



ENGLISH

D27 / D36-SERIES DIESEL OUTBOARD MOTOR

OPERATION MANUAL

YANMAR OPERATION MANUAL for Diesel Outboard Motor

Thank you for purchasing a Yanmar product.

This Operation Manual tells you how to operate and service your new Yanmar Diesel Outboard Motor. Please read it before using the Diesel Outboard Motor to insure proper handling and operation. Follow the instructions carefully to keep your engine in the best running condition. If you have any question concerning this manual, or any suggestions, please contact your nearest Yanmar dealer.

This Operation Manual deals with the main points for operation of the Diesel Outboard Motor.

In order to insure safe working conditions, be sure to read the precaution sections for safe operation of the Diesel Outboard Motor.

Pay special attention to statements preceded by the following words:



WARNING:

Indicates a strong possibility of severe personal injury or loss of life if instructions are not followed.



CAUTION:

Indicates a possibility of personal injury or equipment damage if instructions are not followed.

Note:

Gives helpful information.

If a problem should arise, or if you have any questions about the engine, consult an authorized Yanmar dealer.



WARNING:

The Yanmar Diesel Outboard Motor is designed to give safe and dependable service provided that it is operated according to instructions.

Read and understand the Operation Manual before operating the Diesel Outboard Motor. Failure to do so could result in personal injury or equipment damage.

TIPS ON SAFETY

TIPS ON SAFETY

For your safety and the safety of others, pay special attention to these precautions.



WARNING:

1. PREVENTING FIRES

Never add fuel to the fuel tank while the engine is running. Wipe away all fuel spills with a clean cloth. Keep gasoline, kerosene, matches, other explosives and inflammables away from the engine, since the temperature around the exhaust muffler is very high during operation.

- To prevent fire hazards and to provide adequate ventilation, keep the engine at least 3 ft (1 m) away from the building and other equipment during operation.

2. PREVENTING EXHAUST GAS INHALATION

- Exhaust gas contains poisonous carbon monoxide. Breathing exhaust can cause loss of consciousness and may lead to death.
- If you run the engine in an area that is confined, or even partially enclosed, the air can become contaminated with a dangerous amount of exhaust gas. To keep exhaust gas from building up, provide adequate ventilation.

3. PREVENTING BURNS

- The engine and exhaust system become very hot during operation and remain hot for a while after stopping. Contact with hot engine components can cause burns and may ignite some materials.
- Avoid touching a hot engine or exhaust system.
- Allow the engine to cool before performing maintenance or transporting.

4. OTHER SAFETY TIPS

- Know how to stop the engine quickly and understand operation of all the controls. Never permit anyone to operate the engine without proper instructions.
- Do not operate under the influence of alcohol.
- Keep children and pets away from the engine when it is in operation.
- Keep away from rotating parts while the engine is running.
- When the engine is coupled with a machine, be sure to provide suitable covers for the belt, coupling and other dangerous parts.
- Work according to the rules and regulations of work area. When working with others, be sure to maintain good communication with everyone else.
- Do not exceed the boat manufacturer's power recommendation, and be sure that the outboard motor is properly mounted.
- Stop the engine immediately if any one falls overboard.
- Do not run the motor while the boat is near anyone in the water.
- Before operating the outboard motor, familiarize yourself with all laws and regulations relating to boating and the use of outboard motors.
- Do not attempt to modify the outboard motor.
- Always wear a life-jacket when on board.
- Do not remove any guards, labels, shields, covers or safety devices; they are installed for your safety.
- Use correct tools and equipment.

5. WHEN CHARGING THE BATTERY

- Battery electrolyte contains sulphuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and get prompt medical attention, especially if your eyes are affected.
- Batteries generate hydrogen gas which can be highly explosive. Do not smoke or allow flames or sparks near a battery, especially during charging.
- Charge the battery in a fully ventilated place.

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1. ENGINE SPECIFICATIONS

Specifications

[P] : power Tilt

Model		D27		
Type		AXLE[P]	AXLLE[P]	AXULE[P]
Main spec.	Overall length	730 mm		
	Overall width	432 mm		
	Overall height	1380 mm	1443 mm	1505 mm
	Transom height	560 mm	623 mm	685 mm
	Dry weight	94 kg	95 kg	96 kg
Max. Output/Engine PPM		27PS/4500rpm (19.9kW/4500rpm)		
Engine	Type	4-cycle, water cooled, vertical crankshaft diesel engine		
	No. of cylinder	3		
	Cyl. dia.x stroke	70×70 mm		
	Displacement	808 cc (49 cu. in)		
	Combustion system	Direct injection by unit injector		
	Valve driving	Timing-belt driving/OHC system		
	Cooling system	Direct sea-water cooling by rubber impeller pump		
	Starting system	Electric with emergency rope starting		
Electrical Equipment	Dynamo capacity	12V, 10A		
	Starting motor capacity	12V, 1.2kw		
	Applicable battery (to be supplied by customer)	12V, 100AH		
Steering System		Bar handle or Remote control		
Speed control system		Bar handle or Remote control		
Number of tilting step/ Tilting angle		4 steps/7°~23° (from transom plate)		
Max. Tilt-up angle		76° (from transom plate)		
Reduction ratio		1.846 (for both forward and reverse)		
Clutch		Dog type (by clutch lever operation)		
Propeller	Type	3-blade, spline coupling, rubber press-in type		
	Direction of rotation	Clockwise (viewed from propeller)		
	Propeller size (to be supplied by customer)	3-10½"x 9, 10, 11, 12, 9½, 10½, 11½, 12½, 13"		
Lubrication system	Engine	Forced lubrication with trochoid pump		
	Lower unit	Oil bath		
Lube-oil	Engine	3.0ℓ (Effective capacity: 1.3ℓ)		
	Lower unit	0.55ℓ		
Kind of gear oil	Engine	Quality API-CD Viscosity : SAE 15W40 (Recommended)		
	Lower unit	Gear oil API #90 - SAE 80W90 (Recommended)		
Type of f.o. tank/capacity		Portable type/24ℓ		

* The above specifications are subject to change without prior notice.

* The specifications of the photographs in this manual may differ in some parts from the standard specifications.

Specifications

Model		D27		
Type		AYLE	AYLLE	AYULE
Main spec.	Overall length	1128 mm (When folding the handle 730)		
	Overall width	432 mm		
	Overall height	1434 mm	1493 mm	1559 mm
	Transom height	560 mm	623 mm	685 mm
	Dry weight	95 kg	96 kg	97 kg
Max. Output/Engine PPM		27PS/4500rpm (19.9kW/4500rpm)		
Engine	Type	4-cycle, water cooled, vertical crankshaft diesel engine		
	No. of cylinder	3		
	Cyl. dia.x stroke	70×70 mm		
	Displacement	808 cc (49 cu. in.)		
	Combustion system	Direct injection		
	Valve driving	Timing-belt driving/OHC system		
	Cooling system	Direct sea-water cooling by rubber impeller pump		
	Starting system	Recoil starting		
Electrical Equipment	Dynamo capacity	Option (12V, 10A)		
	Starting motor capacity	Option (12V, 1.2kw)		
	Applicable battery (to be supplied by customer)	Option (12V, 100 AH)		
Steering System		Bar handle or Remote control		
Speed control system		Bar handle or Remote control		
Number of tilting step/Tilting angle		4 steps/7°~23° (from transom plate)		
Max. Tilt-up angle		76° (from transom plate)		
Reduction ratio		1.846 (for both forward and reverse)		
Clutch		Dog type (by clutch lever operation)		
Propeller	Type	3-blade, spline coupling, rubber press-in type		
	Direction of rotation	Clockwise (viewed from propeller)		
	Propeller size (to be supplied by customer)	3-10 1/2" x 9, 10, 11, 12, 9 1/2, 10 1/2, 11 1/2, 12 1/2, 13"		
Lubrication system	Engine	Forced lubrication with trochoid pump		
	Lower unit	Oil bath		
Lube-oil	Engine	3.0ℓ (Effective capacity:1.3ℓ)		
	Lower unit	0.55ℓ		
Kind of gear oil	Engine	Quality API-CD Viscosity : SAE 15W40 (Recommended)		
	Lower unit	Gear oil API #90 · SAE 80W90 (Recommended)		
Type of f.o. tank/capacity		Portable type/24ℓ		

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Specifications

Model		D27		
Type		AYL	AYLL	AYUL
Main spec.	Overall length	1128 mm (When folding the handle 730)		
	Overall width	432 mm		
	Overall height	1417 mm	1480 mm	1540 mm
	Transom height	560 mm	623 mm	685 mm
	Dry weight	92 kg	93 kg	94 kg
Max. Output/Engine PPM		27PS/4500rpm (19.9kW/4500rpm)		
Engine	Type	4-cycle, water cooled, vertical crankshaft diesel engine		
	No. of cylinder	3		
	Cyl. dia.x stroke	70×70 mm		
	Displacement	808 cc (49 cu. in)		
	Combustion system	Direct injection		
	Valve driving	Timing-belt driving/OHC system		
	Cooling system	Direct sea-water cooling by rubber impeller pump		
	Starting system	Recoil starting		
Electrical Equipment	Dynamo capacity	Option (12V, 7A)		
	Starting motor capacity	Option (12V, 1.2 kw)		
	Applicable battery (to be supplied by customer)	Option (12V, 100 AH)		
Steering System		Bar handle		
Speed control system		Bar handle		
Number of tilting step/ Tilting angle		4 steps/7°~23° (from transom plate)		
Max. Tilt-up angle		76° (from transom plate)		
Reduction ratio		1.846 (for both forward and reverse)		
Clutch		Dog type (by clutch lever operation)		
Propeller	Type	3-blade, spline coupling, rubber press-in type		
	Direction of rotation	Clockwise (viewed from propeller)		
	Propeller size (to be supplied by customer)	3-10 1/2"x 9, 10, 11, 12, 9 1/2, 10 1/2, 11 1/2, 12 1/2, 13"		
Lubrication system	Engine	Forced lubrication with trochoid pump		
	Lower unit	Oil bath		
Lube-oil	Engine	3.0ℓ (Effective capacity: 1.3ℓ)		
	Lower unit	0.55ℓ		
Kind of gear oil	Engine	Quality API-CD Viscosity : SAE 15W40 (Recommended)		
	Lower unit	Gear oil API #90・SAE 80W90 (Recommended)		
Type of f.o. tank/capacity		Portable type/24ℓ		

