig. 6 (Carburetor silencer removed)

is of the hothead type, although the cylinder heads are partially water cooled at the outer diameter. The heads are removable, which enables cleaning out carbon, water jackets and water passages after extensive use. The exhaust ports are also easily accessible for cleaning by removing the plate on exhaust port side of cylinder (Fig. 6).

CO-PILOT AND STEERING ADJUSTMENT The Co-Pilot is your relief steersman, helps you keep a true course. It provides a cushioned,

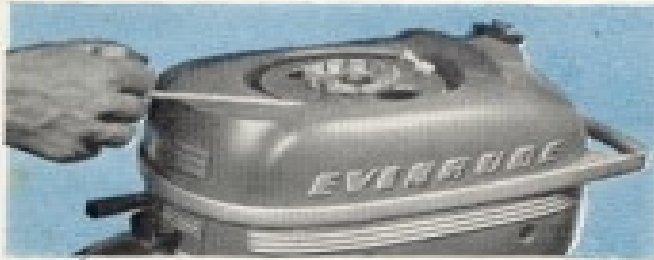


Fig. 7

SPARK PLUG The Champion J6J are the proper spark plugs to be used. They are carefully adjusted to .050 inch gap at factory, but after continued use it may be necessary to reset them. A gage for this is provided in tool kit. Use end marked "Spark Plug".

When placing spark plugs into cylinders, be sure gaskets are intact, and tighten plugs securely. (Wrench furnished in tool kit). It is important that spark plug nuts are tightened with pliers.

RUBBER SPARK PLUG HOOD

Magneto high tension wires are equipped with special spark plug hoods, (Fig. 8-17) that fit tightly over spark plug and prevent plugs from shorting due to moisture.

When attaching wire to spark plug, press hood down securely and give hood a half turn to right.

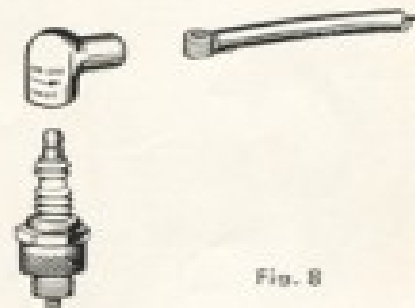


Fig. 8

CARBURETOR (Fig. 9) The Carburetor is designated as a single barrel horizontal type, having throttle and choke valves.

Carburetion is controlled by a butterfly type throttle valve. There is a single jet which supplies the fuel at high speed. A high speed adjusting needle protrudes from the front of carburetor and is regulated by the large Knob located directly back of carrying handle (Fig. 4).

Two low speed jets are located in ceiling of throat of carburetor and supply fuel when the throttle valve is closed. The proper mixture for low speed is regulated by an **ADJUSTING NEEDLE** protruding from upper front of carburetor and is controlled by the **LOW SPEED Adjusting Knob** (Fig. 4) at upper front of motor.

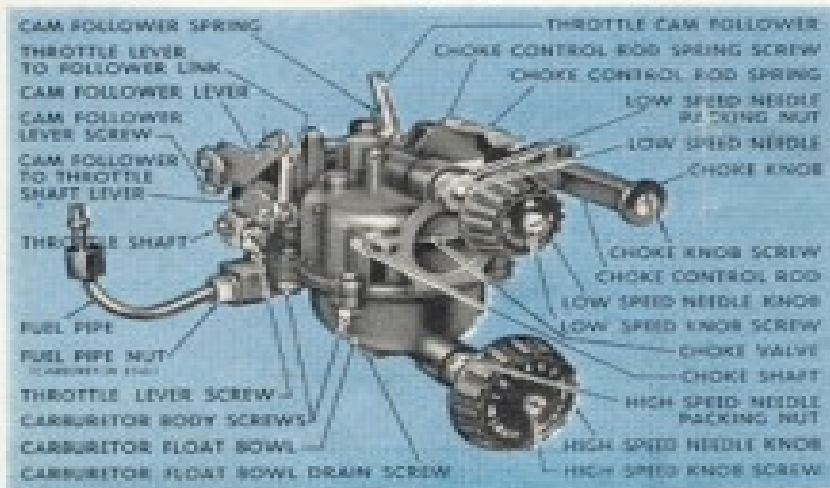


Fig. 9

A butterfly type choke valve for starting is located in front of carburetor just ahead of Venturi and is controlled by a choke knob (Fig. 4) located on port side of motor.

IMPORTANT — KEEP CARBURETOR CLEAN No matter what precaution is used in straining fuel before filling fuel tank, there is always a chance of dirt, sediment, or water accumulating in tank or pipe, therefore it is advisable to clean the carburetor at regular intervals. To do this first remove motor covers, then remove fuel pipe from shut off valve (Fig. 5). Remove the two nuts holding carburetor to manifold flange and remove complete carburetor.

To clean and drain float bowl remove small brass screw located at bottom of bowl (Fig. 9).

FUEL FILTER The fuel filter assembly is located in the bottom starboard side of fuel tank, (Fig. 10) to which the fuel shut off valve is attached. It consists

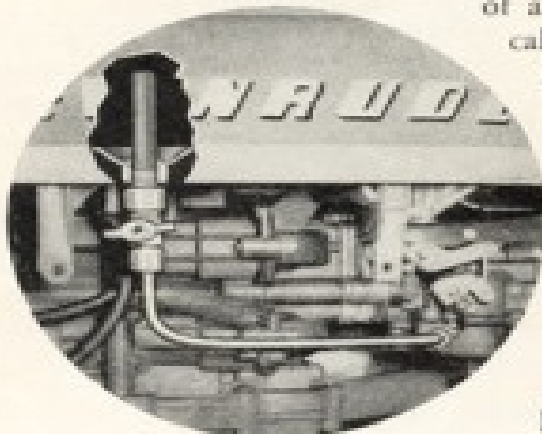


Fig. 10

of a porous metal element, which is inserted vertically in bottom of tank, and is about 2 inches in length. The extremely fine porosity of this metal filters out all foreign matter, water etc., permitting only the fuel to pass through. Due to its large outer area, it may never become totally clogged, but can be removed for occasional cleaning. To remove filter, remove starboard motor cover, disconnect fuel line (Fig. 10) and unscrew filter fitting from Tank (Fig. 10). Tank should preferably be empty since the shut-off valve is also removed. It may be wise to flush out tank with clean fuel, before replacing filter.

