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INDICATOR PANEL TEMPLATE

SWITCH PANEL TEMPLATE

WIRING DIAGRAMS

- Side Mount Remote Control
- Top Mount/Panel Mount Remote Control

PREFACE

This instruction provides the proper information for set-up and pre-delivery inspection of the Honda Outboard Motor BF135A-BF150A. Proper set-up and pre-delivery inspection are essential for safe and reliable operation.

It is recommended that the Honda Outboard Motor BF135A-BF150A Shop Manual and Owner's Manual be referred to conjunction with these manuals for more detailed set-up instructions.

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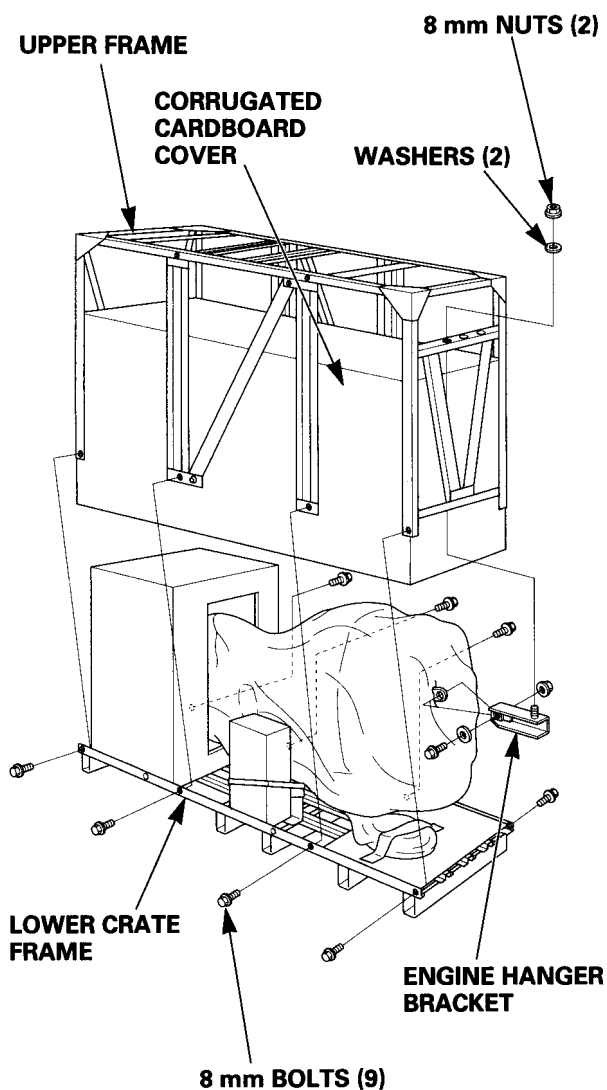
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1. UNPACKING

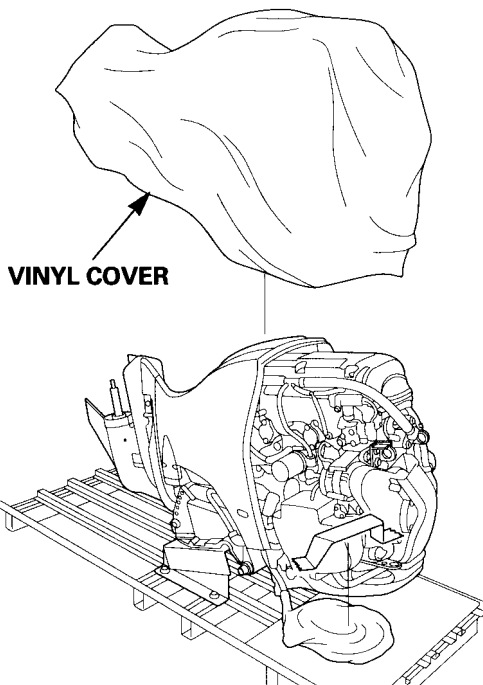
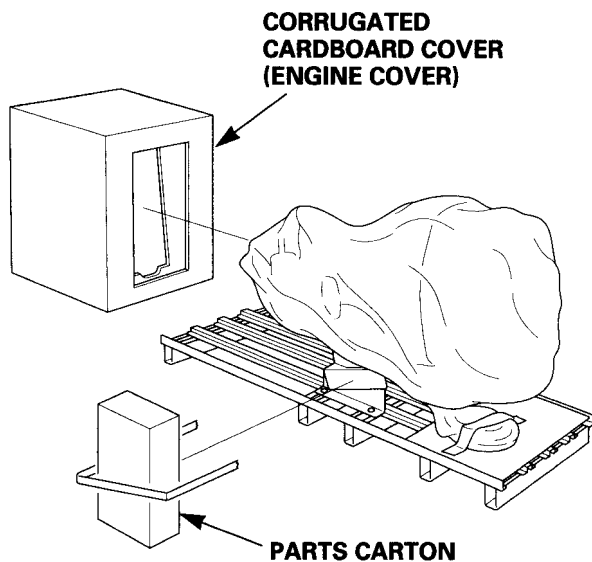
CAUTION:

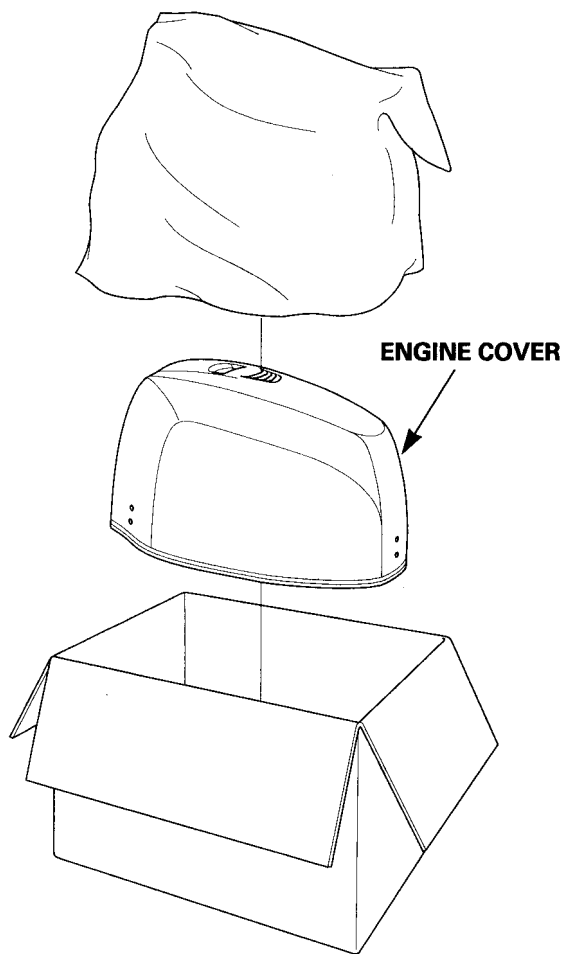
- Wear the gloves during unpacking to protect your hands with the burrs on the frame.
- Take care not to drop the parts contained in the container and do not damage the parts, either.

1. Remove the nine bolts attaching the upper frame and the a nut attaching the engine hanger bracket.
2. Lift up the upper frame slowly with care not to strike on the outboard motor. (Get an assistant to help remove the crate frame.) Then remove the corrugated cardboard cover.
3. Lift up and remove the corrugated cardboard protector that contains the engine.



4. Slide and remove the corrugated cardboard protector that contains the engine cover.
5. Cut the tie and remove the parts carton from the crate.
6. Remove the vinyl cover then compare the parts to the parts list on page 6.





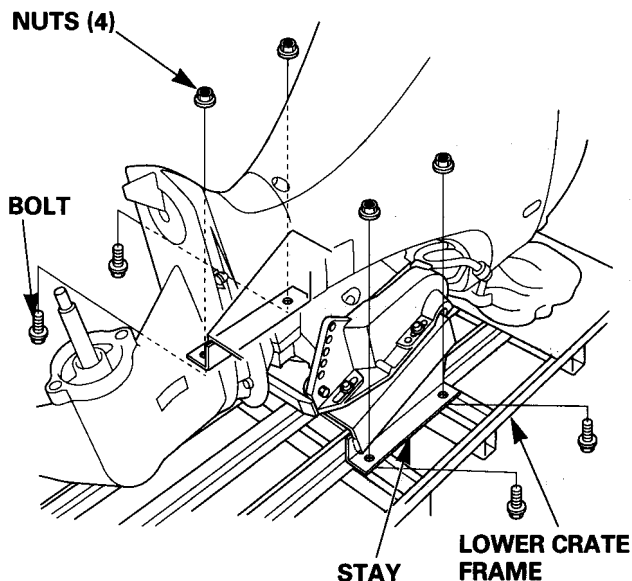
7. After comparing the parts, go to **LIFT UP THE OUTBOARD MOTOR** on page 5.

