



# OWNER'S MANUAL

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# **YOUR TOHATSU OUTBOARD MOTOR**

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## **OWNER REGISTRATION AND IDENTIFICATION**

Upon purchasing this product, be sure your dealer\* fills out the WARRANTY CARD correctly and completely and mails it to the distributor. This card identifies you as the legal owner of the product and serves as your warranty registration.

If this procedure is not followed, your outboard motor will not be covered by warranty.

\* : In this manual, "dealer" always means an authorized TOHATSU dealer.

## **PRE-DELIVERY CHECK**

Be sure that the product has been checked by the dealer before the delivery.

## **Limited Warranty**

This TOHATSU product is fully guaranteed against defective materials and workmanship for the period from the date of purchase, provided that the purchase has been registered in accordance with the above.

The limited warranty will not apply to the normal wear and tear of parts, adjustments, tune-ups, or to any damage caused by:

- 1) Use or operation NOT conforming to the instructions described in this owner's manual,
- 2) Participation in or preparation for racing or other competitive activities,
- 3) Water entering the engine or the engine room,
- 4) Damage of an accidents, collisions, contact with foreign materials, or submersion.
- 5) Growth of marine organisms on motor surfaces.
- 6) Any other careless use or operation.
- 7) Normal deterioration.

The limited warranty does not cover maintenance items. The following items are some examples not to be covered by the limited warranty.

spark plugs, anode, trim-tub, propeller, fuel filter, oil filter, carbon brush, starter rope, shear-pin, split-pin, bolt-nut-washer, wire cable, rubber goods: pump impeller, oil seal, "O"-ring, fuel pipe, primer bulb, etc., viny tube.

The limited warranty will become void if the product has been altered, modified, or repaired by anyone other than a company or service firm authorized by TOHATSU.

The limited warranty will cover only your TOHATSU product and will not cover the boat the product is mounted on, the trailer, equipment, or accessories associated with the product.

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## **⚠ CAUTION**

Failure to observe could result in minor personal injury or product or property damage.

### **Note:**

This instruction provides special information to facilitate the use or maintenance of the outboard or to clarify important points.

## **EMERGENCY STOP SWITCH**

The stop switch will cut off the engine when the stop switch line is pulled out. This line can be attached to the body of the operator, effectively preventing injuries from the propeller in case he/she falls overboard.

We highly recommend use of the stop switch line because it can save the life of the operator if something bad happens. However, we would also like to point out the drawbacks of the switch. Accidental activation of the switch (such as the line being pulled out in heavy seas) could cause passengers to lose their balance and even fall overboard, or it could result in loss of power in heavy seas, strong currents, or high winds. Loss of control while mooring is another potential hazard.

To prevent such hazardous situations, the 500 mm line is coiled and can be extended to a full 1,300 mm.

## **WARNINGS**

As the operator/driver of the boat, you are responsible for the safety of those aboard and those in other crafts around yours, and for following local boating regulations. Therefore you should possess thorough knowledge of correct operation of the boat, its accessories, and the engine. To learn about the correct operation and maintenance of the engine, please read through this manual carefully.

It is very difficult for a person standing or floating in the water to take evasive action should he or she see a power boat heading in his/her direction, even at a slow speed. Therefore, when your boat is in the immediate vicinity of people in the water, the engine should be shifted to neutral and shut off.

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## Serial Number

In the space below, please record the engine's serial number (indicated both on the lower motor cover and on the cylinder block). This number will come in handy in the event of theft or to help in quickly identifying the product type.

Serial Number : \_\_\_\_\_

## To You, Our Customer:

Thank you for selecting a TOHATSU product. You are not the proud owner of an excellent outboard engine that will service you for many years to come.

We would like to point out that carefree usage can only be assured on condition that this manual is read through in its entirety and the maintenance routines described later in this manual are followed carefully. Should difficulty arise with the engine, please follow the troubleshooting procedures listed at the end of this manual. If the problem persists, contact an authorized TOHATSU service shop or your dealer.

We hope you will get much enjoyment from this product and wish you good luck in your boating adventures.

**TOHATSU CORPORATION**

## NOTICE: DANGER/WARNING/CAUTION/Note

Before operating your outboard motor, be sure to thoroughly read and understand this Owner's Manual and follow all of the instructions shown. Of particular importance is information preceded by the words "DANGER," "WARNING," "CAUTION," and "Note." Always pay special attention to such information to ensure safer and trouble-free operation at all times.

<b>▲▲▲ DANGER</b>
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Failure to observe will result in severe personal injury or death.
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<b>▲▲ WARNING</b>
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Failure to observe could result in severe personal injury or death.
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SERIOUS INJURY IS LIKELY IF A PERSON IN THE WATER MAKES CONTACT WITH A MOVING BOAT, GEAR HOUSING, PROPELLER, OR ANY SOLID DEVICE RIGIDLY ATTACHED TO A BOAT OR GEAR HOUSING.

It is the operator's responsibility to perform all safety checks and to ensure that all lubrication and maintenance instructions are complied with for safe operation. It is also the operator's responsibility to return the unit to the local dealer for periodic inspection.

Correct periodic maintenance and good care of this outboard engine will lessen the chance of problems and keep overall operating expenses at a minimum.

### **SERVICING, REPLACEMENT PARTS & LUBRICANTS**

Only let an authorized TOHATSU service shop perform servicing or maintenance on this product. Be sure to use genuine parts and genuine lubricants or recommended lubricants.

### **MAINTENANCE**

As the owner of this outboard engine, you should be acquainted with its correct maintenance. Please comply with all instructions on lubrication and maintenance, and return the engine to the dealer or service shop for periodic inspection at the prescribed intervals.

Troublefree operation cannot be expended unless the engine receives adequate periodic maintenance. If maintenance is performed periodically, it is not likely that a costly overhaul will ever be required.

### **USE OF SERVICE SHOP**

When subjecting your TOHATSU product to a check or repair, please be sure to use a TOHATSU dealer authorized by TOHATSU or a TOHATSU agent.

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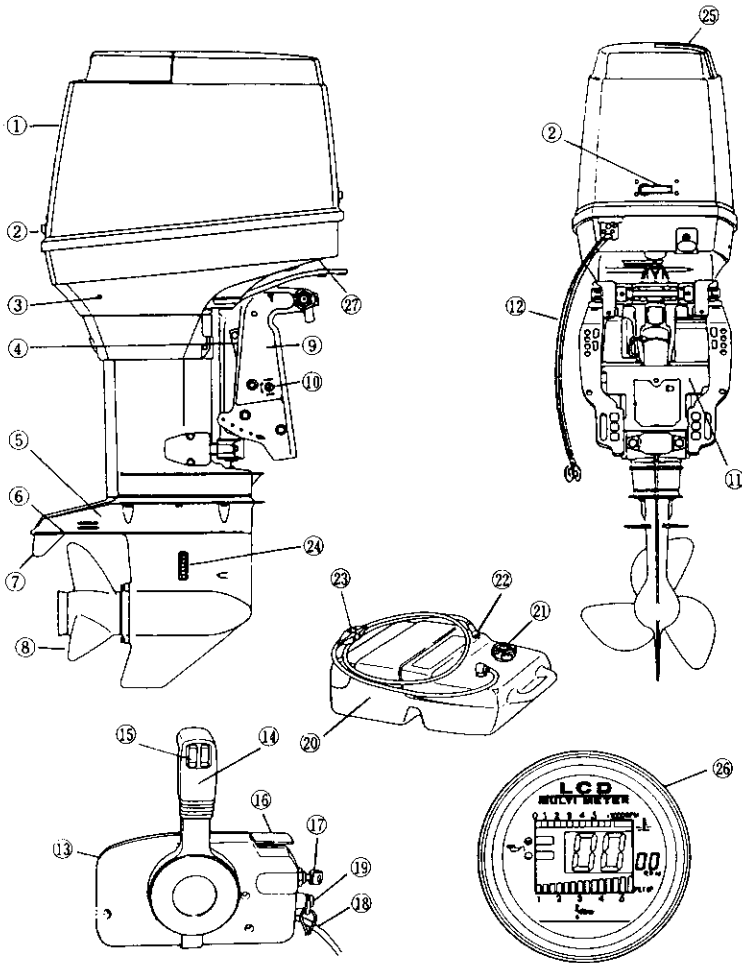
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# SPECIFICATIONS

Model .....	M115A2EPTO/MC115A2EPTO
Overall Length, mm (in) .....	Approx. 747 (29.40)
Overall Width, mm (in) .....	Approx. 390 (15.35)
Overall Height, mm (in) .....	L: 1,560 (61.4) XL: 1,687 (66.4)
Transom Height, mm (in) .....	L: 516 (20.3) XL: 643 (25.3)
Weight, kg (lbs) .....	L: 164 (362) XL: 166.5 (367)
Max. Output, kW (PS) .....	85.7 (115)
Full Throttle Speed range, rpm. ..	5,200 – 5,700
No. of Cylinders .....	4
Piston Displacement, cc (in <sup>3</sup> ) .....	1,768 (107.89)
Bore & Stroke, mm (in) .....	88 × 72.7 (3.464 × 2.862)
Exhaust System .....	Through hub exhaust
Lubrication .....	Separating oil supply auto mixing system
Fuel Mixing Ratio .....	50:1 – 120:1
Cooling System .....	Forced water cooling
Starting System .....	Electric starter motor
Ignition .....	Flywheel Magneto C.D. Ignition
Spark Plugs .....	NGK B8HS-10/BR8HS-10 or Champion L-78C/RL-78C (1.0mm gap)
Alternator .....	12V, 330W
Tilt Stages .....	5
Engine Oil .....	Genuine Motor Oil or recommended one (TCW- III )
Gear Oil .....	Genuine Gear Oil or API GL5, SAE #80 to #90. approx. 900cc
Fuel Tank Capacity, liter (US gal) .....	25 (6.6)
Engine Oil Capacity, liter (US gal) .....	6 (1.6)
Gear Reduction Ratio .....	13:26

# NOMENCLATURE



- |                            |                            |                            |
|----------------------------|----------------------------|----------------------------|
| ① Upper Engine Cover       | ⑫ Battery Cables           | ⑳ Water Strainer           |
| ② Cover Hook               | ⑬ Remote Control Box       | ㉑ Filler Lid               |
| ③ Cooling Water Check Port | ⑭ Remote Control Lever     | ㉒ Multi-purpose Meter      |
| ④ Tilt Stopper             | ⑮ Power Trim & Tilt Switch | ● Tachometer               |
| ⑤ Gear Case                | ⑯ Neutral Warm-up Lever    | ● Trim Gauge               |
| ⑥ Anti-Ventilation Plate   | ⑰ Main Switch              | ● Overheat Alert Indicator |
| ⑦ Trim Tab                 | ⑱ Harness B                | ● Oil Level Indicator      |
| ⑧ Propeller                | ⑲ Stop Switch              |                            |
| ⑨ Stern Bracket            | ㉓ Fuel Tank                |                            |
| ⑩ Manual Valve (Port side) | ㉔ Air Vent Screw           |                            |
| ⑪ Power Trim and Tilt      | ㉕ Fuel Connector           |                            |
|                            | ㉖ Primer Bulb              |                            |

# 1. ENGINE INSTALLATION ON BOAT

## WARNING

Most boats are rated and certified in terms of their maximum horsepower limit, and this is shown on the boat's certification plate. Do not equip your boat with an outboard that exceeds this limit. If in doubt, contact your dealer.

Do not operate the engine until it has been securely mounted on the boat in accordance with the instruction below.

### 1 Installation

#### ① Single-engine Installation

- Position the outboard engine at the exact center of the stern, and mount it using a cushioning pad or plate.

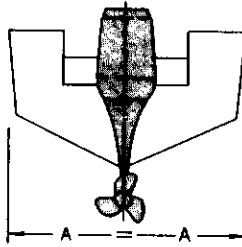


Fig. 1

#### ② Twin-engine Installation

- Position the outboard engine 470–600mm (18.50–23.62") apart, measured from an imagined center line of each engine, in the exact center of the stern.

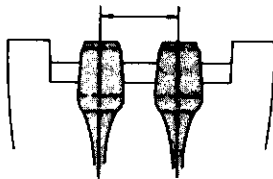


Fig. 2

### ③ Transom Height

Install the engine with the Anti-cavitation Plate at a level 0–30mm (0–1.2") below the bottom of the boat.

#### CAUTION

Overheating may occur if the height difference is less than 30mm (1.2") or if the Anti-cavitation Plate is at a level higher than the bottom of the boat, as a result of air sucking.

If the height difference exceeds 0–30mm (0–1.2"), engine power performance is likely to be reduced as a result of increased water resistance to the gear assembly.

- The installation height can be adjusted in 18mm (0.7in) steps using the fixing hopes provided on the Stern Bracket.

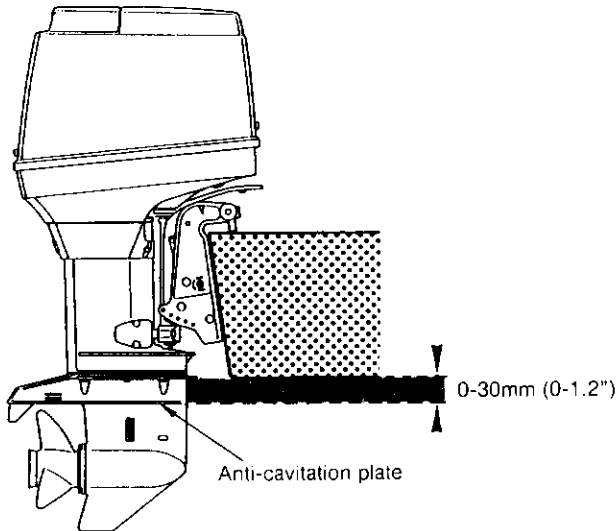


Fig. 3

### ④ Transom Matching

Be sure that the anti-cavitation plate of the outboard is below the water surface when running with wide open throttle.

