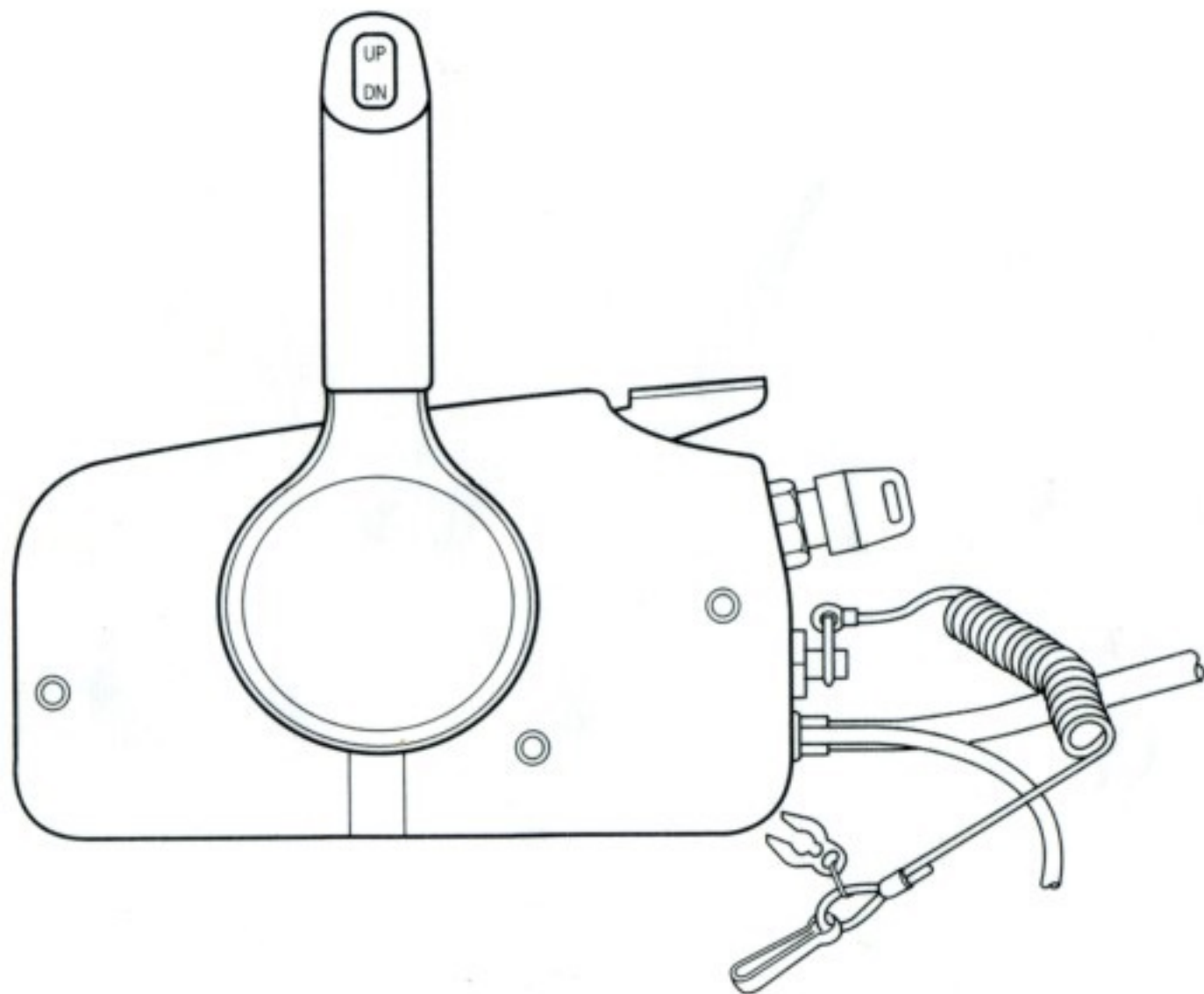


REMOTE CONTROL BOX (TYPE NA27S)

Installation instruction & Operator's manual



POWEROB TEC

Thank you very much for purchasing PBD Remote Control Box NA27S. This manual contains the instructions for installation and operation of PBD Remote Control Box NA27S.

Prior to installation, please make sure to read the instructions carefully and carry out the proper installation work.

On completion of the installation, please hand over this manual to the customer.

In this manual, the symbol and the words **⚠ WARNING**, **CAUTION** and *NOTE* are used to emphasize special information. Pay special attention to the messages highlighted by these signal words.

⚠ WARNING

Indicates a potential hazard that could result in death or injury.

CAUTION

Indicates a potential hazard that could result in motor damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

⚠ WARNING

- For installation of the remote control box, ask your authorized PBD Marine Dealer to perform the necessary work.
- Do not attempt to install the remote control box on a customer's do-it-yourself basis.

CAUTION

- The installation or adjustment must be performed with the engine at stop and the lock plate removed from the emergency stop switch. In the case of electric starter specification outboard motor, this work must be performed with the battery cable disconnected from the battery.
- Problems resulting from the work operation in a manner not instructed in this manual will become liable to the operator who has performed such a work operation.

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⚠ WARNING

Excessive speed in Reverse can dangerously cause loss of boat control.
Exercise caution and use minimal speed when operating the boat in Reverse.

(2) Warm-up lever

- The warm-up lever is used to adjust the engine speed with the remote control lever held in Neutral position.
- Position the remote control lever in Neutral and lift the warm-up lever, then the throttle opens and the engine speed rises.
- The warm-up lever is used at the time of starting or warm-up operation.

NOTE:

- *The warm-up lever cannot be operated unless the remote control lever is set in Neutral position.*
- *Similarly, the remote control lever cannot be operated unless the warm-up lever is returned to the complete close position.*

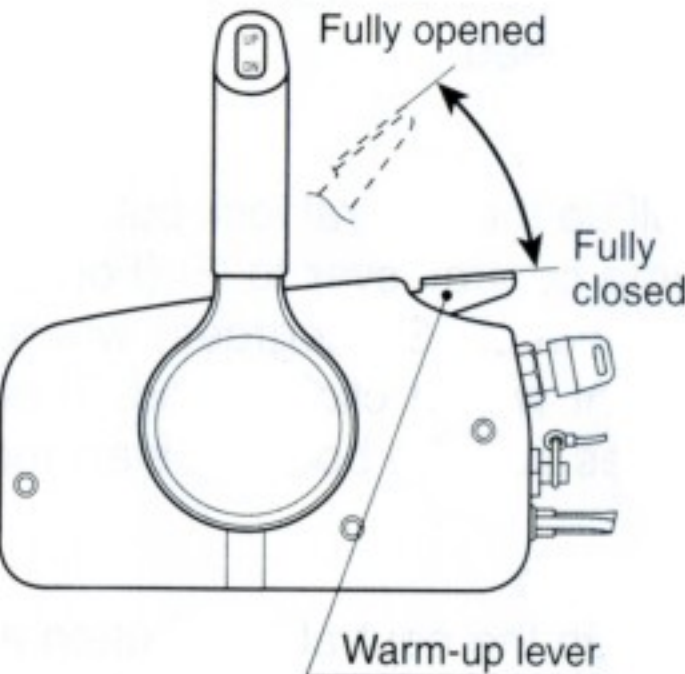
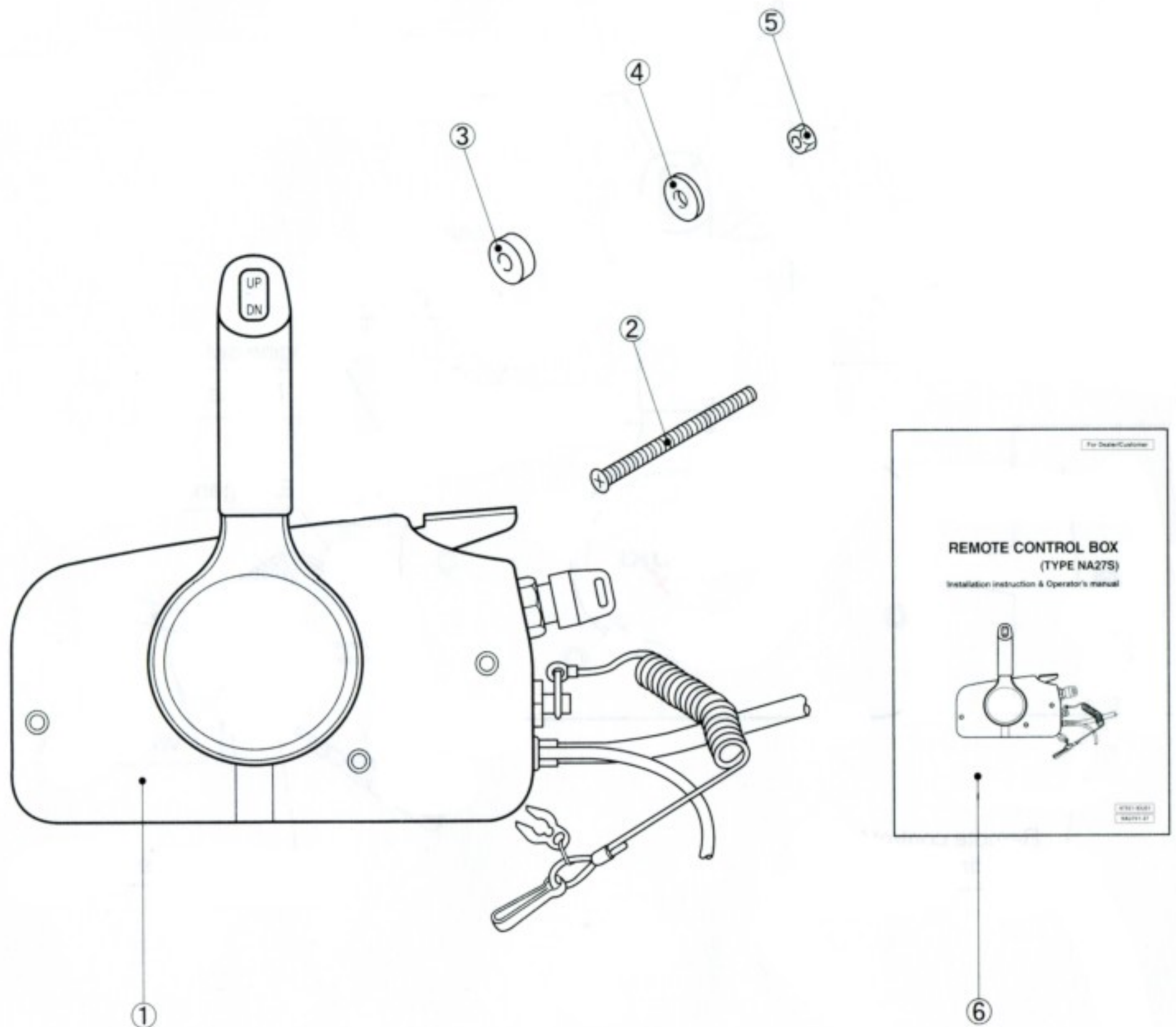


Fig. 3

1. Component parts



No.	Part name	Q'ty
①	Remote control assy	1
②	Screw (M6 × 90)	3
③	Spacer	3
④	Washer (6.5 × 24 × 2.0)	3
⑤	Nut (M6)	3
⑥	Installation instruction & Operator's manual	1

2. Location of parts

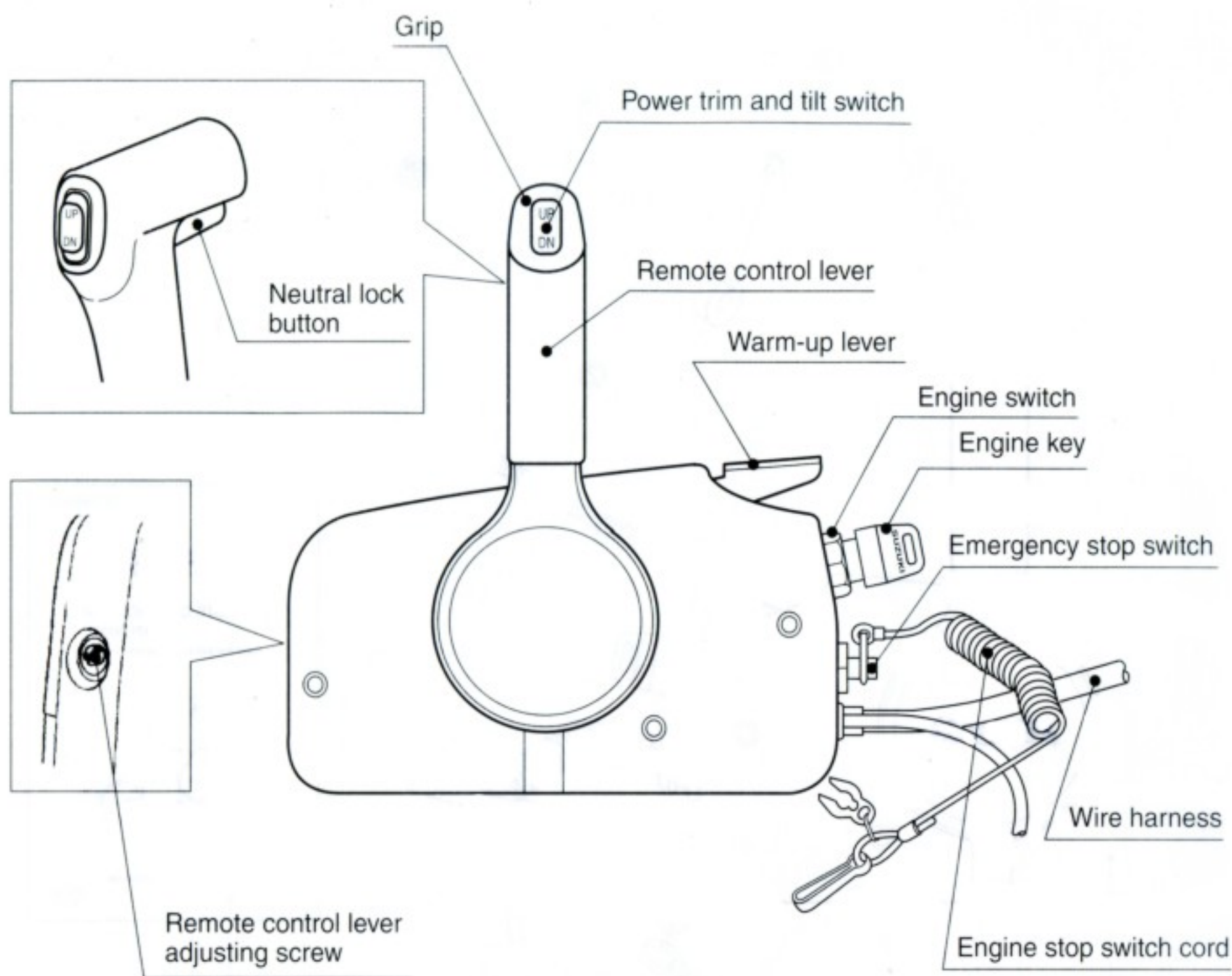


Fig. 1

NOTE:

- The illustration shows the typical example of Remote Control Box NA27S. Depending on specification, Remote Control Box may include different switch or wiring harness.
- To select and install Remote Control Box appropriate for the customer's use, check for its part number in the Parts Catalog.