2. LIFT UP THE OUTBOARD MOTOR

CAUTION:

- Use the hoist which allowable load is 250kg (550lbs) or above.
- To prevent the hoist from swaying, support the outboard motor with care when lifting it up.
- Prevent damage the silencer duct.

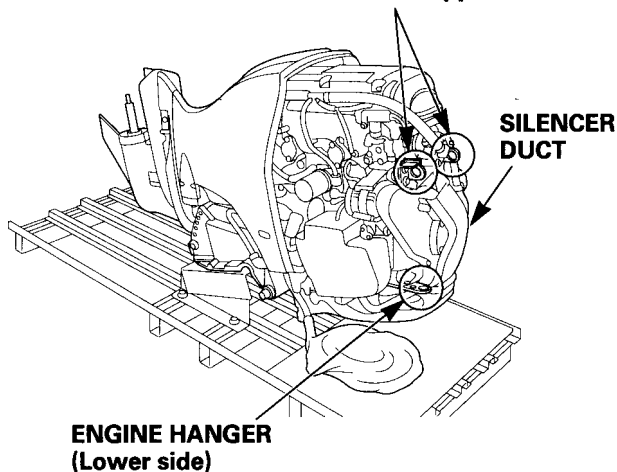
1. Remove the four bolts and nuts that secures the lower crate frame.



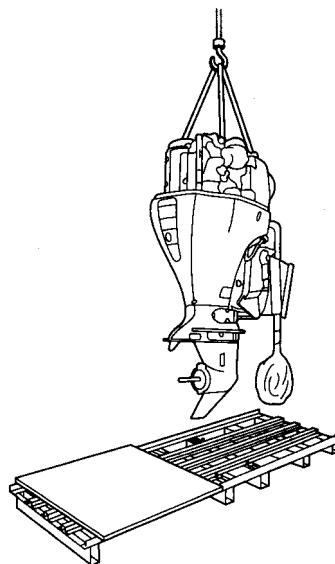
2. Connect engine lifting sling chains to the engine hangers, and lift up the outboard motor with a hoist.

- To prevent damage to the silencer duct, first connect the chains to the two engine hangers of the upper side, then connect another chain to the other engine hanger of the lower side.

ENGINE HANGER (Upper side)



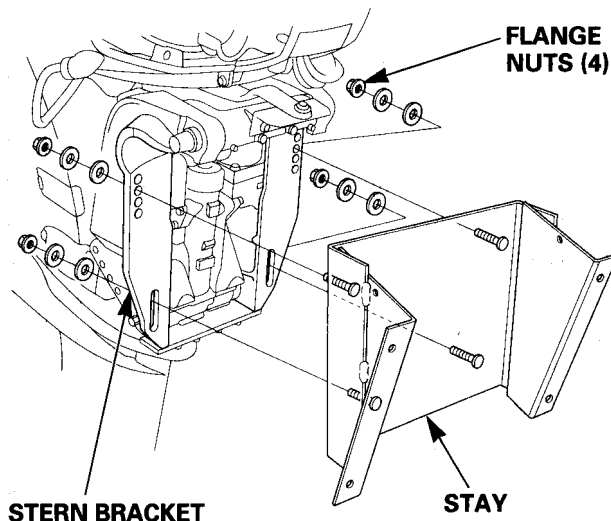
3. Lift up the outboard motor with the stay setting on the stern bracket.



4. Remove the stay from the stern bracket by removing the four flange nuts.

NOTICE

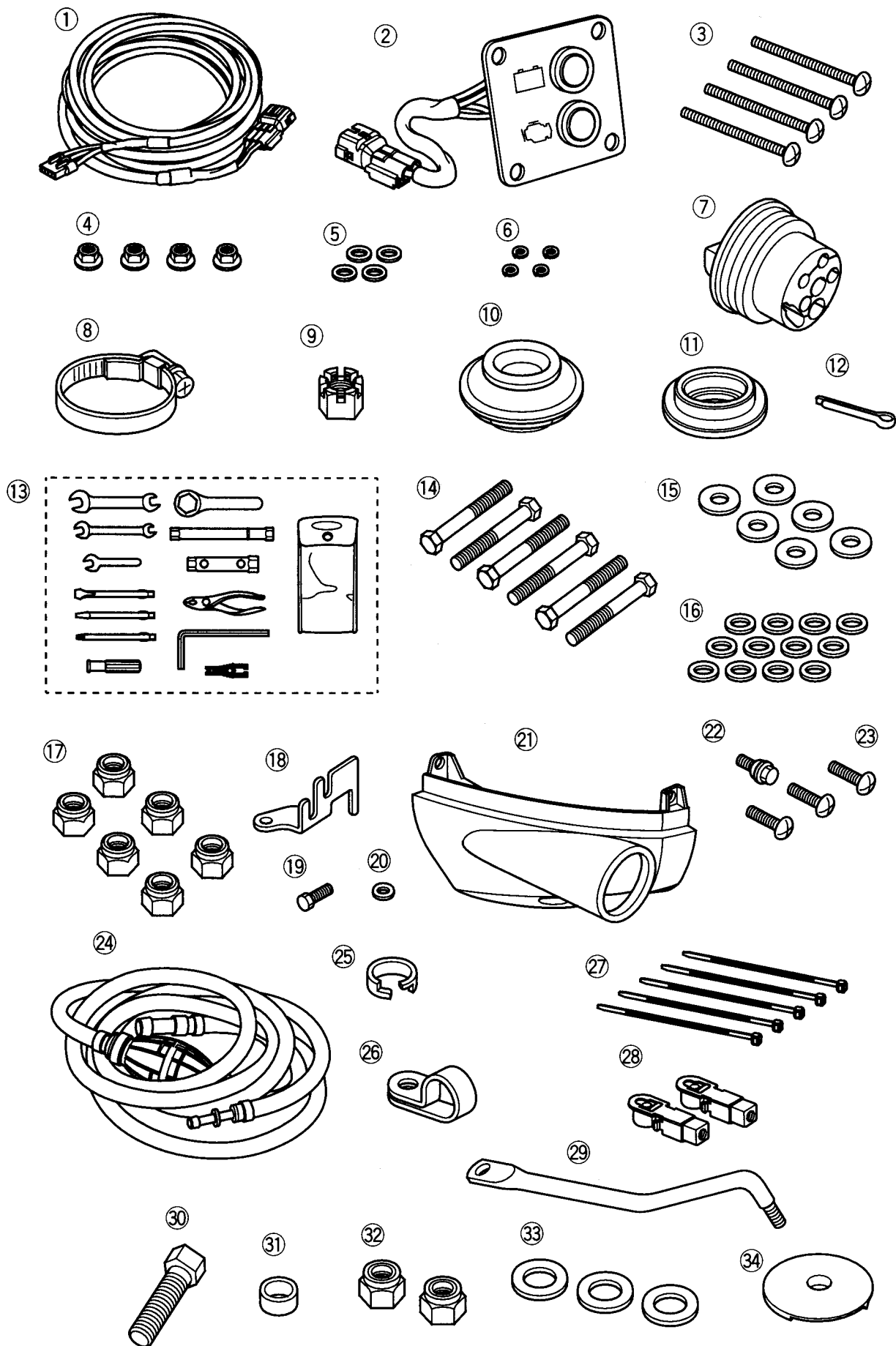
- Get an assistant to help to lift up the outboard motor.