In case the above condition cannot be met due to a bottom shape of your boat, please consult the dealer.

# 1. ENGINE INSTALLATION ON BOAT

## ⑤ Attaching the Stern Bracket

After positioning the Stern Bracket, fix the engine temporarily to the transom with bolts ( $10 \times 60\text{mm}$ , pitch 1.5mm) for easy attachment. Bolt not included with the accessories.

Drill 4 holes in the transom board, matching the holes in the Stern Bracket, and then secure the engine with the supplied bolts ( $M12 \times 90\text{mm}$ ) and nuts. Be sure to use the washers. The small-diameter washers go with the bolts and the larger diameter washers go with the nuts.

The mounting holes may be drilled beforehand by referring to the dimensional drawing below.

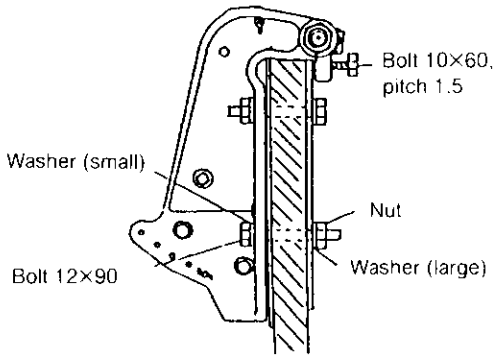
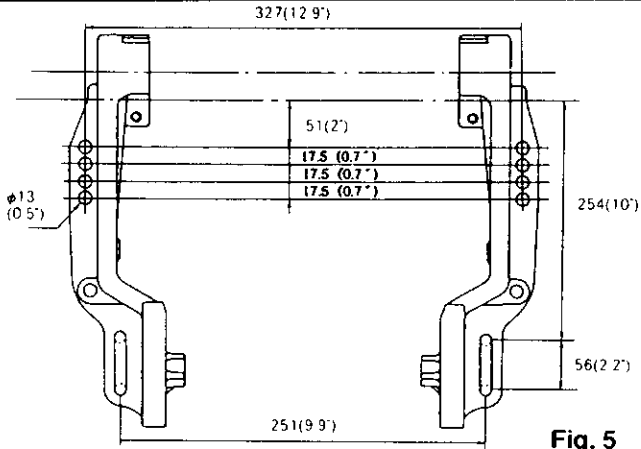


Fig. 4

### NOTES:

1. We recommend that the bolt head of at least the upper bolts face inward while the nuts are kept on the outside of the boat to prevent injury to the passengers.
2. Temporarily used bolts ( $10 \times 60\text{mm}$ ) should be removed after the Stern Brackets has been properly installed.



**Fig. 5**

**NOTES:**

1. Apply sealing agent, Such as silicon sealer, between the bolts and the transom board holes when tightening the bolts.
2. Be sure to fix the engine securely.

**⑥ PROPELLER SELECTION**

A propeller must be selected so that the engine rpm measured at wide open throttle while cruising is within the recommended range, 5,200 to 5,700 rpm. For genuine propellers, refer to page 68 of this manual.

## 2. REMOTE CONTROL BOX

The following explains installation for right-hand driving.

### ■ Installing the Remote Control Box

- Position the Remote Control Box in a place that will not interfere with handling of controls, levers and switches. Confirm that there are no obstacles in the passage of remote control cables.

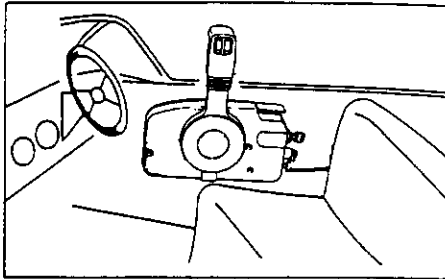


Fig. 7

- Determining the Remote Control cable length:

Use distances "A" and "B", as depicted in the illustrations, as guide lines for the Remote Control cable length, and add an additional 300mm (1 foot).

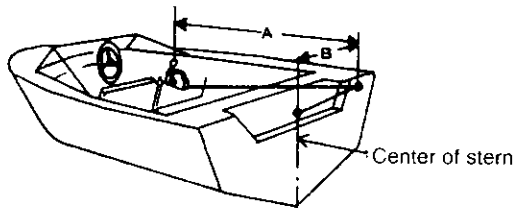


Fig. 8

**NOTE:**

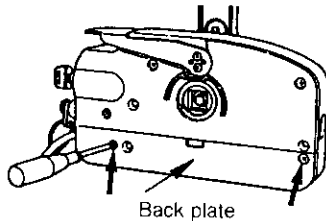
*Do not sharply bend the remote control cable to a radius of 203mm (8in) or less as this will interfere with cable operation.*

### CAUTION

To prevent accidental running of the engine, which could result in an injury, **DO NOT** connect the battery cables to the battery until the installation of the Remote Control Box and the engine is complete.

## 2 Connecting the Remote Control Cable to the Remote Control Box

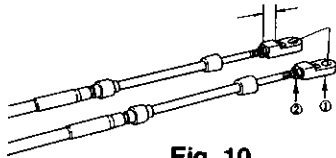
- 1 Remove the back plate by loosening the two screws.



**Fig. 9**

- 2 Thread at least 11mm (0.43in) of the Remote Control cables through the terminal eyes (1). Securely lock the terminal eyes with lock nuts (2).

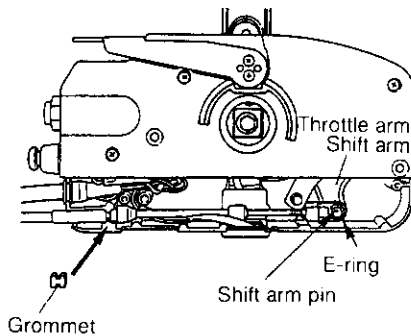
Approx. 11mm (0.43 in)



**Fig. 10**

- 3 Engage the outer groove of the shift cable on the Remote Control side with the clamp groove of the housing. Insert a grommet, supplied with the Remote Control Box, into the clamp groove.

- 4 Insert the shift arm pin into the terminal eye, and lock it with the E-ring.



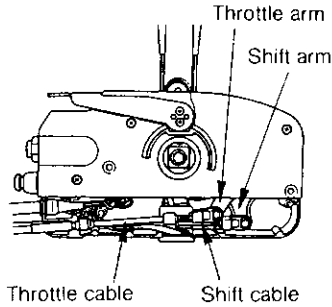
**Fig. 11**



## 2. REMOTE CONTROL BOX

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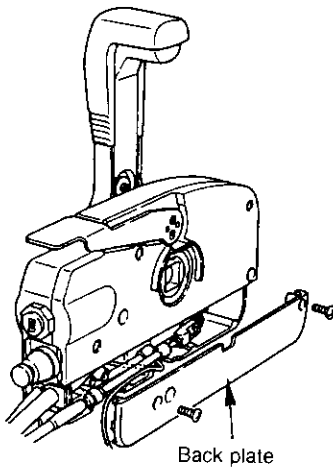
- ⑤ Connect the throttle cable to the throttle arm in the same way as the shift cable was connected.



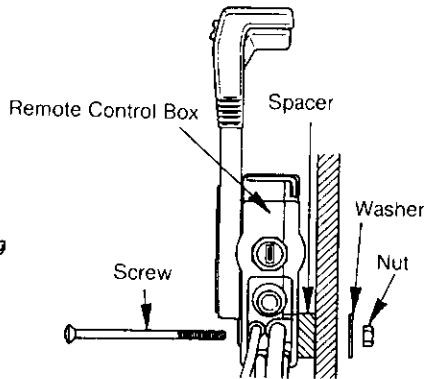
**Fig. 12**

- ⑥ Reinstall the back plate.

- ⑦ Install the Remote Control Box using the three screws, spacers and nuts.



**Fig. 13**



**Fig. 14**

### 3 Connecting the Remote Control Cable to the Engine

- ① Detach the upper engine cover.

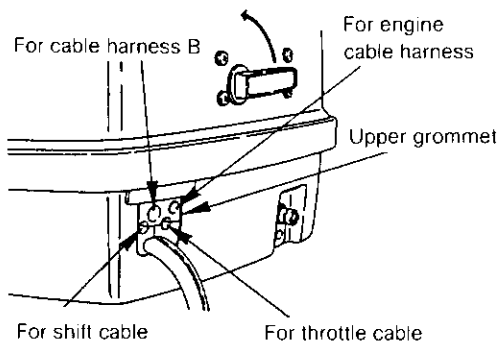


Fig. 15

- ② Detach the upper grommet cord clamp bolt.

- ③ Detach the throttle and shift cable joints by removing the R-shaped pins.

- ④ Move the Remote Control lever Forward, to Neutral and to Reverse to confirm the shift is working, and then set the lever to Neutral.

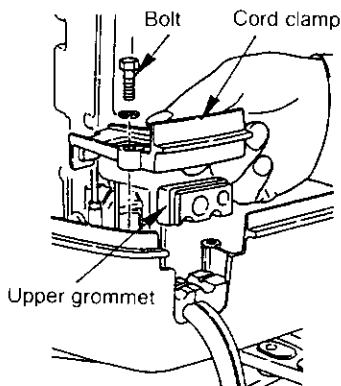


Fig. 16

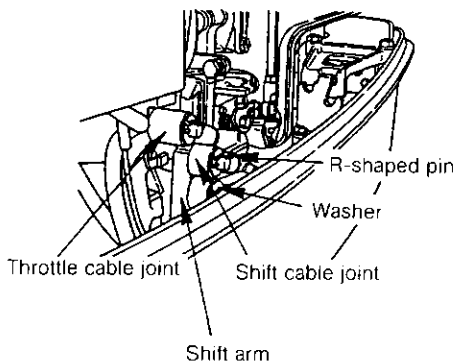


Fig. 17

## 2. REMOTE CONTROL BOX

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- Double-check that the Remote Control cables, the throttle cable and shift cable have been connected correctly.

Move the Remote Control lever Forward until the first engaging point (approx.  $32^\circ$ ) and connect, the end of the cable which moves first, to the shift arm.

Check that the shift lever is in Neutral and the neutral warm-up lever is fully closed when the remote control cables have been connected.

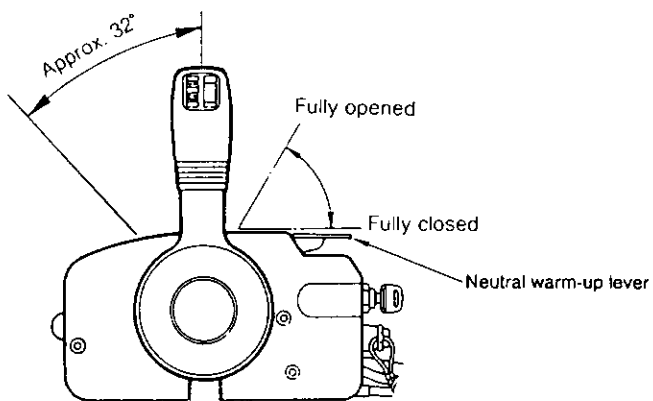
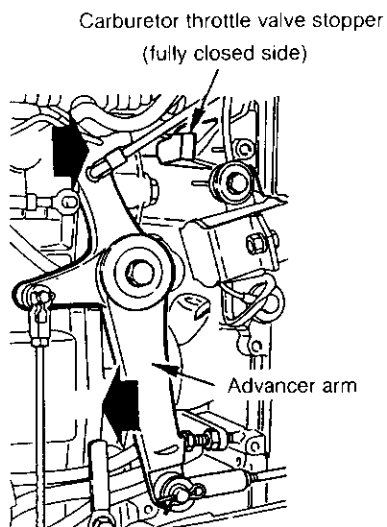


Fig. 18

- 
- The advancer arm on the engine should have contact with the stopper of the carburetor throttle valve to enable it to be fully closed.



**Fig. 19**

## 2. REMOTE CONTROL BOX

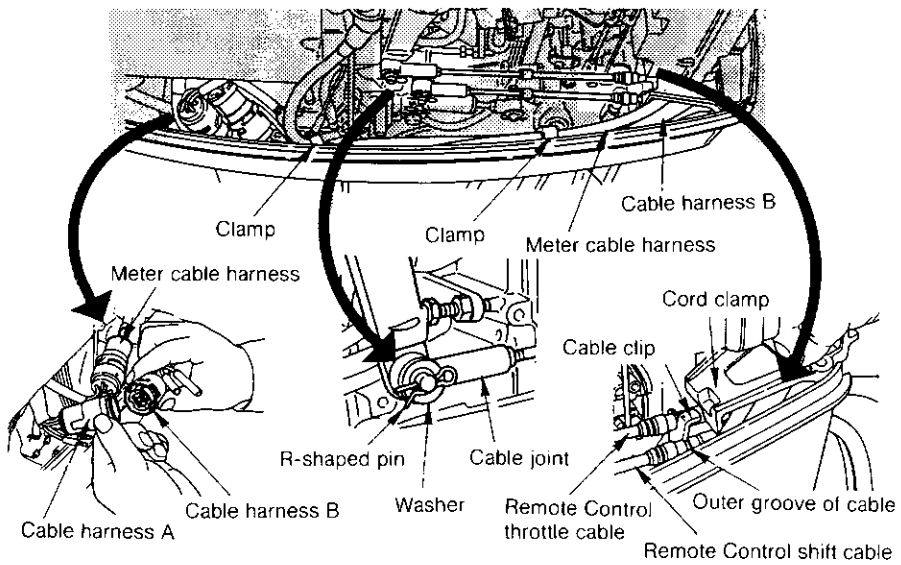
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### 4 Connecting Cords and Cables

- ① Connect cable harness B to cable harness A, and connect the meter cable harness.