3. Operation

NOTE:

The operation of Remote Control Box may vary slightly among the type of outboard motors. For specific operation of Remote Control Box, refer to the outboard motor owner's manual.

(1) Remote control lever

The remote control lever selects Forward, Neutral or Reverse. It also adjusts the engine speed.

Forward

Pull up the neutral lock button and move the remote control lever to **F** (Forward) position (approximately 32 degrees) where the lever feels detent with a click sound. Then the clutch engages and the boat will start moving forward.

Reverse

Pull up the neutral lock button and move the remote control lever to **R** (Reverse) position (approximately 32 degrees) where the lever feels detent with a click sound. Then the clutch engages and the boat will start reversing.

Engine speed adjustment

Moving the remote control lever further from the clutch engaged position will open the throttle and raise the engine speed. The engine speed can be controlled by adjusting the position of remote control lever.

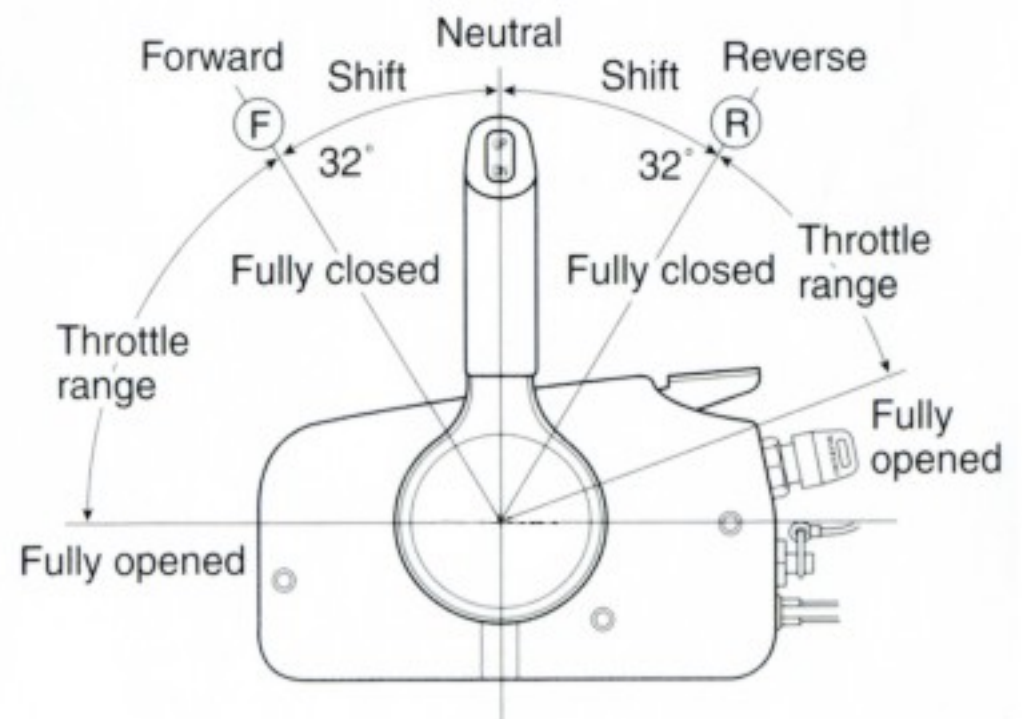
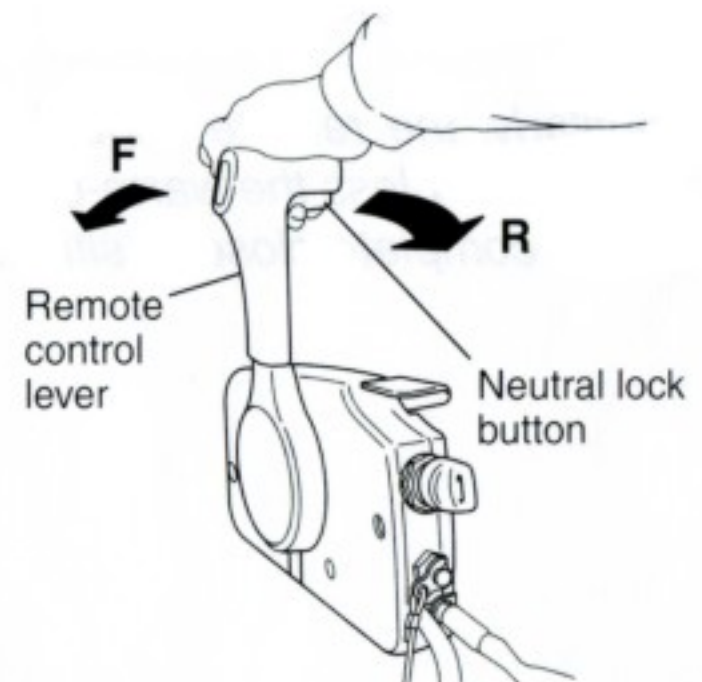


Fig. 2

⚠ WARNING

Excessive speed in Reverse can dangerously cause loss of boat control.
Exercise caution and use minimal speed when operating the boat in Reverse.

(2) Warm-up lever

- The warm-up lever is used to adjust the engine speed with the remote control lever held in Neutral position.
- Position the remote control lever in Neutral and lift the warm-up lever, then the throttle opens and the engine speed rises.
- The warm-up lever is used at the time of starting or warm-up operation.

NOTE:

- *The warm-up lever cannot be operated unless the remote control lever is set in Neutral position.*
- *Similarly, the remote control lever cannot be operated unless the warm-up lever is returned to the complete close position.*

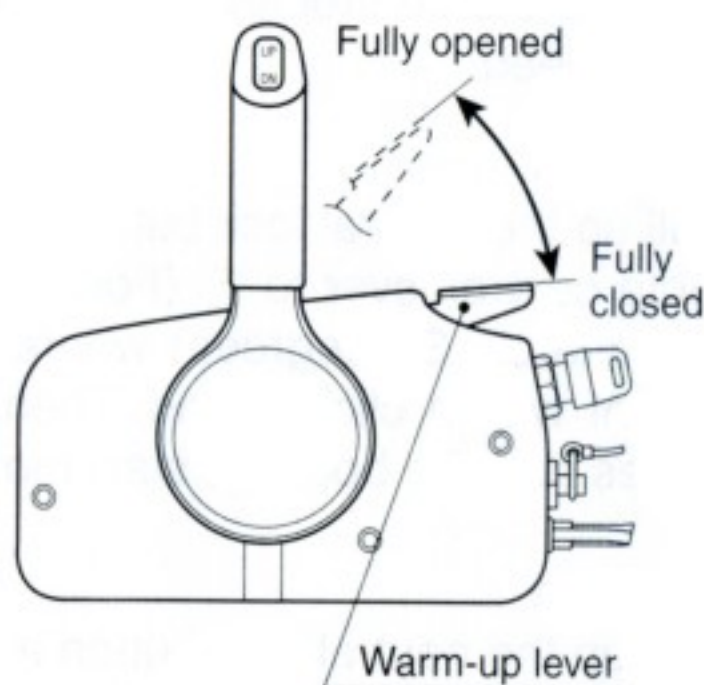


Fig. 3

(3) Operation of switches

1) Engine switch

Turning the engine key can start or stop the engine with the electrical circuit turned ON or OFF. Insert the engine key into the engine switch and turn it to the respective positions for the following functions.

OFF position:

- The engine stops.
- The engine key can be removed from the switch body.

ON position:

- This is the normal position for the engine operation.
- The circuit turns on and the electrical system can be used.
- The engine key cannot be removed from the switch body.

START position:

- The starter motor operates and the engine starts.
- When the hand is released from the engine key, the switch returns to ON position automatically.

DEPRESS:

Applicable only to the outboard motor equipped with electrically operated choke in the carburetor.

- Depressing the engine key operates the electrically operated choke.
At the time of starting a cold engine or in a low temperature condition, depress the engine key to make air/fuel mixture rich.
- When the hand is released from the engine key, the switch returns to the normal position automatically.

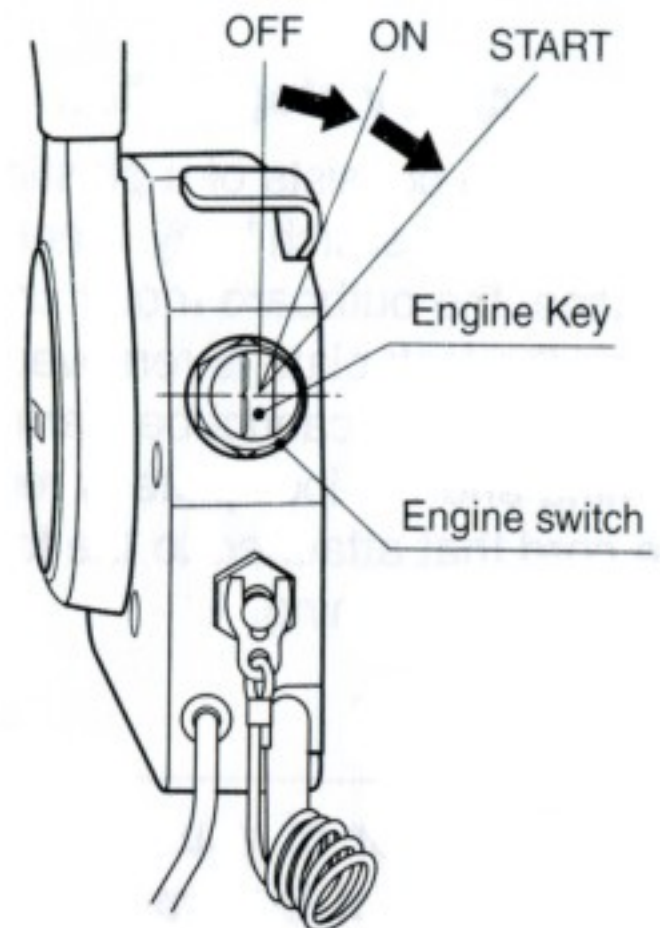


Fig. 4

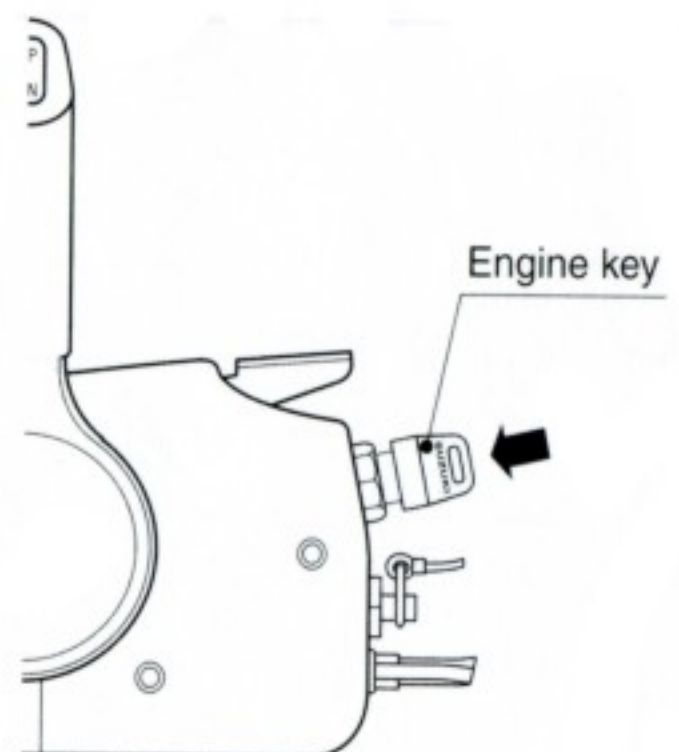


Fig. 5

NOTE:

In the case of electronic fuel injection system equipped outboard motor, depressing the engine key is not necessary.

2) Emergency stop switch

This switch consists of a plastic lock plate fitted over a plastic switch body. When the lock plate is in place, the outboard motor can operate.

When the lock plate is removed from the switch body, the motor cannot be started. If the motor is running and the lock plate is removed by pulling the cord that attached to the lock plate the motor will stop running.

⚠ WARNING

The operator of your boat should always tie the end of the emergency stop switch cord around a part of his or her body before operating the boat. This way, if the operator is thrown overboard or an emergency occurs, the engine can be stopped quickly by pulling on the cord.

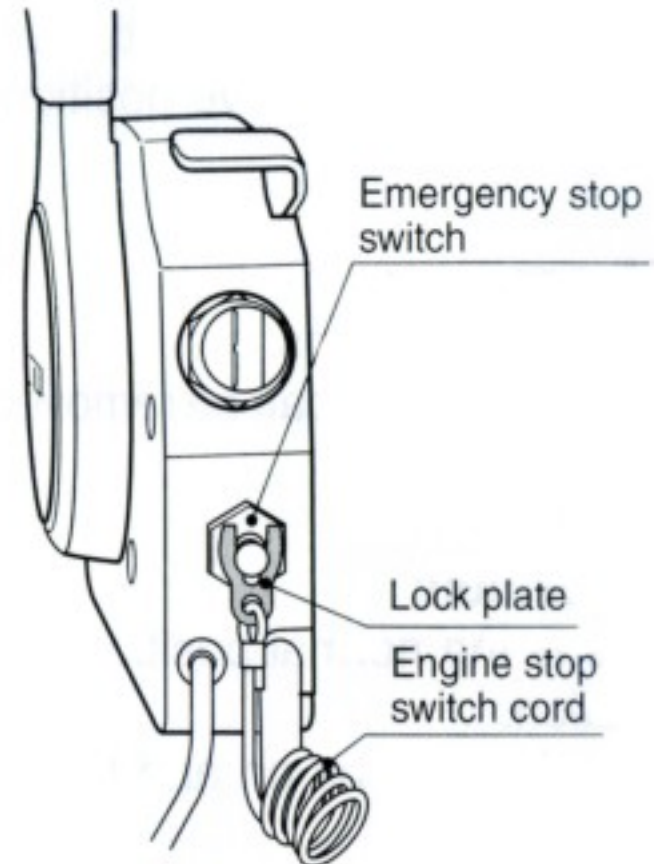
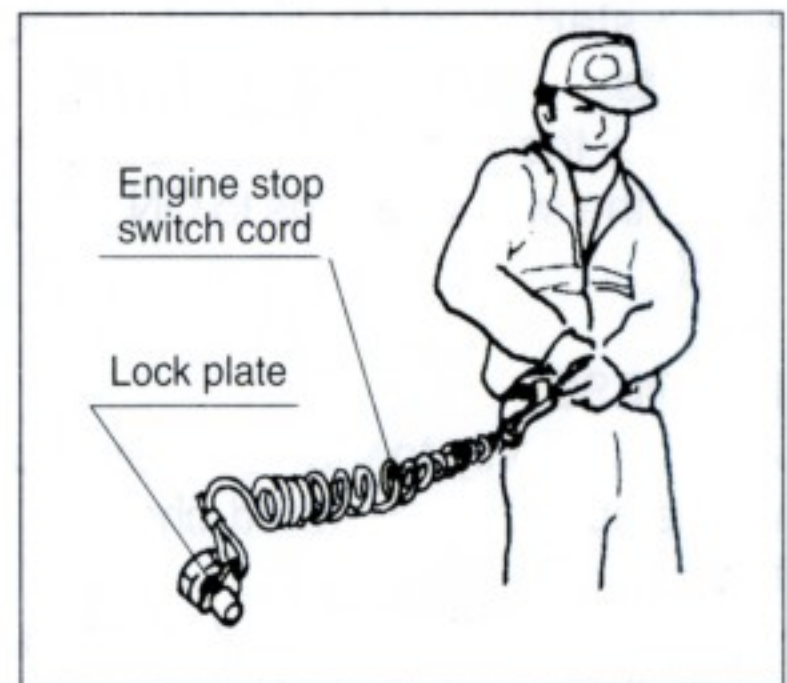


Fig. 6



NOTE:

If the lock plate is not in position, the engine cannot be started.