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Specifications

[P] : power Tilt

Model		D36		
Type		AXLE [P]	AXLLE [P]	AXULE [P]
Main spec.	Overall length	759 mm		
	Overall width	449 mm		
	Overall height	1438 mm	1501 mm	1563 mm
	Transom height	560 mm	623 mm	685 mm
	Dry weight	120 kg	121 kg	122 kg
Max. Output/Engine PPM		36PS/4500rpm (26.5kW/4500rpm)		
Engine	Type	4-cycle, water cooled, vertical crankshaft diesel engine		
	No. of cylinder	3		
	Cyl. dia.x stroke	82×70 mm		
	Displacement	1109 cc (68 cu. in.)		
	Combustion system	Direct injection by unit injector		
	Valve driving	Timing-belt driving/OHC system		
	Cooling system	Direct sea-water cooling by rubber impeller pump		
	Starting system	Electric with emergency rope starting		
Electrical Equipment	Dynamo capacity	12V, 10A		
	Starting motor capacity	12V, 1.4 kw		
	Applicable battery (to be supplied by customer)	12V, 100AH		
Steering System		Bar handle or Remote control		
Speed control system		Bar handle or Remote control		
Number of tilting step/ Tilting angle		4 steps/ 8°~20°(from transom plate)		
Max. Tilt-up angle		76° (from transom plate)		
Reduction ratio		1.846 (for both forward and reverse)		
Clutch		Dog type (by clutch lever operation)		
Propeller	Type	3-blade, spline coupling, rubber press-in type		
	Direction of rotation	Clockwise (viewed from propeller)		
	Propeller size (to be supplied by customer)	3-11½"×9, 10, 11, 12, 13, 14"		
Lubrication system	Engine	Forced lubrication with trochoid pump		
	Lower unit	Oil bath		
Lube-oil	Engine	3.0ℓ (Effective capacity: 1.3ℓ)		
	Lower unit	0.55ℓ		
Kind of gear oil	Engine	Quality API-CD Viscosity: SAE 15W40 (Recommended)		
	Lower unit	Gear oil API #90・SAE 80W90 (Recommended)		
Type of f.o. tank/capacity		Portable type/24ℓ		

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Specifications

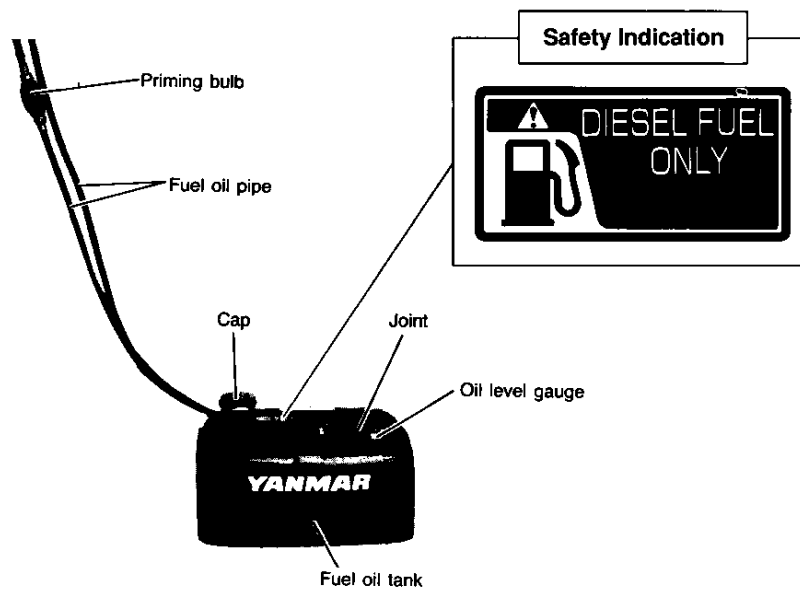
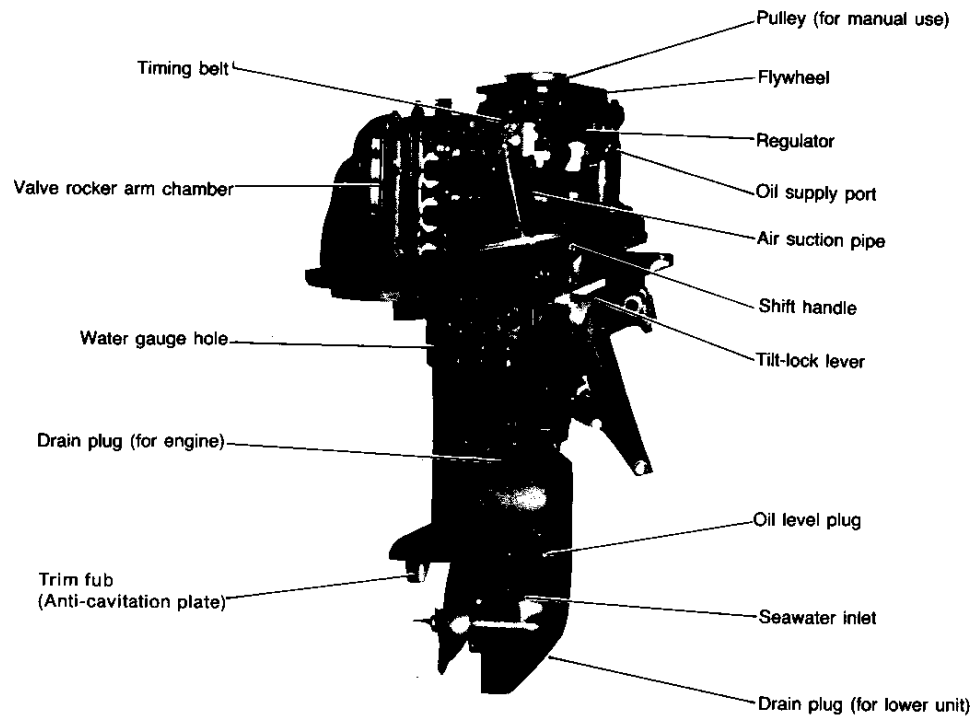
[P] : power Tilt

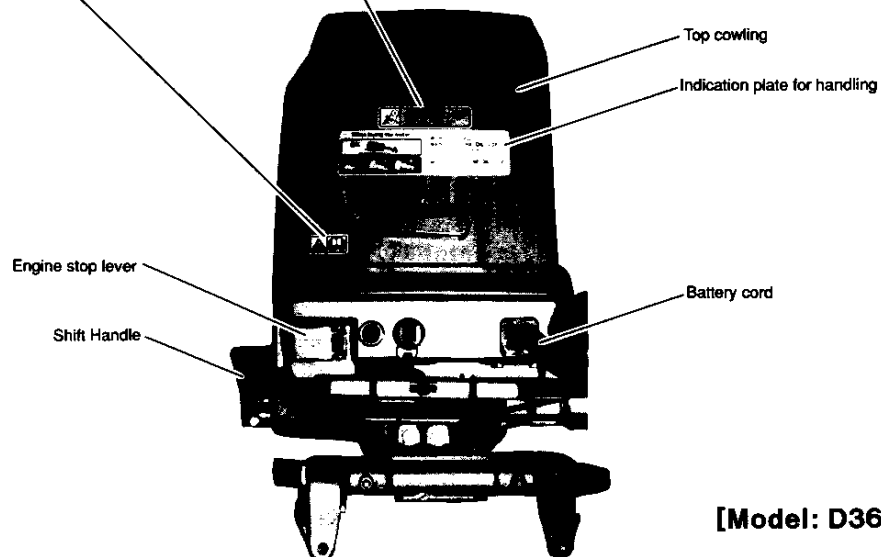
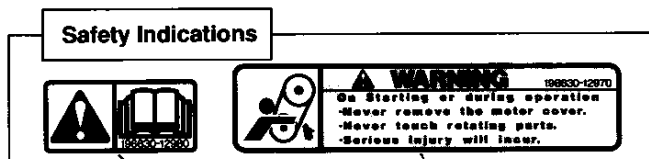
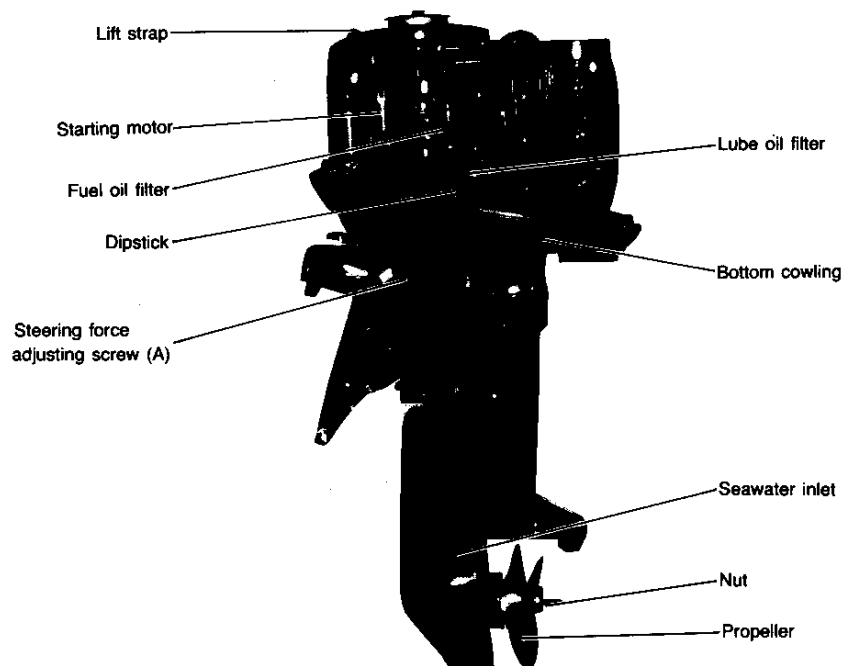
Model		D36		
Type		AYLE[P]	AYLLE[P]	AYULE[P]
Main spec.	Overall length	1157 mm (When folding the handle 759)		
	Overall width	437 mm		
	Overall height	1434 mm	1493 mm	1559 mm
	Transom height	560 mm	623 mm	685 mm
	Dry weight	116 kg	117 kg	118 kg
Max. Output/Engine PPM		36 PS/4500rpm (26.5kW/4500rpm)		
Engine	Type	4-cycle, water cooled, vertical crankshaft diesel engine		
	No. of cylinder	3		
	Cyl. dia.x stroke	82 × 70 mm		
	Displacement	1109 cc (68 cu. in)		
	Combustion system	Direct injection by unit injector		
	Valve driving	Timing-belt driving/OHC system		
	Cooling system	Direct sea-water cooling by rubber impeller pump		
	Starting system	Electric with emergency rope starting		
Electrical Equipment	Dynamo capacity	12V, 10A		
	Starting motor capacity	12V, 1.4 kw		
	Applicable battery (to be supplied by customer)	12V, 100AH		
Steering System		Bar handle or Remote control		
Speed control system		Bar handle or Remote control		
Number of tilting step/ Tilting angle		4 steps/8°~20° (from transom plate)		
Max. Tilt-up angle		76° (from transom plate)		
Reduction ratio		1.846 (for both forward and reverse)		
Clutch		Dog type (by clutch lever operation)		
Propeller	Type	3-blade, spline coupling, rubber press-in type		
	Direction of rotation	Clockwise (viewed from propeller)		
	Propeller size (to be supplied by customer)	3-11½" × 9, 10, 11, 12, 13, 14"		
Lubrication system	Engine	Forced lubrication with trochoid pump		
	Lower unit	Oil bath		
Lube-oil	Engine	3.0ℓ (Effective capacity: 1.3ℓ)		
	Lower unit	0.55ℓ		
Kind of gear oil	Engine	Quality API-CD Viscosity : SAE 15W40 (Recommended)		
	Lower unit	Gear oil API #90 · SAE 80W90 (Recommended)		
Type of f.o. tank/capacity		Portable type/24ℓ		

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* The specifications of the photographs in this manual may differ in some parts from the standard specifications.