Do not disconnect the electric couplers while the engine is running, as this will damage the C.D. unit and could result in a serious electric shock.

- ② Connect the pink and light-blue leads from cable harness A and B to each other.
- ③ Using the washers and R-shaped pins to adjust the thread length, connect the throttle and shift cables to the pins on the engine-side.
- ④ Insert the outer groove of each cable into the cable grip provided in the lower engine cover.  
Attach the cord clamps and fix the cables securely with the bolts.



**Fig. 20**

# 3. TRIM ADJUSTMENT

The Power Trim & Tilt can be adjusted depending on the desired trim angle of the engine in relation to the transom shape, planing speeds and load. It is imperative that the trim angle is adjusted correctly. Incorrect adjustment will cause the boat to sway, deteriorate engine performance and may cause unsafe steering conditions.

**CAUTION**

The Power Trim & Tilt can be set to any trim angle, however, avoid cruising with the engine titled in the tilt range. Operating the boat in this manner, the engine may suck air into the water cooling system, resulting in engine overheating.

■ How to use the trim meter:

When the trim angle is set as desired, take a reading off the trim meter, and record it for future reference.

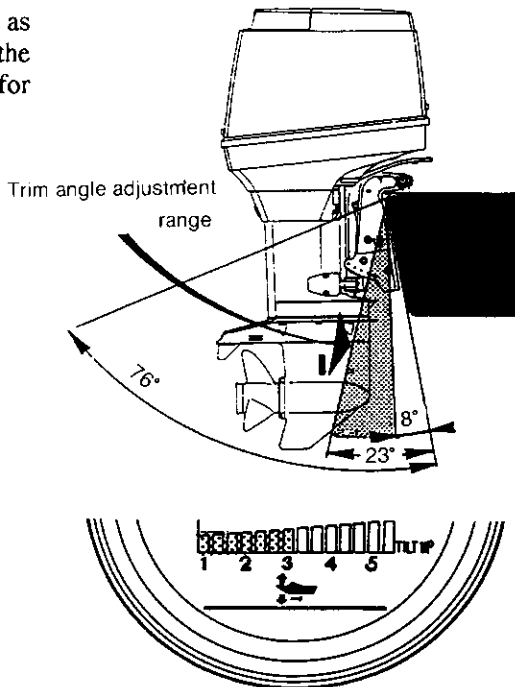


Fig. 21

## 1 Proper Trim Angle

The trim angle is optimum when the boat is parallel to the water surface while running.

## 2 Improper Trim Angle (bow rises too high)

If the trim angle is excessive, the bow will rise out of the water and the speed will decrease. Furthermore, the bow may sway or the bottom may slam the water while cruising. In this case, decrease the trim angle by flicking the switch on the Remote Control lever to "DN".

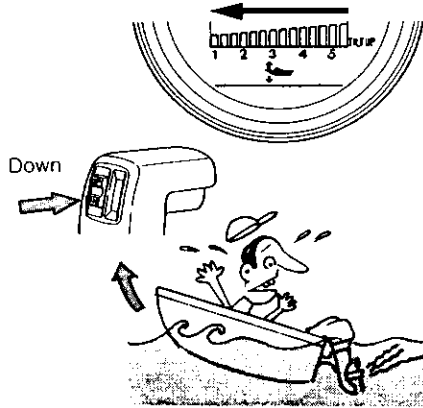


Fig. 22

## 3 Improper Trim Angle (bow dips into the water)

If the trim angle is too small, the bow will dip into the water, the speed will decrease, and water may enter the boat. In this case, the trim angle should be increased by flicking the switch on the Remote Control lever to "UP".

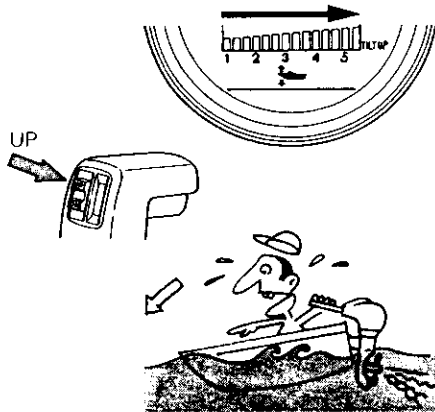


Fig. 23



# 4. MULTI-PURPOSE METER

This meter consists of a tachometer, an overheat meter, a trim meter and an engine oil level meter with built-in alarm.

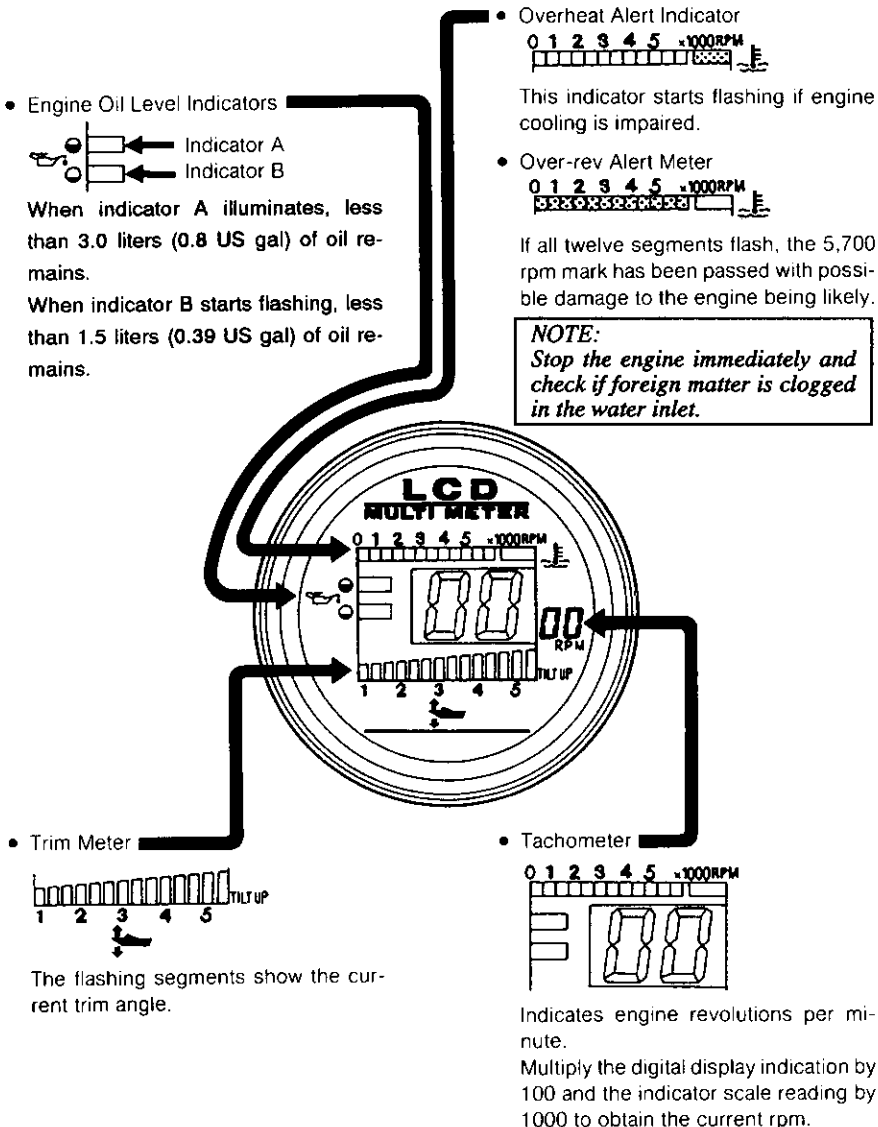


Fig. 24

## 1 Installing the Multi-purpose Meter

Install the meter securely in the dashboard where the instruments can be easily read. Recommended dashboard thickness is 2–11mm (0.08–0.4in). For dashboards thicker than 11mm (0.4in), the fitting plate should be cut accordingly.

Be sure to tighten the fitting nuts on the fitting plate evenly.

- The dashboard inclination should be  $50^{\circ} - 70^{\circ}$ .

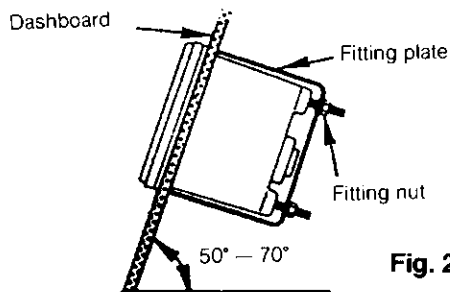


Fig. 25

- Cut a hole with 85.5mm (3.37in) diameter for the Multi-purpose Meter.

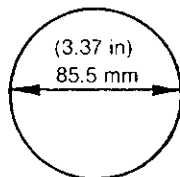


Fig. 26

- Turn the selector knob at the back of the meter to the "12" position.

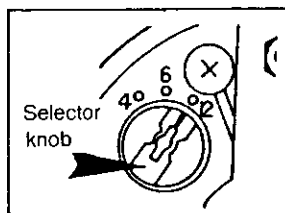
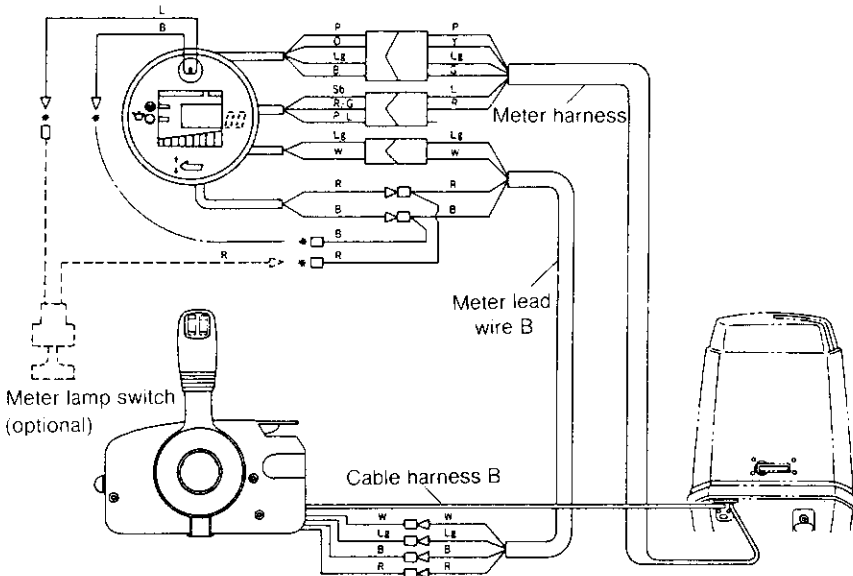


Fig. 27

# 4. MULTI-PURPOSE METER

## ■ Wiring Diagram for Multi-purpose Meter

Connect the lead wires of the meter referring to the wiring diagram below.



**Fig. 28**

Cord colors

B: Black	P: Pink
G: Green	R: Red
L: Blue	Sb: Sky Blue
Lg: Light Green	W: White
O: Orange	Y: Yellow

### NOTES:

- *Oblique lines (Z) depict cords with a color stripe.*
- *Only connect leads marked with—when a meter lamp switch (optical) is used.*

## 5. INSTALLING THE DRAGLINK ASSEMBLY

Incorrect or unstable installation of the Drag Link assembly can result in accidents while riding the boat or breakage of the hull

Installation of the Drag Link Assembly by a service shop is highly recommended.

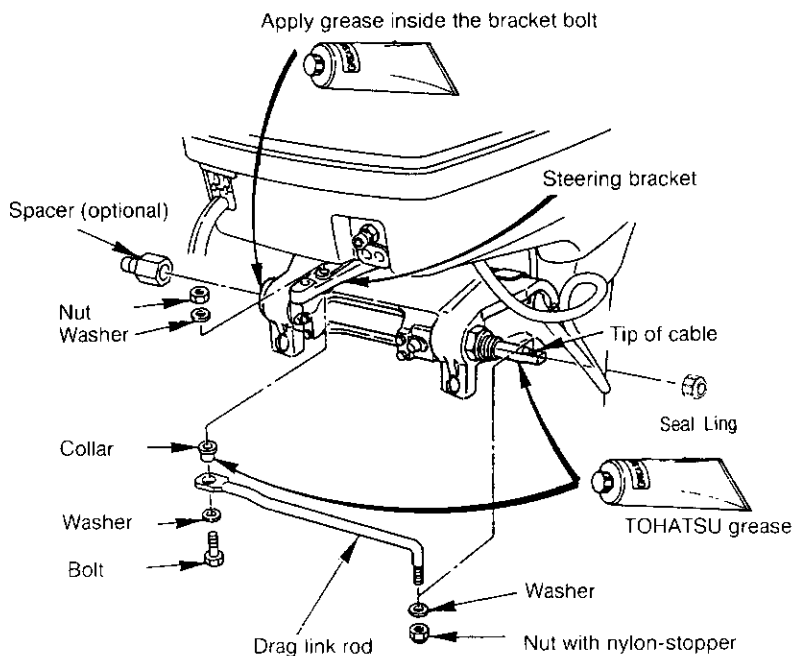
**NOTE:**

*Depending on the steering cable manufacture, spacers (optical) may be required.*

- ① Connect the Drag Link rod to the tip of the steering cable.  
Tighten the rod using the nut with nylon-stopper, making sure the rod can swing freely.
- ② Connect the other tip of the rod to the steering bracket with a bolt, first applying a collar and washer. The bolt head must face downward.