3) Power trim & tilt switch

This switch is located on the remote control lever.

- With UP side of this switch pushed, the outboard motor tilts up.
- With DOWN side of this switch pushed, the outboard motor tilts down.
- When the hand is released from the switch, the power tilt/trim system operation stops and the tilt/trim position of outboard motor is held at that position.

⚠ WARNING

Keep all person away from the outboard motor to help prevent accidental use of the power trim & tilt system.

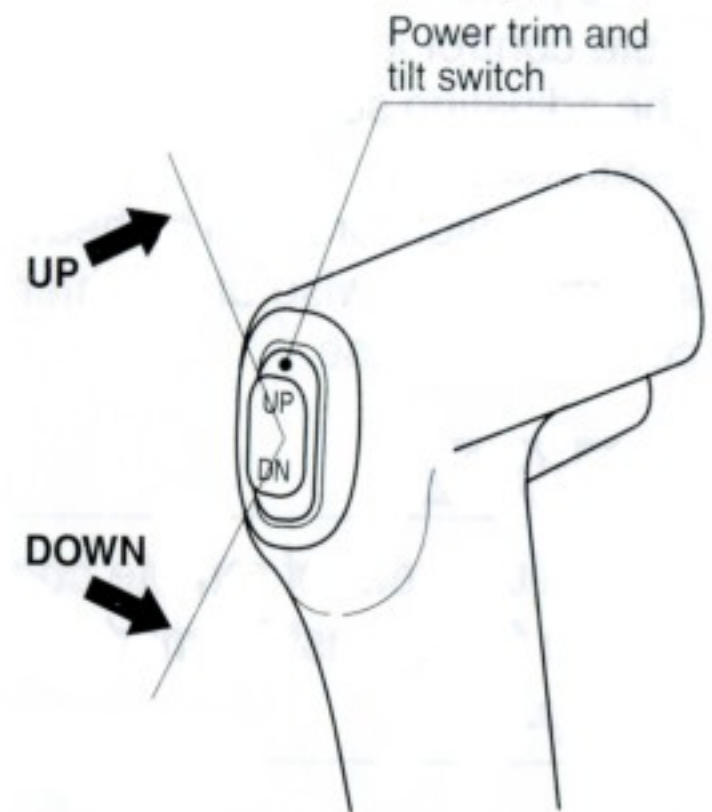
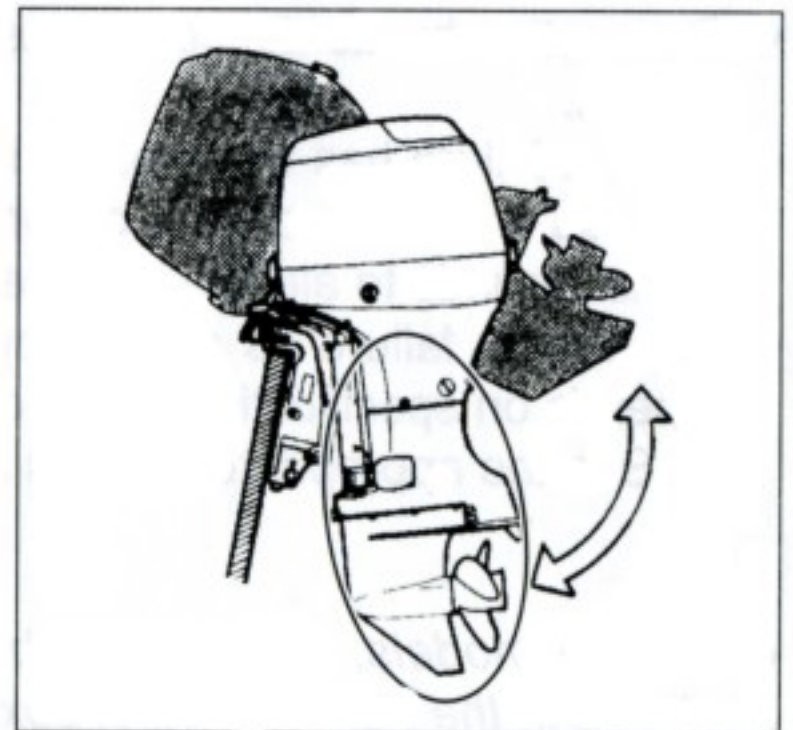


Fig. 7



(4) Remote control lever operation force adjustment

- Adjust the remote control lever operation force to the preference of operator by turning the remote control lever adjusting screw.
- The adjusting screw is located as shown in the illustration.
- The operation force will be heavier as the screw is turned clockwise and lighter as it is turned counterclockwise.

⚠ WARNING

The adjustment of remote control lever operation force must be made with the engine at stop.

NOTE:

To turn the adjusting screw, use a flat head screwdriver.

(5) Caution buzzer

- The caution buzzer is located inside the control box.
- When a failure has taken place in the engine such as overheat or low oil pressure, this buzzer sounds to alert to the operator.
- The engine failure as alerted by the buzzer depends on specification of the outboard motor. See the appropriate owner's manual.

NOTE:

On some models, the caution buzzer is not equipped in the remote control box.

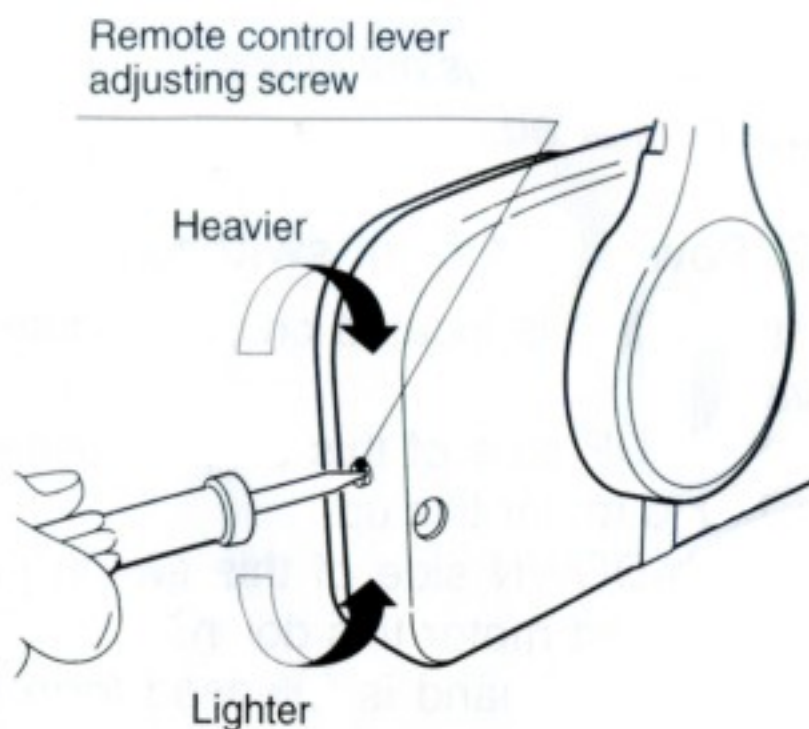


Fig. 8

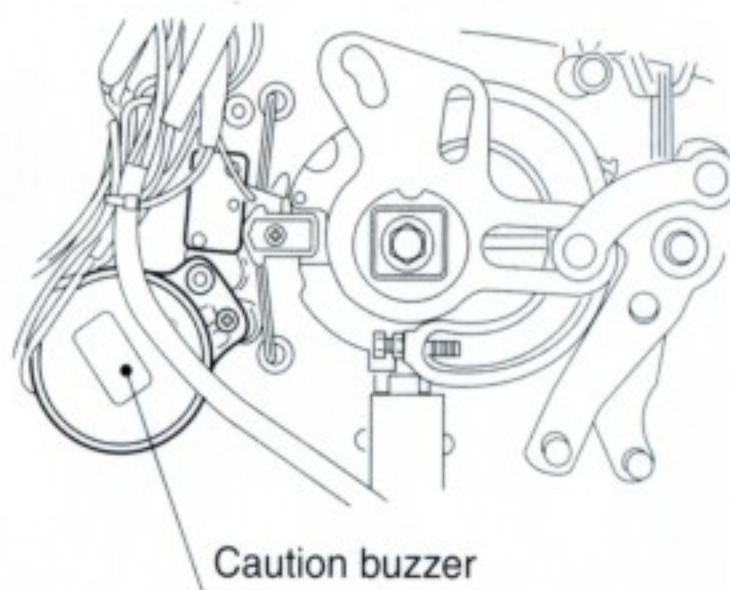


Fig. 9

(6) Neutral switch

- The neutral switch is located inside the control box.
- This switch controls the engine starting system so that the engine can be started only in Neutral position.

NOTE:

On some models, the neutral switch is not equipped in the remote control box.

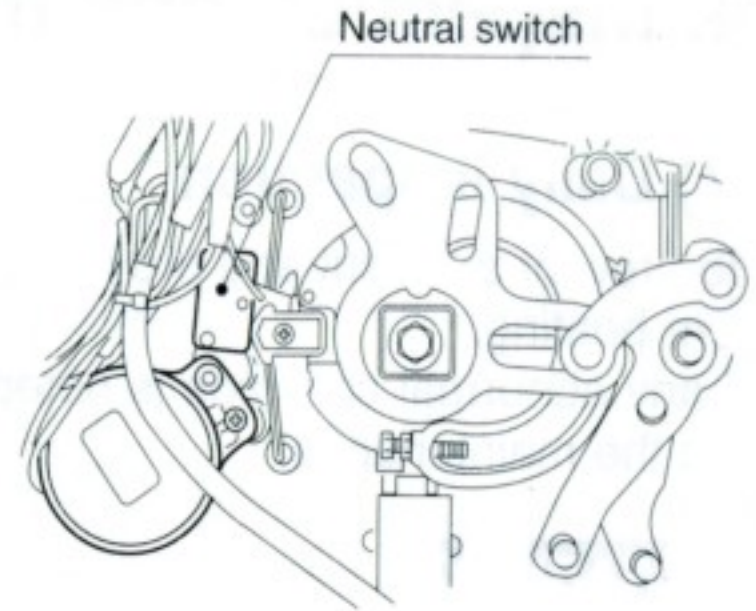


Fig. 10

4. Inspection and maintenance

(1) Daily inspection

To prevent accident and provide safe operation, perform the following inspections before boating.

If any abnormal condition is noted, have your authorized PBD Marine Dealer carry out the maintenance.

▲ WARNING

For periodic inspection and maintenance on the remote control box or remote control system, ask your authorized PBD Marine Dealer to perform the necessary work.

With engine standstill:

- Check that no looseness exists in the remote control box mounting. Retighten if any looseness is found.
- Check that there is no abnormal condition such as damage and corrosion in the remote control cable. If any problem is noted, have your authorized PBD Marine Dealer correct the condition.
- Check that there is no crack or break on the remote control lever. If any problem is noted, have your authorized PBD Marine Dealer correct the condition.
- Check that there is no looseness or damage on the section connecting the shift/throttle remote control cable to the engine. If any problem is noted, have your authorized PBD Marine Dealer correct the condition.

With engine started:

- Check that the shift control (Forward, Neutral and Reverse operations) and throttle control (Full open ↔ Complete close operation of throttle) can be performed smoothly. If any problem is noted, have your authorized PBD Marine Dealer correct the condition.
- Remove the lock plate from the emergency stop switch and check that the engine stops. If the engine does not stop, have your authorized PBD Marine Dealer correct the condition.

(2) Periodic inspection and maintenance

To maintain the remote control box in the best and safe operating condition, make sure to carry out the periodic inspection and maintenance.

Periodic Inspection Interval:

- 20 hours or one month of use whichever comes first, since the remote control box has been first placed in use.
- Thereafter, every 100 hours or 6 months whichever comes first.

⚠ WARNING

For periodic inspection and maintenance on the remote control box or remote control system, ask your authorized **PBD** Marine Dealer to perform the necessary work.

NOTE:

Refer to the “7. Periodic inspection and maintenance” section of this manual for specific procedures.

5. Remote control box installation

⚠ WARNING

- Improperly installed remote control box can lead to loss of boat control possibly resulting in accident.
Make sure to install the remote control box properly.
- For installation of the remote control box, ask your authorized **PBD Marine Dealer** to perform the necessary work.
- Do not attempt to install the remote control box on a customer's do-it-yourself basis.

CAUTION

- Perform installation or adjustment with the engine stopped and the lock plate removed from the emergency stop switch.
For electric starter equipped specification, disconnect the battery cable from the battery before carrying out the work.
- Problems resulting from the work operation in a manner not instructed in this manual will become liable to the operator who has performed such a work operation.

(1) Remote control box mounting position

To determine the mounting position, the following points must be checked.

- The remote control lever can be securely operated fore-and-aft without interference.
- There is no interference with the operation of switches and other equipment.
- Other related equipment will not come in contact with the remote control box.
- There is no sharp bend on the shift/throttle remote control cable and wiring harness that are extending from the remote control box when installed.

At least 200mm of radius must be secured when routing and bending the remote control cable.

CAUTION

When routing the remote control cable, do not bend it to a radius smaller than 200mm. If the cable is bent to a smaller radius, the remote control lever operation may become heavy possibly shortening the life of the cable.

(2) Remote control cable length

To determine the length of remote control cable, it is recommended to make calculation in the following formula.