2. DESCRIPTION OF PARTS





[Model: D36 AXLE]

3. CAUTIONS FOR HANDING

Be sure to observe the follow when using Yanmar Diesel Outboard Motors:

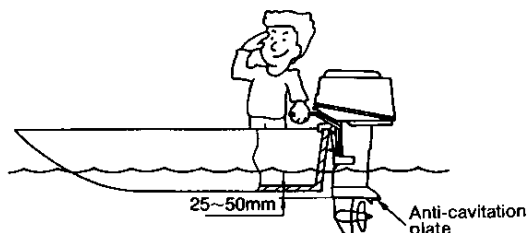
- (1) Never hold the outboard only by the handle bracket. The handle bracket may break due to stress or impact. Use the optional carrying handle if your D27Y is equipped with it.
- (2) Never drop the outboard.
The outboard may break irreparably.
- (3) Clamp the outboard firmly to the transom.
Failure to do this will increase impacts and vibrations during fast acceleration and deceleration, and could damage the outboard unit.
- (4) Never cut off the fuel limiting wire.
This will cause engine performance to drop and the engine's life will be shortened.
- (5) Don't operate the outboard with the tilt lock released. (Some types are not equipped with the tilt lock lever depending on their specifications.) (This is only allowed for ahead operation when cruising in shallow waters.)
If you do this, the propeller will spring up when switch to astern. This distorts the propeller and increases vibrations. The boat speed will suffer.
- (6) Never shift the clutch to ahead or astern during full speed cruising. Also, avoid quick shifting from ahead to astern or astern to ahead.
The clutch may be broken and fail to control the engine.
- (7) Never apply sharp load changes during operation.
Do not repeat the max. ⇔ min. speed operation.
The engine parts may be broken and the engine's life will be shortened.
- (8) Never let obstacles strike the propeller, and never use a boat with a distorted propeller.
Vibrations will increase, the engine will be overloaded and performance will drop largely.
- (9) Never turn off the key switch during operation.
If you do, the warning lamps will not work so you will not be able to identify engine trouble.
Also, turning of the key switch back ON will break the regulator.
- (10) Never connect the plus and minus battery cables in reverse.
The regulator will break, the starting motor will run in reverse and the engine will be damaged.
- (11) Place the outboard motor correctly as specified for storage, or lube oil spilt will cause engine seizure.

4. INSTALLATION

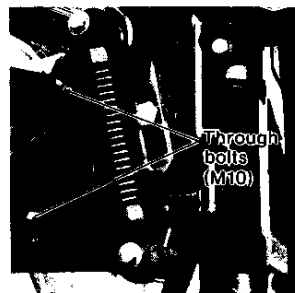
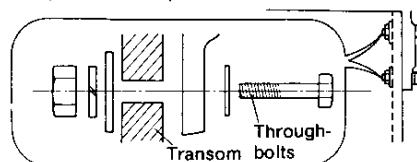
4-1 Installation Procedure

Attach the outboard motor to your boat according to the following procedure.

- 1) Attach the outboard motor so that the anti-cavitation plate is located 25~50mm below the bottom of the boat.

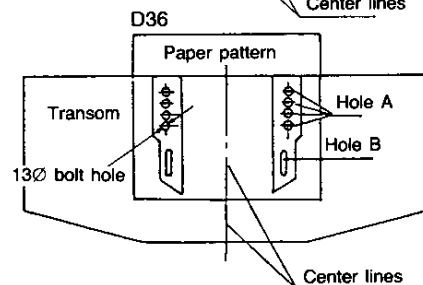
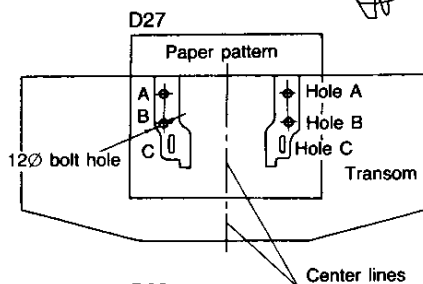
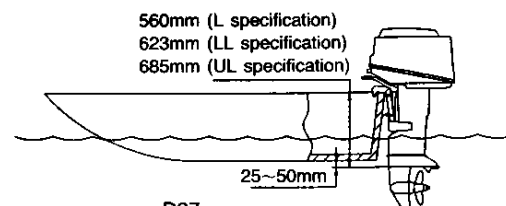


- 2) When attaching outboard motor to the transom, be sure to clamp it by four through bolts (D27---M10, D36---M12)



- 3) How to use paper pattern

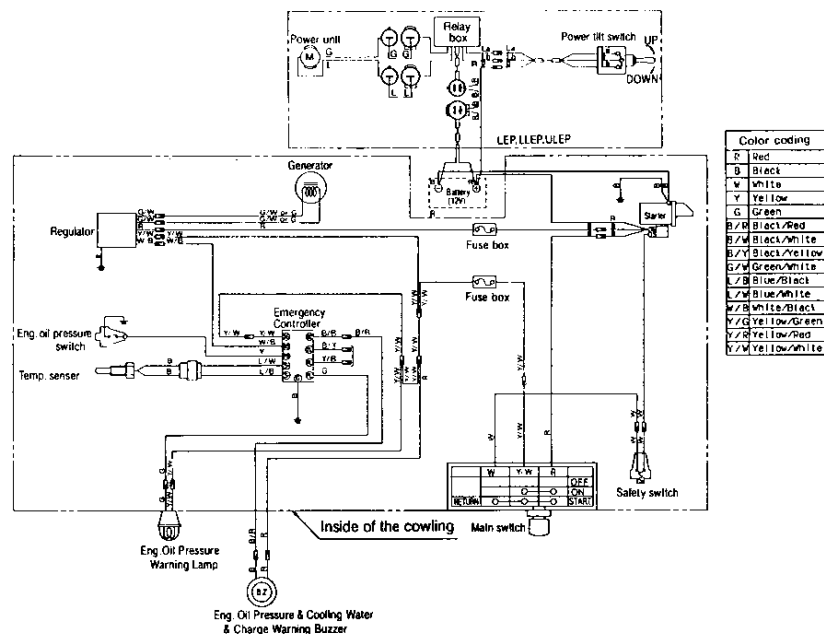
- ① Mark the transom center line.
- ② Determine the transom upper limit (L-size) so that the interval between the bottom of the boat and the anti-cavitation plate is 25~50mm.
- ③ When the position of transom upper limit and the center line are determined, stick the paper pattern on the transom so as to match the upper line and center line on the paper pattern with the corresponding lines on the transom. Then, drill 12mm bolt holes. (13mm bolt hole-D36)
- ④ Fit M10 bolts into each of the A holes (right and left) and into the B holes (right and left); or fit the bolts into the A holes (right and left) and C holes (right and left). (D36 - M12 Bolt)



CAUTION

Install the outboard motor securely. Loosely mounted outboard motor can result in accidental loss of the motor and damage and injury to the equipment and personer.

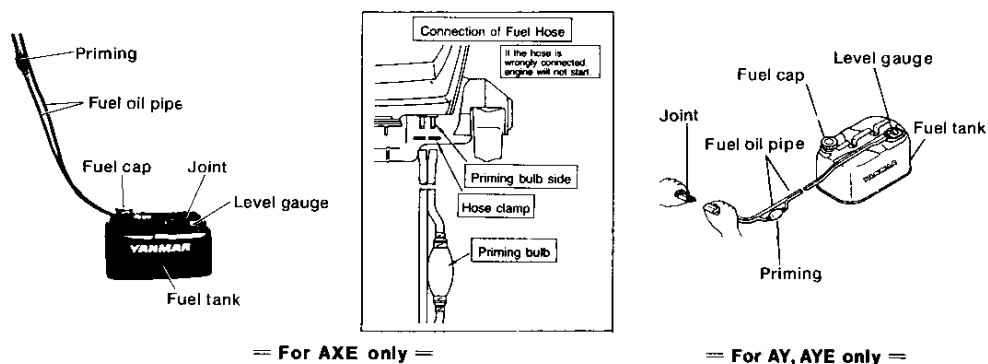
4) Wiring diagram (Standard, for AXE[P], AYE type only)



Optioned wiring diagrams (A,B,C,D type) are attached on the last pages.

- 5) Connect the fuel hose securely to the outboard motor and bleed air.
After operation, make sure that there is no air left in the fuel filter. — Refer to page 13.

(Hose connection)



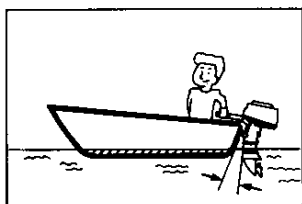
== For AXE only ==

== For AY, AYE only ==

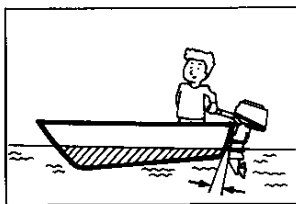
- 1) Insert the fuel hose joint securely into the fuel tank joint, and lock it with the lock connector.
- 2) Insert it into inlet pipe of the outboard motor and fix it securely with the hose band. (Connect it as indicated on the tag "Connection of Fuel Hose")

4-2 Cautions for installation

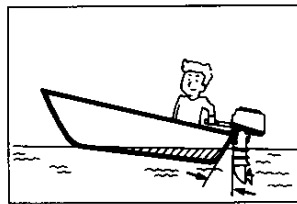
- 1) After installation, confirm that steering in right and left directions, tilt-up and tilt-lock are done properly with ease. — Refer to page 25.
(If the rudder or a part of the engine hits the hull to make steering or tilt-lock impossible, remodel the hull of your boat.)
- 2) Tilt up the outboard motor and move the rudder right and left to see if undue force is applied on the fuel hose or battery cable or if they hit a corner.
- 3) Select a propeller that makes the engine speed of 4400 ~ 4600 rpm at full speed run without load.
- 4) Set the thrust rod position so that the boat runs in the proper trim.



○ Proper trim angle



✗ Trim angle too small
(Boat tends to plow)



✗ Trim angle too large
(Boat tends to squat)

- 5) In case trim during running is still too large to control even when the adjustments in 3) and 4) have been done, remodel the hull of your boat.

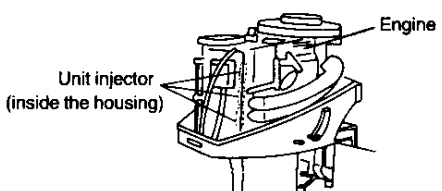
5. POINTS TO BE OBSERVED

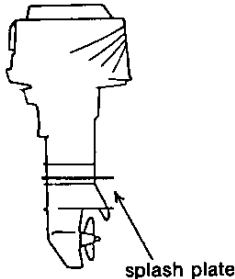
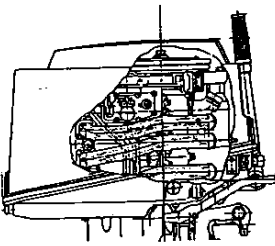
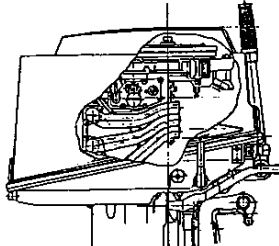
5-1 Cautions for handling of diesel outboard motor

Be sure to observe the following points in order to extend the life of your outboard motor.