**NOTE:**

*Apply grease in required places.*



**Fig. 29**

## 6. BATTERY

---

- ① Keep the battery in the designated battery space of the boat. Secure it tightly and make sure it cannot be reached by water.
- ② Connect the positive  $\oplus$  cable connector (with red tube) to the positive  $\oplus$  terminal first. Then connect the negative  $\ominus$  cable connector to the negative  $\ominus$  terminal.  
When disconnecting the battery, always disconnect the negative  $\ominus$  cable first.
- ③ A 12V battery with a recommended capacity of 70 AH or over is recommended.

### NOTES:

1. Battery cables should be of sufficient length to allow free movement of the engine.
2. Keep battery cables in a tidy arrangement, and protect them from damage. (from steering, etc)
3. The engine will not start if cable connectors are loosely connected.
4. The battery charging system (Rectifier) will be damaged if the polarity (+and -) is reversed.
5. Be sure the battery is fully charged prior to starting the engine.

### ⚠ DANGER ⚠

- Hydrogen gas is generated when charging a battery. Thus, keep the battery well ventilated during charging.  
Remove from boat, this will protect your hull interior from damage.  
Electric sparks, cigarette smoking and other sources of fire must be avoided in the charging area to prevent explosion of the battery.
- The battery fluid (electrolyte) contains sulfuric acid. If electrolyte is spilled on the skin, clothes, etc. wash with plentiful of water and consult a medical doctor. Always use safety glasses and rubber gloves when handling the battery.

## 7. FUEL & ENGINE OIL

### NOTES:

#### Gasoline

*Unleaded gasoline is recommended for Outboard motors.*

*Gasoline should be a minimum pump posted octane rating of 87 (91 by research octane rating).*

*Gasoline containing alcohole, methanol (methyl), or ethanol (ethyl), may cause:*

- Wear and damage on bearings, piston, piston rings and cylinder liners*
- Corrosion on metal parts*
- Deterioration of rubber parts and plastic parts.*

■ Fuel tank capacity --- 25 liters (6.6 U.S. gal)

■ Engine oil ----- Use a genuine engine oil or recommended one (TCW3).

Will not recommend use of other two stroke engine oil.

#### Fuel Tank

When using a fixed fuel tank in place of genuine fuel tank, it is recommended to select a one with a structure facilitating interior cleaning.

### CAUTION

DO NOT mix different brands of oil.

Mixing different brand of oil, or different type of oil even if the brand is the same, may cause gelling, resulting in possible filter screen blockage. This could result in serious engine damage because of impaired lubrication performance.

#### 1 Auto Mixing System

The mixing ratio varies automatically in between 50 : 1 and 120 : 1 according to throttle opening. Gasoline is fed over a separate feeding line.

#### 2 Engine Oil Level Meter with Built-in Alarm

If the level in the oil tank falls below a certain level, the Alarm Indicator will start flashing.

Upper indicator flashing ... Less than 3.0liters (0.8 US gal) of oil left.

Lower indicator flashing ... Less than 1.5liters (0.39 US gal of oil left)

Buzzer will sound simultaneously.

# 7. FUEL & ENGINE OIL

## ① Resetting the low oil level alarm

Reduce engine speed to trolling rpm and steer towards a safe area with calm water. Set the Remote Control lever to Neutral (buzzer will stop). Turn off the ignition switch, and fill up the oil tank with recommended engine oil.

Start the engine, and move the Remote Control lever forward carefully. Confirm that the indicator lamp stops flashing and the buzzer does not sound.

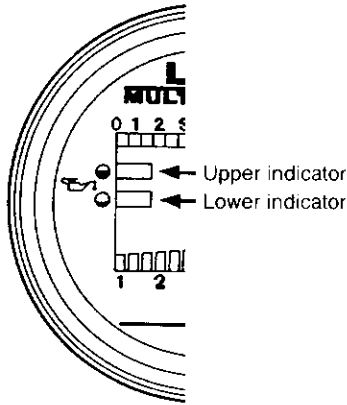


Fig. 30

## ② Replenishing oil in the engine oil tank.

1. Open the filler lid of the upper engine cover.
2. Remove the oil tank cap.
3. Fill up the tank with Genuine Outboard Motor Oil or recommended oil.

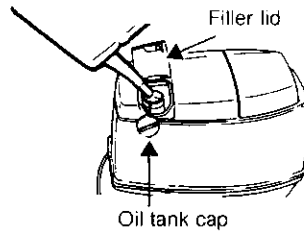


Fig. 31

### WARNING

Be sure to stop the engine before oil replenishment.

If the engine is not stopped, you clothes may become caught in the flywheel or a fire could result from spilled oil.

Wipe off any spilled oil afterward with a rag.

### CAUTION

1. In the unlikely event that gasoline by mistake is filled into the oil tank, drain the oil tank completely, and consult an authorized service shop for advice.

2. Check the amount of oil in the oil tank visually before starting the boat. Running out of oil at sea is a cause for potential disaster.

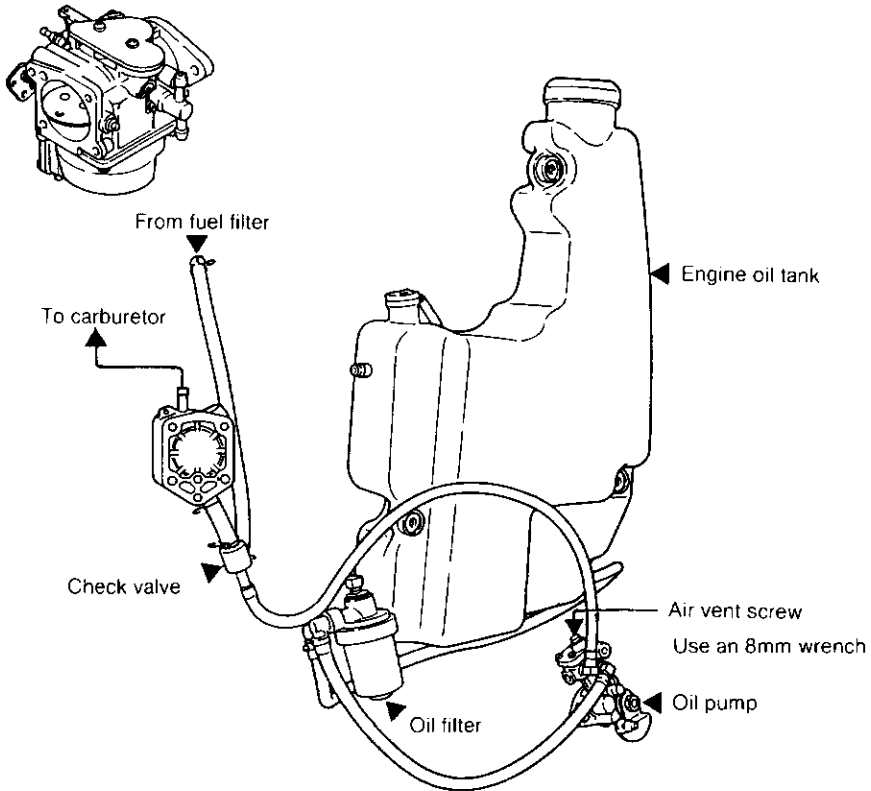
### ③ Oil pump air vent

Visually check whether there is air in the oil through the vinyl pipe connecting the oil tank with the oil pump. If present, purge the air as follows:

- Loosen the air vent screw on the oil pump to purge the air, and tighten it when all air, as seen through the vinyl pipe on the oil pump side, has been purged.

**NOTE:**

*Wipe off any spilled oil with a rag, and dispose of it.*



**Fig. 32**



# 8. RUNNING

## 1 Break-In

- The break-in run time is approximately 10 hours.

Time	Break-in method	Running Conditions
0 min –	Trolling or idling speed	Cruising at minimum speed
10 min –	Throttle opening $< 1/2$ about 3,000 rpm	–
1 hr –	Throttle opening $< 3/4$ about 4,000 rpm	Run with full throttle for 1 min–10 min.
2 hrs –	Throttle opening $3/4$ about 4,000 rpm	Run with full throttle for short time
10 hs –	Normal running	–

- Fuel mixing ratio: Unleaded gasoline 50:1 genuine engine oil or recommended one (TCW3).

- Use of poor quality fuel and old fuel will shorten the engine life and may cause trouble, including starting failure.

To use of high-quality gasoline and genuine or recommended Outboard motor Oil.

The gasoline used must have a minimum pump posted octane rating of 87 (research octane rating 91). Do not use gasoline grades mixed with methanol (methyl) or ethanol (ethyl).

### CAUTION

1. In addition to the oil in the oil tank, gasoline mixed with engine oil (mixing ratio 50:1) is necessary during break-in of the engine.
2. Replenish the fuel tank with pure gasoline only after the first 10 hours of break-in have passed and the tank is completely emptied.

## 2 Starting

### ① Preparations

(1) Loosen the air vent screw on the fuel tank cap.

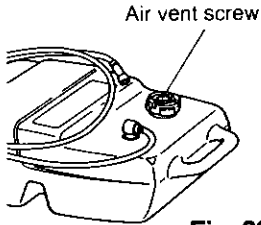


Fig. 33

(2) Connect the A connector to the engine.

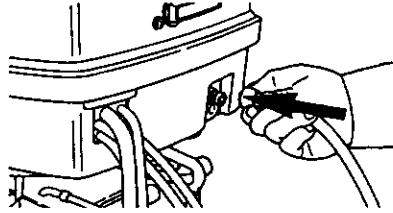


Fig. 34

(3) Feed fuel to the carburetor by squeezing the primer bulb until firm.

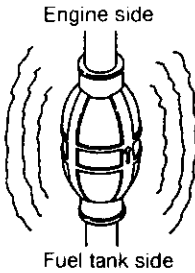


Fig. 35

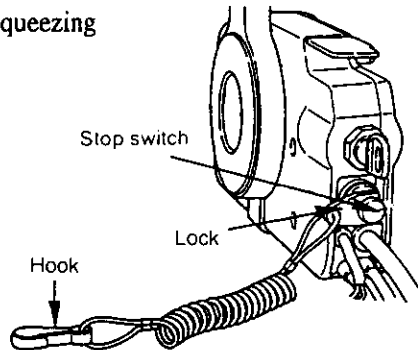


Fig. 36

Be sure to connect the emergency stop line to your wrist. The engine is shut down if the stop line switch is disconnected. This is a safety measure, designed to protect the driver from propeller injury if he is thrown overboard.

The engine will not start unless this switch has been properly connected and locked beforehand.

#### NOTES:

*Be sure that the shift is at neutral when starting the engine.*

*This model is provided with start in-gear protection.*

## 8. RUNNING

### CAUTION

If motor starts in gear, do not use, contact your authorized dealer.

- (4) Insert the key into the main switch.
- (5) Set the Remote Control lever to Neutral (N), and move the neutral warm-up lever to Open.

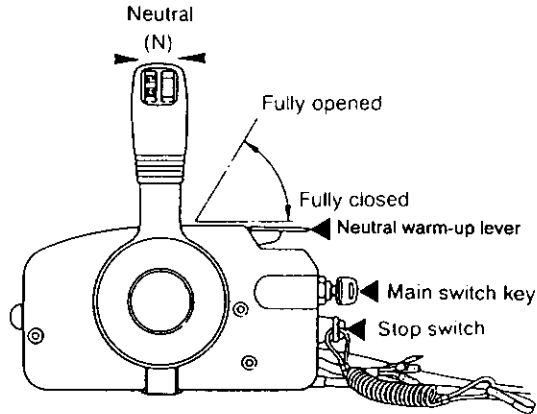


Fig. 37

- (6) Turn the main switch key to ON, and push on it for choke operation.  
(The key need not be pushed if the engine is warm.)

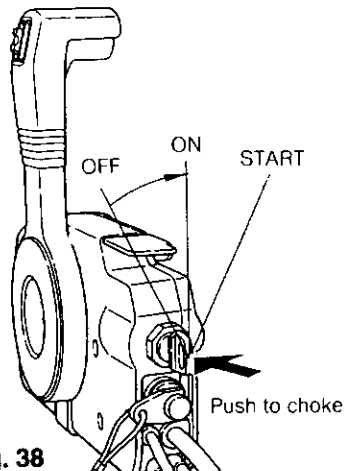


Fig. 38

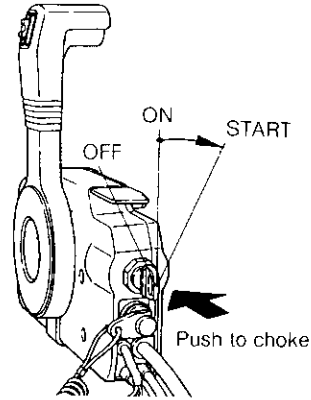
#### NOTE:

The neutral warm-up lever is inoperative unless the Remote Control lever is set to Neutral.

- (7) While keeping the key pressed, turn it to START.