5. Install the outboard motor on the boat while holding it vertically as shown.

3. PARTS PACKAGE INSPECTION

No.	Part name	BF135A / BF150A				Remarks
		LD	XD	LCD	XCD	
1	Indicator wire harness	1	1	1	1	Use with Ref. No.2
2	Indicator panel assembly	1	1	1	1	
3	5 x 40 mm pan-head screw	4	4	4	4	
4	5 mm flange nut	4	4	4	4	
5	5 mm plain washer	4	4	4	4	
6	5 mm spring washer	4	4	4	4	
7	Remote control cable grommet	1	1	1	1	Use for propeller installation
8	Undercase grommet band	1	1	1	1	
9	18 mm castle nut	1	1	1	1	
10	Propeller thrust washer	1	1	1	1	
11	Propeller washer	1	1	1	1	Use for outboard motor installation
12	4.0 mm split pin	1	1	1	1	
13	Tool kit	1	1	1	1	
14	12 x 119 mm hex bolt	6	6	6	6	
15	12 mm plain washer (large)	6	6	6	6	Use with Ref. No.18
16	12 mm plain washer (small)	12	12	12	12	
17	12 mm self-locking nut	6	6	6	6	
18	Remote control cable plate	1	1	1	1	Use with Ref. No.21
19	6 x 16 mm hex bolt	1	1	1	1	
20	6 mm plain washer	1	1	1	1	
21	Front separate cover	1	1	1	1	Use with Ref. No.2
22	6 x 17 mm special bolt	1	1	1	1	
23	6 x 25 mm pan-head screw	3	3	3	3	
24	Fuel tube assembly	1	1	1	1	Use with Ref. No.2
25	12.5 mm tube clip band	1	1	1	1	
26	Cable clamp F	1	1	1	1	
27	Cable tie	5	5	5	5	
28	Shift pivot	2	2	2	2	
29	Steering link rod	1	1	1	1	
30	3/8-24 UNF bolt	1	1	1	1	
31	Collar	1	1	1	1	
32	3/8-24 self lock nut	2	2	2	2	
33	10 mm washer	3	3	3	3	
34	Gear case cover			1	1	



4. TORQUE VALUES

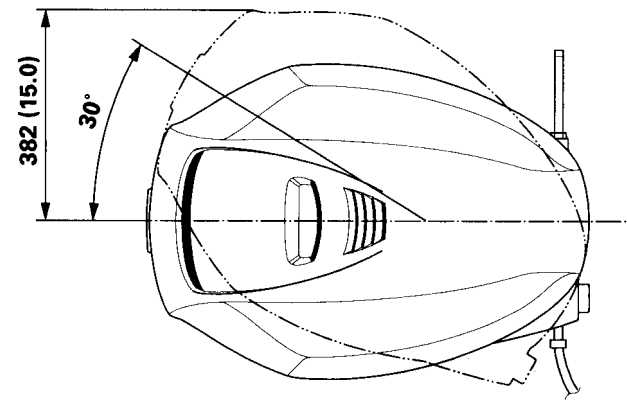
FASTENER APPLICATION	DESCRIPTION	TORQUE VALUES		
		N·m	kgf·m	lbf·ft
Propeller lock nut (18 mm castle nut)	Minimum torque	1	0.1	7
	Maximum torque	44	4.5	33
Front separate cover bolt and screw	6 x 17 mm special bolt	12	1.2	9
	6 x 25 mm pan-head screw	4.4	0.45	3.3
Steering link arm bolt	3/8-24 UNF	22	2.2	16
Steering link arm lock nut	3/8-24 UNF	22	2.2	16
Stern bracket mount bolt	12 x 119 mm	54	5.5	40
Standard hardware	5 mm screw	4.2	0.4	3.0
	6 mm screw	9	0.9	6.5
	6 mm bolt, nut	10	1.0	7
	6 mm flange bolt, nut	12	1.2	9
	8 mm bolt, nut	21	2.1	15
	8 mm flange bolt, nut	26	2.7	20
	10 mm bolt, nut	34	3.5	25
	10 mm flange bolt, nut	39	4.0	29
	12 mm bolt, nut	54	5.5	40

Torque values for special hardware will be called out during procedure.

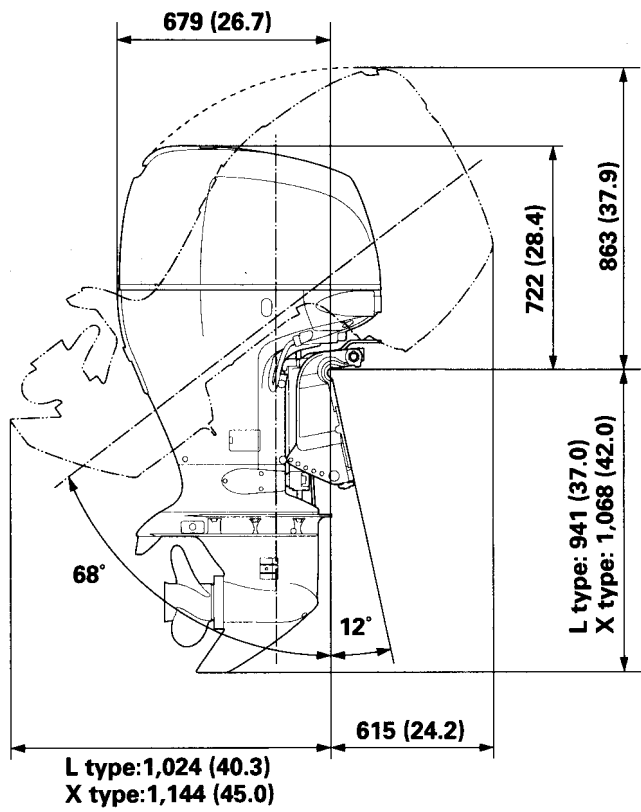
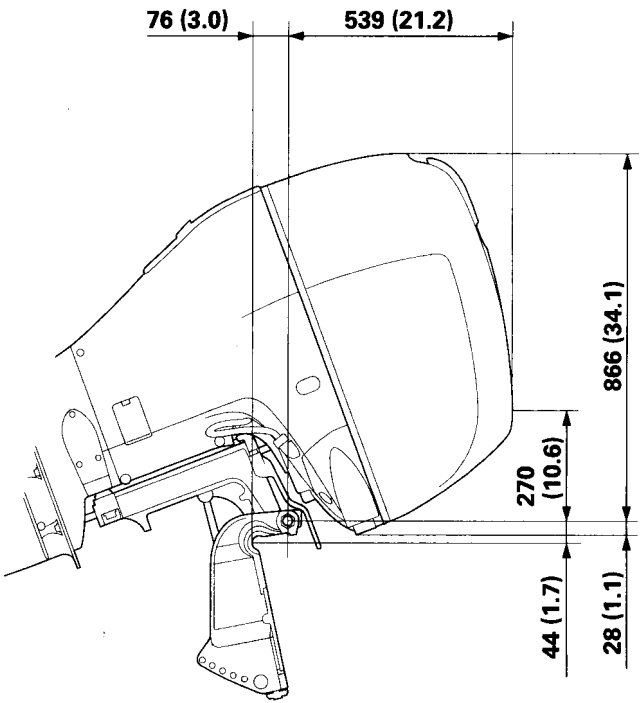
5. DIMENSIONAL DRAWINGS

Unit: mm (in)

AT 30° STEERING:



AT 68° TILT UP:



6. OUTBOARD MOTOR INSTALLATION

Motor Slection

NOTE:

- For secure and safe sailing, install the outboard motor on the transom of the boat properly. Improperly install outboard motor result in the displaced outboard motor, lack of speed and stability, and poor fuel economy. In addition, the boat does not drive straight unless the outboard motor is installed properly.
- Install the outboard motor that conforms to the boat manufacturer's recommended horsepower. Never install an outboard motor which exceeds the recommended maximum horsepower of the boat.

MAXIMUM HORSEPOWER:

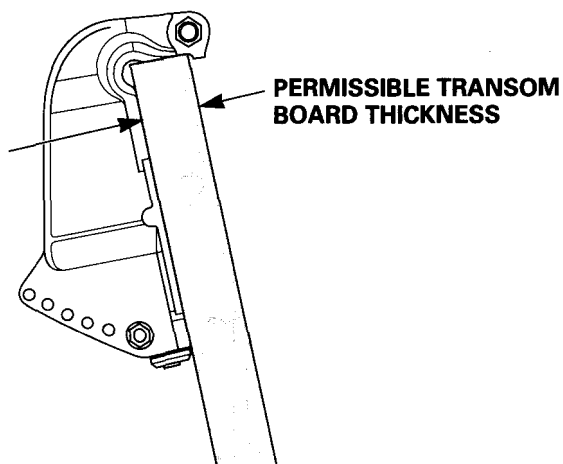
BF135A: 99.3 kW (135 PS)

BF150A: 110.3 kW (150 PS)

Refer to the following dimensional drawings to be sure there is nothing on the boat that will interfere with outboard motor tiltup and steering.