	Points to be Observed	Instructions and Possible Troubles if Not Observed
1	Be sure to conduct break-in operation for your new engine.	At first, as the parts of a new engine will not work together smoothly, undue force on the engine may shorten its life. Be sure to avoid forcible operation 20 hrs after installation.
2	(1) Use high-speed diesel oil (2) Be sure to replace the fuel oil filter element after 400 hr. operation or every 6 months. (If water or dust becomes much accumulation on it before 400 hr., replace it earlier).	Never use gasoline, which may cause explosion or seizure. After long hours of use, the filter will be clogged worsening fuel flow, and resulting in troubles with engine. If it is used as it is, premature deterioration in the injection system may occur.
3	Use either of the following lube oils for your engine: API-Class CD SAE No. 15W40 (Recommended) Be sure to supply or replace lube oil for engine periodically.	If oils other than recommended are used, your engine life will be shortened due to, for example, sticking of piston, seizure of piston and liner, abnormal wear of moving parts etc. Check and supply of lube-oil for engine Every day Replacement of lube-oil 1st time After 50 hrs. 2nd time and thereafter Every 200 hrs. Replacement of filter element 1st time After 50 hrs. 2nd time and thereafter Every 400 hrs. ⚠ CAUTION ● Reinstall the oil filler cap after complete the replacement of lube oil. ● Use of old lube oil will make engine parts wear fast and cause engine troubles. ● The oil pressure drops if the element is old or clogged with dust. This causes main bearing seizures and any dust in the bearing makes it wear faster.
4	Use gear oil No. 80W90 for lower unit. (Recommend)	Use of oils other than those recommended may shorten the life of lower unit due to, for example, wear of gear, clutch and bearing.

	Points to be Observed	Instructions and Possible Troubles If Not Observed
4	For details, refer to page 11. Be sure to replace lube oil for lower unit periodically.	Replacement of lube oil for lower unit. 1st time After 50 hrs. 2nd time and thereafter Every 100 hrs. <i>NOTE: Negligence of lube oil replacement will cause seawater comes into the gear case and shorten the life of gears and bearing considerably.</i>
5	(1) After starting the engine, make sure that the lube oil warning lamp goes off. (For AXE[P], AYE only) (2) After starting the engine, make sure that cooling water comes out of the water gauge hole (3) Make sure, from time to time during the cruising that cooling water is being discharged.	If it does not go off, check the level of engine oil. When no water is being emitted from the hole, this often indicates clogging of the seawater inlet by PVA sheet, etc. Tilt up the engine and check the inlet. If water does not come out, the engine will be seized.
6	Be sure to conduct warm-up operation.	To spread lube oil sufficiently into every part of the engine, conduct warm-up operation for 3 min. after starting. Insufficient warm-up operation will cause abnormal wear or seizure of moving parts.
7	Do not operate the starting motor continuously for longer than 10 seconds. When restarting, wait for 10 seconds. (For AXE[P], AYE only)	Operation for longer time (continuous operation for longer than 10 seconds) will damage the starting motor.
8	Do not operate the engine continuously at low speed for longer than 3 hrs. Be sure to do free acceleration once, 2 ~ 3 min. while 3 hrs. or run it for 5 min. at full speed once every 3 hrs.	If this is not followed, engine will emit blackish exhaust, showing insufficient combustion. This will cause premature wear of engine parts.

	Points to be Observed	Instructions and Possible Troubles If Not Observed
9	When shifting the clutch to forward or reverse, be sure to idle the engine first and then shift quickly. To shift to reverse, first lower the engine speed. When boat speed drops, shift the clutch to neutral position, and then soon to the reverse position.	Slow shifting of the clutch will cause abnormal noise and result in clutch trouble. This operation prevents damage to the dog clutch. It is particularly dangerous to change abruptly from full-speed forward running over to reverse running.
10	When tilting up the engine, do not push the steering handle.	For prevention of breakage.
11	When the engine is left in tilt-up position after stopping, place the engine so that the steering handle comes down.	When the steering handle is raised in tilt-up position, seawater remains inside the engine. This accelerates corrosion, and in cold weather, will lead to cracking of the cylinder block due to freezing. However, there is no problem when the engine is first tilted down for longer than one min. after stopping and then tilted up after the seawater is completely drained.
12	After stopping the engine, be sure to turn starting switch to "OFF". For details refer to page 22.	If the engine is left with this switch being turned to "ON" the lube oil warning lamp is kept lit to discharge the battery. Starting of the engine is impossible in the next operation.
13	Be sure to entrust the adjustment disassembly and reassembly of precision parts — unit injectors, valves and governors to your nearest dealer.	When these are improperly adjusted, starting failure due to gas leakage, injection failure and other failures in engine performance will result. 
14	When leaving the outboard motor in a horizontal position, have the steering handle pointing downwards.	If not so placed, oil may leak out.
15	Engine operation	Do not run the engine while it is tilted up. Before starting the engine, make sure the propeller is in the water.

	Points to be Observed	Instructions and Possible Troubles If Not Observed
15	Do not operate the engine without the top cowling.	Direct contact of your body or clothes with moving parts will result in a serious injury.
16	If your engine makes abnormal noises or the engine speed is dropped suddenly, immediately check the water gauge condition. When no abnormality is found in the cooling system or lube oil system, return to port at low speed, and consult YANMAR dealer. For details, refer to page 29.	
17	When a boat with the diesel outboard motor is running or Comes to a stop, water may be introduced through the suction pipe because of shorter distance between the diesel outboard motor and water surface and that such water is successfully prevented by the following method. Should water be introduced through the suction pipe, the water hammer phenomenon occurs, and may cause serious damage to the engine structure.	1) If the boat is intolerably swayed or too much splash is found on the water surface, the splash plate installed under the upper case is capable of inhibiting splash. (The splash plate is optionally available at request.)  2) Fig.1 shows the suction pipe attached to the engine designed to the X specification. Fig.2 shows the suction pipe designed to the another specification. If the boat is intolerably swayed or too much splash is found on the water surface, the user may install the suction pipe shown in Fig. 2. Fig.1  Fig.2 

6. FUEL AND LUBE OIL

6-1 Selection and handling of fuel oil

Use high-speed diesel oil, which is the most suitable for the engine.

6-2 Fuel supply

Check the fuel system again to see if the inside of the tank or fuel pipes are completely cleaned. Then, replenish the tank with fuel oil (Capacity: 24ℓ).

① Cleaning of fuel tank

Wash the tank with fuel oil and remove sediment and water accumulated on the bottom once every three months.



WARNING

To avoid fire hazards, be sure to stop the engine before refilling with fuel.



CAUTION

To prevent fuel from overflowing, supply to 80–90% of the tank's capacity.

6-3 Selection of lube oil

1) How to select

In diesel outboard motor, selection of lube oil is essential. Use of improper lube oil or negligence of oil replacement will cause sticking of piston rings, seizure and premature wear of pistons, cylinder liners and other moving parts to shorten the life of your outboard motor.

2) Kind of lube oil

For your outboard motor, YANMAR Genuine Oil is ideal.

Engine	Lower Unit
API-Class CD SAE 15W40 (Recommended)	Gear oil API #90 Gear oil SAE 80W90 (Recommended)

(NOTE)

- If you have any doubts about selecting lube oil, please consult your YANMAR dealer.
- Use of oils other than those recommended will greatly shorten the life of your outboard motor.
- Blending of lube oils of different natures may deteriorate the quality of lube oil. Do not mix lube oils.

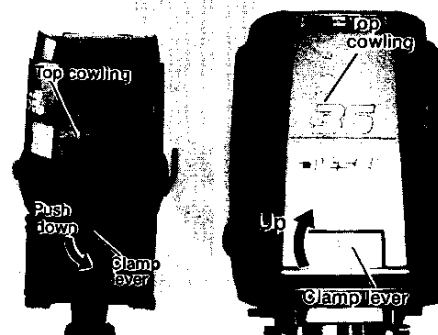
6-4 Supply and replacement of engine lube oil

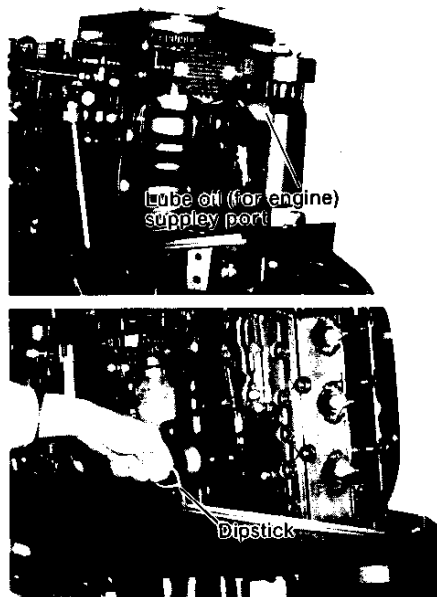
- 1) Check the oil level with dipstick before using, if it comes in between the upper and lower limits. If the level is low, supply oil.

2) Checking of oil level

- (1) Tilt down the engine.
- (2) Push the clamp lever downwards and remove the top cowling.
- (3) Add oil from the oil supply port.
- (4) Check the oil level with dipstick.

Do not pour oil over the upper limit of the dipstick.

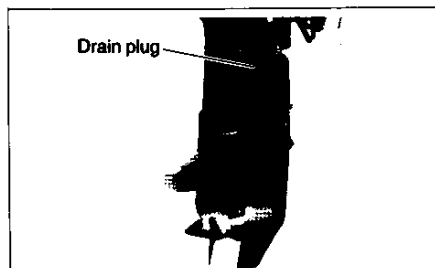




Lube oil amount at the upper	D27	3.0 ℓ
limit of engine side dipstick	D36	3.0 ℓ

3) Replacement

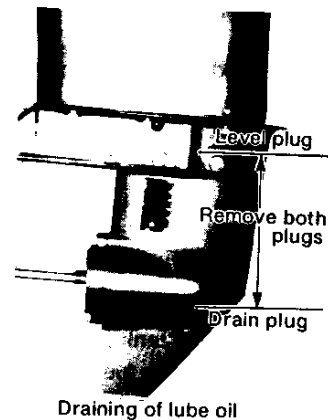
- (1) Remove the drain plug and drain lube oil.
(Lube oil is drained completely while the engine is still warm.)



6-5 Replacement of gear oil for lower unit

(1) Draining of gear oil

Remove the level plug and drain plug of the lower unit case and drain out gear oil.



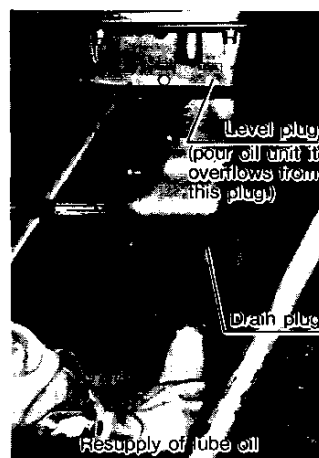
(2) Resupply of gear oil

Resupply lube oil from drain plug. If oil brims out of the level plug, tighten the level plug and then the drain plug.

(NOTE)

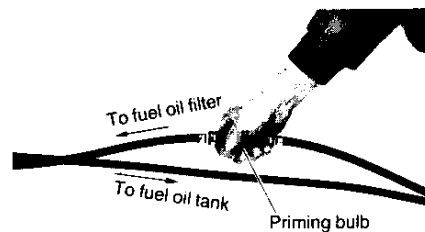
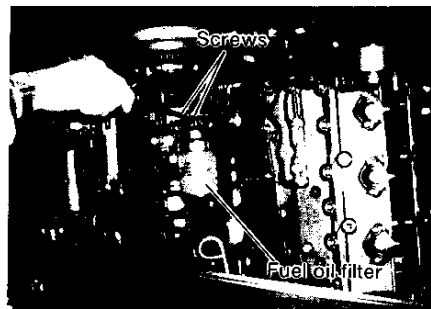
Loosened plugs allow the entry of seawater into the lower case. Be sure to tighten them securely.