Remote control cable length = (Distance X to Y) + (Distance Y to Z) + Approx. 900 mm (3 ft)

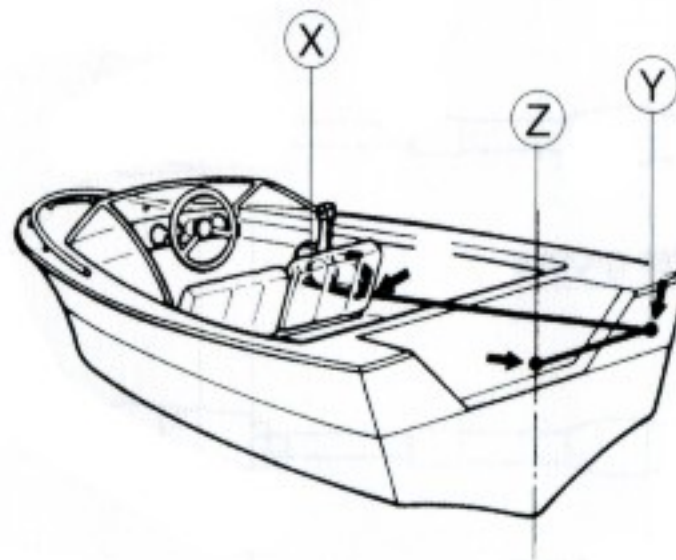


Fig. 11

(3) Remote control cable installation

NOTE:

Use PBD Genuine Parts for remote control cable.

- 1) Loosen two screws ① and remove back plate ②.
- 2) Screw the cable end to the distance of 11-14mm onto the threaded end of remote control cable and fix the cable end with the lock nut securely.
Apply PBD Water Resistant Grease or equivalent to the hole of the cable end.
(PBD Water Resistant Grease is available separately from the kit.)

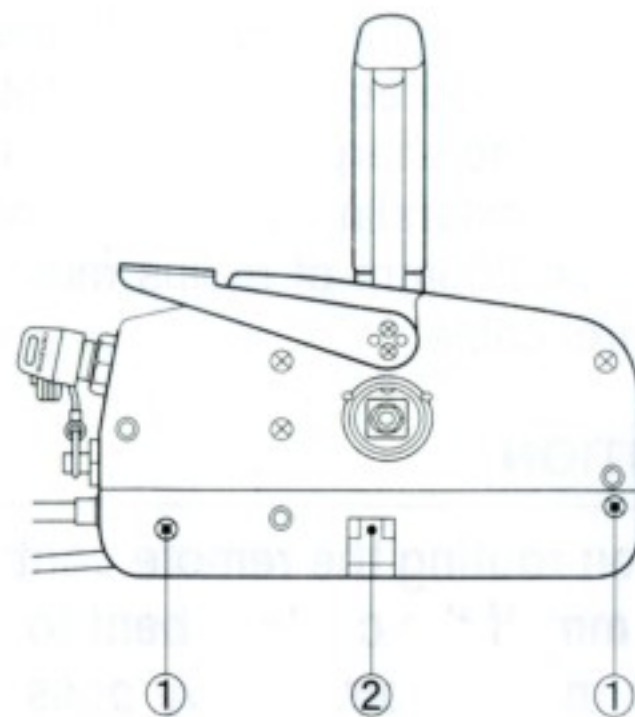


Fig. 12



99000-25350:

PBD Water Resistant Grease

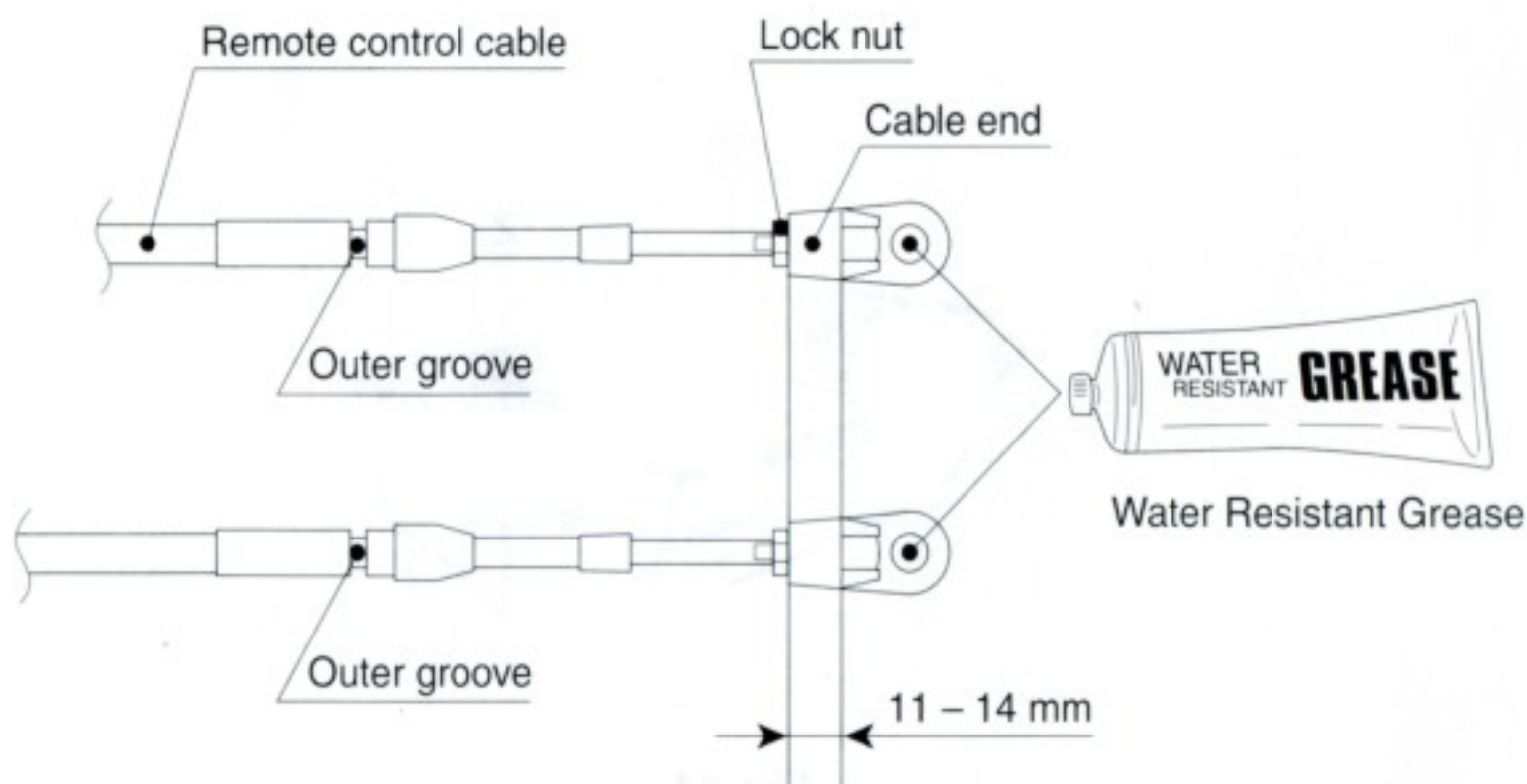


Fig. 13

- 3) Insert the outer groove (See Fig. 13) of the shift remote control cable ③ into the clamp groove ④ of the housing.

Next, fit the cable end ⑤ onto the pin ⑦ of the shift arm ⑥, and fix the end with the circlip ⑧ fitted into the groove of pin ⑦.

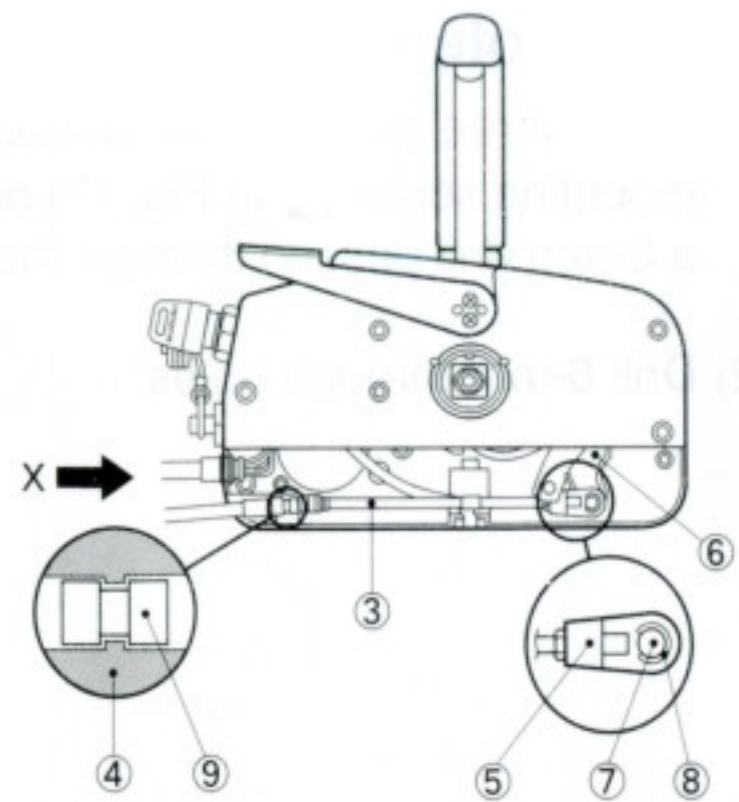


Fig. 14

View X

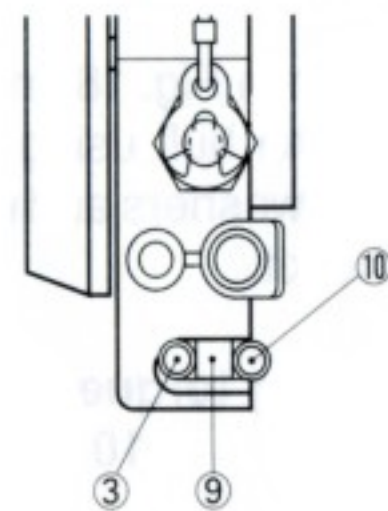


Fig. 15

- 4) Insert the grommet ⑨ into the clamp groove ④ all the way until it contacts the shift side remote control cable ③.

- 5) Install the throttle remote control cable ⑩ to the throttle arm ⑪ in the same manner as the shift remote control cable ③ as shown in Fig. 14.

- 6) Install the back plate ② and tighten it with two screws ①. (See Fig. 12)

Tightening torque:

4 N·m (0.4 kgf-m, 2.9 lb-ft)

Check that the wiring harness grommet ⑫ is properly inserted into the slot of back plate ②.

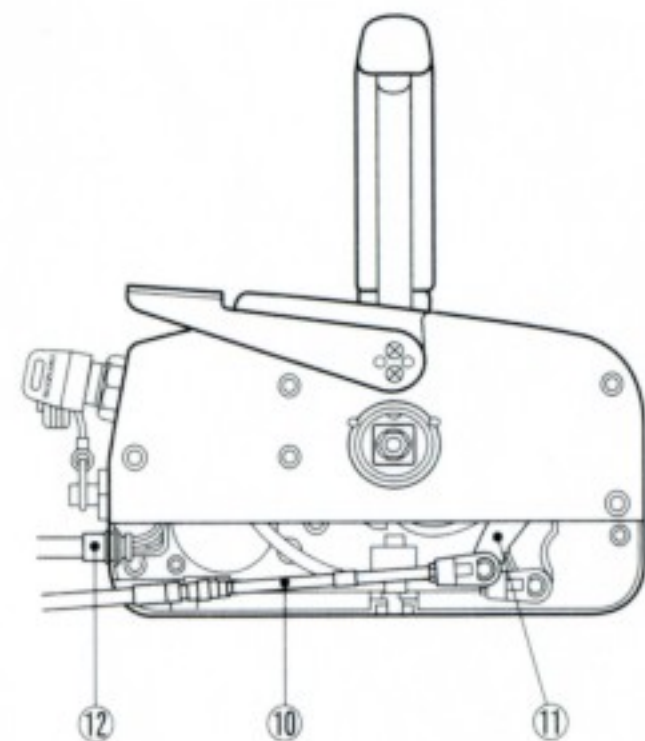


Fig. 16

(4) Remote control box installation

- 1) Mark three positions of remote control box mounting screw (■ in Fig. 17) on the hull with a 6-mm drill passed through the screw holes.
- 2) Drill 6-mm through holes.

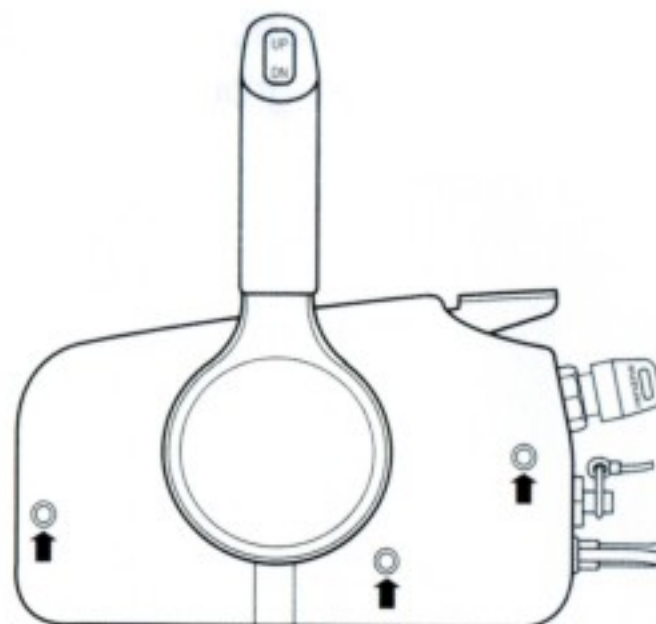


Fig. 17

- 3) As shown in Fig. 18, install the remote control box on the hull using three each of screws, spacers, washers and nuts that come supplied with the kit.

Tightening torque:

10 N·m (1.0 kgf-m, 7.0 lb-ft)

With the remote control box installed on the hull, check that at least three threads of the screw come out of the nut.