REED PLATE The reed plate (Fig. 11) is located between the carburetor manifold and crankcase and consists of two phosphor bronze reeds and two brass reed stops. The purpose of the reed plate is to entrap all fuel and air mixture which is sucked into the crankcase.

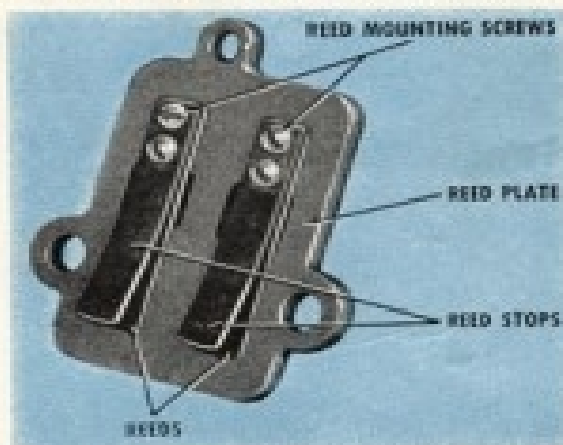


Fig. 11

As the general performance of the motor depends largely on the fit of these reeds, it is necessary that they seat flat on reed plate surface, assuring an air tight seal.

Although these reeds are designed to withstand the normal life of the motor, it is well to examine them anytime the carburetor is removed.

The reeds should be checked for dirt that may have become lodged between reed and reed plate or for possible fracture in the reeds themselves.

Care should be taken not to mar reed seat on plate and not to bend reeds during inspection.

COOLING SYSTEM

(Fig. 12-13) Water for cooling purposes is provided by the action of the "CENTRI-MATIC" pump, which consists of a single

Fig. 12

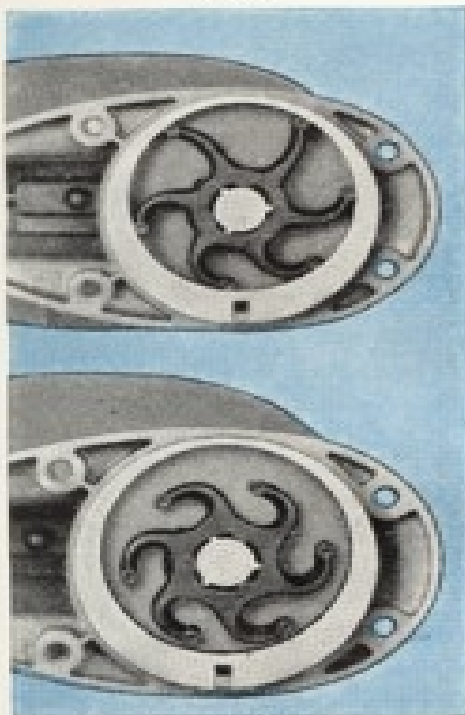


Fig. 13

stage rubber impeller centrifugal pump. It functions as a positive full displacement pump (Fig. 12) assuring adequate water supply at the lowest motor speed. At the higher speeds, it becomes a centrifugal pump, (Fig. 13) as the increased water pressure bends back the impeller blades, decreasing the impeller diameter, thereby eliminating wear and conserving power. Under average conditions the pump should give satisfactory service for many seasons.

The water inlet (Fig. 17) are a number of slots located directly below cavitation plate.

While operating motor at full speed, should it show signs of slowing down, immediately check water discharge which appears at exhaust relief silencer (Fig. 17) located at front of housing somewhat above water level.

In case no water is being discharged, immediately shut off motor and check water inlet slot (Fig. 17) for obstruction. If no obstruction is found it may be necessary to check the pump itself.

LARGE AND SMALL ADJUSTING KNOB FRICTION

Should adjusting knobs become too loose and not retain proper setting they can be tightened to the desired friction by drawing up on the packing nut. After considerable use, it is desirable to replace packing in the nut which is located just inside the motor cover (Fig. 9).

UNIFIED SPEED CONTROL The spark and throttle are correctly synchronized under a single positive Speed Control Lever, which provides a perfect means of controlling the speed of the motor.

It consists of a cam plate fastened beneath the magneto base which travels with any movement of the Speed Control Lever. This plate contacts a cam follower lever (Fig. 9) on carburetor, which is connected directly to the throttle valve on the carburetor. The moving of the Speed Control Lever (Fig. 3) to "FAST" advances the spark and opens the throttle valve; to "SLOW" retards the spark and closes the throttle valve.

SPEED CONTROL LEVER The position of the speed control lever (Fig. 3) will vary depending upon the type boat the motor is used on and the load that is carried. It is therefore important that the best running position be obtained as over-advancement will allow motor to four-cycle and knock causing burning and fouling of spark plugs.

HOW TO REMOVE FLYWHEEL Never remove the flywheel of your motor unless it is absolutely necessary to do so. The only reasons for removing flywheel are for replacing points, condenser, coil or high tension wires, or for checking for loose or broken wires.

Remove starboard motor cover (Fig. 4).

Remove Simplex Starter (See instructions on Simplex Starter Emergency Operation, page 7).

Remove Gasoline Tank by disconnecting fuel line at shut-off valve.