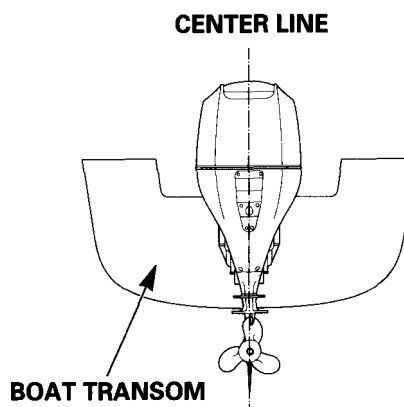
The BF135A and BF150A outboard motors are designed to be installed on boat transom with the following transom board thickness.

Boat transom board thickness: 50 – 70 mm (2-2-3/4 in)

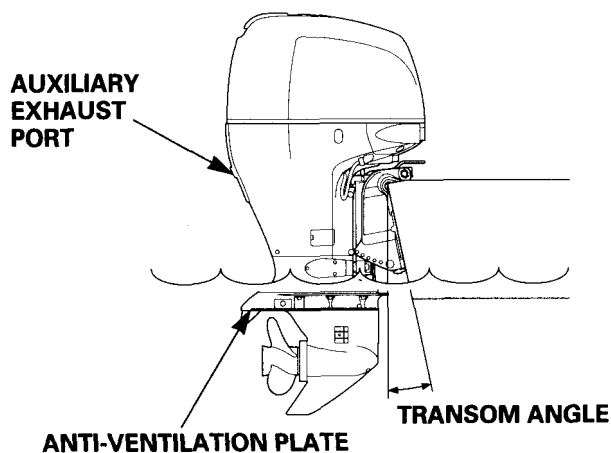


General Guidelines

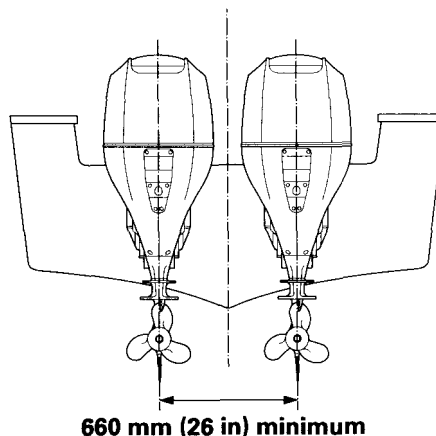
Install the outboard motor on the center of the transom securely and be sure that the boat is well-balanced.



As a general rule, the outboard should be installed so the anti-ventilation plate is parallel to the boat transom. If the boat transom angle is less than 8°, the BF135A or BF150A anti-ventilation plate will not be parallel to the boat bottom when trimmed to the lowest position.



Dual outboard motors must be installed so that the outboard motor center-to-center distance is a minimum of 660 mm (26 in).



Installation Height Check

NOTE:

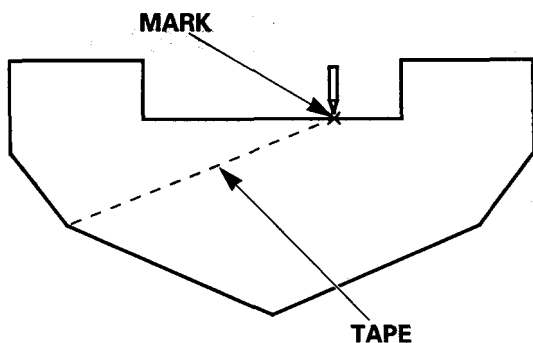
- The outboard motor installation height shall be 0 — 25 mm (0 — 1 in) when the transom height of the boat is subtracted from the transom height of the outboard motor.
Note that this dimension is just the standard. Optimal installation height differs depending on the boat type and shape of the bottom of the boat. Refer to the boat maker's recommended installation height and determine the optimal installation height by test cruising the boat.
- If the outboard motor is installed at too low (deep) position;
 - It reduces operating stability.
 - It reduces high speed sailing performance.
 - Water splashed over the wash board can be jetted out and fan out the stern of the board.
 - It lacks airiness of the boat.
 - It gets heavy steering.
- If the outboard motor is installed at too high (shallow) position, it causes cavitation when sailing on the choppy water or sailing at high speed, and the boat does not sail smoothly.
- When testing the installation height on water, check the buoyancy by loading the boat fully.
Check whether the auxiliary exhaust port is in the position where is sufficiently above the water surface so that the surged wave does not enter the engine when the engine stops with the boat fully loaded.

Boat Transom Center Line

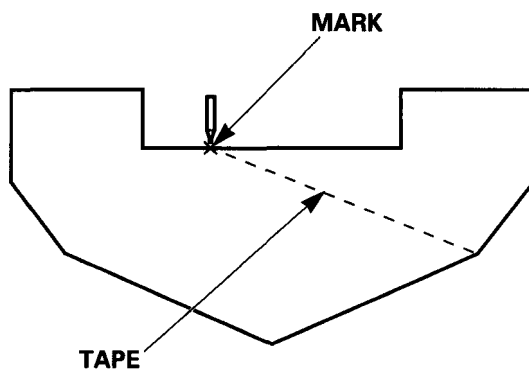
Measure across the transom to determine the transom center line and draw a vertical line. On a "V" bottom boat, the vertical line should pass through the keel.

Use a pencil and tape measure to locate center line.

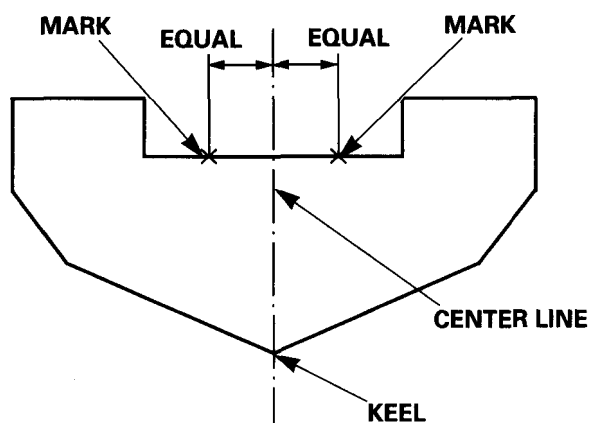
1. Put one end of the tape measure on a chine and place the other end on the upper edge of the transom, somewhere past the "visual" center. Place a mark on the transom and record the distance measured.



2. Measure the same distance from the opposite chine and make a mark.

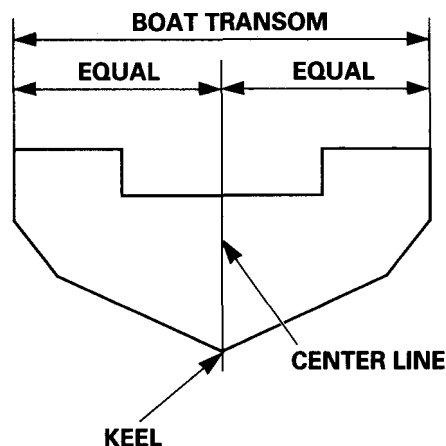


3. Measure the distance between the two marks and place a third mark halfway between them. The line connecting the third mark with the keel is the center line.

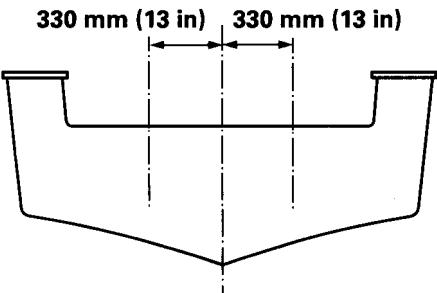


NOTE:

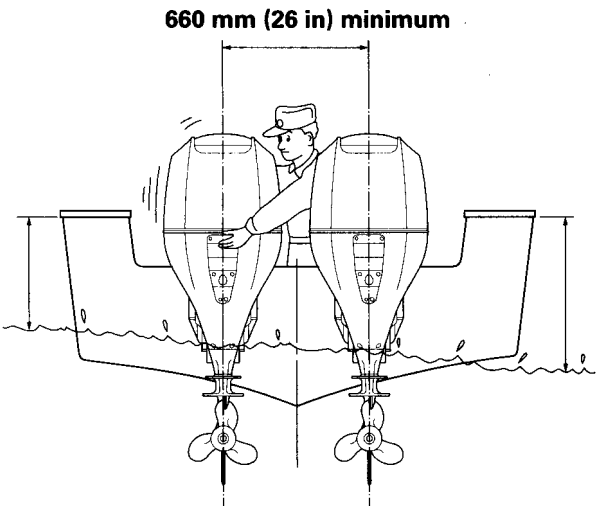
- The boat is symmetrical with respect to the keel. If the boat has no keel, measure the transom width and draw the center line.