Gear oil quantity for lower unit	D27	0.55 ℓ
	D36	0.55 ℓ

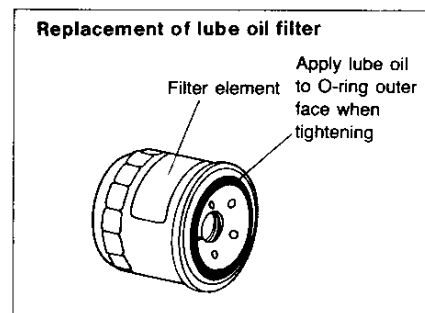
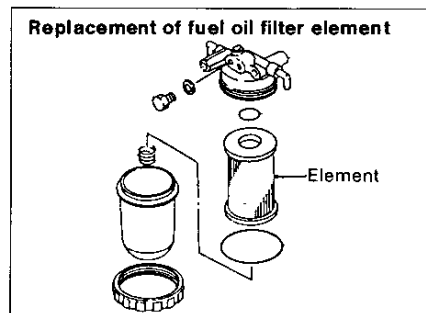


6-6 Bleeding the air from fuel pipe

- (1) Loosen the screws of the fuel oil filter.
- (2) Press and release the priming bulb alternately to feed oil until air left in the filter is completely purged out.
- (3) Tighten the screws of the fuel oil filter.
- (4) Operate the priming bulb again for 4 ~ 5 times.



6-7 Replacement of fuel oil filter and lube oil filter

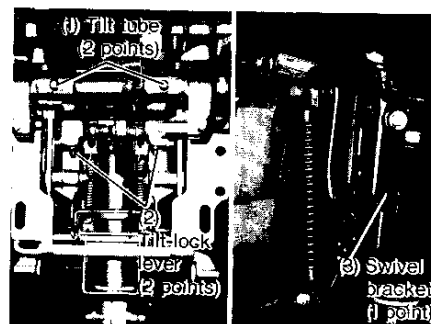


6-8 Greasing

Grease each part (through grease nipples).

Greasing points

- | | |
|---------------------------|----------|
| (1) Tilt tube | 2 points |
| (2) Tilt-lock lever | 2 points |
| (3) Swivel bracket | 1 point |



7. OPERATION (For AXE, AYE only)

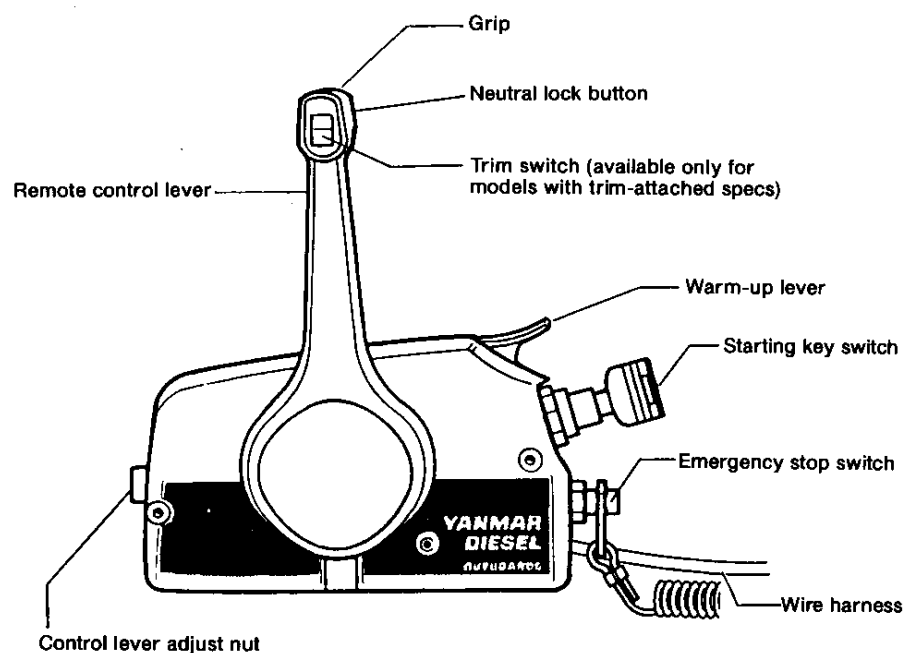
7-1 Preparation for operation

- (1) Check the fuel tank with level gauge to see if it is sufficient.
- (2) Press and release the priming bulb alternately (several times) and repeat this until a reactive pressure is felt to your hand.
- (3) Make sure that engine oil comes up to the upper limit of the dipstick.

7-2 Electrick Starting

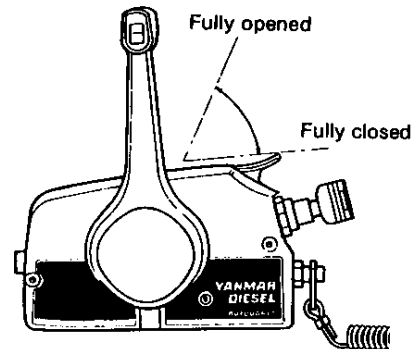
7-2-1 Operation of YANMAR remote control box

- 1) Description of parts

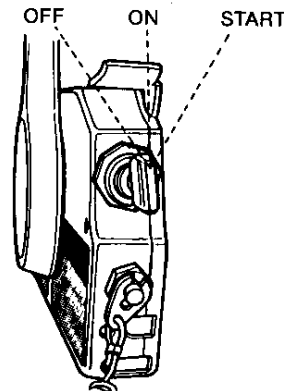


- (2) Put the remote control lever in neutral.
(When the safety relay is on, starting is not possible.)
- (3) Attach the emergency stop switch rope and fasten the other end to your person.
- (4) When the engine is cold, put the warm-up lever in the fully open position. (After the engine is warmed up, it is no longer necessary to leave the lever in the fully open position.)

(NOTE) The warm-up lever cannot be move unless the control lever is in neutral; and the control lever cannot be moved unless the warm-up lever is returned to its original position.



- (5) To start the engine, insert the engine switch key and turn it to "ON". Next, turn the key to "ON" and the engine will start.
- (6) As soon as you have checked to see that the engine has started, release the key allowing it to return automatically to the "ON" position.



- (7) Adjust the turning of the engine by making the appropriate changes in the angle at which the warm-up lever is set, and check the following.
 - (a) Lube oil warning lamp is off
 - (b) Water is flowing from the water gauge hole
- (8) After performing warm-up operation for about 3 minutes, return the warm-up lever to the fully closed position.
 - (a) Do not operate the starting motor for more than 10 seconds at a time.
 - (b) Use 12V~100AH battery.
 - (c) Restarting

If the engine fails to start on the first try, wait 10 seconds before attempting to start again. Make sure that the engine is stopped before turning the key switch. Operation of the key while engine is still in motion causes damage to the starting motor or flywheel teeth.

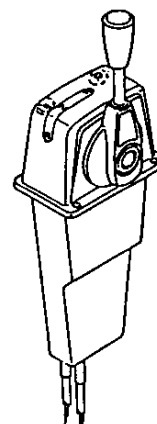
7-2-2 Starting/Stopping for the remote control box

(For other remote control boxes available for purchase)

- 1) Put remote control lever in neutral.
- 2) Leaving the clutch disengaged, put the remote control lever throttle in the open position.
(For other remote control boxes, the operation of the lever is the same as for that of warming up or starting the engine when it is cold.)

- 3) Turning the starter switch from "ON" to "START" starts the engine.

As soon as you have checked to see that the engine has started, release the key allowing it to return automatically to "ON".

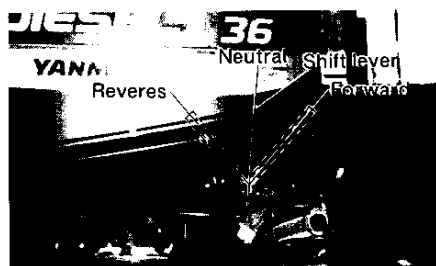


7-2-3 Operation of steering handle (option)

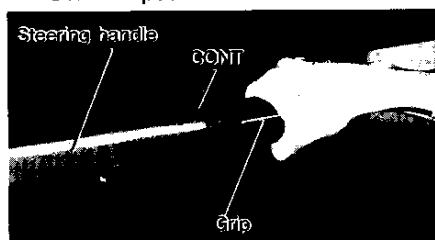
- 1) Set the shift lever in neutral position.

(NOTE)

When the shift lever is in either forward or reverse position, the safety relay actuates to prevent starting.



- 2) Turn the grip of the steering handle to "START" position.



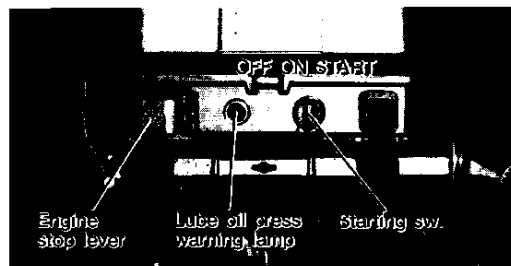
- 3) Turn "ON" the starting (key) switch and make sure that the warning lamp lights up.



- 4) When the starting switch is turned to "START" position, the engine will start. Handle vibrates at the time of starting, so graps it securely.
- 5) When the engine is started, immediately return the starting switch (key) to "ON" position.
- 6) While returning the grip gradually in a range, not to stop the engine, check the following points.
 - (1) Lube oil warning lamp is off.
 - (2) Water flows out of the water gauge hole.



- 7) After about 3 minutes of warm-up operation, return the grip completely to neutral position to proceed with idling.



(NOTE)

1. Do not operate the starting motor for more than 10 seconds at one time.
2. Use 100AH battery.
3. Restarting

If the engine fails to start, wait 10 seconds before restarting. Make sure that the engine is stopped before turning the key switch. Operation of the key while engine is still in motion will break the starting motor or the flywheel teeth.

7-3 Forward and reverse operations

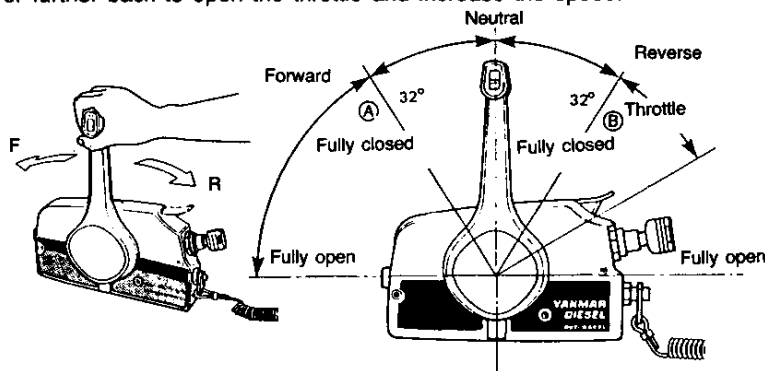
7-3-1 Operation of YANMAR remote control box

1) Forward

Press the neutral lock button and move the remote control lever forward to the (A) position (approx. 32°) engaging the gears; next, push the lever further forward to open the throttle and increase the speed.

2) Reverse

Press the neutral lock button and move the remote control lever in the reverse direction to the (B) position (approx. 32°) engaging the gears; next, push the lever further back to open the throttle and increase the speed.



7-3-2 Operation of steering handle

Return the grip to neutral position
perform idling operation.