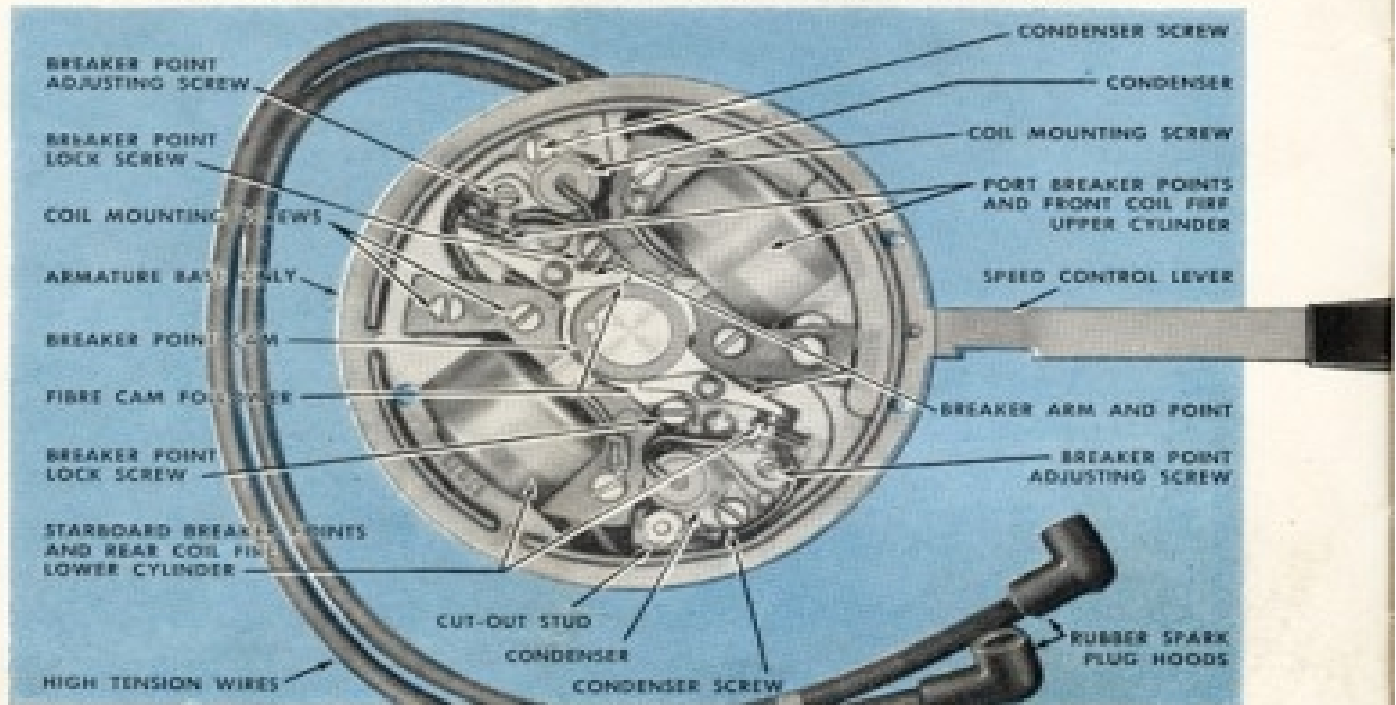


Fig. 14

Holding the flywheel rigid, unscrew the flywheel nut several turns, using a $\frac{3}{4}$ " wrench. Pull up on flywheel at the same time tapping flywheel nut several sharp blows with a hammer. When flywheel comes off, use care not to lose the key which holds flywheel and breaker point cam in engagement with crankshaft.

Should breaker point cam (Fig. 14) be removed for any reason be sure when replacing that side marked "TOP" is up.

Before replacing flywheel check key in crankshaft to make sure it is a tight fit also see that keyway in flywheel lines up perfectly with key on crankshaft. It is also advisable to place a few drops of oil on felt oiler (Fig. 14) and be sure breaker points are clean and dry. Make sure flywheel nut is tightened securely by using a hammer on wrench.

IGNITION TROUBLES AND HOW TO LOCATE THEM

In locating ignition trouble, the first and most common cause may be spark plugs. Remove plugs, and examine them carefully. Should the points and inner porcelain appear wet from either oil or water, plug is definitely fouled. Also check plugs for dirt across points, proper gap and for cracked porcelain.

If no faulty spark plugs are found, proceed to check strength of spark from magneto. Leaving plugs out of cylinder, remove rubber hoods (Fig. 8) from the high tension wires, ground one high tension wire onto motor, then, holding the other one $\frac{1}{4}$ " away, pull on starter handle. A good spark should jump this gap.

Repeat this procedure on the other wire, and if there is any evidence of spark failure, it will then be necessary to check magneto. Before attempting to do this, read instructions "Adjustment of Magneto Breaker Points", page 13, and follow them carefully.

If trouble does not appear to be in breaker points, then check over the complete magneto base. Search for any broken or loose wires on coils, condensers, breaker assemblies, etc. If no visible defect is apparent, the trouble may be either in a coil or condenser, in which case it is advisable to send complete magneto to nearest dealer. (See instructions on removing flywheel, page 12). To remove magneto base from motor, remove high tension wire from spark plugs and then remove the four hold down screws located near center of base (Fig. 14).

The magnet, composed of the improved "Alnico" steel, will retain its magnetic charge practically indefinitely. Therefore, the magneto should not be considered to have lost its "pep" until such diagnoses have been made by a competent authority.