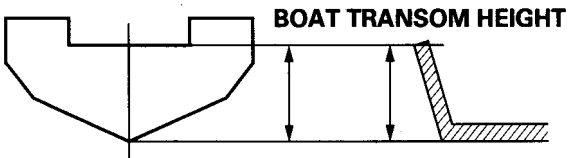
If dual outboard motors are to be installed, mark transom at a minimum of 330 mm (13 in) from center line.



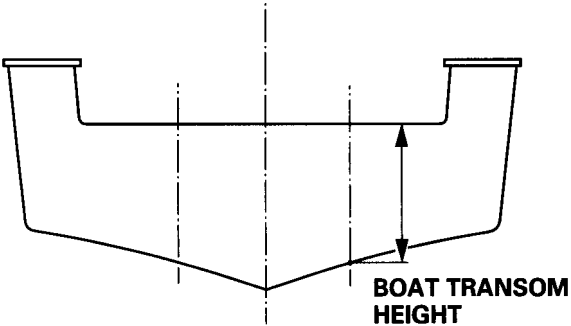
Before drilling the holes for installation of the outboard motors, set the outboard motors on the respective center lines and check whether the boat is well-balanced. If a boat is out of balance, adjust by sliding the outboard motor to the adequate position.



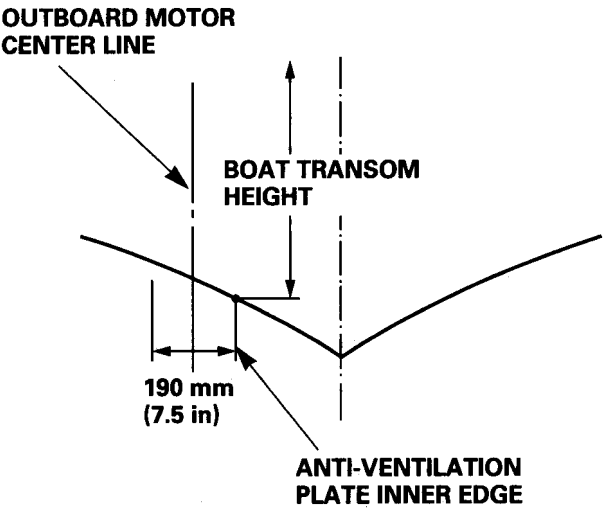
1. Measure the boat transom height.
SINGLE OUTBOARD MOTOR



DUAL OUTBOARD MOTORS

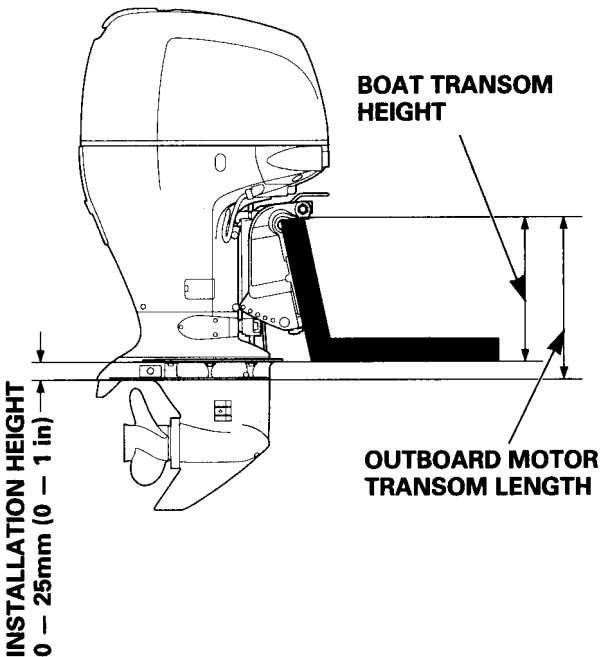


On "V" bottom boats, measure the transom height which is the distance from the top edge of the boat transom to the point at which the vertical line passing the inner edge of the anti-ventilation plate intersects with the boat bottom.

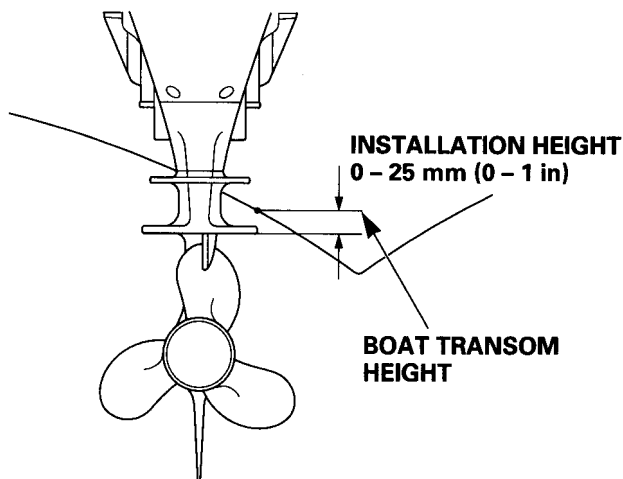


- Calculate the outboard motor installation height.
 - Outboard motor installation height must be in the range between 0 – 25 mm (0 – 1 in).
 - Determine the outboard motor installation height by subtracting the boat transom height from the outboard motor transom length.

Shaft Length	Outboard Motor Transom Length	Workable Boat Transom Height
Long	508 mm (20 in)	483 – 508 mm (19 – 20 in)
Extra long	635 mm (25 in)	610 – 635 mm (24 – 25 in)



When mounting dual outboard motors on "V" bottom boats, the outboard installation height range is 0 – 25 mm (0 – 1 in).



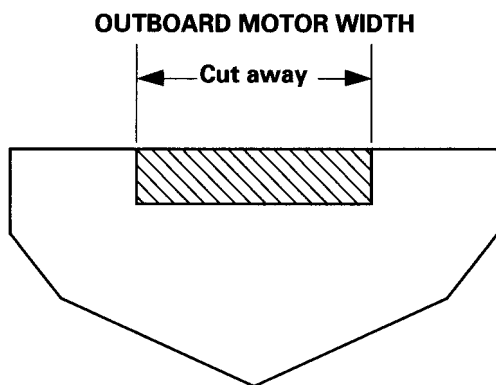
4. If the outboard motor installation height does not conform to the above specification, adjust the transom height of the boat.

Boat Transom Height Adjustment

- If the outboard motor installation height is too low, attach wood block(s) to the top of the transom and increase the installation height by the amount it is required.
- If the outboard motor installation height is too high, reduce the height by planing down the top of the transom by the required amount.

NOTE:

- When increasing the installation height, attach the wood block(s) to the transom of the boat securely.
- Be sure to plane off the boat transom by the amount of the outboard motor width.
- If mounting two outboard motors, be sure the installation height is identical for both.
- Some boat manufacturers may require different mounting height. Consult your boat manufacturer for specifics on your boat.



Transom Drilling

Verify no damage will occur when the motor mounting holes are drilled. Look for any structural impediments such as bulkheads, braces, fuel cells, bilge pumps, or floor sections before drilling.

Ensure there is adequate space for the bolt, washer, and transom support plate (if applicable), to bear on a flat surface.

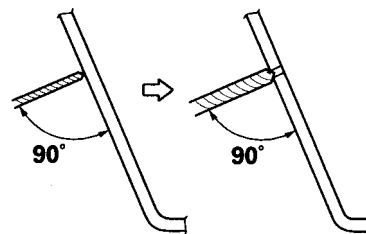
1. Mark the center point of the 6 drilling holes (i.e. 3 holes at the right and left sides of the transom respectively that are in the symmetrical position with regard to the center line of the outboard installation line.)

NOTE:

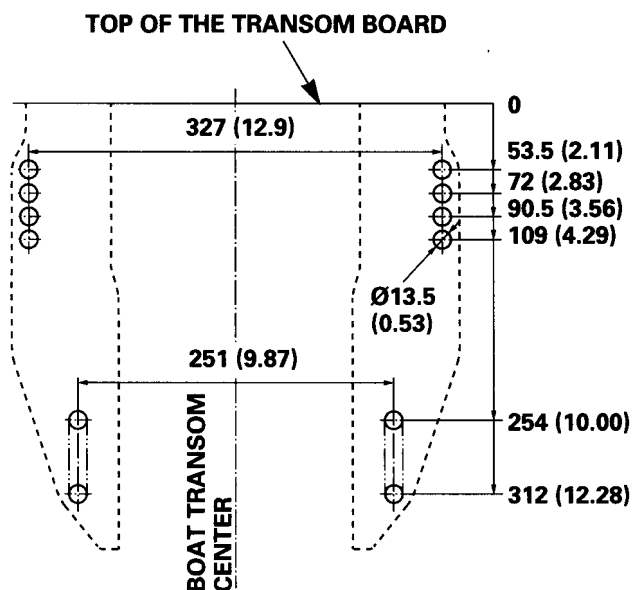
- Do not drill a hole in the wood block attached to the transom of the boat.
- Be sure that the upper bolt holes are not located above the position shown in the drawing (more than 25 mm (1.0 in) from top of the transom board).
- Drill the lower bolt holes so that mounting bolts contact the upper end of the stern bracket.