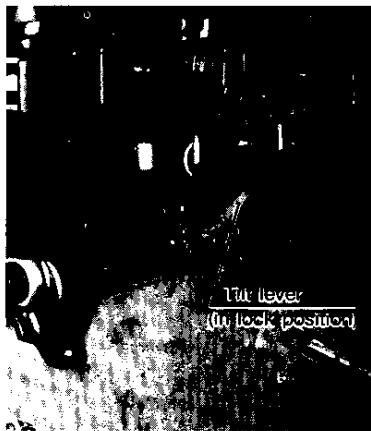
1) Forward operation

- (1) Quickly move the shift lever to "F"
position.



2) Reverse operation

- (1) Make sure that the tilt lever is in the
lock position.



- (2) Quickly move the shift lever to "R"
(Reverse) position. In reverse operation, grip stroke is limited to about 1/2. Do not accelerate the engine speed more than necessary.

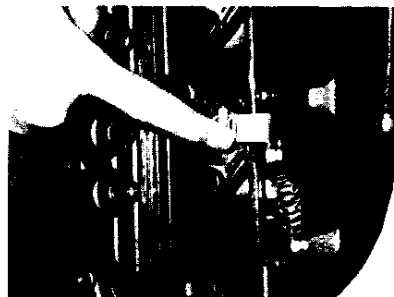
7-4 Rope starting

Follow to the instructions for electric
starting up to 6-1 6-2-2 and then handle as
follows

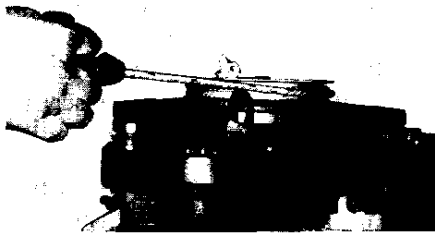
- (1) Remove the top cowling.
- (2) Turn the flywheel manually and set it
at the position reaching the top
compression of No.3 cylinder.



- (3) Pull the de-compression lever of the
No. 1 cylinder and set it at the de-
compression position.

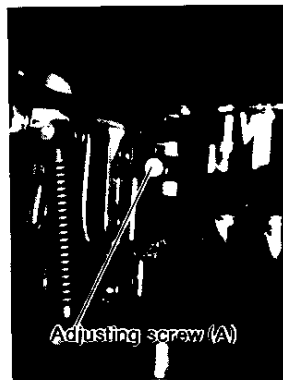


- (4) Turn the steering handle starboard.
- (5) Wind the rope around the start pulley and pull the rope at a stroke.

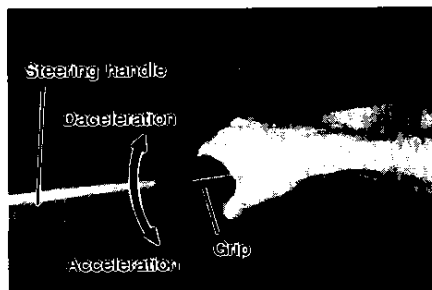


7-5 Controlling

- 1) Boat turns by turning the steering handle. Steering force is adjustable by adjusting screw (A). (Clockwise turning makes Steering heavy.)



- 2) Turning of the grip accelerates or decelerates the engine speed.



Grip force is adjustable by adjusting screw (B). (Clockwise turning makes steering heavy.)



7-6 Cautions on operation

During operation of your outboard motor, be sure to check the following points:

1) Cooling water (seawater)

Check from time to time to see that water is being discharged from water gauge hole.

In case water comes out intermittently or volume of the water is small, stop the engine at once, tilt it up and check the seawater inlet to see if it is obstructed by waste. If waste or other matter obstructs the inlet, remove.

When the cause can't be located, return to port at low speed and consult your YANMAR dealer.

2) Cleaning of water gauge hole

Remove dust by wire etc.

3) Color of exhaust

Blackish exhaust gas indicates that the engine is overloaded. Overload operation shortens the service life of exhaust valves, piston rings, cylinder liners and particularly of unit injector.

Do not continue to operate when blackish exhaust gas is observed.

uish exhaust gas appears.

When no abnormality is found after checking weight of cargoes, and deposits on the bottom of your boat, consult your YANMAR dealer.

4) Water leakage, oil leakage and other troubles

Check your engine daily for water, oil, and gas leakage; loose bolts; abnormal noise; and abnormal heating or vibrations. If any such problem is found, consult your YANMAR dealer.

5) Depending on the structure of hull, vibration becomes excessive when the engine is rotated at a certain rpm due to resonance of the hull and the engine. Avoid operation within this resonance range.

6) Checking of lube oil pressure warning lamp

Make sure that the lube oil pressure warning lamp is off during operation. If it is lit, abnormality exists. Make sure that the oil signal is in blue position. Check the lube oil volume, and if it is insufficient, add lube oil. When the lamp still remains lit or lit in red after resupplying oil, consult your YANMAR dealer.

7) Abnormal noise during operation

If the cause is unclear, return to port at low speed and consult your YANMAR dealer.

8) Operation at low speed

Limit the low-speed operation to less than 3 hrs. Be sure to do free acceleration your engine for a few mins. without run or run it for 5 mins. at full speed every 3 hrs.

7-7 Stopping

7-7-1 Operation of YANMAR remote control box

- (a) Push the key when it is in the "ON" position to activate the stop switch and stop the engine.

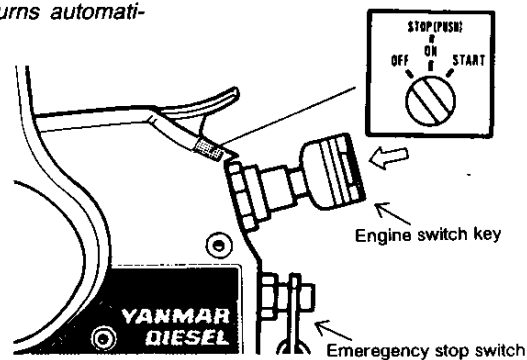
(Note)

After removing your hand, the key returns automatically to the original position.

The regular engine stopping operation should be done with the starting key switch. If the emergency stop switch has been released a beep will be sounded and this switch should be quickly pressed in to the original position.

CAUTION

Leaving this switch released for 30 seconds or longer will lead to the destruction of the stop solenoid coil.



7-7-2 Starting/Stopping for the remote control box

- (a) Pull stop cable to stop engine.
- (b) Put the starting switch in "OFF" after stopping the engine.

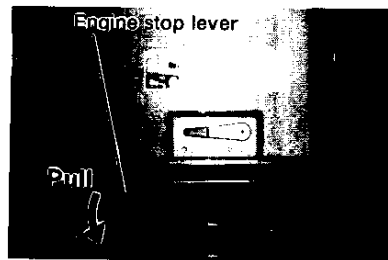
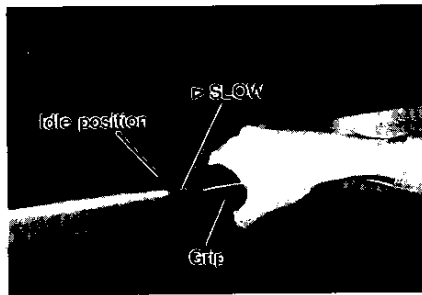
(Note)

When the switch is not turned to "OFF", the battery continues to discharge, and will result in starting failure.

7-7-3 Operation of steering handle

1) Idle your engine before stopping.

- (1) Return the grip to idle position and idle the engine for about 3 min.

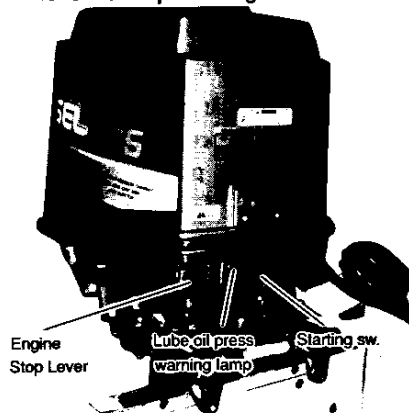


- (3) When the engine is stopped, turn the starting key switch to "OFF".

(Note)

If it is left in "ON" position, the battery will continue to discharge, and starting failure will result.

- (2) After idling, pull up the engine stop lever to stop the engine.

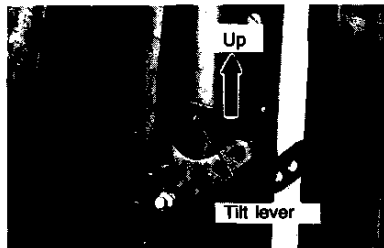
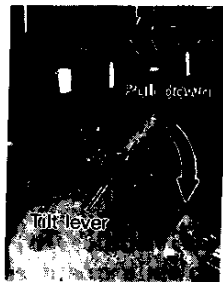


7-8 Tilt-up and tilt-down

When the outboard motor is left for a long time before reuse, or if it is moored in a shoal, be sure to tilt it up to prevent breakage or corrosion of the propeller and lower unit case due to rocks and ebb tide.

(How to tilt up)

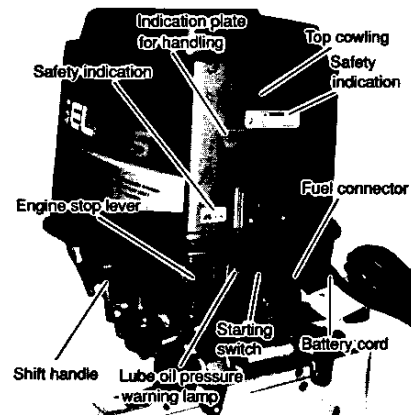
- (1) Pull down the tilt lever. The lever stops at this position.



- (2) Hold the rear of the outboard motor and raise it up to the full extent. Then, the motor is locked automatically. (At this time, make sure that the tilt-lock lever is in locking position.)

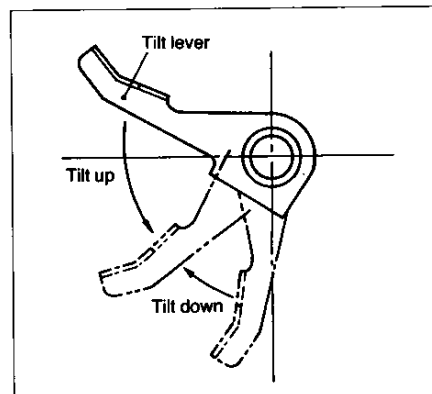
(Note 1)

When you want to quit tilting-up on the way, return the tilt lever to the original position before starting.



(Note 2) (For D27 only)

Do not push the steering handle when tilting up the engine.

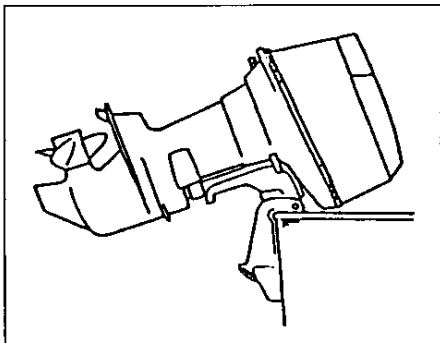


(How to tilt down)

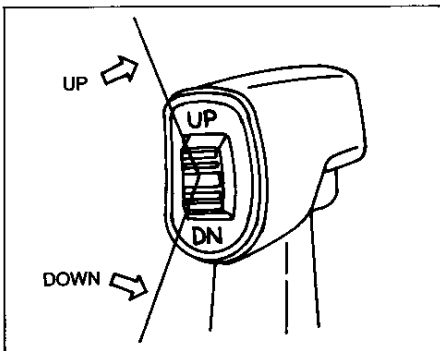
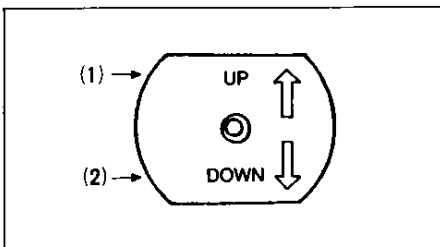
- (1) Pull up the tilt lever.
- (2) Hold the outboard motor and pull it up a little. Then, push it slowly down.