ADJUSTMENT OF MAGNETO BREAKER POINTS

After extensive service, the breaker points may become dirty or out of adjustment. To check, it is necessary to remove simplex starter. (See Fig. 5) (See Simplex Starter Page 7). It is not necessary to remove flywheel, as there is a hole in flywheel

Fig. 15

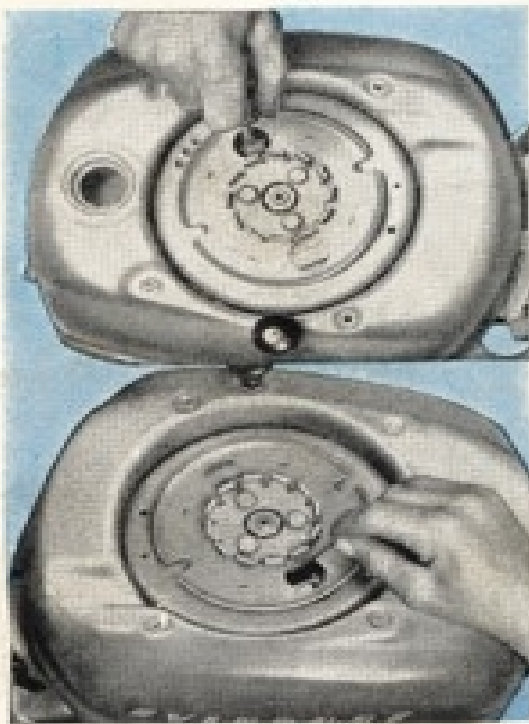


Fig. 16

The starboard breaker points fire the lower cylinder through the rear coil and the port breaker points fire the upper cylinder through the front coil (Fig. 14).

for this purpose. (See Fig. 15-16). After removing starter, turn flywheel until one of the breakers lines up with hole, and then insert gage (furnished with motor). Use end marked "Breaker". Points should check $.020$ ". If necessary to re-adjust, insert screw driver through hole and loosen breaker point lock screw (Fig. 14). Now with screw driver turn breaker point adjusting screw (Fig. 14) clockwise to open points, anti-clockwise to close points. After proper adjustment has been made lock breaker by tightening breaker point lock screw (Fig. 14). Re-check points for correct gap.

Turn flywheel $\frac{1}{2}$ turn and repeat for other set of points.

If, after considerable service, points need filing or replacing or if it is necessary to check complete magneto base, flywheel will have to be removed. (See how to remove Flywheel, page 12). When adjusting points with flywheel removed, turn crankshaft until flywheel key is in line with fibre cam follower (Fig. 14) on breaker arm. This is the high point of the cam, and breaker points should check $.020$ ".

LIGHTWIN WITH PORT COVER REMOVED

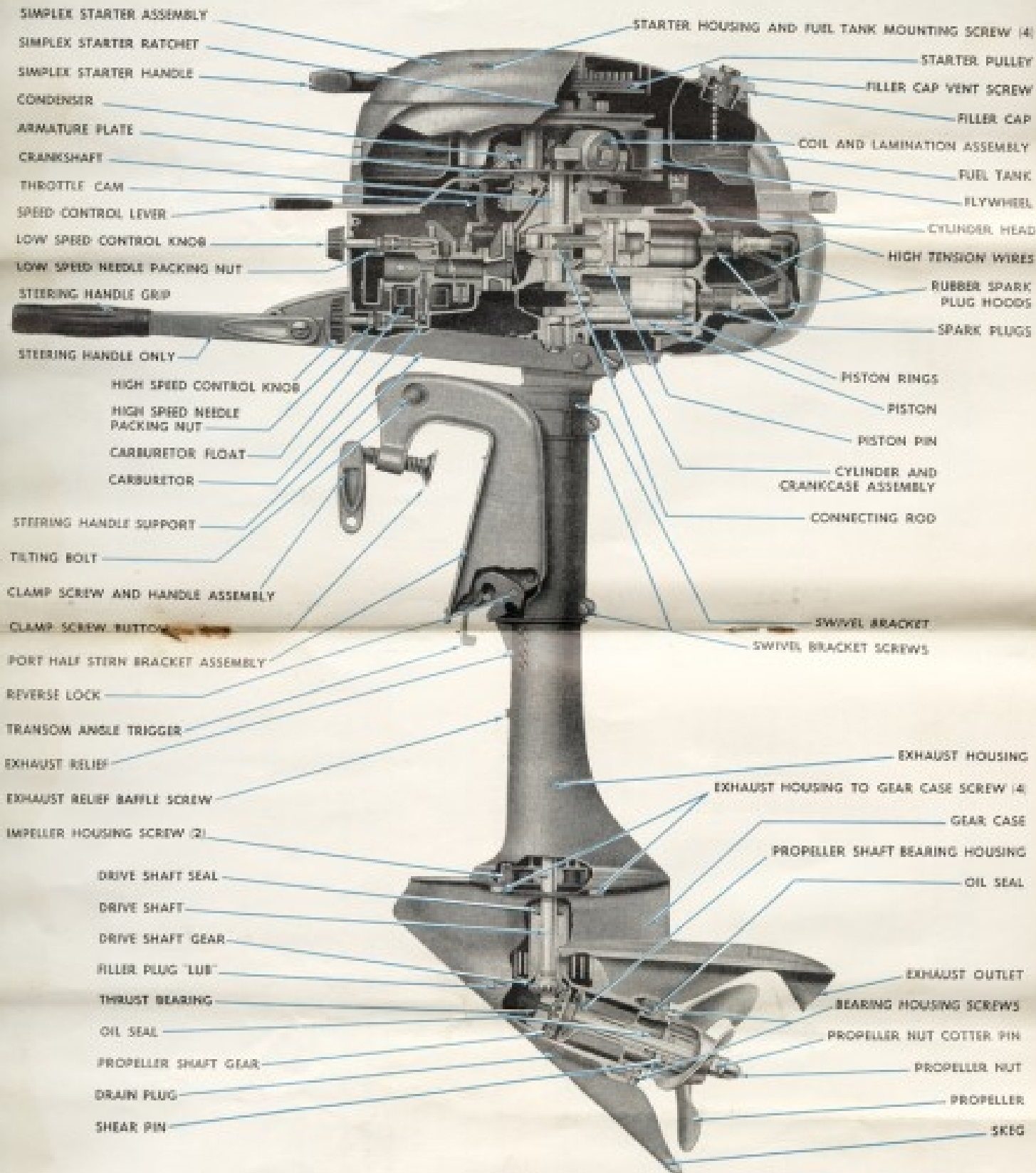


Fig. 17

When writing for instructions on motor refer to above illustration for names of parts.
Starboard (right) and port (left) are designated while facing bow, front)