NOTE:

Drill at right angles to the transom board.



Unit: mm (in)



2. Drill the pilot holes using a 3 – 5 mm drill.
3. Drill the bolt holes precisely at the marked points with the 13.5 mm (0.53 in) drill bit.
4. Use vacuum cleaner to clean up after drilling.

Outboard Motor Installation

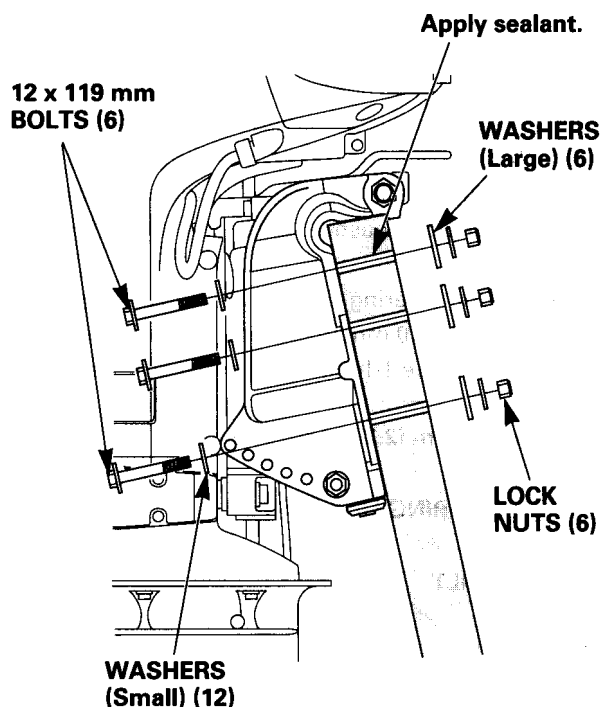
CAUTION:

Connect the steering guide cable to the outboard motor before installation.

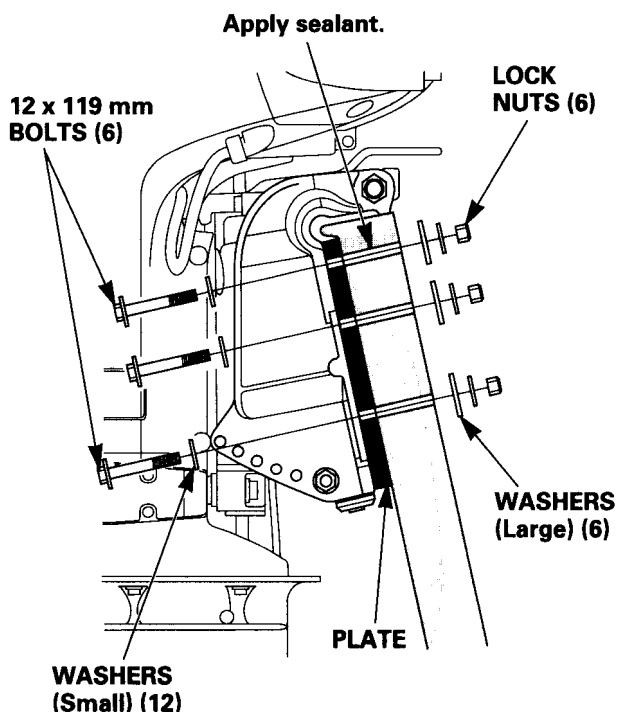
1. Apply the sealing agent (silicone sealant) to the bolts and the bolt holes.
2. Attach the outboard motor on the hull.
3. Tighten the outboard motor securely with the 12 mm x 119 mm bolts (6), small washers (12), large washers (6) and the 12 mm self-locking nuts (6).
Torque: 54 N·m (5.5 kgf·m, 40 lbf·ft)

CAUTION:

Insert the bolts from the outer side (outboard motor side) and secure them with the self-locking nuts from the hull side.



If the molding of the transom upper edge interferes with the outboard stern bracket, add the plate or recondition the bump and install the outboard stern bracket to the boat transom securely.



Steering Guide Cable Installation

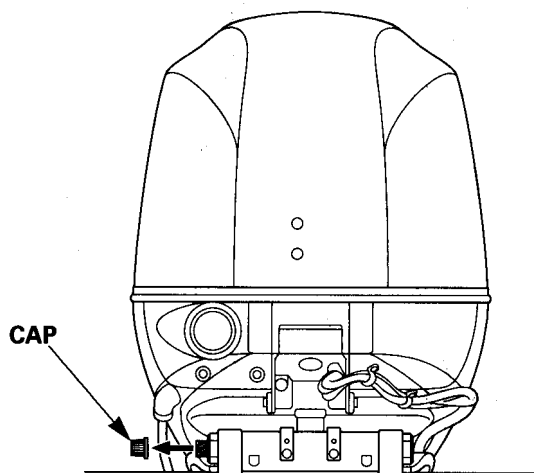
NOTE:

- Attach the steering guide cable to the outboard motor first, then install the outboard motor on the boat.
- Refer to the steering guide cable manufacturer's manual for cable handling procedures.

• PUSH-PULL TYPE

Single outboard motor:

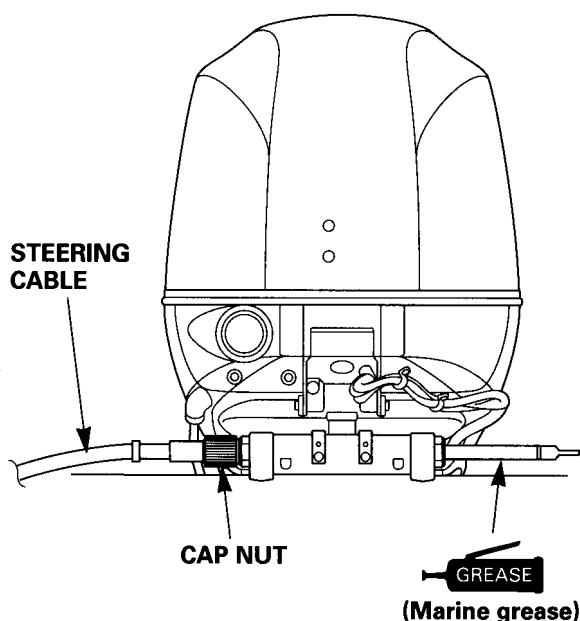
1. Remove the cap from the tilting shaft.



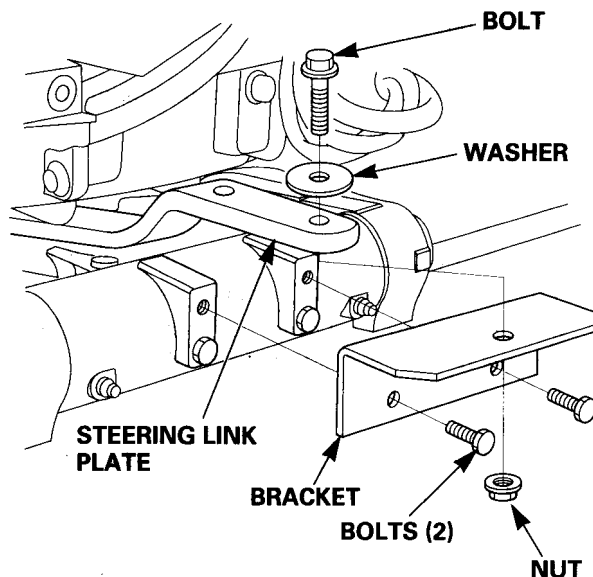
2. Pass the steering guide cable through the tilting shaft and tighten the cap nut. Install the outboard motor on the hull.

NOTE:

Before installing the steering guide cable, apply marine grease to the sliding surface of the cable and the inner side of the cap nut.