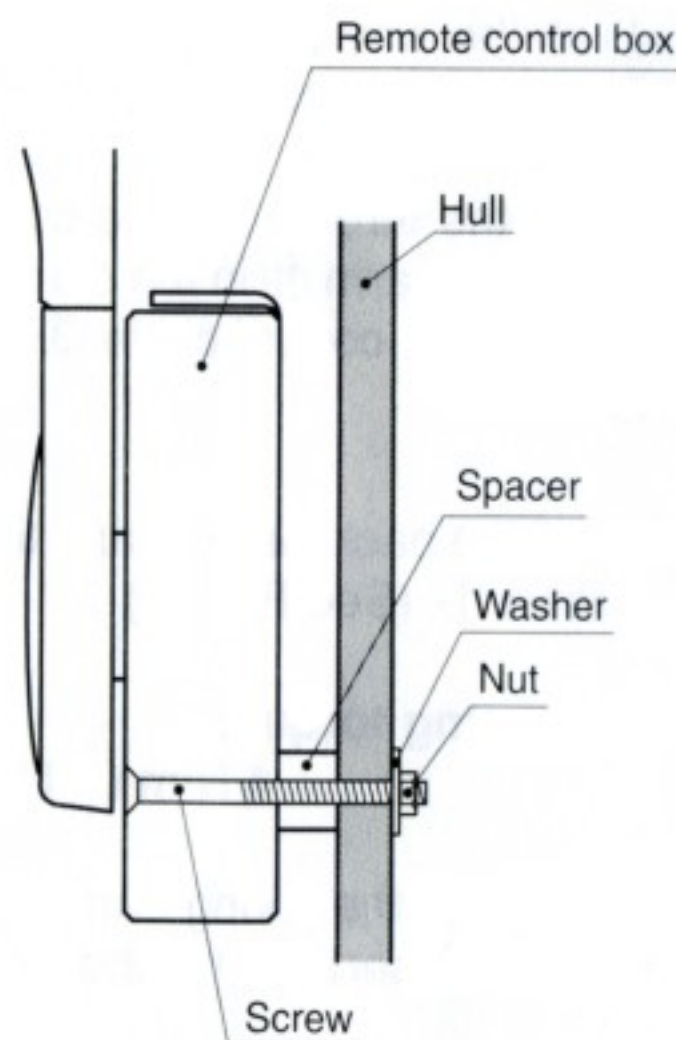


Fig. 18

(5) Connecting shift/throttle remote control cable to engine

NOTE:

The connection of remote control cable to the engine varies with different model. Refer to the Set-up manual of applicable model.

When the connection of shift/throttle remote control cable to the engine has been completed, check for the following by operating the remote control lever. This check must be performed with the engine standstill.

<Shift control>

- While turning the propeller, check that the remote control lever can be operated each to Forward, Neutral and Reverse smoothly.
- While turning the propeller, move the remote control lever from Neutral to Forward and to Reverse. At this time, check that the lever feels detent with a click sound at positions ① and ②, each at approximately 32 degrees, and the clutch on engine side shifts into Forward and Reverse respectively. (See Fig. 19.)

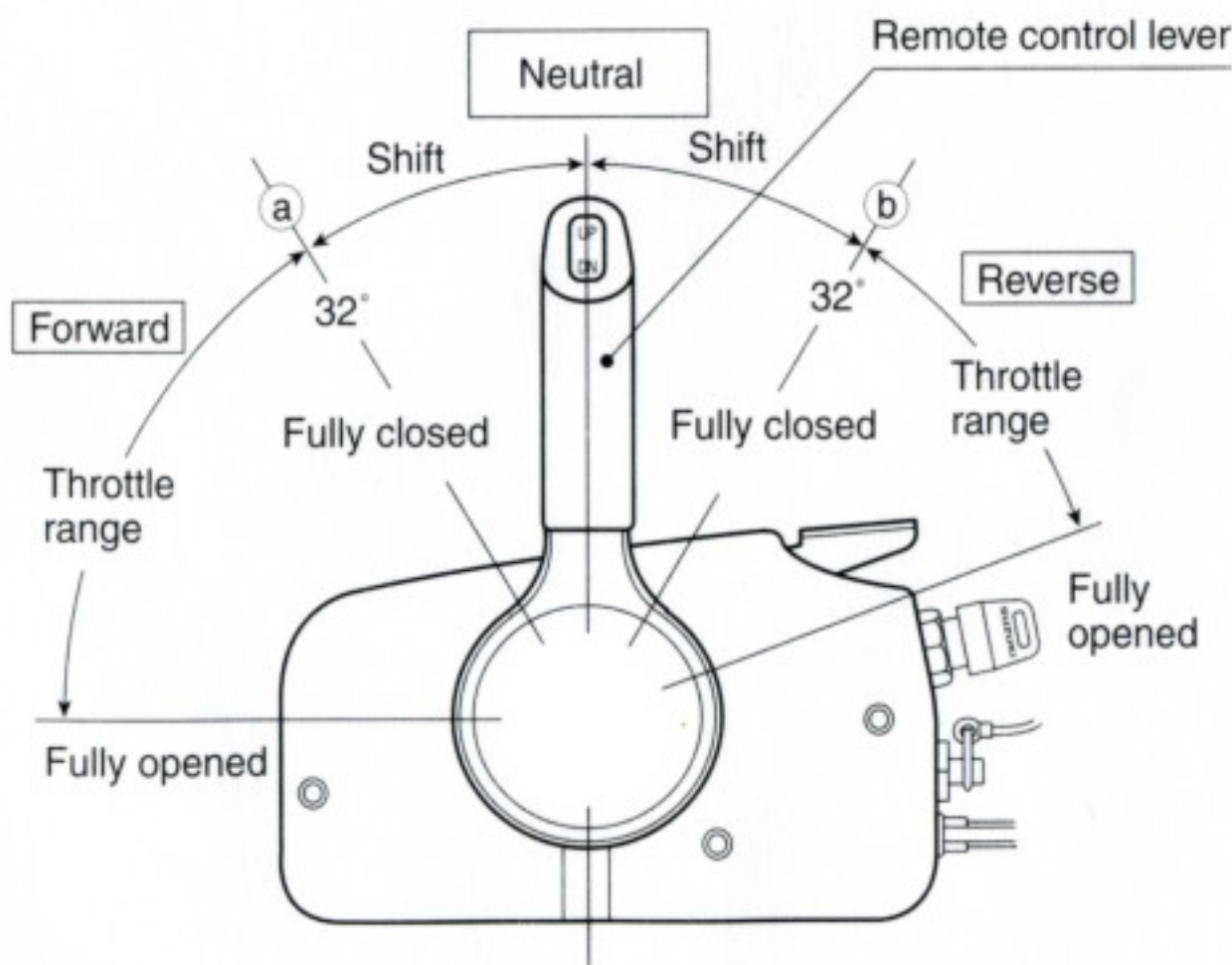


Fig. 19

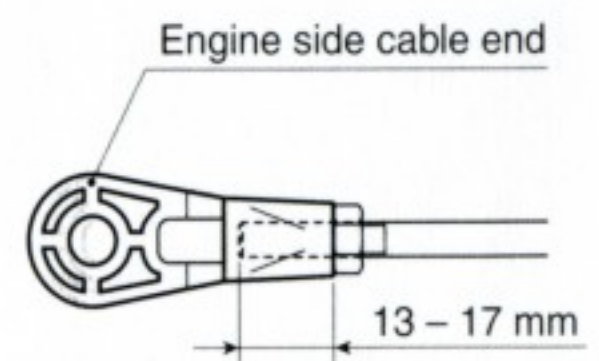


Fig. 20

For Dealer

- Next, return the remote control lever to Neutral position from Forward and Reverse. At this time, check that the lever latches into Neutral with a click sound and the clutch on engine side disengages while turning the propeller.
- If the clutch on engine side does not shift to Forward, Reverse or Neutral, readjust the remote control cable length on the engine side by changing the thread engaging depth of the cable end. For the detail of readjustment, refer to the applicable Set-up manual.

CAUTION

- For the remote control cable end on the engine side, the thread engaging depth shall be 13-17 mm. (See Fig. 20.)
- For the remote control cable end on the remote control box side, the thread engaging depth shall be 11-14 mm. (See Fig. 13.)

<Throttle control>

- While turning the propeller until the clutch engages, move the remote control lever from Neutral position each to Forward and Reverse all the way to the maximum position.
Check that this operation can be made smoothly both on Forward and Reverse sides.
- While turning the propeller, move the remote control lever from Neutral toward Forward and Reverse. The lever feels detent with a click sound at Forward ① and at Reverse ② positions, each at approximately 32 degrees. In these positions, check that the clutch is engaged and the throttle is completely closed. Move the remote control lever further and check that the engine throttle starts to open and reaches the full open position as the lever stops at the maximum position. (See Fig. 19.)
- Then, return the remote control lever from the full open throttle position toward Neutral direction and stop the lever when it feels detent with a click sound at positions ① and ②. At these positions, check that the engine throttle is completely closed.
- If the engine throttle does not reach the full open and complete close positions, readjust the remote control cable end thread engaging depth on the engine side. For the detail of readjustment procedures, refer to the applicable Set-up manual.

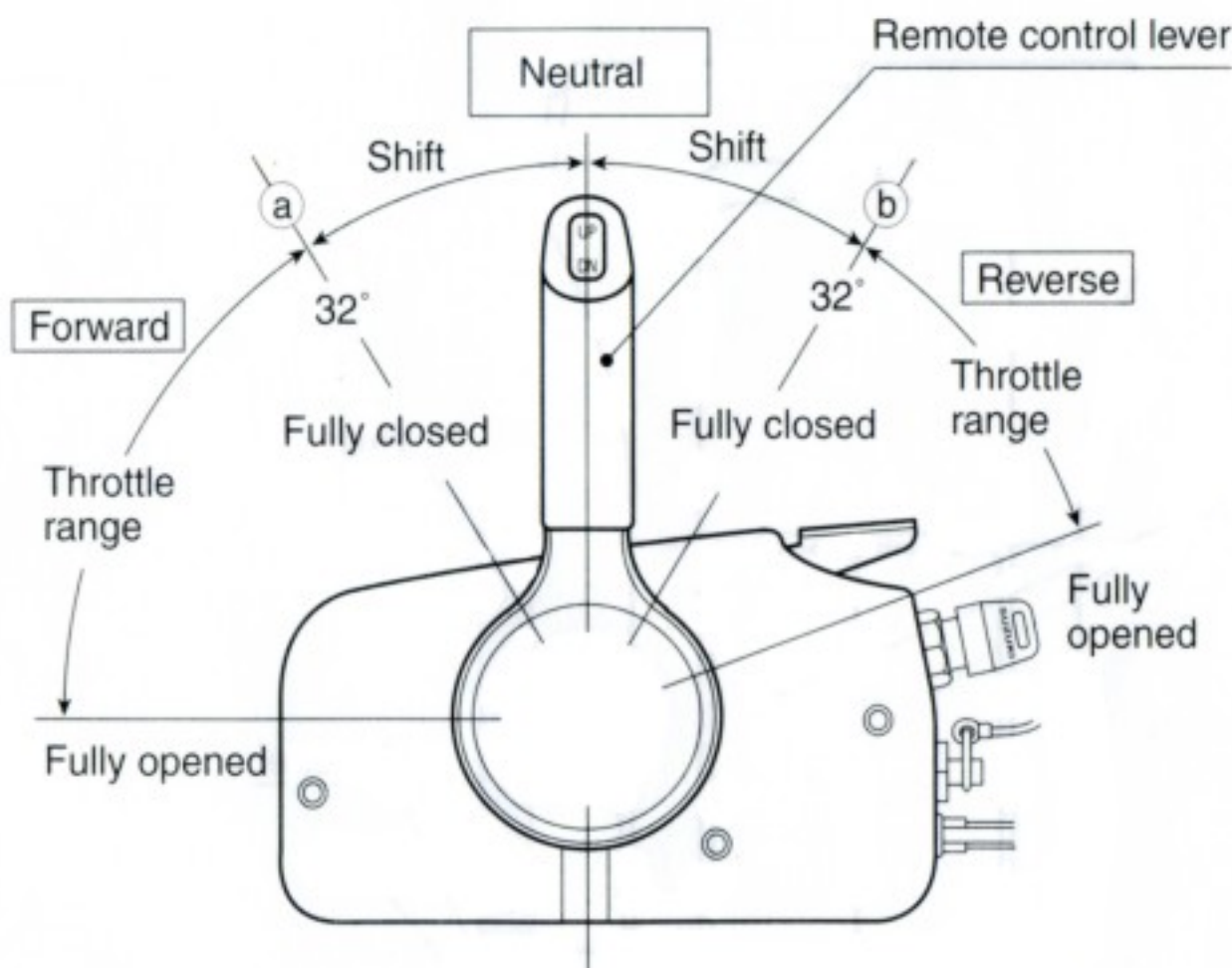


Fig. 19

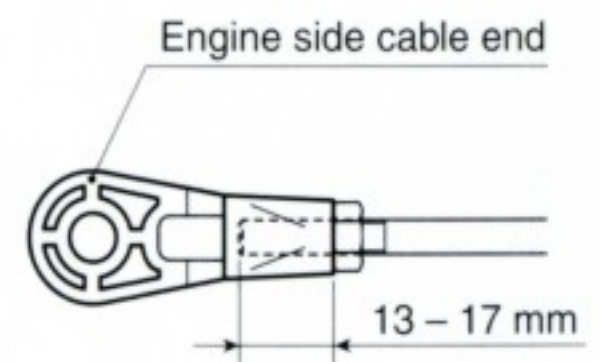


Fig. 20

CAUTION

- For the remote control cable end on the engine side, the thread engaging depth shall be 13-17 mm. (See Fig. 20.)
- For the remote control cable end on the remote control box side, the thread engaging depth shall be 11-14 mm. (See Fig. 13.)

(6) Twin attachment kit

- In the case of twin engine installation, two remote control boxes can be installed on the boat as shown in Fig. 21 using the twin attachment kit that is available separately.
- With the remote control box installed on the hull, check that at least three threads of the screw come out of the nut.

⚠ WARNING

- To secure sufficient space for remote control operation, use 2-3 spacers side by side on the screw. (See Fig. 21.)
- Mount two remote control boxes together using the screw and nut securely and on completion of installation, check that the remote control lever can be operated smoothly.