HOW TO REMOVE PROPELLER SHAFT BEARING AND DRIVE SHAFT ASSEMBLY

(see illustration, Fig. 18, Page 16). First remove 4 screws (1) securing housing to gear case. This permits removal

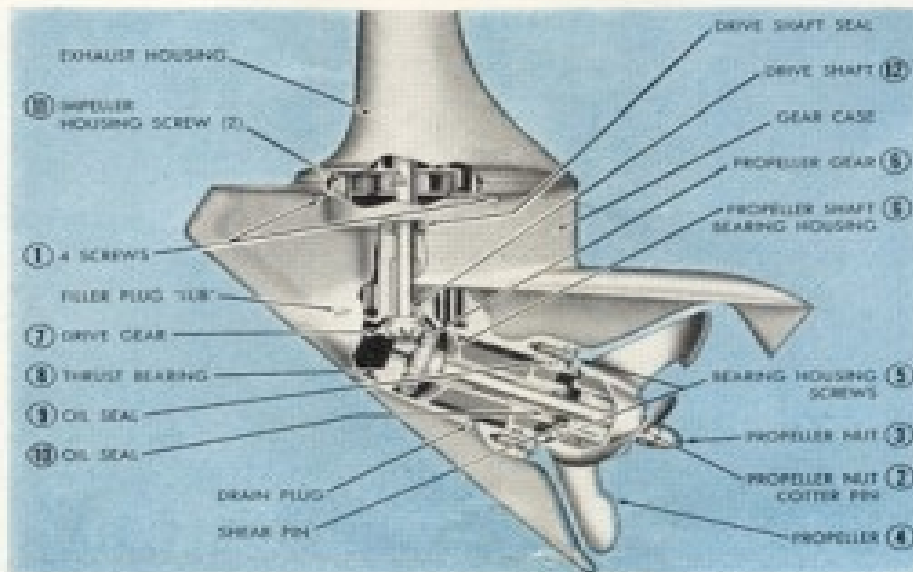


Fig. 18

of entire gear housing and drive shaft assembly. Next remove propeller nut cotter pin (2) and propeller nut (3). Remove propeller (4) and 2 bearing housing screws (5). Entire propeller shaft and bearing housing can now be removed from gear housing. Remove thrust bearing (8). Drive gear (7) can now be slipped off of shaft spline. Remove 2 impeller housing screws (11) and entire

drive shaft (12) and impeller assembly can be removed by pulling up on drive shaft.

Drive shaft oil seal (13) can now be removed if replacement is necessary.

Oil seal (10) in rear of propeller shaft bearing housing is easily replaced, as it snaps into place in a recess in housing.

The oil is also sealed by a radial fit oil seal ring (9) at the rear of housing. There is no gasket on face of housing. Always refill housing with GX-90 Mobilube or any other good grade of oil suitable for automotive hypoid gears meeting U. S. Army spec. No. 2-105B Grade 90.

DO NOT USE GREASE.

Permit housing to drain thoroughly before refilling, removing both "LUB" and "DRAIN" plugs in housing. (Do not lose plug gaskets).

EVINRUDE
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IN CASE OF TROUBLE Gasoline and ignition troubles are by far the most prevalent ailments among all types of gasoline engines. Therefore, if your motor does not behave properly, it is wise to look for the most common form of trouble before attempting to dismantle the engine — don't try to find something when you don't really know what you're looking for.

If your motor has fuel properly mixed and carefully strained, but refuses to start, or behaves badly, consult the check chart. If you have no idea what the trouble may be, start making a systematic check, through the list of symptoms described below. If you do this, the chances are ninety-nine out of a hundred that you'll quickly locate your trouble and be ready to remedy it.

CHECK CHART The following chart aims to provide an outline for the systematic tracing down of trouble with the least amount of effort. Finding the cause of trouble usually suggests the remedy.

Motor won't start —

GASOLINE TROUBLE

- Tank empty.
- Shut-off valve closed.
- Carburetor flooded, if motor is warm.
- Mixture too lean, if engine is cold.
- Too much oil mixed with gasoline.
- Water in carburetor, tank or strainer.
- Pipe clogged.
- Spray nozzle or feed hole in carburetor clogged.
- Vent screw closed.

NO SPARK

- Wire to breaker disconnected.
- Wire to spark plug disconnected.
- Water, oil, on breaker points.
- Breaker points do not come together when flywheel is revolved.
- Breaker points do not separate when flywheel is revolved.

SPARK PLUG FAULTY

- Fouled with carbon, oil or moisture.
- Porcelain cracked.
- Center pole loose.
- Points not properly adjusted — should be apart .030.

Motor overheats —

- Lack of oil or water.

Motor knocks —

- Spark too far advanced.
- Carbon in cylinders (caused by too much oil in gasoline).
- Motor too hot, causing pre-ignition.
- Bearings loose or worn.
- Piston or cylinder worn.
- Flywheel nut loose.

Motor is stiff or cranks hard —

- Rust in cylinder.
- Bearings out of line.
- Crankshaft bent.
- Gear shaft bent.
- No oil on bearings.