LEP, LLEP, ULEP

- (1) Lift the power tilt switch to the "UP" side for approximately 10 seconds until the sound of the motor changes.



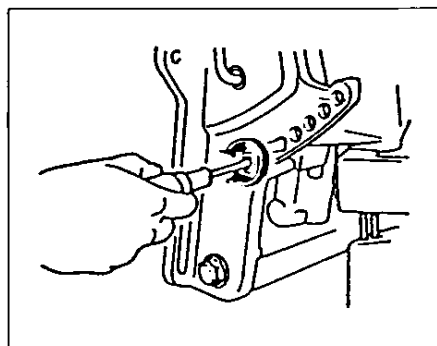
- (2) For tilting downward, push the switch to the "DOWN" side for approximately 10 seconds until the sound of the motor changes.



While the switch is being pushed, the motor is on.
When you remove your hand from the switch, the motor stops,
leaving the outboard motor in the position in which it stopped.

(Note)

Should the battery become discharged and you are unable to operate the power tilt, tilting up and down can be performed manually by turning the manual valve fully to the left. To keep in the tilted up position, use the tilt lock lever.

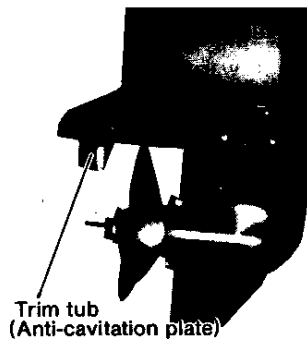


Operation is possible even when the starting key switch is in the OFF position.

⚠ CANTION

Do not operate this power tilt switch on the outboard motor while sailing.

7-9 Trim tub



If the steering wheel/handle is pulled to a side while running at full speed, adjust the trim tab so that the boat runs straight ahead. Loosen the tightening bolt and turn the trim tab right or left to adjust.

The trim tab also functions as the anode metal.

This is also the anode metal, functioning as a sacrificed metal which protects the outboard from corrosion.

CAUTION

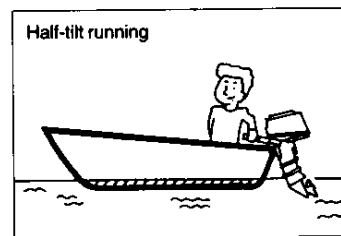
Do not paint the anode metal. It deteriorates the function of the anode metal, which can lead to rust and corrosion damage to the outboard motor.

7-10 Shoaling

This outboard motor is equipped with an automatic half-tilt device which is useful for shoaling. Use this device in accordance with the following procedures.

(How to half-tilt)

- (1) Pull down the tilt lever. The lever stops at this position.
- (2) Hold the rear of the outboard motor and pull it up to form an angle of 30°~40°, and then return it to the original position. This completes the procedures for half-tilt operation.



- (3) To release half-tilting, pull up the outboard motor a little and pull up the tilt lever.

(Note)

Keep the minimum speed and do not accelerate the engine more than necessary during shoaling.

7-11 Warning Device

1. Details of warning device (standard specifications)

- (1) The alarm buzzer turns ON from abnormality such as insufficient hydraulic pressure, overheat or poor battery charge.

- (2) The alarm lamp turns on from insufficient hydraulic pressure only. If the alarm lamp is OFF and the alarm buzzer is ON, the cause is overheat or poor battery charge.

(standard specifications)

	Alarm buzzer	Alarm lamp
Insufficient hydraulic pressure	○	○
Overheat	○	—
Battery charge	○	—
Installing place	Arbitrary $\ell = 3\text{m}$ from bottom cowling	Standard position on bottom cowling

(Option) For Type I (P. 6-7) and Type II (P. 6-8)

	Alarm buzzer	Alarm lamp
Insufficient hydraulic pressure	○	○
Overheat	○	○
Battery charge	○	○
Installing place	Indicator panel	

2. Functioning of warning device

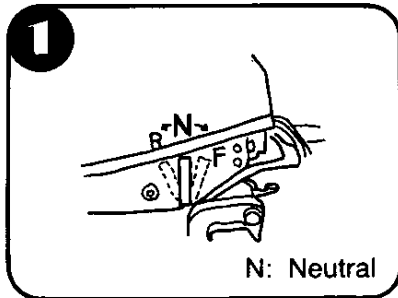
(1) Turning key switch ON causes the alarm buzzer and the alarm lamp to turn ON for approximately 2 sec.

(2) If you leave the key switch without starting the engine for approximately 180 sec., the buzzer and the lamp turn ON again. When you start the engine after that, the buzzer and the lamp turn OFF.

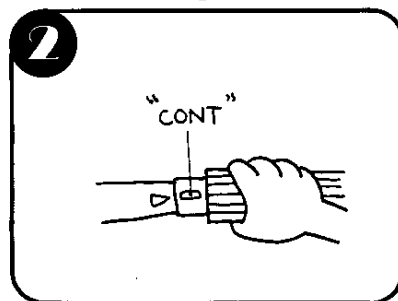
8. OPERATION (For D27 AY only)

8-1 Starting engine

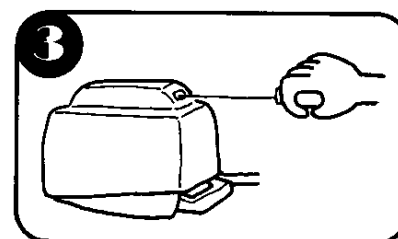
Recoil type rope starting



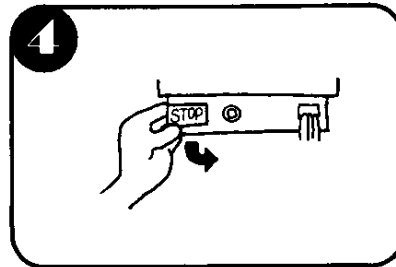
Set shift lever at "N"



Set handle grip at "CONT"



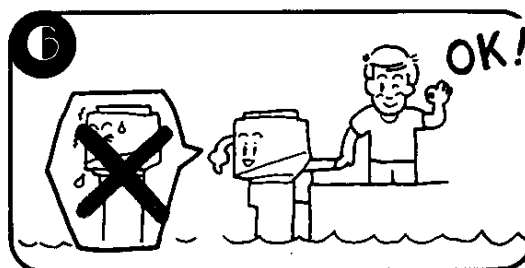
Pull starting rope slowly until it is felt heavy to your hand & return.



Pull up "stop lever"



Pull it with force particularly on midway.
Pull recoil rope with force.



Check water outlet

9. PERIODICAL CHECKING AND MAINTENANCE

In order to use your outboard motor always in good condition, periodical checking is indispensable. The table below shows the relation between the check items and their servicing intervals.

●: Consult your YANMAR dealer ○: Checking ◎: Replacement of parts(s)

Item	Servicing	Servicing interval				
		Daily	Every 50 hrs. (1 month)	Every 100 hrs. (3 months)	Every 200 hrs. (6 months)	Every 400 hrs. (one year)
Fuel	Check f.o. volume/supply	○				
	Clean fuel tank			○		
	Replace filter		◎			◎
Lube oil	Check volume/Supply/Replace	○	◎ (Replace 1st time)		◎ (Replace)	
	Replace lube oil for lower unit		◎ (After 10 hrs. 1st time)	◎ (Replace)		
	Replace filter element		◎ (1st time)			◎
Cooling water (seawater side)	Check cooling w. discharge	○				
	Replace anticorrosive zinc					●
	Check (Replace) impeller ※					●
	Check thermostat					●
Cyl. head	Adjustment of int./exh. valve head clearance					●
	Check/adjust unit injector					●
	Check and adjust cables					●
	Check timing belt					●
	Retighten thru-bolts		○			
Electrical equipment	Check warning lamp	○				
	Check battery electrolyte volume		○			
	Grease to various parts				○	●
	Retighten thru-bolts		○			

⚠ CAUTION (※)

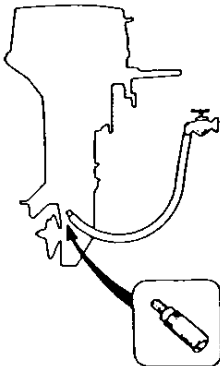
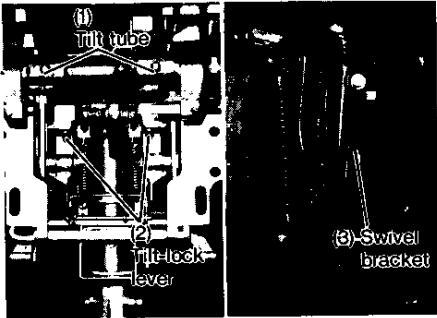
If you have sailed over the surface of the water contaminated with oil or any other chemicals, check the impeller of cooling water pump for damage. If need be, replace the impeller earlier than specified.

Others

- (1) ● when your outboard motor is left unused for 2–3 days, land your boat on shore or put the outboard motor in tilt-up position.
 - Protect it with cover.
 - Disconnect the battery cables.
- (2) Whenever the specified period (1 year or 400 hrs. of operation) is over, ask your YANMAR dealer for checking and maintenance.
- (3) If you have sailed on the water which is contaminated over and/or inside with oil or any other chemicals, the propeller's rubber bushing may be swelling. In such water area, check this bushing frequently. Such swelling and similar problems are not covered by the YANMAR WARRANTY.

10. MAINTENANCE PRIOR TO LONG-TERM STORAGE

(When you store your outboard motor for longer than a month, be sure to do the following to insure continued top-level performance.)

Point	Procedure
Washing of cooling water system and outfits.	Fill the cooling water system with fresh water and run the engine for longer than 10 min. to clean inside the engine. Then, wash the outfits in fresh water and wipe them off. When fresh water basin is not available, (1) Remove "WASH" plug, screw in the cooling water line washing joint (optional), connect a hose between the joint and tap water faucet and wash the line while operating the engine. (Plug the seawater inlet so water is not allowed to flow out.)  Cooling water line washing joint.
Greasing	Feed grease to the grease nipples and sliding parts. (Greasing points)  (1) Tilt tube (2) Tilt lock lever (3) Swivel bracket

Point	Procedure
• Washing of f.o. tank	Wash the f.o. tank inside and suction pipe strainer with high speed dissel oil, and fill them with high speed dissel oil. To wash the strainer, remove 4 screws of the f.o. gauge.
• Battery	Disconnect the terminals, add electrolyte and store the battery in a place free of moisture. (Since the battery discharges even during storage, charge it monthly in summer and bimonthly in winter.)
• Storage	Protect your engine with cover and keep it in a well-ventilated place. When placing it horizontally, direct the steering handle side downwards.



WARNING

Batteries produce explosive gases: If ignited, an explosion can cause serious injury or blindness. Provide adequate ventilation when charging.