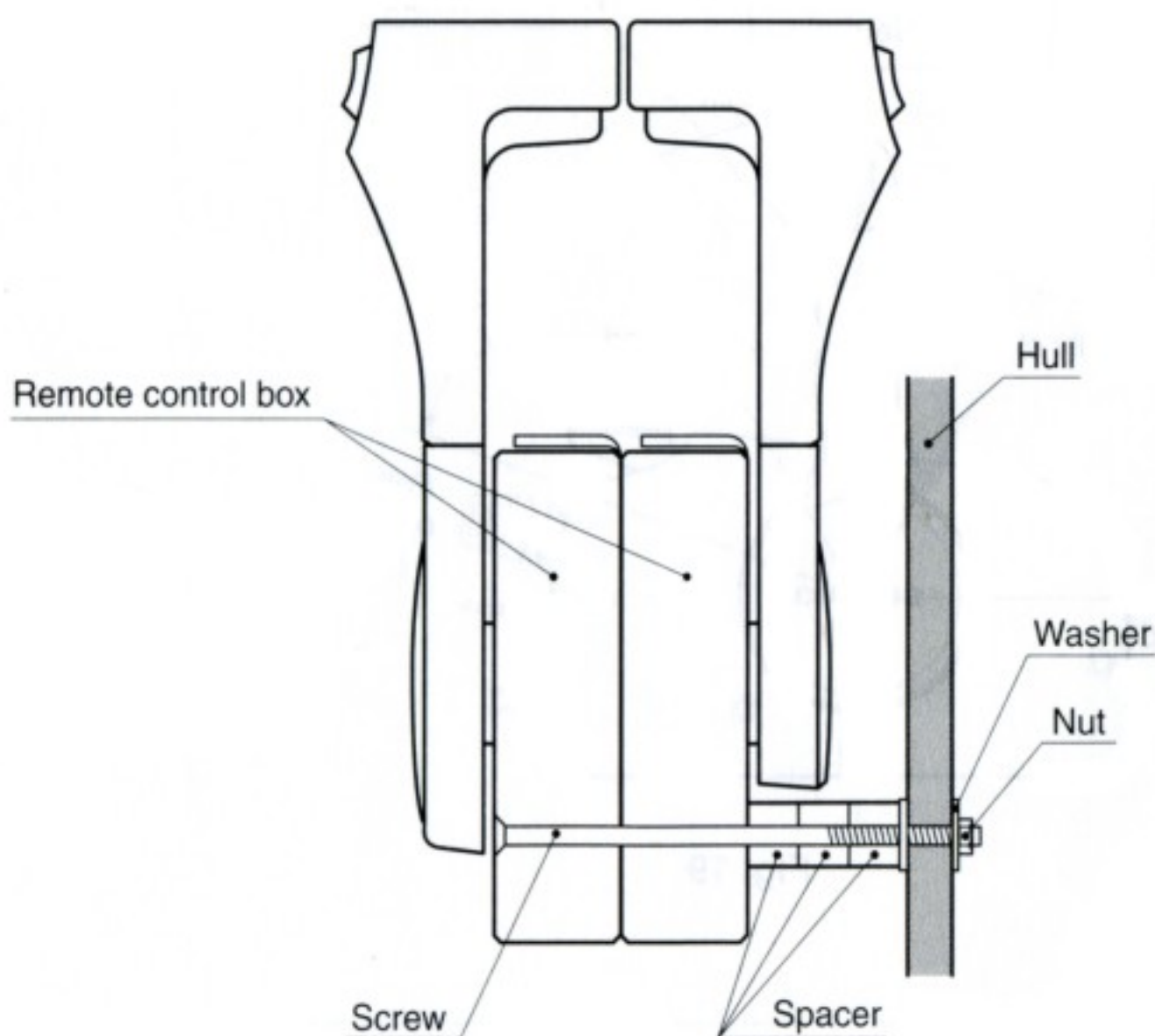


Fig. 21

NOTE:

- When installing two remote control boxes together to the hull, use the twin attachment kit of PBD Genuine Parts.
(The twin attachment kit is available separately.)
- The twin attachment kit consists of three screws and three spacers.
- In the case of mounting two remote control boxes together:
 - Prepare the twin attachment kit and necessary number of spacers.
 - For washers and nuts, use those which come supplied with the remote control box.
- For two remote control boxes to be put together, one side of the remote control levers requires relocation. To relocate the attaching position of remote control lever, refer to "6. Relocating remote control lever attached position" section of this manual.

(7) Adjustment of reverse throttle opening

⚠ WARNING

- For adjustment of the reverse throttle opening, ask your authorized PBD Marine Dealer to perform the necessary work.
- Do not attempt to adjust the reverse throttle opening on a customer's do-it-yourself basis.

CAUTION

- The adjustment of reverse throttle opening must be performed with the engine at stop and the lock plate removed from the emergency stop switch. In the case of electric starter specification outboard motor, this work must be performed with the battery cable disconnected from the battery.
- Problems resulting from the work operation in a manner not instructed in this manual will become liable to the operator who has performed such a work operation.

⚠ WARNING

Excessive speed in Reverse can dangerously cause loss of boat control. Do not allow the engine speed to exceed 4000 rpm when the remote control lever is moved fully in Reverse. (Limit the remote control lever angle in Reverse range to the maximum of 60 degrees.)

In reversing, if the engine speed exceeds 4000 rpm or the boat speed is insufficient when the remote control lever is moved fully to the maximum position, adjust the reverse throttle opening in the following procedures.

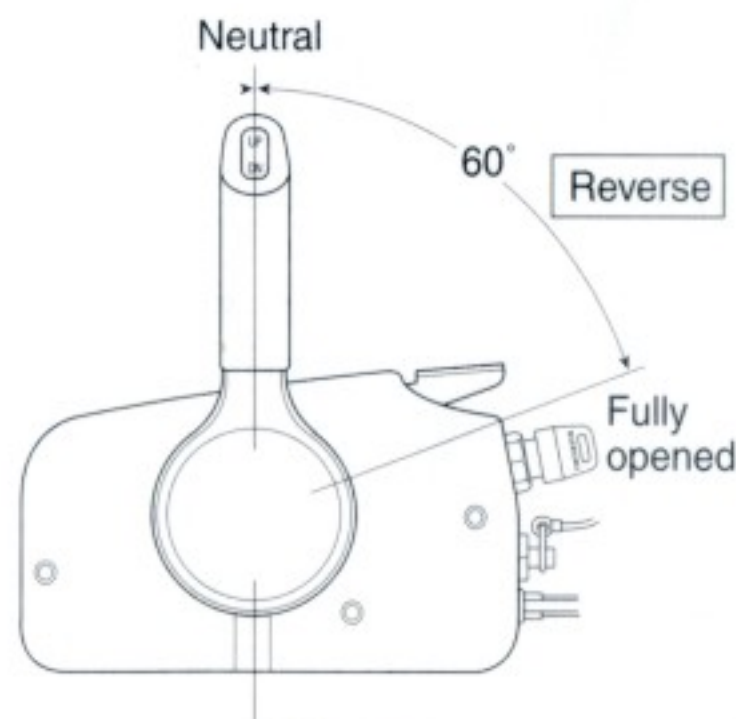


Fig. 22

- 1) Stop the engine.
Remove the remote control box from the hull.

- 2) Loosen and remove five screws ①.
Remove the rear housing ⑬ and back plate ②.

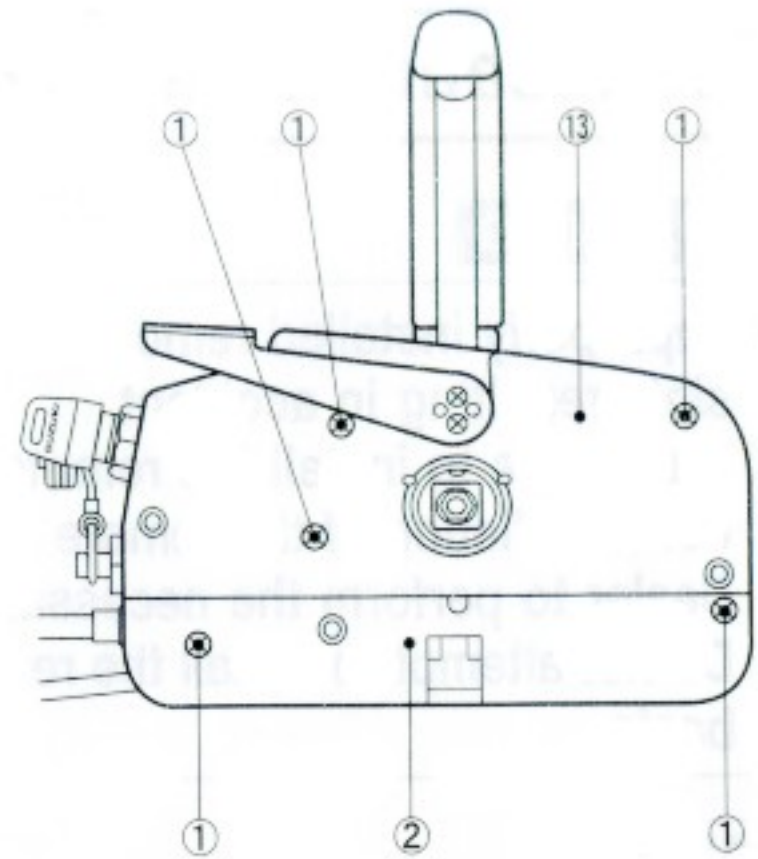


Fig. 23

- 3) Loosen the lock nut ④.
Adjust the engine speed when the remote control lever is moved to the maximum in Reverse by turning the adjusting bolt ⑤.
The engine speed when the remote control lever is moved to the maximum position decreases with the bolt ⑤ turned clockwise and increases with the bolt ⑤ turned counterclockwise.
- 4) Tighten the lock nut ④ to lock the adjusting bolt ⑤.

Tightening torque (lock nut ④):
1.8 N·m (0.18 kgf-m, 1.3 lb-ft)

- 5) Restore the rear housing ⑬ and back plate ② to the original position and tighten the screws ①.

Tightening torque:
4 N·m (0.4 kgf-m, 2.9 lb-ft)

- 6) Restore the remote control box to the original position on the hull.
- 7) Set the boat afloat and check for the maximum engine speed in Reverse.
Repeat the procedures 1) – 6) as necessary.

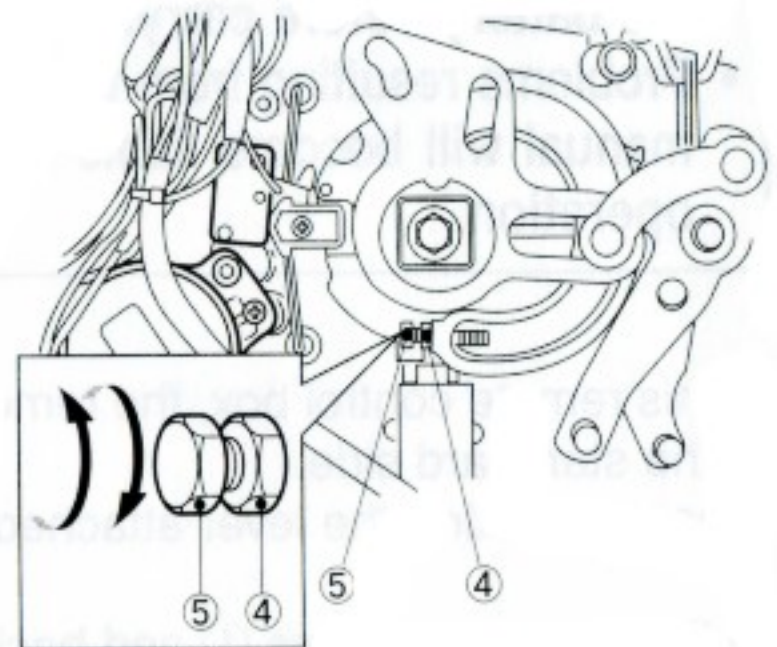


Fig. 24

6. Relocating remote control lever attached position

⚠ WARNING

- Improperly installed remote control box can lead to loss of boat control possibly resulting in accident.
Make sure to install the remote control box properly.
- For installation of the remote control box, ask your authorized PBD Marine Dealer to perform the necessary work.
- Do not attempt to install the remote control box on a customer's do-it-yourself basis.

CAUTION

- Perform installation or adjustment with the engine stopped and the lock plate removed from the emergency stop switch.
For electric starter equipped specification, disconnect the battery cable from the battery before carrying out the work.
- Problems resulting from the work operation in a manner not instructed in this manual will become liable to the operator who has performed such a work operation.

In this remote control box, the remote control lever can be relocated from the port side to the starboard side.

When relocating the lever attached position, follow the procedures below.

- 1) Remove two screws ① and back plate ②.

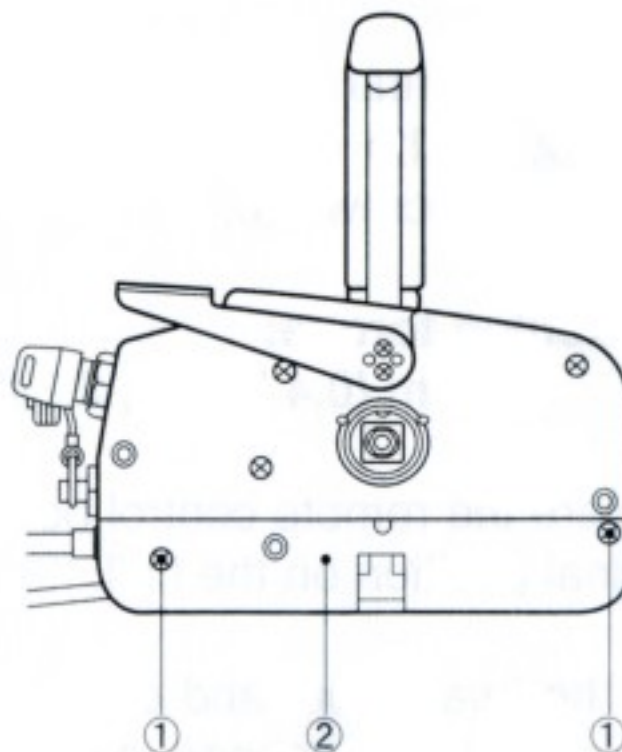


Fig. 25

- 2) Compress the pawl section of wire cover ③ and remove it from the remote control box.

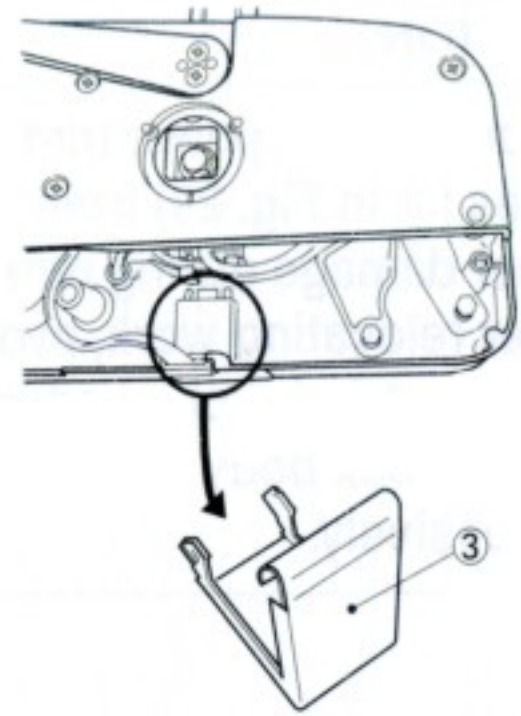


Fig. 26

- 3) Using a 12 mm socket wrench, turn the bolt ④ 3-4 rotations counterclockwise to loosen it. Do not remove the bolt at this time.