Water stops circulating —

- Obstruction in water intake.
- Leak in water system.
- Motor not setting deep enough in water.

Poor compression —

- Piston rings carbonized and stuck in groove.
- Cylinder scored.
- No oil in cylinder.

Motor misses —

WIRING

- Broken or loose wiring.
- Poor insulation.
- Wires short circuited with moisture, oil or foreign material.

MAGNETO

- Breaker points corroded.
- Breaker points improperly spaced.
- Weak coil.
- Weak condenser.
- Weak magnet.
- Foreign matter or oil on breaker points.

CARBURETOR

- Foreign matter in spray nozzle or needle valve or feed hole.
- Supply impeded.
- Water in carburetor.

**IMPROPER CARBURETOR
ADJUSTMENT**

IMPROPER MIXTURE

- Too rich (will slow down and knock).
- Too lean (will knock).

LACK OF COMPRESSION

- Lack of oil.
- Scored cylinder.
- Worn rings.
- Rings stuck in grooves.

Motor vibrates —

- No spark in one cylinder.
- Loose pivot bearing.
- Bent propeller wheel.
- Motor loose on boat.
- Too lean or rich a mixture of gas.

**Motor runs but boat makes little or
no progress —**

- Propeller blades bent.
- Rope or other obstruction dragging in water.

Motor runs at excessive speed

- Foreign matter on propeller or gear housing.

EVINRUDE
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SALT WATER INSTRUCTIONS

EVINRUDE MOTORS ARE BUILT FOR USE IN EITHER FRESH OR SALT WATER. Yet science has not

succeeded in developing any metal which is totally impervious to the corrosive action of salt water. The materials with which your motor is built are commercially "salt water proof".

A few instructions, easily carried out, will extend the life and satisfactory performance of your motor when it is used in salt water.

If you've been out on salt water all day, it isn't much trouble to flush your motor with fresh water when you come ashore. The cylinder jackets, water pipes and muffler jacket can all be easily flushed



Fig. 19

with fresh water by using a flushing nozzle. (Fig. 19) This nozzle is inserted in hole in "WATER FLUSH", (Fig. 19) after removing the pipe plug.

Drain and fill Gear Housing per instructions on page 4 "GEAR LUBRICATION".

CARE OF MOTOR IN COLD WEATHER

Your motor will freeze in cold weather just as the radiator of an automobile will, if not given proper attention. A frozen motor usually means cracked pipes and water jackets.

There is not the slightest danger of your motor freezing while running. But, when your motor is idle, or before storing it away in cold weather, drain the motor by setting it in an upright position and revolving flywheel. This lets the water out of the cylinder jackets and pipes, preventing costly freezing and bursting of parts.

Drain and fill Gear Housing per instructions on page 4 "GEAR LUBRICATION".

EVINRUDE
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STORING THE MOTOR AWAY If you are not going to use your motor for a while, don't store it away in a cellar or other place where it will be exposed to dampness or dust. No sportsman would do such a thing with his guns or fishing rods, and there is no reason why your motor should not receive the same care that would be accorded to other personal property of even less value.

Dampness and dust may injure the magneto of your motor, cause deterioration and do other damage almost beyond repair.



Fig. 20

When storing your motor away **PUT IT IN A DRY PLACE.** If it has been used in salt water, flush it thoroughly with fresh water, and let it dry before putting it away.

Drain the water out of the pipes and cylinder jackets as instructed under "CARE OF MOTOR IN COLD WEATHER". Drain all fuel from Fuel Tank and Carburetor (Fig. 20). It is also a wise precaution to remove the spark plugs, put a couple of teaspoonfuls of pure lubricating oil into the cylinders (Fig. 21) and then revolve the flywheel several times to spread the oil over the cylinder walls before putting the spark plugs back. Drain and fill Gear Housing per instructions on page 4 "GEAR LUBRICATION". Wipe the entire motor with a cloth saturated with oil (Fig. 22). An exterior film of oil won't hurt any piece of machinery, but dampness and rust **WILL**. When these instructions have been carried out, wrap the motor in a piece of canvas, an old blanket, or in heavy paper, (Fig. 23) and store in a dry place.

If these simple instructions are carried out, storing will not injure your motor in the least. Further, it will be ready to run faithfully when you are ready to use it again.

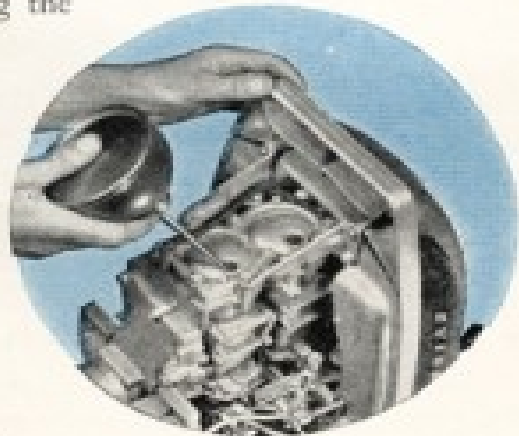


Fig. 21

EVINRUDE
LIGHTWIN

WHEN READY TO USE IT AGAIN If your motor has been idle for some time, or has been stored without following the instructions, "Storing the Motor Away", it is a good plan to squirt a little pure lubricating oil into the cylinders through the spark plug holes (Fig. 21). This done, the flywheel should be revolved a few times, to spread the oil around the cylinder walls.