WARNING

- **CHEMICAL HAZARD:** Battery electrolyte contains sulfuric acid. Contact with eyes or skin, even through clothing, may cause severe burns. Wear a faceshield and protective clothing.

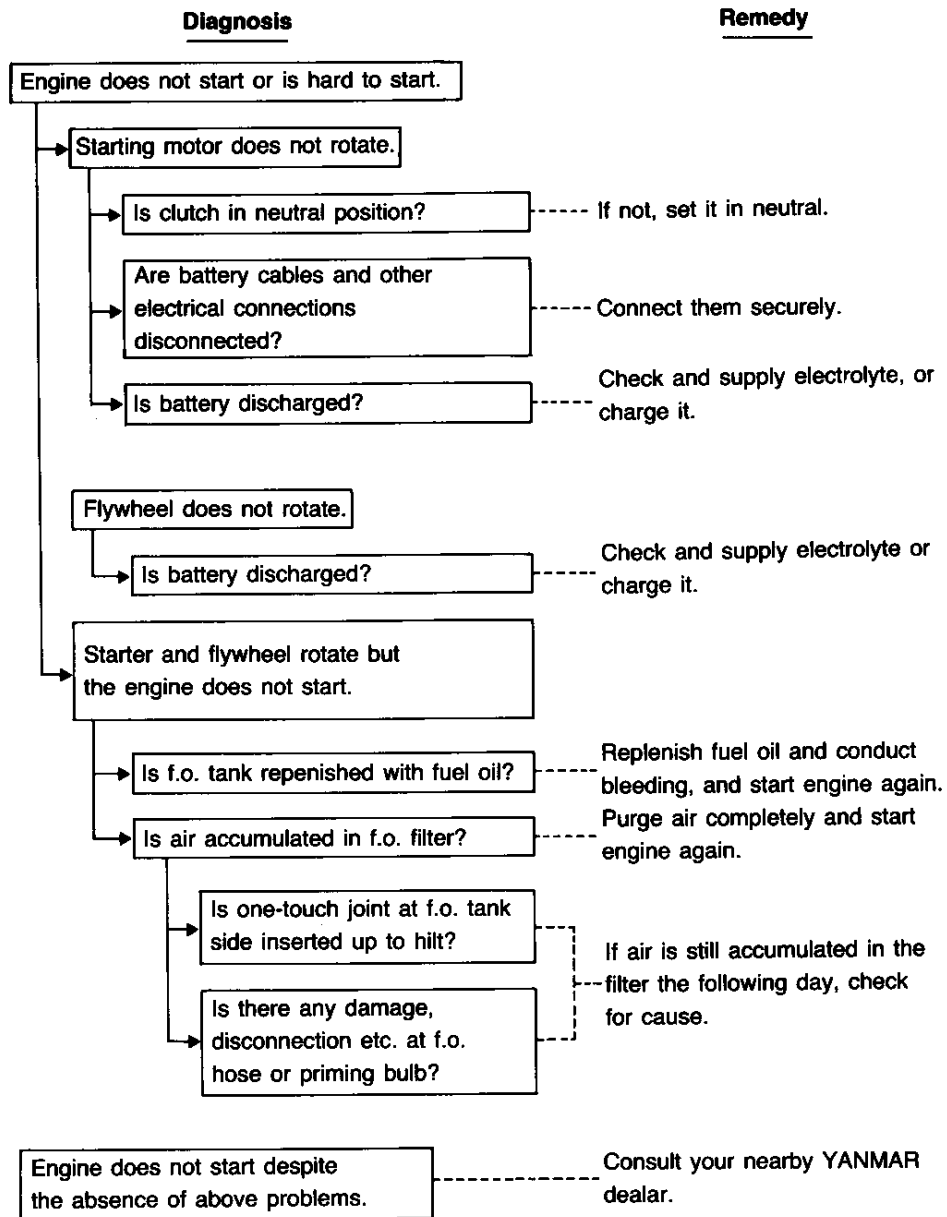


WARNING

- Keep flames and sparks away, and do not smoke in the area. **ANTIDOTE:** If electrolyte gets into your eyes, flush thoroughly with warm water for at least 15 minutes and call a physician immediately.

11. TROUBLESHOOTING

11-1 Diagnosis



Diagnosis

Remedy

Trouble with l.o. press. warning lamp

It does not light up when starting (key) switch is turned to "ON".

Is there any disconnection in electric wiring?

The lamp lights up by turning starting (key) switch to "ON", but it does not go off in spite of acceleration of engine speed.

L.o. volume is insufficient

The lamp does not light up in spite of sufficient oil volume.

It disconnected, connect it securely.
It is very dangerous to launch your boat into the sea when the lamp is not operating correctly. Be sure to consult your nearby dealer.

Check oil volume with dipstick and add if necessary.

Immediately consult your nearby dealer.
If you are underway, return to port at low speed and consult nearby YANMAR dealer.

Water does not come out of the checking hole after starting or in the course of operation.

Water splash comes together with exhaust gas out of idle port at the rear part of engine.

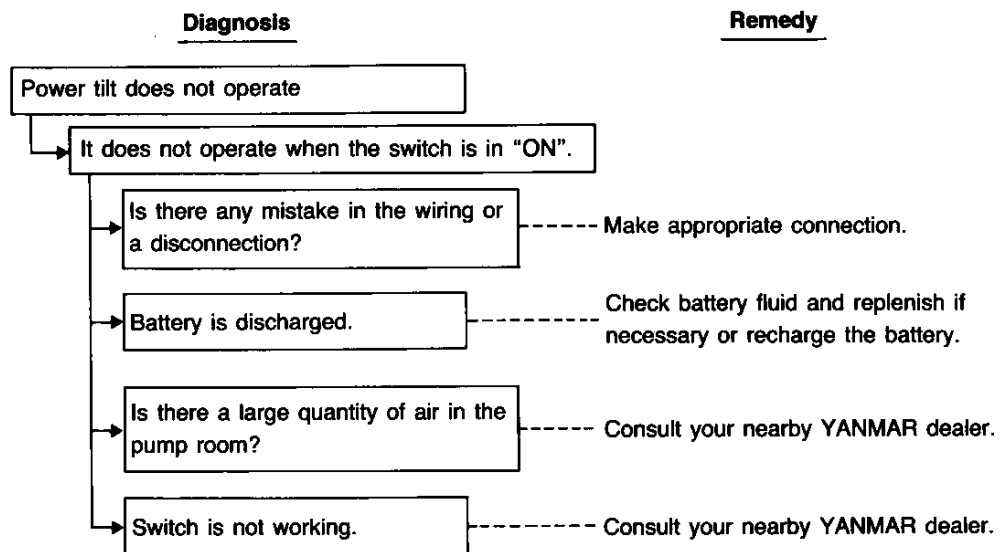
Water splash does not come out of the idle port simultaneously with exhaust gas.

The water gauge hole is obstructed.
Remove waste or ice, using a piece of wire etc.

Stop engine and check suction hole to see if it is obstructed or not.
If water does not come out in spite of no obstruction at the hole, return to port at a low speed and consult nearby YANMAR dealer.

Engine sounds different or issues abnormal noises during running.

Immediately return to port at a low speed and consult nearby YANMAR dealer.

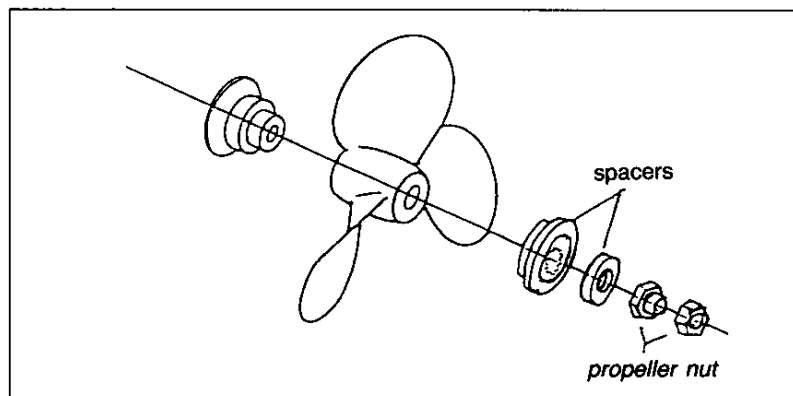


(Note)

10-2 Replacement of propeller

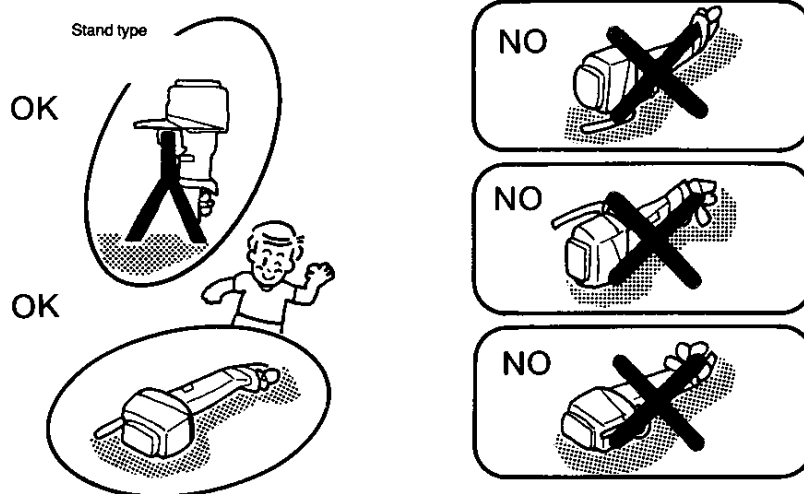
When the propeller is damaged seriously, it is necessary to replace it with new one. Refer to the diagrams below for replacement.

(Note) When reassembling, be sure to securely tighten the propeller nut (tightening torque: 3.0 ~ 4.0 kg-m).



Posture of outboard engine

Store the motor either vertically or horizontally, as shown here.



11. ACCESSORIES

Standard Accessories

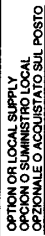
	Part Name	Applicable Model			Q'ty	Remarks
		XE[P]	YE	Y		
1	Accessories to propeller	○	○	○	1 set	Nuts, spacers (one each for front and rear),
2	F.O. tank assembly	○	○	○	1 set	Tank (24) cap, level gauge etc.
3	F.O. pipe assembly	○	○	○	1 set	F.O. pipe, joint, priming valve etc.
4	Element (F.O. filter)	△	○	○	1	_____
5	Hose clip	○	—	—	2	For fitting F.O. pipe to outboard engine side.
6	Outboard engine installation kit	○	○	○	4	Bolts, washers (large & small), spring washers and nuts.
7	Anode (Trim tub)	△	○	○	1	_____
8	Gasket (Trim tub)	△	○	○	1	_____
9	Impeller	△	○	○	1	_____
10	Key (for driving shaft)	△	○	○	1	_____
11	L.O. filter	△	○	○	1	_____
12	Filter wrench	○	○	○	1	_____
13	Starter rope assembly	○	○	○	1	_____
14	Tool kit	○	○	○	1	Pliers, double-ended spanner (10×12) screwdrivers ⊕ & ⊖
15	Operation manual	○	○	○	1	Pattern paper is included

○ : Standard △ : Option

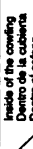
REMOTO CONTROL Ass'y A-type



Diagrama de cableado del CONTROL REMOTO tipo B



Gruppo COMANDO A DISTANZA tipo C



Gruppo COMANDO A DISTANZA tipo D