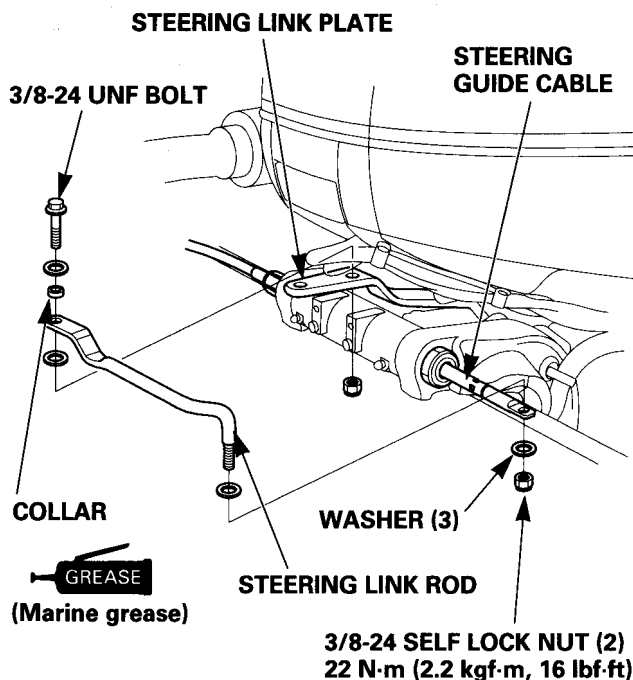


3. After installing the cables and wire harnesses to the motor, remove the bolts, nut and the bracket from the steering link plate.



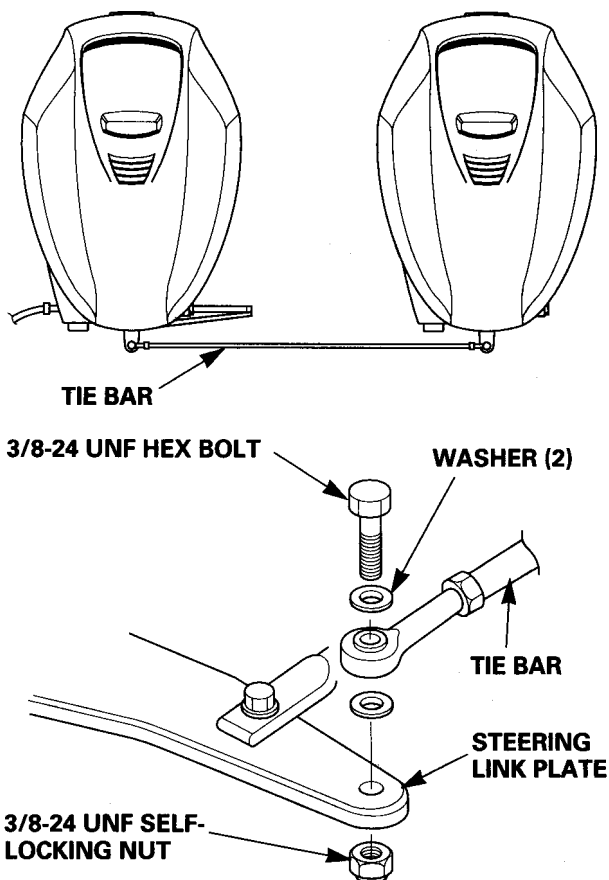
4. Apply the marine grease to the collar and to the sliding surface of the steering rod.
5. Attach the steering rod to the inner hole in the steering link plate and loosely tighten it with the 3/8-24 UNF bolt, washer, collar and the self-locking nut.
6. Connect the steering link rod to the steering guide cable with the 10 mm washers and self-locking nut.
7. Tighten the self-locking nuts to the specified torque.

Torque: 22 N·m (2.2 kgf·m, 16 lbf·ft)



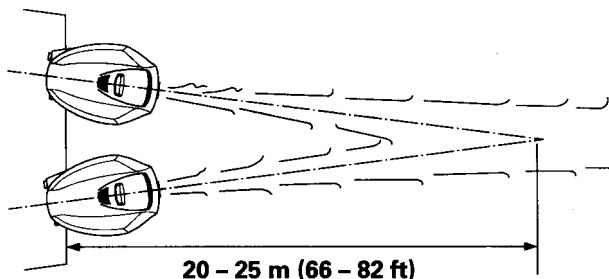
Dual outboard motors:

1. As previously described, install the steering guide cable and the steering link rod (see page 16).
2. Install a commercially available tie bar in the steering link plate hole using the bolt, washers and self-locking nut.



3. After installation, test run the outboard motors and adjust the tie bar.

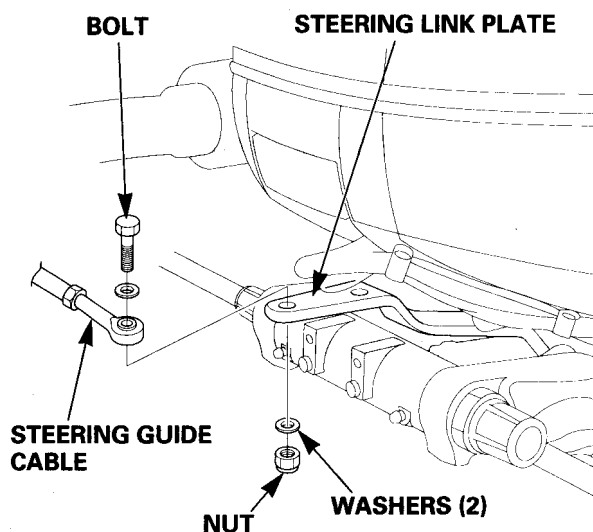
Adjust the tie bar length so that the motors toe-out. Toe-out is when the motor's forward measurement is wider than the motors' after measurement. Motors toe-out (viewed from the stern) will ensure better boat stability. It is best if the waves of two motors joint 20 – 25 m (66 – 82 ft) astern.



Not all boats will follow this specification. Consult your boat manufacturer for toe-in or toe-out recommendation.

• BALL-POST TYPE

- Connect the steering guide cable to the outer hole in the steering link plate.



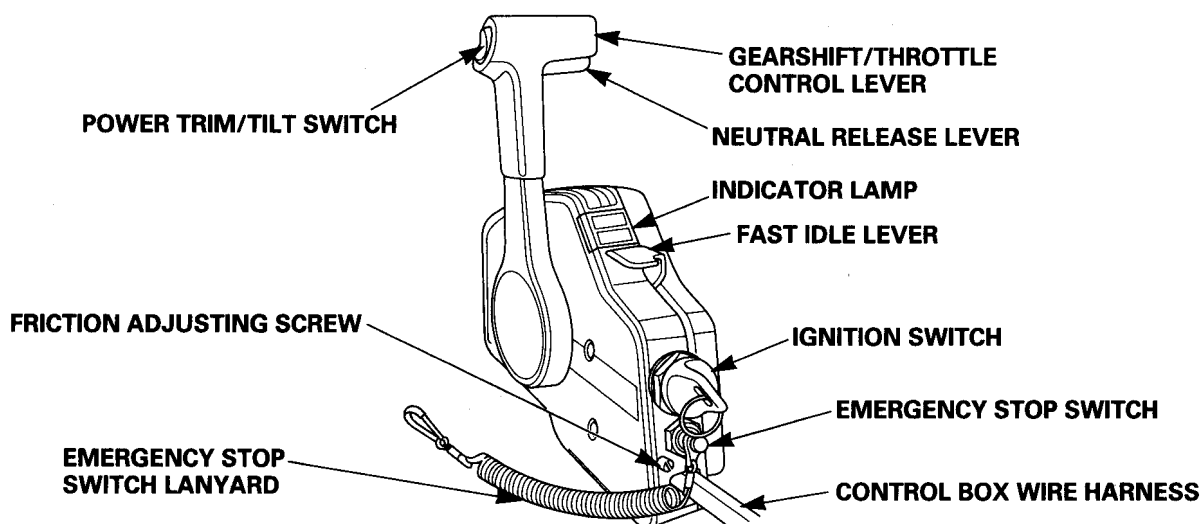
NOTE:

- After installation, turn the steering wheel right and left and bring the right and left steering angles equal by adjusting at the steering wheel side of the steering guide cable.
- For further information regarding the steering guide cable, refer to the boat manufacturer's operation manual.

7. REMOTE CONTROL BOX

COMPONENT IDENTIFICATION (Optional equipment)

• SIDE MOUNT REMOTE CONTROL



GEARSHIFT/THROTTLE

CONTROL LEVER Controls gear selection and throttle opening position.

INDICATOR LAMP Indicates the operating condition of the outboard motor.
(Engine oil and overheat warning)

FAST IDLE LEVER For engine warm-up and throttle opening adjustment when restart the warm engine.