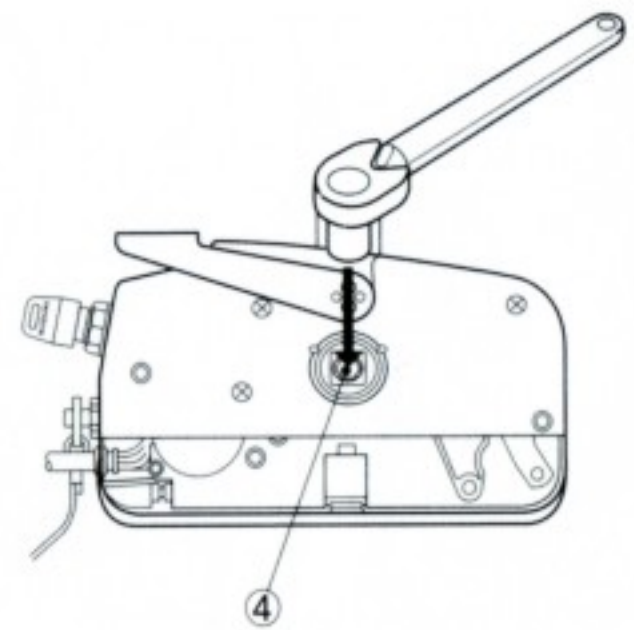


Fig. 27

- 4) Using a center punch and a plastic hammer, lightly hit the bolt head ④ and slide the remote control lever ⑥. Remove the bolt ④ and washer ⑤ and detach the remote control lever ⑥ from the remote control box.

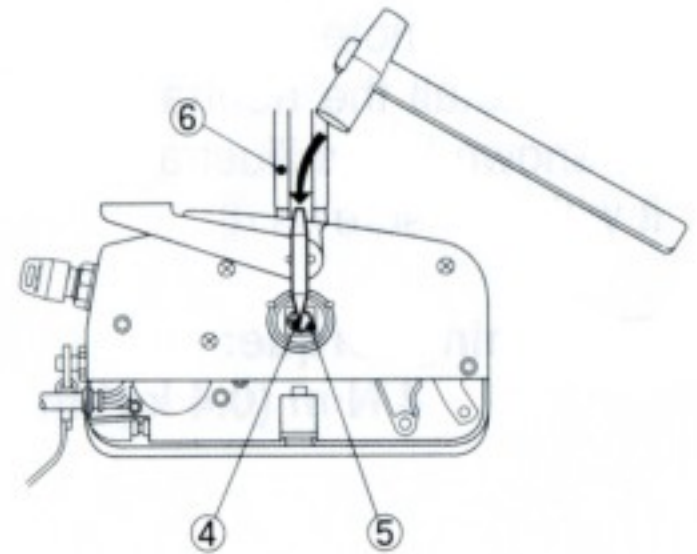


Fig. 28

CAUTION

To prevent the power trim & tilt switch wires (9 in Fig. 29) from breaking or other damage during remote control lever relocating work, avoid causing the wires to be pinched with remote control box body or to be pulled taut excessively.

- 5) Loosen and remove two screws (8).
Remove the neutral lock holder (7).

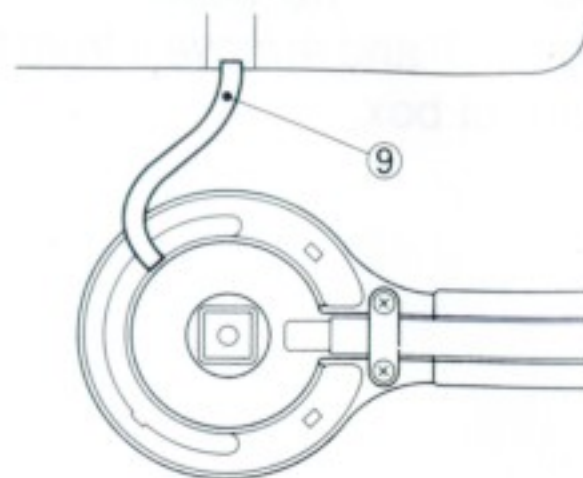


Fig. 29

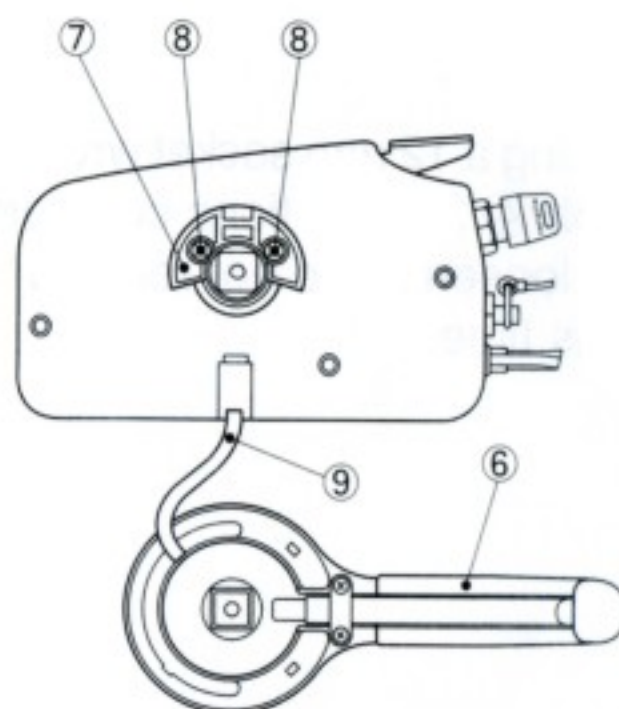


Fig. 30

- 6) Turn the remote control box to the back-side. Install the neutral lock holder (7) as shown in the illustration and tighten it with two screws (8).

Tightening torque:

4 N·m (0.4 kgf-m, 2.9 lb-ft)

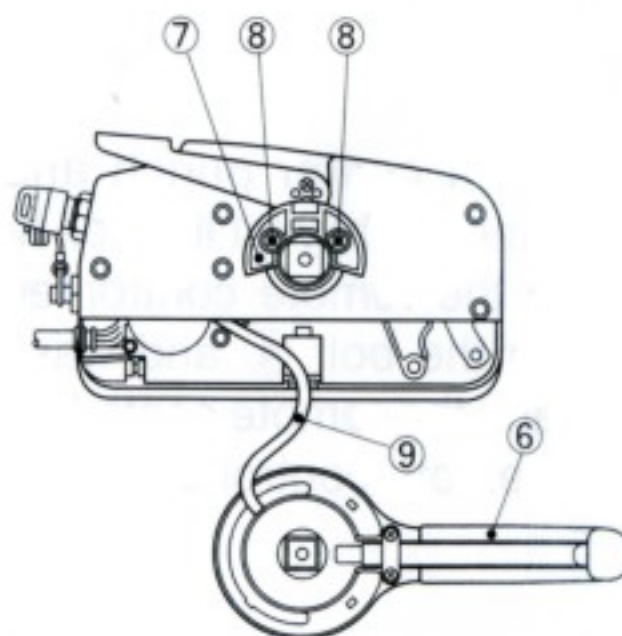


Fig. 31

- 7) Install the remote control lever ⑥ with the lever square section ① and shaft square section ② aligned.

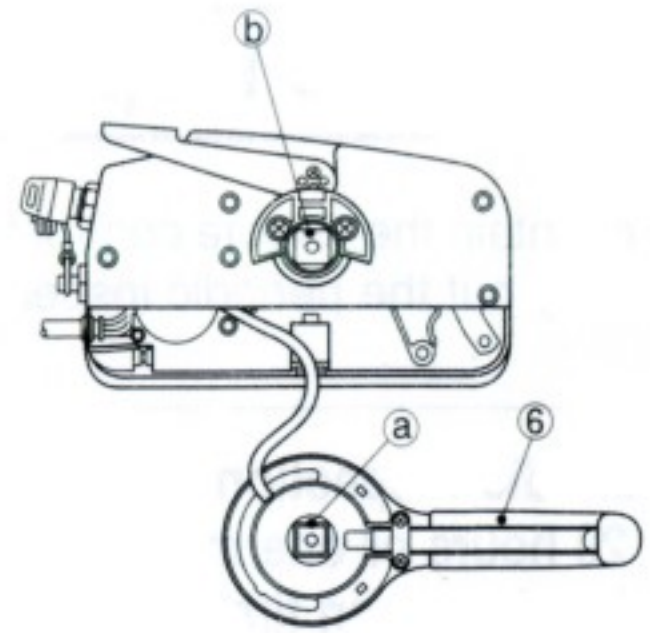


Fig. 32

- 8) Turn the remote control box again to the other side. Tighten the remote control lever with the bolt ④ and washer ⑤.

Tightening torque:

10 N·m (1.0 kgf-m, 7.0 lb-ft)

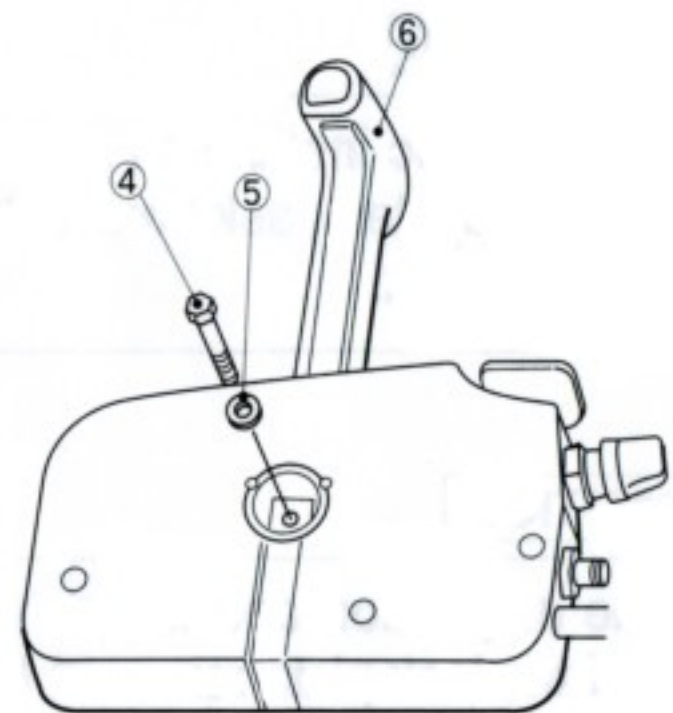


Fig. 33

- 9) Route the power trim & tilt switch wires ⑨ using care not to twist or sag. Install the back plate ② and tighten with two screws ①.

Tightening torque:

4 N·m (0.4 kgf-m, 2.9 lb-ft)

- 10) Turn the remote control box over. Fitting in two claws and install ③.

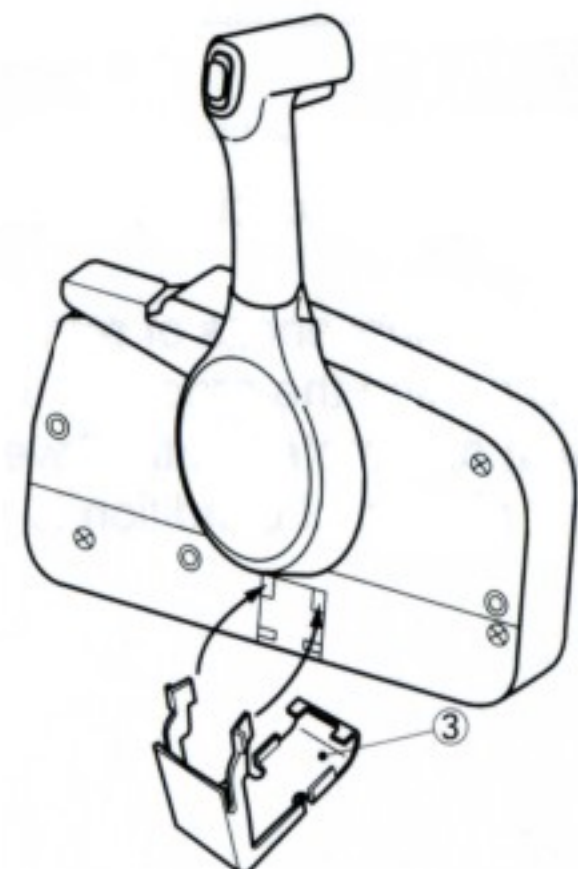


Fig. 34

7. Periodic inspection and maintenance

To maintain the remote control box in the best and safe operating condition, make sure to carry out the periodic inspection and maintenance.

Periodic Inspection Interval:

- 20 hours or one month of use whichever comes first, since the remote control box has been first placed in use.
- Thereafter, every 100 hours or 6 months whichever comes first.

⚠ WARNING

For periodic inspection and maintenance on the remote control box or remote control system, ask your authorized **PBD** Marine Dealer to perform the necessary work.

CAUTION

The inspection and maintenance must be performed with the engine at stop and the lock plate removed from the emergency stop switch (with the exception of the case in which this manual instructs otherwise).

In the case of electric starter specification outboard motor, the work must be performed with the battery cable disconnected from the battery.

In the remote control box and remote control cable, carry out the following inspections. If any abnormal condition is found, be sure to perform the necessary service.

- Check for looseness of remote control box installation and retighten if found.
- While turning the propeller until the clutch engages, check for smooth and sure operation of remote control lever.

If any abnormal condition is found, replace the relevant parts to correct the condition.

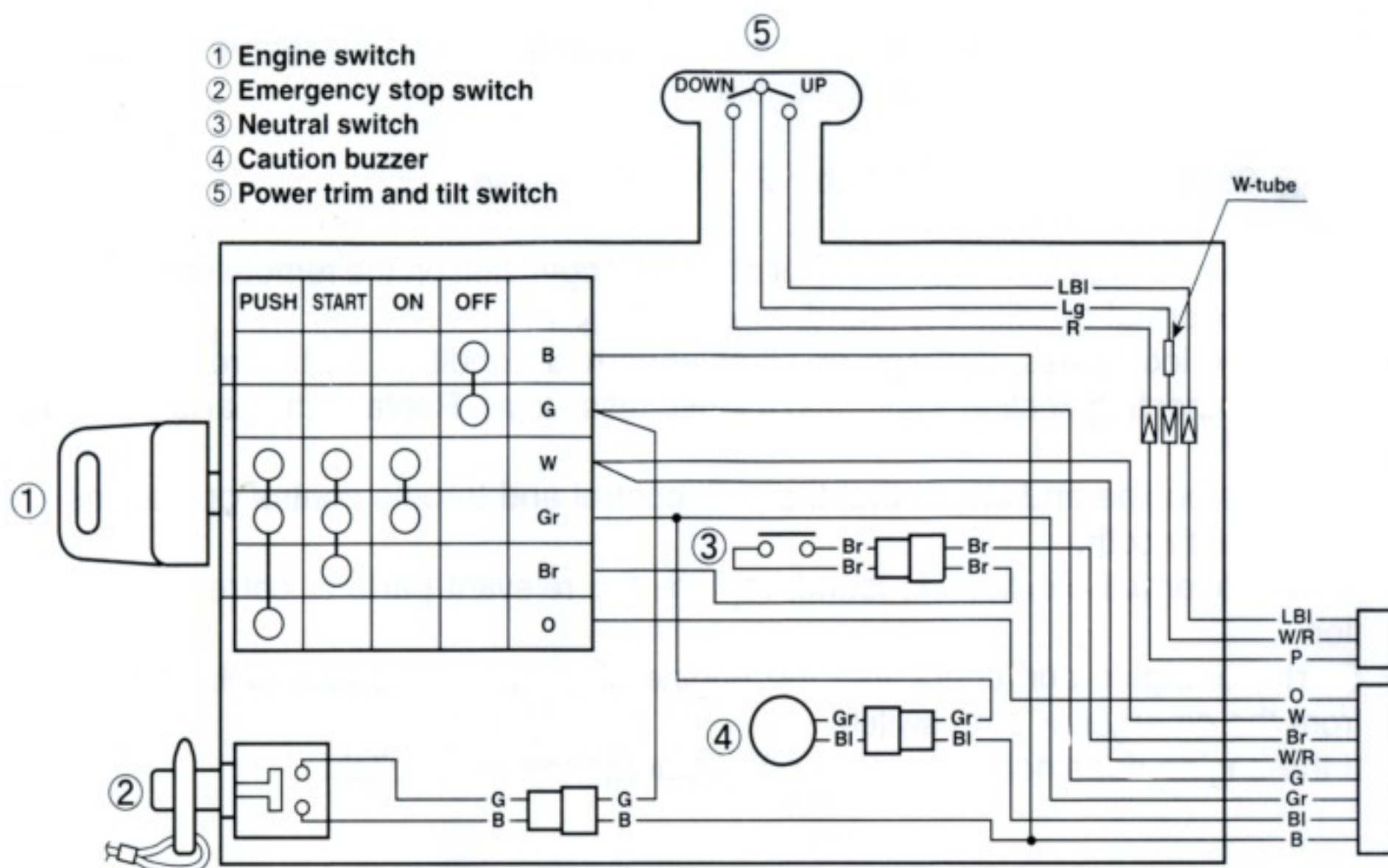
- While turning the propeller until the clutch engages, check that the shift control (Forward, Neutral and Reverse) and throttle control (complete close  full open) operations are sure and smooth with the engine side shift link and throttle link operations also being observed.
If any abnormal condition is found, replace the relevant parts to correct the condition.
- Apply PBD Water Resistant Grease to the sliding sections inside the remote control box and to the remote control cable.