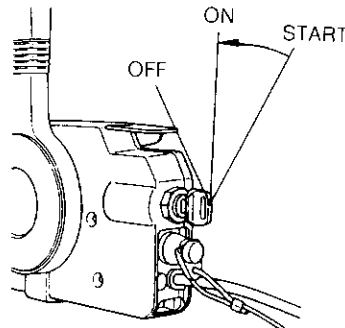
**NOTE:**

*If the engine is warm, there is no need to press the key for choking when turning it to START.*



**Fig. 39**

- (8) When the engine starts, release the key and allow it to return to ON.



**Fig. 40**

**NOTES:**

**"Important"**

1. *Extended operation of the starter motor will run the battery down. Operate the starter motor for maximum 3 seconds. If the engine does not start, wait for 5 seconds before operating the starter motor again, or starter will be damaged.*
2. *NEVER operate the starter motor once the engine has started.*
3. *If the starter motor won't turn over, check that the battery terminal connections are tight and the battery is fully charged.*

## 8. RUNNING

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### ③ Manual start-in case of trouble with the electric starter motor

- ① Turn the main switch key to OFF and set the remote control lever to Neutral (N).
- ② Remove the upper engine cover.
- ③ Take off the flywheel cover, by removing the four fixing bolts.

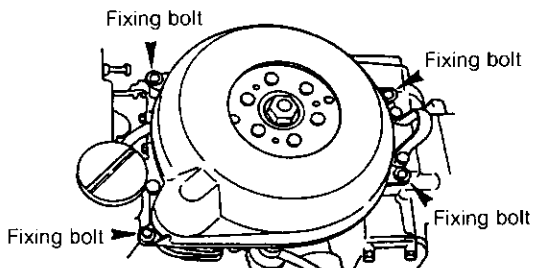
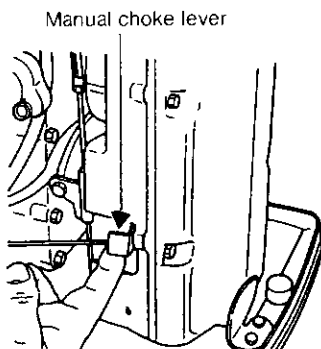


Fig. 41

- ④ Move the manual choke lever to the Closed position.



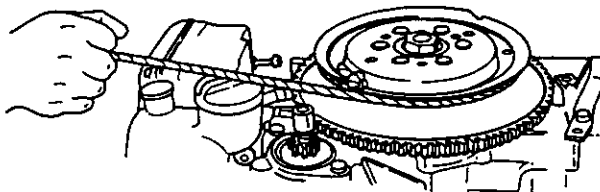
**Fig. 42**

- ⑤ Turn the main switch key to ON.

- ⑥ Wind the starter rope around the flywheel a few turns. Give it a sharp tug to start the engine. Use a socket wrench or similar to get a firm grip on the end of the rope.

**NOTE:**

*The battery cables must be connected to the battery also when starting the engine manually.*



**Fig. 43**

**CAUTION**  
Be careful that your clothes or other items do not get caught in the rope or other engine parts.

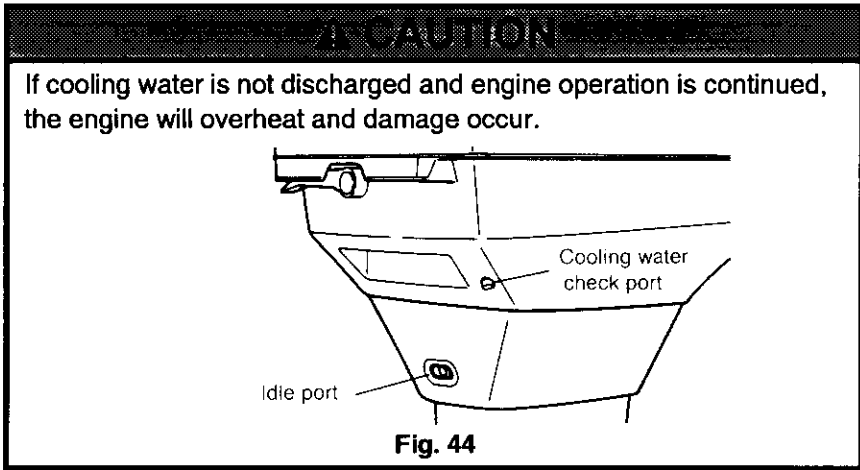
To prevent your clothes and other items from getting caught in the engine, do not install the flywheel cover nor the upper engine cover after the engine is started with the starter rope.

Immediately contact an authorized service shop when reaching shore.

# 8. RUNNING

## 4 Warm-up

Before driving the boat, let the engine run at low speed for approximately three minutes to let it warm and allow the oil to circulate through the machine. If the engine is not warmed up beforehand, the engine life will shorten greatly. During the warm-up operation, confirm that cooling water is discharged from the check port and idle port.



## ■ Engine speed

Proper idle speed for warm-up operation

Clutch engaged	Clutch disengaged (reference)
550 – 850 rpm	700 – 1,000 rpm

Do not exceed the full-throttle engine speed

Full-throttle engine speed
5,200 – 5,700 rpm

# 9. WARNING SYSTEM

## 1 Outline

This outboard warns of engine trouble using the following three ways.

- (1) Warning buzzer
- (2) Illumination or flashing of warning lamp.
- (3) Engine RPM limitation

The warning system includes the following functions.

- (1) Overheat sensor that checks cylinder temperature.
- (2) Water pressure switch that checks pressure of cooling water.  
The switch functions with engine speed over 2800rpm.
- (3) Oil level sensor that informs oil level in the tank at 3 liters and 1.5 liters.
- (4) Warning buzzer that is built in the remote control box.  
The buzzer can be activated only in forward or reverse shift, and not in neutral.
- (5) Warning lamps that is built in the MULTI-PURPOSE METER.
- (6) ESG (engine revolution limiter) that is built in the CDI unit.  
The device limits engine rpm according to the case.

## 2 Troubleshooting at warning

Use the following table to pinpoint trouble in case the warning system functions.

Buzzer	Lamp	RPM limitation, (approx.)	Trouble	Action
On	None	2,800 rpm	Cooling water intake is clogged.	Go to 3 - (1).
On	Overheat lamp flashes.	None	Engine overheats.	Go to 3 - (1).
On	Lower oil level indicator B flashes.	2,800 rpm	Remaining oil, less than 1.5 liters.	Go to 3 - (2).
Off	Upper oil level indicator A illuminates.	None	Remaining oil, less than 3 liters.	Go to 3 - (2).
Off	"X 1000RPM" indicator flashes.	6,000 rpm	Over-revolution	Go to 3 - (3).
Off	Engine speed indicates "00"	1,500 rpm	Incorrect connection of wire harness B	Go to 3 - (4).



# 9. WARNING SYSTEM

---

## 3 Corrective actions at warning

Take one of the following actions as applicable, in case a warning condition has occurred.

- (1) Buzzer and RPM Reduction : Overheat Warning or Water Intake Clogged Warning
  1. Shift into neutral.
  2. Check that cooling water is running out of the check port.
  3. If no water is running out, check if the water intake is clogged.
- (2) Buzzer and Lamp : Low Oil Warning
  1. Shift into neutral.
  2. Turn the main switch off.
  3. Fill the oil tank.
  4. Turn the main switch on to check if the buzzer and lamp are off.
  5. Turn the main switch to start.
- (3) Engine RPM is limited to approximately 6,000 and "X 1,000 RPM" indicator flashes.

Over-revolution protection function is turned on.

Note :

This function may be turned on in case a propeller has run out of the water. In such a case, the function will be turned off automatically after the propeller gets into the water again.

1. Shift into neutral.
2. Check the propeller for damage.

In case the propeller is damaged, return to port immediately at a low or medium speed to replace it with new one.  
If the propeller is not damaged, go to step 3. (The propeller pitch may be unfit for the outboard.)
3. Replace the current propeller with a proper pitch.

For selection of the propeller, consult with the dealer.
- (4) Engine RPM is indicated "00" and limited to approximately 1,500.

Red/yellow lead of wire harness B (For location of the lead, refer to page 69 of this manual.) is not connected.

  1. Shift into neutral.
  2. Turn off the engine.
  3. Check if the lead is connected.

# 10. OPERATION OF THE REMOTE CONTROL BOX

## 1 Forward Running

While pressing the lock button on the Remote Control lever upward, swiftly move the lever to forward (F) to the engaging point (approx.  $32^\circ$  forward from Neutral). If the lever is moved further forward, the throttle will open.

**NOTE:**

*The Remote Control lever becomes inoperative unless the neutral warm-up lever is in the fully closed position.*

## 2 Reversing

While pressing the lock button on the Remote Control lever upward, swiftly move the lever to Reverse (R) to the engaging point (approx.  $32^\circ$  backward from Neutral). If the lever is moved further backward, the throttle will open.

1. The throttle opening is limited to 1/2 while reversing.
2. Do not increase the engine speed unnecessarily while reversing.
3. Do not operate the engine with the Remote Control lever unlatched as the dog clutch may become damaged.

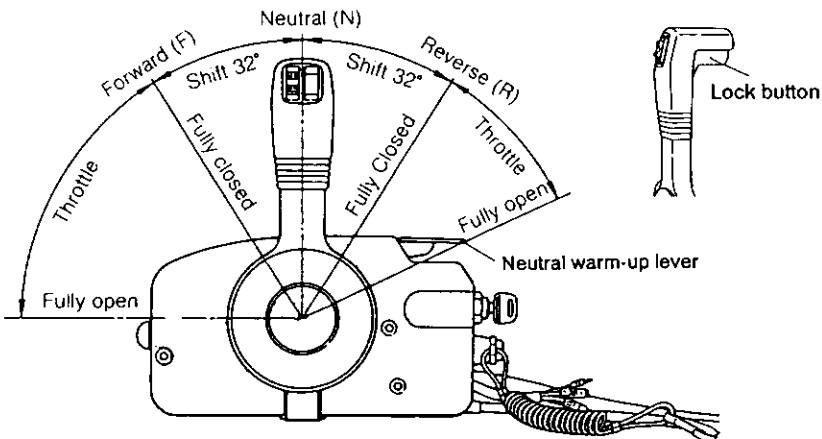


Fig. 45

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**WARNING**

It may be dangerous to attempt shifting at high RPM.  
Be sure to slow down to trolling or idling rpm before shifting.

### **3 Shallow Water Running**

Shallow water running is available.

Tilt up the engine using the Power Trim & Tilt System.

Set the outboard at higher position adjusting the same manner with the trim angle adjustment.

- CAUTION**
- When in shallow water running, take care that the water strainer is submerged at all times and that water is continuously running out of the cooling water check port. If the water does not discharge from the cooling water check port, adjust the motor angle to tilt down a little.
  - Be sure to run slowly when using the shallow water drive. Running at higher speeds will result in lack of control and may cause damage the gear case.
  - Make sure that the motor does not strike the bottom, especially when running in REVERSE. If the motor strikes the bottom while reversing, the impact is transmitted to the transom, risking damage to both the motor and the boat.

## 4 Stopping the Engine

- ① Move the Remote Control lever to Neutral and let the engine idle for 2–3 minutes to allow it to cool down.

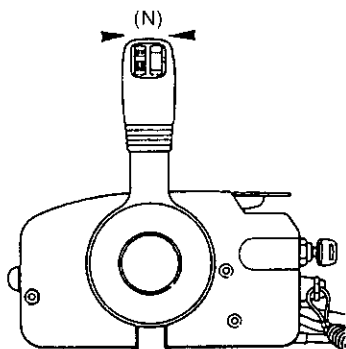


Fig. 46

- ② Turn the main switch key counter-clockwise or pull out the stop switch. The engine stops. The engine can also be stopped by pressing on the stop switch.

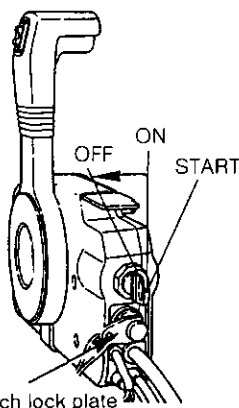


Fig. 47

- ③ Disconnect the fuel connector from the engine.

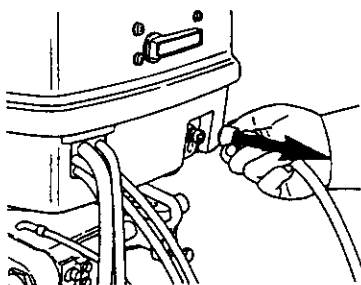


Fig. 48

- ④ Close the air vent screw on the fuel tank cap.

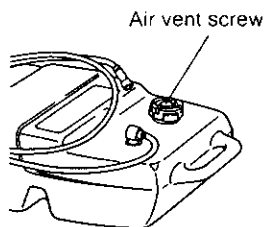


Fig. 49

### NOTE:

Disconnect the cables from the battery if the engine will not be used for an extended period of time.

# 11. MOORING WITH THE ENGINE TILTED UP

When the engine has been stopped and it will not be used for a long time or when mooring in shallow water, tilt the engine up to prevent damage on the propeller and gear case.

- ① Disconnect that fuel connector from the engine.
- ② Turn the ignition key to ON.
- ③ Operate the Power Trim & Tilt switch and tilt the engine up.