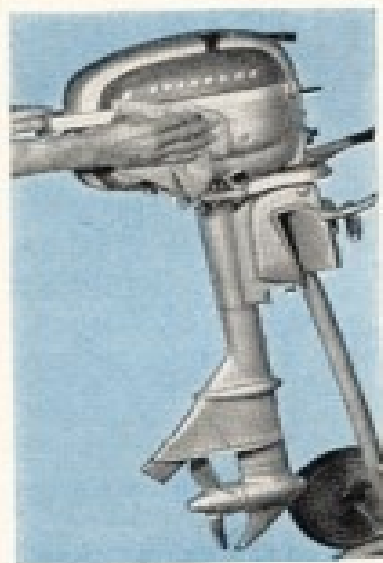


Fig. 22

When you take the motor out, clean it up. Inspect the gears, propeller shaft and bearings to see that they are in good condition. Fill Gear Housing per instruction on page 4 "GEAR LUBRICATION".

Clean the contact points (Fig. 14) by running a piece of hard paper or cardboard between them. If they are very dirty or rough, use a very fine file to polish them. See that the points are adjusted to correct gap.

Clean the fuel filter. Clean out the fuel tank, the fuel feed pipe and the carburetor.

Mix your gasoline and oil in a clean can, and in the right proportion. Strain all fuel; use only metal containers. Fill the tank. See that the fuel is flowing to the carburetor.

Thoroughly clean the spark plugs. Replace with new ones if cracked, broken, or badly burnt.

If, in going over the motor, you find any parts damaged, replace them at once.

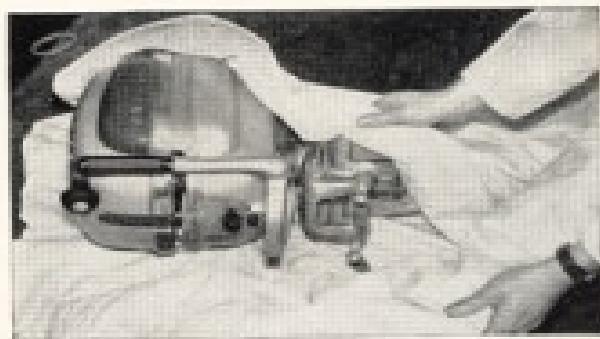


Fig. 23

Tighten up all screws and nuts.

Put the motor on the boat and start it. Carefully adjust the carburetor. See that cooling water is flowing.

After long, continuous, hard service, a very complete overhauling may be advisable. This should be done by an expert. If you desire, return the motor to our distributor or dealer, and you will get a workmanlike job at a fair charge for time and materials.

MOTORS THAT HAVE BEEN SUBMERGED Accidents may happen to the most careful person, and it is by no means impossible to drop an outboard motor overboard. Careful boatmen safeguard themselves against such mishaps by tying a length of rope to their motors and tying the other end to the boat. A motor so secured cannot be lost.

A motor that has been submerged is temporarily out of commission. Such a motor must, of course, be dried out thoroughly before it can be restored to service.

For cleaning and drying motor, proceed as follows:

1. Drain and clean fuel tank, flushing thoroughly with clean gasoline.

2. Remove and clean carburetor (see instructions, page 10 — "Keep Carburetor Clean") fuel line and spark plugs. Make sure all water has been removed from these parts.
3. Hold motor in position with carburetor opening in crankcase down, and revolve flywheel slowly to remove water from cylinders and crankcase.
4. Check Spark as follows: Remove the spark plugs and make sure they are dry, then leaving plugs out of cylinder, attach the high tension wires to plugs and ground the plugs to some part of motor, and pull flywheel over rapidly with starter handle. A good spark should be produced at both spark plug points.
5. If no spark or a very faint spark is produced it is an indication that there is some water on the armature base or contact points. Remove magneto. (See instructions, page 12 — "How to Remove Flywheel".) After flywheel has been removed, thoroughly dry armature base, also breaker points and check points for proper spacing (.020).
6. Replace magneto and again check for spark as above. If still no spark is apparent, again remove flywheel and check complete magneto. (See instructions, page 12 — "Ignition Troubles and How to Locate Them"). If after thoroughly checking magneto a satisfactory spark is not produced, return complete magneto to nearest dealer.
7. Reassemble carburetor and fuel line.
8. Put about two or three tablespoonfuls of oil, of the kind you mix with gasoline, in each cylinder, through each spark plug hole, (Fig. 21) and with the spark plugs removed and both wires grounded rotate flywheel rapidly by pulling starter handle. Repeat this process several times, then put spark plugs in cylinders, fill fuel tank with new fuel mixture and proceed to start motor.
9. Due to the excess oil in cylinders as well as the possibility of some water which may still remain in cylinders, it may be necessary to remove and clean the spark plugs once or twice during the process of starting.

DON'T HESITATE TO WRITE US We realize that our business success depends largely upon the service that users derive from our products. We want every owner to feel that he is getting **MORE THAN HIS MONEY'S WORTH** in service out of his outboard.

If we can be of further help to you in increasing the pleasure you derive from your motor, don't hesitate to write us. Tell us your troubles — if you have any; also your joys. Such correspondence will receive prompt attention. Our Service Department is maintained for your benefit. When writing, give model, name and serial number.

REPAIR SERVICE Dealers usually carry a complete stock of spare parts. If you need parts, or repair service, consult your dealer. If the name and address of the nearest dealer is not known, write us.

PARTS BOOKS Parts books for all current models are available. If you need a parts book, write us.

INSURE YOUR BOAT AND MOTOR AT SMALL COST

Through the Outboard Boating Club of America you may now insure your boat and/or motor on nearly the same basis as you would your motor car. Members of the Outboard Boating Club of America are entitled to the full privilege of this insurance service. *Premiums are exceptionally low* and include protection against fire, theft and marine perils. For further details write **OUTBOARD BOATING CLUB OF AMERICA, 307 North Michigan, Chicago 1, Illinois.**



THE IMPORTANCE OF QUIET OPERATION A noisy motor is unwelcome in the boating scene, and gives the sport of boating a black eye.