 99000-25350: PBD Water Resistant Grease

- Check for damage, corrosion or other abnormal condition on the remote control cable.
If any abnormal condition is found, replace the parts.
- Check for looseness, damage or other abnormal condition on the remote control cable connecting section. Retighten if looseness exists. Replace the parts if damage exists.
- Start the engine and check that the shift control and throttle control operations are sure and smooth.
If any abnormal condition is found, replace the relevant parts to correct the condition.
- Start the engine and check that the engine stops when the lock plate is removed from the emergency stop switch.
If the engine does not stop, replace the emergency stop switch.

8. Wiring diagram

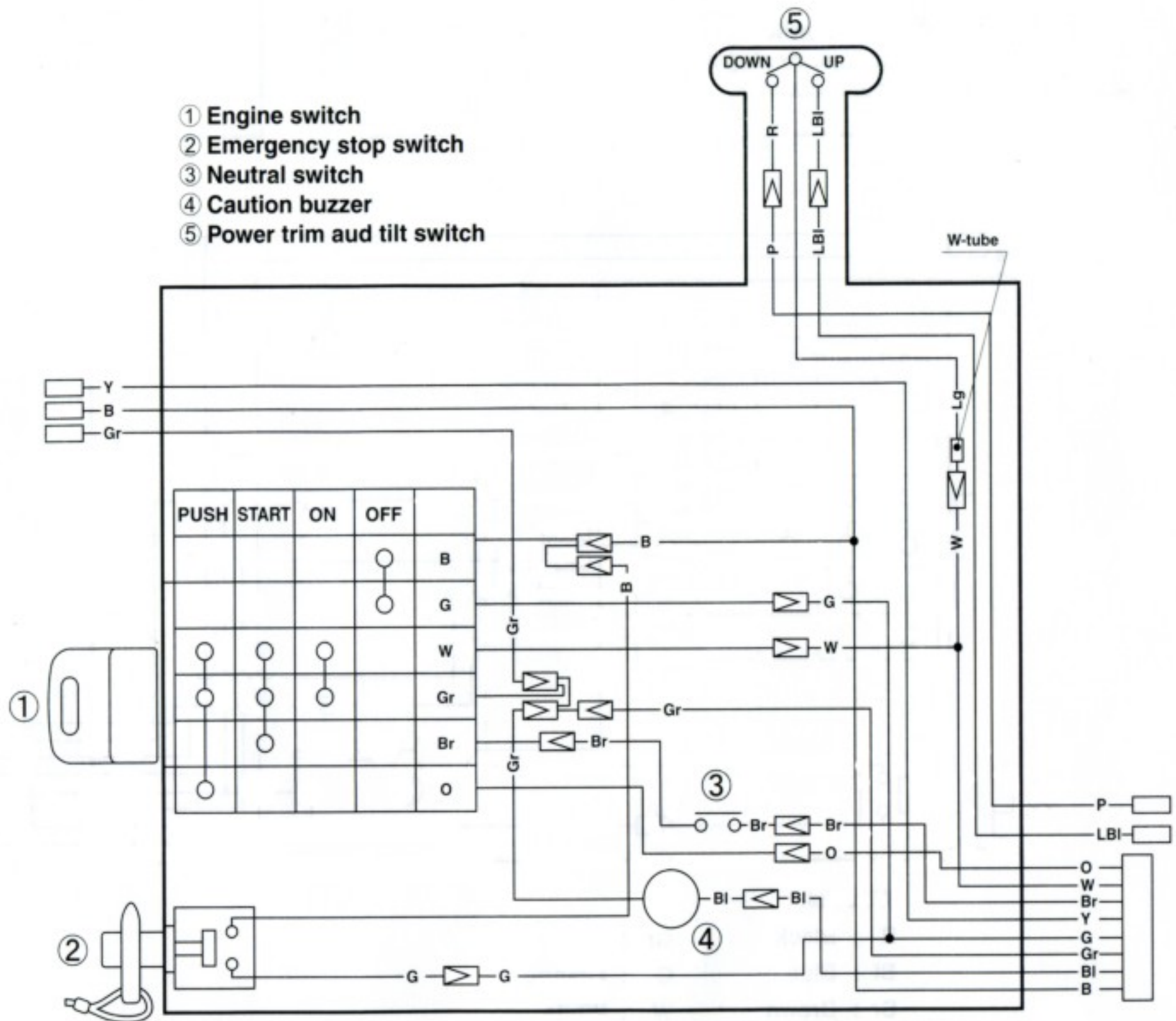
Connector type: Coupler



Wire color

B : Black	LBI : Light blue
BI : Blue	O : Orange
Br : Brown	P : Pink
G : Green	R : Red
Gr : Gray	W : White
Lg : Light green	W/R: White/Red

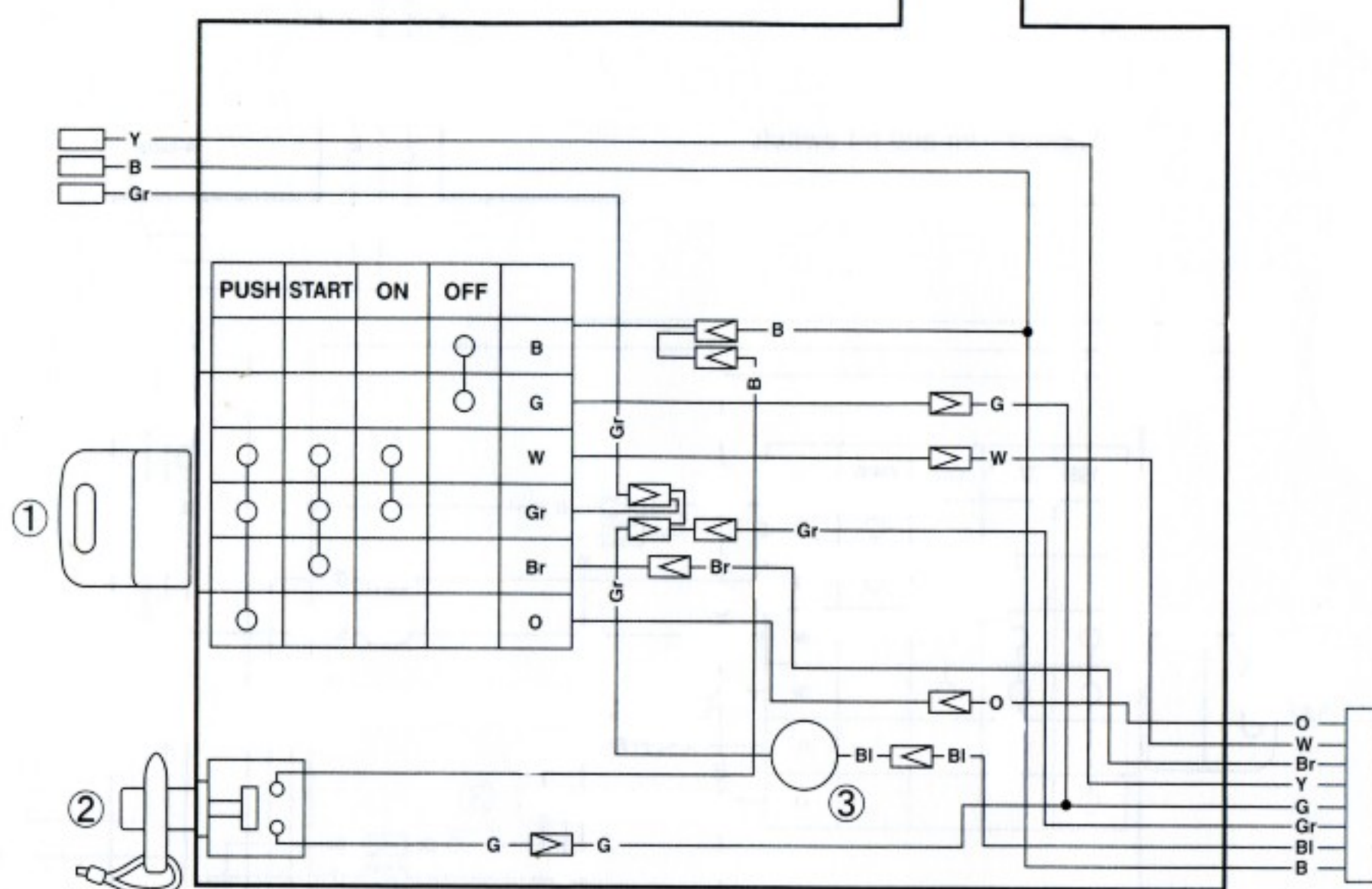
Connector type: Bullet terminal



Wire color

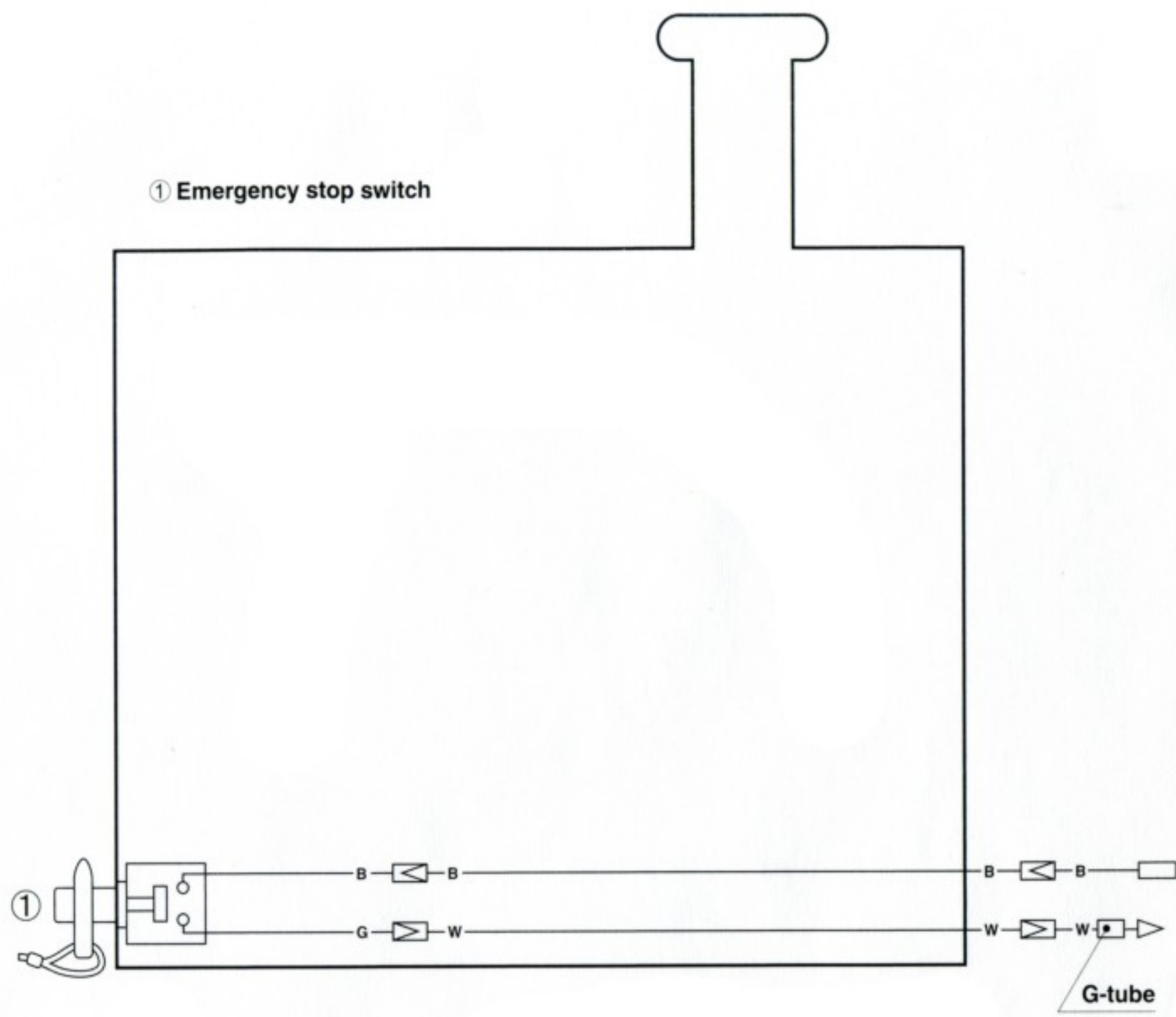
B : Black	LBI : Light blue
BI : Blue	O : Orange
Br : Brown	P : Pink
G : Green	R : Red
Gr : Gray	W : White
Lg : Light green	Y : Yellow

- ① Engine switch
② Emergency stop switch
③ Caution buzzer



Wire color

B : Black	Gr : Gray
Bl : Blue	O : Orange
Br : Brown	W : White
G : Green	Y : Yellow



Wire color
B : Black
G : Green
W : White

MEMO