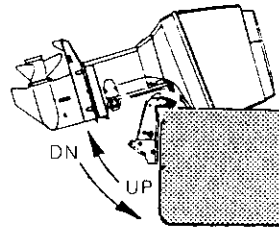
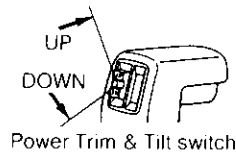


Fig. 50



Power Trim & Tilt switch

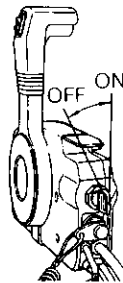


Fig. 51

## 1 Keeping the Engine Tilted

- ① Tilt the engine up, and lock it in the up position with the tilt stopper.
- ② Press the Power Trim & Tilt switch to DN to retract the trim rods. If the trim rods are not retracted, shells and other foreign matter may stick to the rods, and could cause damage when the rods are later retracted.

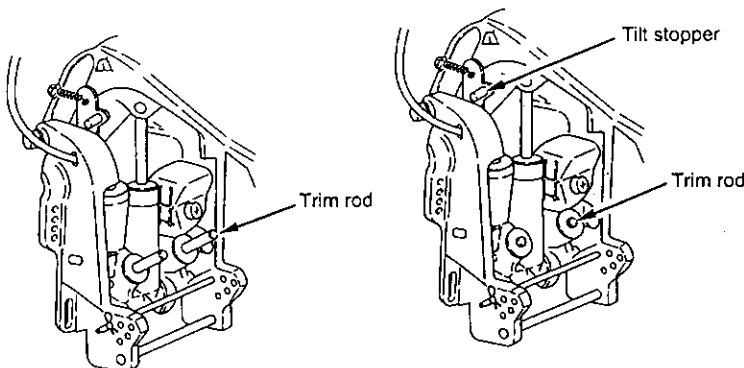


Fig. 52

**NOTE:**

If the battery is dead, and the Power Trim & Tilt switch thus inoperative, turn the manual valve a few turns in the OPEN direction. This will allow manual tilting of the engine. Always lock the engine in the upper position with the tilt stopper.

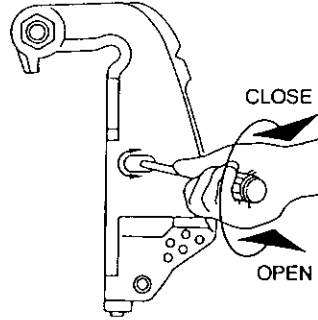


Fig. 53

## 2 Engine-mounted Power Trim & Tilt Switch

In addition to the Power Trim & Tilt switch installed on the Remote Control lever, a similar switch can be found on the lower engine cover.

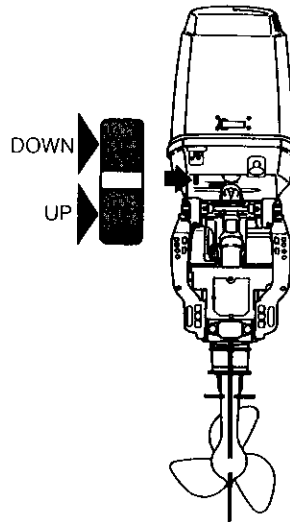


Fig. 54

When tilting up or down, be sure that no finger or hand is placed in between the swivel bracket and stern bracket.

## 12. DISMOUNTING THE ENGINE FROM THE BOAT

- Stop the engine, disconnect the fuel connector, remote control cable and battery cord.
- Remote the engine from the boat. Keep the engine in an upright position until water stops dripping from the gear case. Always carry the engine at upright position.
- If, do not carry the engine at upright position, loosen the drain screw on the carburetors to discharge fuel from them.

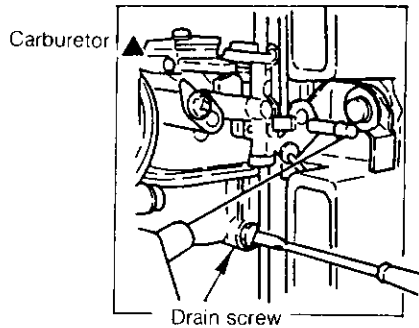


Fig. 55

### CAUTION

Beware of explosion danger. Spilled and vaped gasoline may easily catch fire and explode. Be sure to fully discharge gasoline from the carburetors when transporting the engine. Wipe off spilled gasoline with a rag.

When carrying or putting the engine up for storage, make sure power head side is higher position than the propeller and the side with the oil tank faces down. Otherwise air will enter pump system for the power trim and tilt.

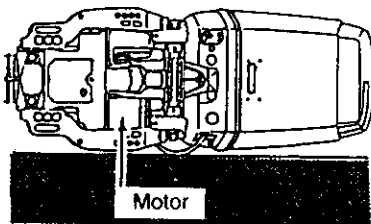


Fig. 56

# 13. ADJUSTMENTS

## 1 Remote Control Lever Load

(Throttle friction adjustment screw)

To adjust the load of the Remote Control lever, turn the throttle friction adjustment screw on the front of the Remote Control Box.

Turn clockwise to increase the load and counter-clockwise to decrease it.

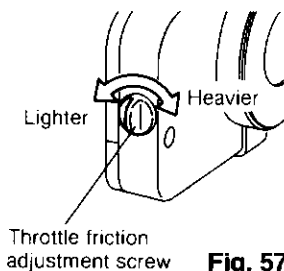


Fig. 57

## 2 Trim Tab Adjustment

If straight-line cruising cannot be achieved, adjust the trim tab located under the anti-ventilation plate.

- If the boat veers toward the right, direct the trim tab towards A.
- If the boat veers toward the left, direct the trim tab towards B.

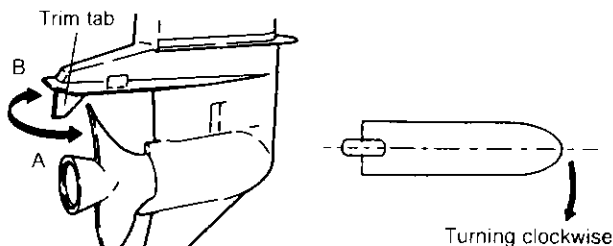


Fig. 58

### NOTES:

1. The trim tab also acts as an anode to prevent electrolytic corrosion. Thus do not paint or grease this part.
2. After adjustment, securely tighten the trim tab fixing bolt.
3. Check for looseness of the bolt and the trim tab at regular intervals. Due to corrosion, the trim tab will over time wear down.



# 14. INSPECTION AND MAINTENANCE

Perform the following checks and inspection before and after use.

## I Daily Inspection

Item	Points to Check	Action
Fuel System	<ul style="list-style-type: none"> <li>● Check the amount of fuel in the tank.</li> <li>● Check for dust or water in the fuel filter.</li> <li>● Check rubber pipes for oil leakage.</li> </ul>	Replenish Clean Replace
Lubrication System	<ul style="list-style-type: none"> <li>● Check the amount of engine oil in the oil tank.</li> <li>● Check for dust or water in the oil filter.</li> </ul>	Replenish Clean
Electrical Equipment	<ul style="list-style-type: none"> <li>● Check the spark plugs for dirt, wear and carbon built-up.                              Spark plugs : NGK B-8HS-10/BR-8HS-10 or                              CHAMPION L-78C/RL-78C (1.0mm gap)</li> <li>● Check if the main switch functions normally.</li> <li>● Check if the battery electrolyte level and specific gravity are normal.</li> <li>● Check for loose connections on battery terminal.</li> <li>● Check if the emergency stop switch functions normally and make sure the lock plate is present.</li> <li>● Check cords for loose connections and damage.</li> </ul>	Clean or replace  Remedy or replace  Replenish or recharge  Retighten or charge  Remedy or replace  Correct or replace
Throttle System	<ul style="list-style-type: none"> <li>● Check if the choke solenoid and valve for the carburetor works normally.</li> <li>● Check if the carburetor and magneto work normally when move the throttle control lever and also check links for looseness.</li> </ul>	Adjust or replace  Correct

Item	Points to Check	Action
Clutch and Propeller System	<ul style="list-style-type: none"> <li>● Check if the clutch engages correctly when operating the Remote Control.</li> <li>● Visually check the propeller for bent or damaged blades.</li> <li>● Check that the propeller nut is tightened and the split pin is present.</li> </ul>	Adjust  Replace  Adjust or replace
Installation of Motor	<ul style="list-style-type: none"> <li>● Check all the motor installation bolts with the boat.</li> <li>● Check the thrust rod installation.</li> </ul>	Tighten Tighten
Power Trim &Tilt	<ul style="list-style-type: none"> <li>● Check working of the tilt up and down of the motor.</li> </ul>	
Cooling Water	<ul style="list-style-type: none"> <li>● Check that cooling water is discharged from the cooling water check port after the engine has started.</li> </ul>	
Tools and Spares	<ul style="list-style-type: none"> <li>● To be ready tools and spare parts for replacing spark plugs, propeller, etc.</li> <li>● Check if the spare rope is provided.</li> </ul>	
Steering Devices	<ul style="list-style-type: none"> <li>● Check working of steering handle and remote control.</li> </ul>	
Other Parts	<ul style="list-style-type: none"> <li>● Check if the anode and trim tab are securely installed.</li> <li>● Check the anode and trim tab for corrosion and deformation.</li> </ul>	Repair if necessary Replace

# 14. INSPECTION AND MAINTENANCE

## ■ Washing with fresh water

When the engine has been used in salt water or polluted water, wash the exterior and flush the cooling passage with fresh water using the flushing plug.

Screw the included flushing plug (hose adapter) into the wash hole on the gear case. Connect a water hose to the flushing plug and flush out with water. (Be sure to secure the water strainer and sub-water strainer on the gear case beforehand.)

Run the engine at low speed with the Remote Control lever set to Neutral to flush out fresh water from the cooling system and in the process remove salt, mud and other foreign particles.

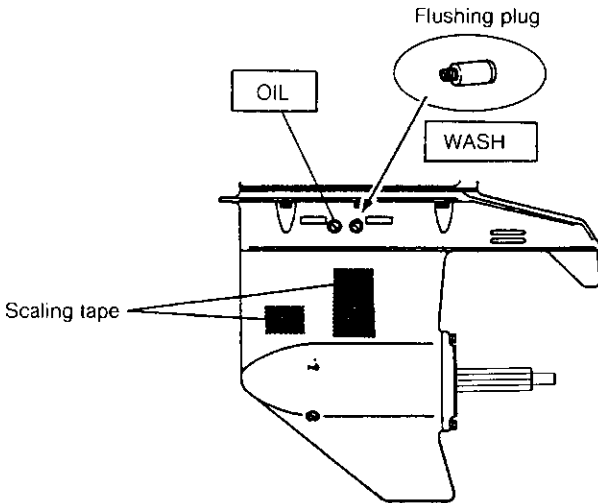


Fig. 59

## WARNING

To prevent rotation of the propeller, remove it before flushing the passage.

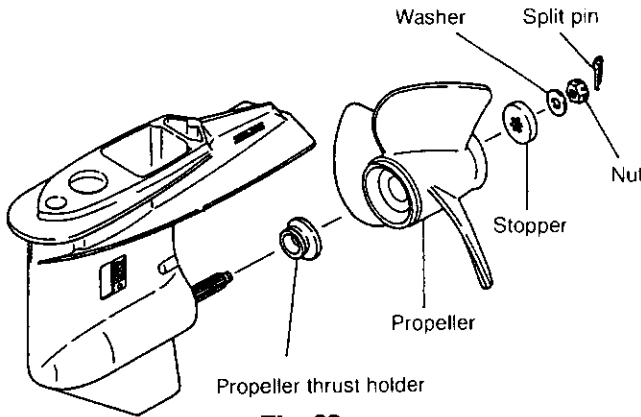
### NOTE:

Run the engine at low speed when flushing the cooling system.

## ① Replace the propeller

A worn or bent propeller will affect engine performance and may cause engine trouble.

1. Pull out the split pin and remove the propeller nut and washer.
2. Remove the propeller by pulling toward you.
3. Apply genuine grease to the propeller shaft before mounting the new propeller.
4. Fit the washer, securely tighten the nut and insert the split pin.

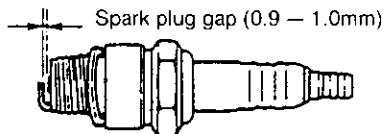


**Fig. 60**

**CAUTION**  
Before removing the propeller, turn the main switch key to OFF, set the remote control lever to Neutral (N), and remove the spark plug caps from the spark plugs.

## ② Replacing the spark plugs

1. Remove the upper engine cover.
2. Remove the spark plug by turning counter-clockwise with the socket wrench (21mm) fitted with the handle. Tap lightly on the spark plugs if they are hard to turn.



**Fig. 61**

## 14. INSPECTION AND MAINTENANCE

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Use spark plugs (NGK B8HS-10/BR8HS-10) or recommended ones (CHAMPION L-78C/RL-78C with gap 1.0).

### CAUTION

Do not touch the high tension cords running from the ignition coil to the spark plugs while the engine is running or it is turned by the electric starter motor, not even for testing the high tension cords or the spark plugs.

The high tension cords and the spark plugs generate very high electric voltage, which can cause a serious electric shock if touched.

## 2 Periodic Inspection Checklist

It is important to inspect and maintain your outboard motor regularly. At each interval on the chart below, be sure to perform the indicated servicing. Maintenance intervals should be determined according to the number of hours or number of months, whichever comes first.

When your outboard motor was used approx. 300 hours, this is a good opportunity to have it serviced and overhauled by your dealer.