That is one big reason why Evinrude Motors has spent, and is continuing to spend, thousands of dollars annually to make Evinrude motors run more quietly.

We count on all Evinrude owners to cooperate with all their fellow boatmen and with us by:

Operating their motors as silently as possible.

Refusing to tamper with or removing all or any part of exhaust and silencing mechanisms.

Promptly repairing silencing mechanisms if these become faulty in operation.

Evinrude dealers recognize the desirability of having all outboards operate quietly, and will gladly cooperate with motor owners in reaching this worthy objective.

Your courtesy in conserving the quiet of the great outdoors will be gratefully recognized by all your boating and shoreside neighbors. We also will sincerely appreciate your cooperation.

"RULES OF THE ROAD FOR OUTBOARD OWNERS"†

1. Boats under sail always have the right of way.
2. Motor boats must keep clear of sailing craft and row boats at all times.
3. Always keep on the right side of the channel or fairway when possible.
4. Any boat overtaking another boat must keep out of the way.
5. When meeting another boat head on or nearly so, each boat shall alter its course to right so as to pass on the left side of the other and each boat should give one short blast of the whistle. In other words, always keep to the right.
6. If a boat is well over to the right in passing, it should keep straight on and give one toot to the whistle. If you are well over to the left, keep straight on and give two toots to the whistle. The other boat should do the same.
7. When two boats are crossing and approaching obliquely, the one that has the other on her own left side should keep her course and speed, and the one which has the other on her right side should get out of the way as best she can, but, if possible, not by crossing ahead. "The giving away vessel" should give one short toot if she is altering her course to right or two short toots if to left, which the boat that is holding her course should answer.
8. If for any valid reason you cannot comply with the rules or do not understand signals being given by another boat, give the danger signal, which is a number of short blasts, not less than four, and stop if necessary.
9. Never sound a whistle while underway unless necessary.

†Prepared by Outboard Boating Club of America.

EQUIPMENT REQUIRED ON FEDERAL WATERS

NOTE: No all-embracing definition of what constitutes Federal waters can be given. However, in general it may be said that craft operating on navigable waters in or opening into the Great Lakes, an ocean or gulf, and all navigable waters tributary to such waters upstream to the first lockless dam, are under Federal supervision and should carry the proper government equipment.

1. A bright white light aft to show all around the horizon. Visible at least 2 miles.*
2. Combination light in the fore part of boat showing green to starboard and red to port, from right ahead to two points abaft the beam on their respective sides. Visible at least 1 mile.*
3. A whistle or other sound-producing mechanical appliance capable of producing a blast of 2 seconds or more in duration. (On boats 16 feet or more in length.)
4. A life preserver or ring buoy (or approved cushion) for every person on board.
5. An approved fire extinguisher. Motor boats propelled by outboard motors and not carrying passengers for hire are not required to carry fire extinguishers.
6. Persons who operate any motor boat in a reckless or negligent manner so as to endanger life, limb or property of any person shall be termed guilty of a misdemeanor and, on conviction, shall be punished by a fine not to exceed \$2,000 or by imprisonment for a term not exceeding one year or by both such fine and imprisonment.

*From Sunset to Sunrise.

BOAT NUMBERS REQUIRED BY THE UNITED STATES COAST GUARD

We quote from the Department Regulations:

1. Application for numbers will be made by the owner or master to the collector of customs of the district in which the owner resides. The owner will then receive full instructions as to the number awarded, how it is to be placed on the vessel, etc.
2. The following undocumented vessels are required to be numbered:
 1. All boats equipped with permanently fixed engines.
 2. All boats over 16 feet in length equipped with detachable engines.
 3. All boats not more than 16 feet in length equipped with detachable engines as the ordinary means of propulsion.
3. The following undocumented vessels are not required to be numbered:
 1. All boats not exceeding 16 feet in length equipped with detachable engines and falling within the following classes:
 - (a) Rowboats and canoes designed and intended for the use of oars or paddles as the ordinary means of propulsion.
 - (b) Sailboats.
 - (c) Boats designed and used solely for the purpose of racing or operation incident to racing.

EVINRUDE
LIGHTWIN

LIGHTWIN MECHANICAL SPECIFICATIONS

MODEL 3012	For 15" boat transom (Standard length)
MODEL 3013	For 20" boat transom
HORSEPOWER	3.0 O.B.C. Certified B.H.P. at 4000 R.P.M.
HIGH SPEED OPERATING RANGE	4000 to 4500 R.P.M.
NUMBER OF CYLINDERS	2
BORE AND STROKE	1 $\frac{9}{16}$ " x 1 $\frac{5}{8}$ "
PISTON DISPLACEMENT	5.27 cubic inches
TYPE	2 cycle reed valve — alternate firing
GEAR RATIO	12:20
PROPELLER	6 $\frac{1}{2}$ " diameter x 5 $\frac{3}{4}$ " pitch, 3 blade
COOLING	Combination positive displacement and centrifugal
IGNITION	Evinrude high tension magneto
CARBURETOR	Horizontal float feed, throttle type, HIGH and LOW speed adjustments
CONTROL	One lever synchronized spark and throttle
FUEL TANK CAPACITY	.7 Gallons (5 $\frac{1}{2}$ Pts.)
STARTER	Simplex, self re-winding
REVERSE	360° Pivoting
FISHERMAN DRIVE	Rubber propeller protection clutch
WEIGHT	32 pounds 5" longer model, 34 pounds

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CANOE BRACKET



Want your Evinrude Lightwin for a canoe trip? This handy, light weight, adjustable aluminum alloy bracket is universally adaptable to all makes and shapes of pointed stern canoes and boats. Tube formed of light weight steel tubing, corrosion proofed.

Takes only a few minutes to attach or detach. Does not mar the hull.

Order Accessory No. 675018 from your dealer. See him for price and delivery.

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