Item		Servicing Interval			Action	Remarks
		10 hours or 1 month	50 hours or 3 months	Every 100 hours or 6 months		
Fuel System	* Carburetor	<input type="radio"/>		<input type="radio"/>	Strip, clean and adjust. Adjust idling.	
	Fuel filter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Check and clean.	
	Piping			<input type="radio"/>	Check and clean.	
	Fuel tank	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Clean	
Ignition	Spark plugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Check gaps. Remove carbon deposits.	
	* Ignition timing	<input type="radio"/>		<input type="radio"/>	Adjust timing.	
Starting System	* Starter motor			<input type="radio"/>	Check for salt deposits and battery cable condition.	
	Battery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Installation, fluid quantity, gravity	

Item		Servicing Interval			Action	Remarks
		10 hours or 1 month	50 hours or 3 months	Every 100 hours or 6 months		
Lower Unit	Pro-peller	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Bend of blades damage, wear	
	Gear oil	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Change of oil or replenishment and water leak	
	Water pump		<input type="radio"/>	<input type="radio"/>	Check for Wear or damage	Replace impeller every 12 months
Bolt and Nuts		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Retigten	
Sliding and Rotating Parts. Grease Nipples			<input type="radio"/>	<input type="radio"/>	Apply and pump in grease.	
* Power Trim & Tilt		<input type="radio"/>		<input type="radio"/>	Check power unit oil level and refill. Check function of manual release valve.	
* Engine Oil System	Oil tank	<input type="radio"/>		<input type="radio"/>	Check for leakage. damage, position of clips and filter conditions.	Repair or consult your dealer
	Oil pipe					
	Oil filter					
Outer Equipment		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Check corrosion	
Anode			<input type="radio"/>	<input type="radio"/>	Check corrosion and defomation	Replace

For checking the items marked with \*, consult with the dealer.

### 3 Charging Gear Oil

- ① Remove the oil plugs (upper and lower), and drain the gear oil completely.
- ② Insert the oil tube nozzle into the lower oil plug hole, and squeeze the tube until the oil flows out of the upper plug hole.

**NOTE:**

Use only genuine gear oil or, if not available, an API (American Petroleum Institute) oil grade of GL5, SAE #80 to #90.

Required volume: approx. 900cc (30,41 US fluid oz)

- ③ Install the upper oil plug. Then remove the oil tube nozzle and install the lower oil plug.

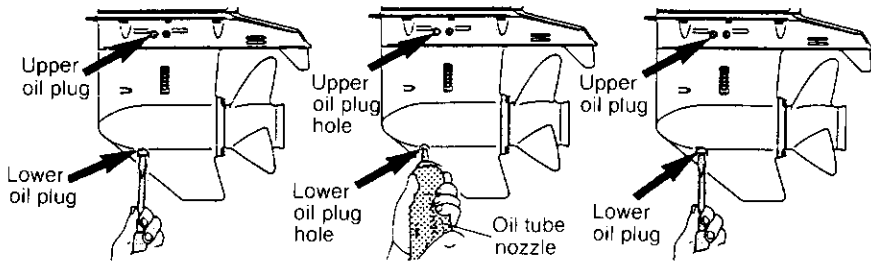


Fig. 62

### 4 Cleaning Tanks and the Filters

- ① Fuel filters are provided inside the fuel tank and on the engine.
  1. Loosen a Fuel Pick-up Elbow and remove it. Then clean the fuel filter.
  2. Clean the filter on the engine after removing the fuel filter case.

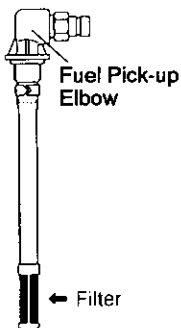


Fig. 63

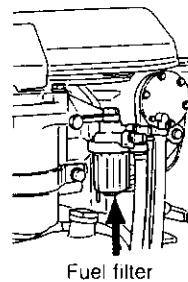


Fig. 64



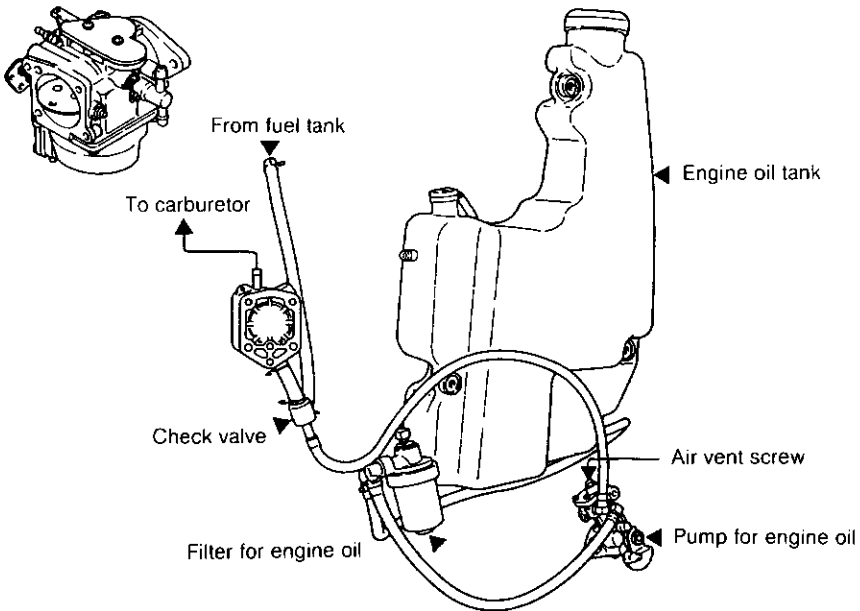
# 14. INSPECTION AND MAINTENANCE

## CLEANING FUEL TANK

Water or dirt in the fuel tank may cause engine trouble.

Clean the tank at specified times or after long time storage (over three months).

- ② Oil filter and oil tank. Check the oil tank and/or filter for entrapped water and dust.
  1. Disconnect all pipes between the oil tank and oil pump of the outboard engine.
  2. Clean out foreign matter.
  3. Refit the pipes to the oil tank and pumps, and then fill up with new engine oil.
  4. For air purging, refer to page 31.



**Fig. 65**

## 5 Checking and Refilling Oil in the Power Trim & Tilt Unit.

### ① Oil level

Check the oil level of the reservoir tank as shown below while the tank is kept in a vertical position. Tilt the engine up to check the oil level. Remove the oil cap by turning counter-clockwise, then check if the oil level reaches the bottom line of the cap hole.

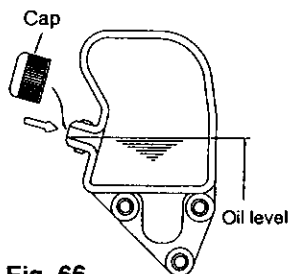


Fig. 66

### ② Recommended oil

Use an automatic transmission fluid approved by GM.  
Recommended oils are as shown below.

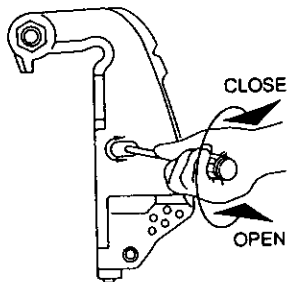
- MOBIL : MOBIL DTE #22, MOBIL ATF 220
- SHELL : SHELL DEXTRON-II, SHELL TELLUS OIL #22 K22
- ESSO : ESSO AUTOMATIC TRANSMISSION FLUID

As shipped from the factory, NISSEKI ATF DEXTRON oil has been used. To prevent oil gelling, do not mix with another brand. Drain the oil completely if another oil brand is to be used.

#### NOTES:

#### POWER TRIM AND TILT AIR BLEEDING PROCEDURE

1. Fully turn the manual valve to "OPEN" direction.
2. Repeat manual tilt up and down over four times.
3. Fully turn the manual valve to "CLOSE" direction at tilt down position.
4. Tilt-up by the power trim & tilt.
5. Check the oil level of the reservoir tank.
6. In case much air is taken in the oil, it may be necessary to repeat the above steps spending several days to completely air bleed.



# 15. WINTER STORAGE

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## WARNING

1. When the motor is out of the water, being transported, or in storage, always remove the positive (+) battery cable to prevent accidental starting of the engine. Accidental starting when the motor is out of the water will cause water pump failure, overheating and damage to the engine due to a lack of cooling water.
2. **DO NOT** disconnect the electrical harness when operating the motor. This model will continue to run and can be started with the electrical harness disconnected. Remove all spark plug connectors from the spark plugs when servicing the engine or propeller.

When your outboard motor is in storage, this is a good opportunity to have it serviced and overhauled by your dealer.

## 1 Engine

- ① Wash the engine exterior and flush the cooling water system thoroughly with fresh water. Let the water drain completely.  
Wipe off any surface water with an oily rag.
- ② Drain all fuel from the fuel pipes, fuel pump and carburetor, and clean these parts.  
Keep in mind that if gasoline is kept in the carburetor for a long time, gum and varnish will be generated, causing the float valve to stick.
- ③ Remove the spark plugs and feed genuine Engine Oil or storage fogging oil through the spark plug holes.  
The oil will be fed into the crank case from the air silencer attached to the carburetors. Turn the engine over several times while feeding the oil into it and make sure it is evenly distributed.
- ④ Apply grease to the propeller shaft.
- ⑤ Change the gear oil in the gear case.
- ⑥ Apply grease to all sliding parts, joints, nuts and bolts.
- ⑦ Use a dry cloth to completely wipe off water and salt from the electrical components.
- ⑧ Remove the fuel connector from the engine.
- ⑨ Stand the engine vertically in a dry place.

---

## **2 Battery**

- ① Disconnect the battery cables.
- ② Clean the exterior of the battery with fresh water or compressed air. Wipe off any chemical deposits, dirt and grease from the battery.
- ③ Apply grease or vaseline to the battery terminals.
- ④ Charge the battery completely before storing it for the winter.
- ⑤ Recharge the battery once a month to prevent it from discharging and the electrolyte from deteriorating.
- ⑥ Store the battery in a dry place.

### **CAUTION**

1. Do not allow the battery to discharge, since it can be damaged by freezing.
2. When storing your outboard for the winter, open up all the water drain holes in the gear case to permit any remaining water to drain out. If a speedometer is installed, disconnect the pickup tube and allow it to drain, then reconnect it after draining. Trapped water may crack the gear case or water pump case as a result of expansion when frozen. Check and replenish the gear case with case specified Gear Oil before storing the motor, to avoid water leakage into the gear case due to a loose lubricant vent plug or grease fill plug. Inspect the gaskets under the lubricant vent and grease plugs, replace them if necessary, and reinstall the plugs.

## **3 Electric Starter Motor**

Coat the pinion gear and shaft of the electric starter motor with grease.

## 16. PRE-SEASON CHECK

---

Have your dealer check the engine before the season starts, or if you prefer, be sure to check the following items yourself:

- ① Check the electrolyte level, and measure the voltage and specific gravity of the battery.

Specific Gravity at 20 °C	Terminal Voltage (V)	Charge Condition
1.120	10.5	Fully discharged
1.160	11.1	1/4 charged
1.210	11.7	1/2 charged
1.250	12.0	3/4 charged
1.280	13.2	Fully charged

- ② Check that the battery is secure and the battery cables installed properly.
- ③ Clean the engine oil filter.
- ④ Purge air in the vinyl pipe connecting the oil tank to the oil pump.
- ⑤ Check that the shift and throttle function properly.  
(Be sure to turn the propeller shaft when checking the shift function or else the shift linkage may be damaged.)

The following steps must be taken when first using the engine after winter storage.

1. In addition to the oil in the oil tank, mix engine oil with the fuel in the following mixing ratio and fill up the fuel tank completely with 25 liters (6.6 U.S. gal.):

Mixing ratio: Gasoline 50:1 Engine oil

Use unleaded gasoline and genuine Outboard Motor Oil. If this oil is not available, use another NMMA TCW3 certified outboard motor oil from another manufacturer.

2. Purge any air from the oil filter assembly.
3. Warm up the engine for 3 minutes with the remote control lever in "NEUTRAL" position.
4. Run the engine for 5 minutes at the slowest speed.
5. Run the engine for 10 minutes at half speed.  
In steps 2 and 3 above, the oil used for winter storage inside the engine will be cleaned out, and optimum performance will be assured.
6. When the full volume, 25 liters (6.6 U.S. gal.), of gasoline mixed with oil has been used, fill up the tank with pure gasoline only.

## 17. CHECKING AFTER STRIKING UNDERWATER OBJECT

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Striking sea bottom or underwater object may severely damage the outboard. Immediately bring the outboard to the dealer and ask for the following checks.

(1) Looseness or damage of power unit installation bolts, gear case and extension case bolts, propeller shaft housing bolts, upper and lower mount rubber bolts and nuts, power trim and tilt bolts, and mount rubber cap bolts.

Ask to tighten loose bolts and nuts, and to replace damaged parts.

(2) Deformation and damage of mount rubber, tilt stopper, thrust rod, gears and clutch, and propeller.

Ask to replace damaged or deformed parts.

## 18. IF THE ENGINE BECOMES SUBMERGED IN WATER

---

After picking up, immediately bring the outboard to your dealer.

Following are the emergency measures to be taken on the submerged outboard.

- ① Take it out of water immediately and wash it with fresh water to remove all traces of salt and dirt.
- ② Remove the spark plugs, and drain the engine completely of water. Turn the flywheel several times, using the starter rope.
- ③ Inject a liberal amount of genuine engine oil or storage fogging oil into the engine through the spark plug holes and the air silencer. Turn the flywheel several times with the starter rope while injecting the oil to make sure the oil is evenly distributed.
- ④ After the above steps, it is still possible for the internal engine parts to be damaged. The electrical components and carburetors will soon deteriorate and become inoperative. Therefore, be sure to have the engine completely overhauled by a service shop immediately.

## **19. PRECAUTIONS IN COLD WEATHER**

When mooring in cold weather at sub-zero temperatures the water in the cooling water pump may freeze and severely damage the pump, impeller, and associated parts. To avoid this, submerge the lower half of the engine into the water, or tilt the engine and operate the electric starter motor for 5 seconds with the stop switch lock plate taken away to allow the water to drain completely.

## **20. TROUBLESHOOTING**

If you encounter a problem with the engine, check the list below and locate the problem you are experiencing. Then follow the suggested remedies.

Do not hesitate to contact your local dealer, as professional advice and assistance is the best way to keep the engine in optimum condition.



# 20. TROUBLESHOOTING

Difficult to start engine	Engine starts, but stops soon	Poor idling	Unstable engine running speed or engine stops	Abnormally high engine speed	Abnormally low engine speed	Cannot obtain high engine speeds	Overheating of engine	Power Trim & Tilt Inoperative	
●	●		●						Empty fuel tank
●	●	●	●		●	●	●		Incorrect connection of fuel system
●	●	●	●		●	●	●		Air enters fuel line
●	●	●	●		●	●	●		Deformed or damaged fuel pipe
●	●	●	●		●	●	●		Closed air vent on fuel tank cap
●	●	●	●		●	●	●		Clogged fuel filter, fuel pump or carburetor
		●	●		●	●	●		Use of improper engine oil
●	●	●	●			●	●		Use of improper gasoline
●	●								Excessive supply of gasoline
●	●	●	●		●	●	●		Poor carburetor adjustment
●	●	●	●			●	●		Recirculation pipe broken
●	●	●	●		●	●	●		Use of non-specified spark plugs
●	●	●	●		●	●			Dirt or carbon deposits on spark plugs
●	●	●	●		●	●			No sparks or weak sparks
			●		●	●	●		Insufficient cooling water flow
		●	●			●	●		Faulty thermostat
				●		●	●		Propeller cavitation
				●	●	●	●		Incorrect propeller selection
		●		●	●	●	●		Damaged or bent propeller
				●	●	●	●		Unbalanced load in boat
				●		●	●		Transom too high
					●	●	●		Transom too low
●	●	●			●	●	●		Incorrect adjustment of throttle link
●	●	●			●	●	●		Incorrect adjustment of ignition timing
●									Insufficient battery capacity, loose terminals, corrosion
●									Faulty ignition switch or Power Trim & Tilt switch
●									Remote Control lever not set to Neutral
●									Stop switch lock plate not fitted
●								●	Incorrect wiring, disconnected or broken wire
●									Starter motor failure
								●	Air in power trim & tilt unit

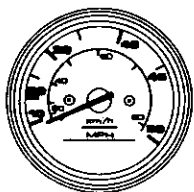
## 21. ACCESSORIES

Name		Q' Ty	Remark
Servicing Tools	Tool Bag	1	
	Socket Wrench (21mm)	1	
	Socket Wrench (10 × 13)	1	
	Socket Wrench Handle	1	
	Pliers	1	
	Screwdriver (Phillips-type and flat head)	1	Adapter-type
	Wrench (7 × 8mm)	1	
Spare Parts	Emergency starter rope (1,600mm)	1	
	Spark Plug	2	NGK B8HS-10 (or BR 8HS-10)
	Slit Pin	1	Diameter × length= 3 × 25mm
Parts Packaged with Engine ※	Bracket Fixing Bolts	4	12mm
	Bracket Fixing Nuts	4	12mm
	Washers A, B	4 each	A (large), B (small)
	Fuel Tank (with primer bulb)	1	Removable
	Flushing Plug	1	For flushing cooling water passage
	Remote Control Box	1	
	Drag Link	1	
	Multi-purpose Meter	1	
	Meter Harness	1	
Lead Wire for Meter	1		

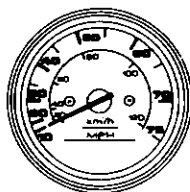
※ : Not included as standard accessories in some markets.

## 22. OPTIONAL ACCESSORIES

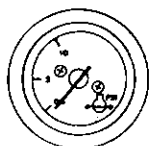
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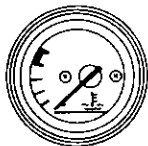
1. Speedometer  
(50MPH)



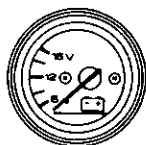
2. Speedometer  
(75MPH)



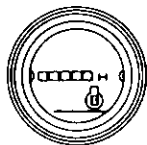
3. Water Pressure  
Meter



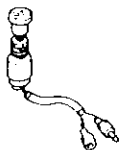
4. Water Temperature  
Meter



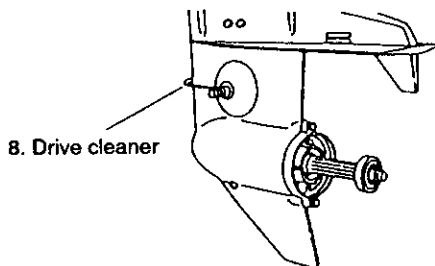
5. Voltmeter



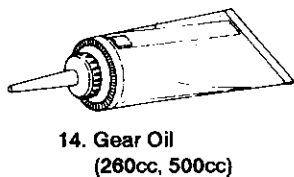
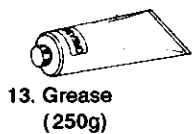
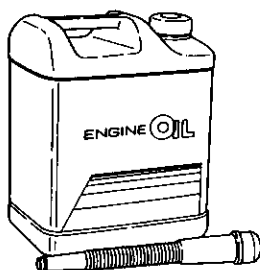
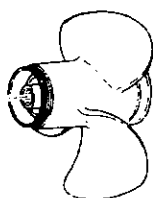
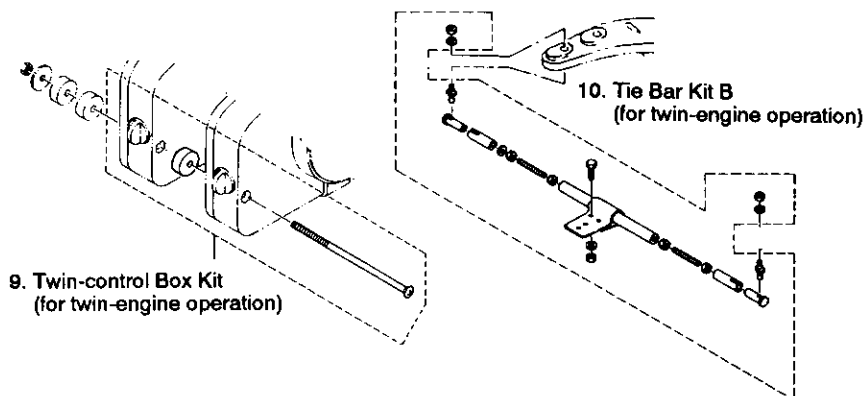
6. Hour Meter  
(engine operation  
hour counter)



7. Meter Lamp Switch



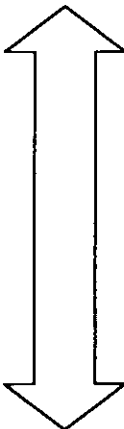
8. Drive cleaner



## 23. PROPELLER SELECTION

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To ensure optimum performance, the propeller should match the boat type and its load.

 <p>Heavier Load boat</p> <p>Lighter Load boat</p>	Mark
	A11
	A13
	A15
	A17 or V1500
	A19 or V1700
	A21 or V1700
	A23 or V1900
	A25 or V2100

### PROPELLER

Use a genuine propeller.

For a stainless propeller, use a genuine propeller.

A propeller must be selected so that the engine rpm measured at wide open throttle while cruising is within the recommended range, 5,200 to 5,700 rpm.

# 24. WIRING DIAGRAM

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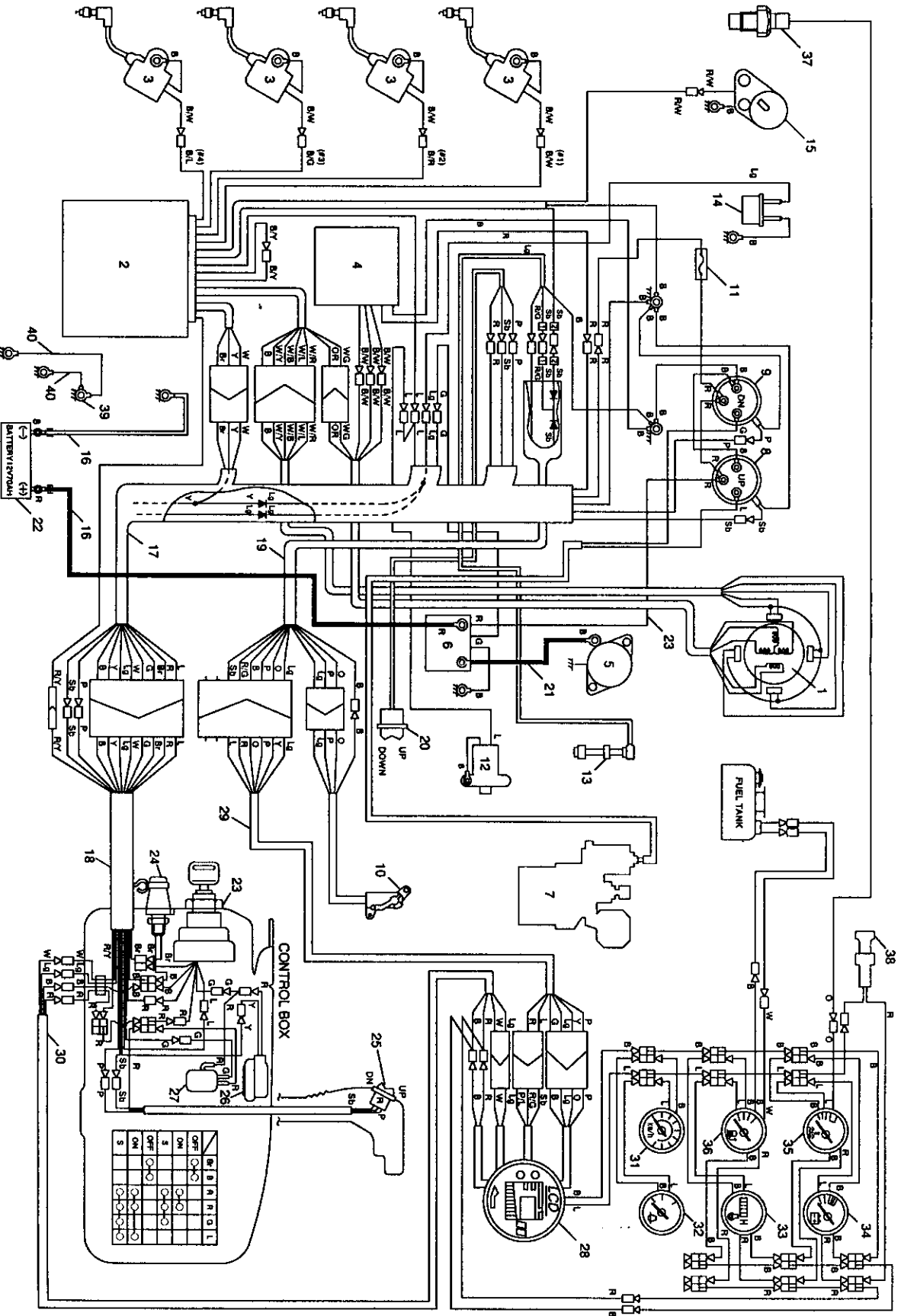
- |  |  |
|--|--|
| 1 Magneto                              | 26 Overheat buzzer                           |
| 2 C.D. Unit                            | 27 Neutral switch                            |
| 3 Ignition coil                        | 28 Multi-purpose meter                       |
| 4 Rectifier complete                   | 29 Meter cord assembly                       |
| 5 Starter motor                        | 30 Meter lead wire                           |
| 6 Starter solenoid                     | 31 Speedometer (option)                      |
| 7 Power trim & tilt                    | 32 Water pressure meter (option)             |
| 8 Solenoid switch A, power trim & tilt | 33 Hour meter (option)                       |
| 9 Solenoid switch B, power trim & tilt | 34 Voltmeter (option)                        |
| 10 Trim sender                         | 35 Cooling water temperature meter (option)  |
| 11 Fuse wire                           | 36 Fuel meter (option)                       |
| 12 Choke solenoid                      | 37 Cooling water temperature sensor (option) |
| 13 Oil level sensor                    | 38 Meter lamp switch (option)                |
| 14 Overheat sensor                     | 39 Electric bracket                          |
| 15 Water pressure switch               | 40 Ground wire                               |
| 16 Battery cable                       |  |
| 17 Cord harness A                      |  |
| 18 Cord harness B                      |  |
| 19 Cord harness C                      |  |
| 20 Power trim & tilt switch B          |  |
| 21 Starter cord                        |  |
| 22 Battery (Provided on the market)    |  |
| 23 Main switch                         |  |
| 24 Stop switch                         |  |
| 25 Power trim & tilt switch            |  |

## Colour of Cord

- B Black
- Br Brown
- G Green
- L Blue
- Lg Light green
- Or Orange
- P Pink
- R Red
- Sb Sky Blue
- W White
- Y Yellow

Note: ( / ) means stripe cord colour

エレクトロニクスキット WIRING DIAGRAM 115A2





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