IGNITION SWITCH For starting and stopping the outboard motor.

EMERGENCY STOP SWITCH Will be activated in case of an emergency stop, or when the operator falls overboard.

FRICTION ADJUSTING SCREW Adjust the operating resistance of the control lever.

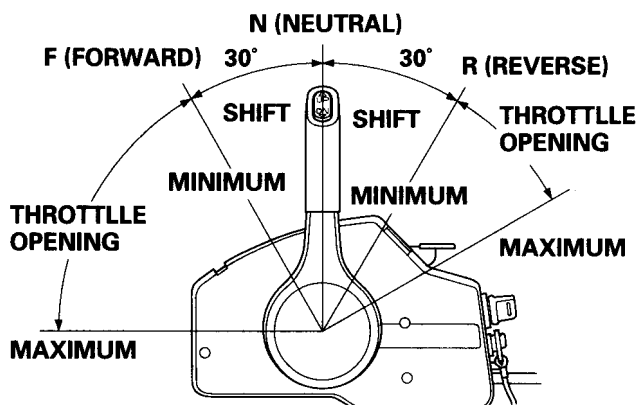
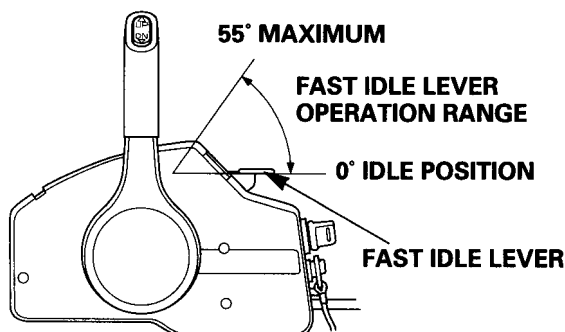
NEUTRAL RELEASE LEVER To move the control lever out of the "N" (NEUTRAL) position, lift this lever up.

CONTROL BOX WIRE HARNESS Wire connecting control box to outboard motor.

POWER TRIM/TILT SWITCH Use this switch to tilt up/down and to trim up/down the outboard motor.

OPERATION

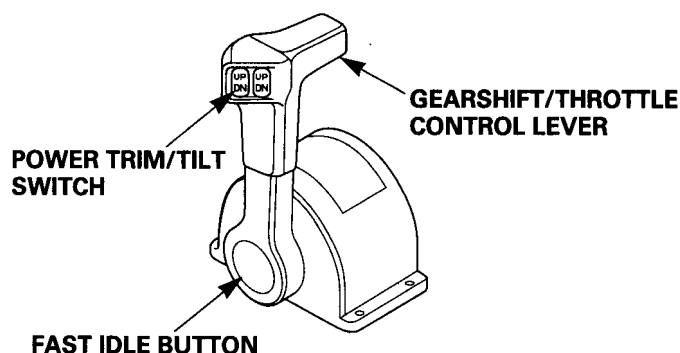
- The fast idle lever can be operated provided that the control lever is in the "N" (NEUTRAL) position.
- The engine speed increases with the fast idle lever in the range shown, which promotes warming up of the engine.
Set the fast idle lever at the "MAXIMUM" position after warming up and at restart of the engine.
- The control lever can be operated provided that the fast idle lever returned fully to the release position.
- The fast idle lever is only needed for starting carbureted outboard models. The BF135A and BF150A models use programmed fuel injection, so this lever will not be needed for starting.
- After the engine starts and if the outside temperature is below 41°F (5°C), the fast idle lever can be used to accelerate engine warm up.



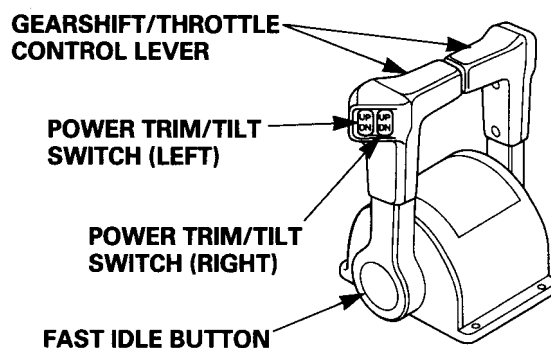
• TOP MOUNT REMOTE CONTROL (Optional equipment)

This section shows you the right-hand handle type only. The right-hand remote control is designed so that you can perform the throttle operation and the tilt angle adjustment with your right hand. Note that the name and operation of each part of the left-hand handle type are identical with those of the right-hand handle type.

For single lever type:



For dual lever type:



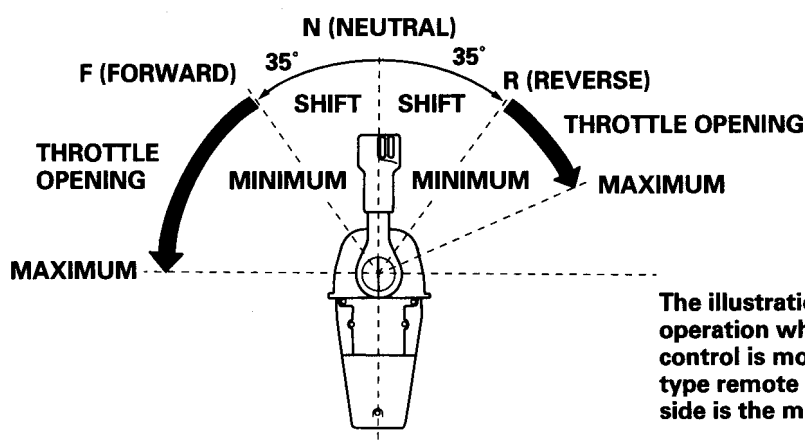
GEARSHIFT/THROTTLE CONTROL LEVER Controls gear selection and throttle opening position.

POWER TRIM/TILT SWITCH Use this switch to tilt up/down and to trim up/down the outboard motor.

FAST IDLE BUTTON When performing throttle adjustment, without gearshift, control lever is operated pushing this button. Please use it at the time of engine starting and warm-up operation.

OPERATION

- Control lever is set to neutral, a little control lever is opened pushing fast idle button, after engine starting, control lever is operated, throttle is adjusted and the warm-up of the engine is carried out. Control lever can push fast idle button only in a neutral position. After an engine warm-up, once it returns control lever to neutral, gearshift operation is carried out.
- The fast idle button is only needed for starting carbureted outboard models. The BF135A and BF150A models use programmed fuel injection, so this lever will not be needed for starting.
- After the engine starts and if the outside temperature is below 41°F (5°C), the fast idle button can be used to accelerate engine warm up.



The illustration shows the remote control lever operation when the right-hand handle type remote control is mounted on the right side. Left-hand handle type remote control operation mounted on the left side is the mirror image of the above illustration.

CAUTION:

If there is no control lever in a neutral (N) position, fast idle button cannot be operated. Moreover, after fast idle button operation, if control lever is returned to a neutral (N) position, fast idle button will return automatically and can perform operation of forward or reverse.

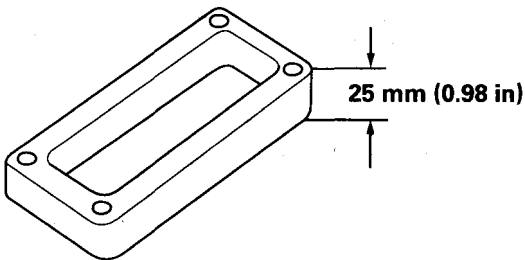
When you move forward or reverse boat, please move control lever to 35 degrees or more from a neutral (N) position. Throttle does not open at 35 degrees or less.

• **SPACER (Optional equipment)**

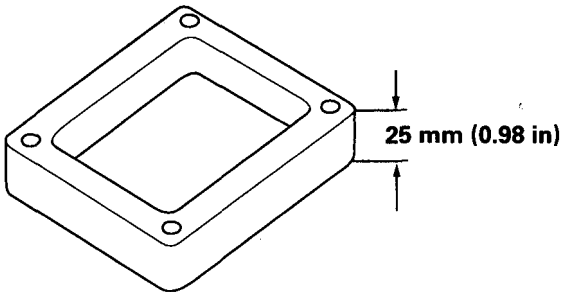
The spacer is not included in remote control kit. It is available as an optional part. Purchase a genuine Honda spacer for the outboard motor remote control kit as needed.

- Note that the installation height of the remote control increase 25 mm (0.98 in) by mounting the spacer.
- Check the spacer installation and the surrounding area for freedom from interference and restriction.

For single lever type:

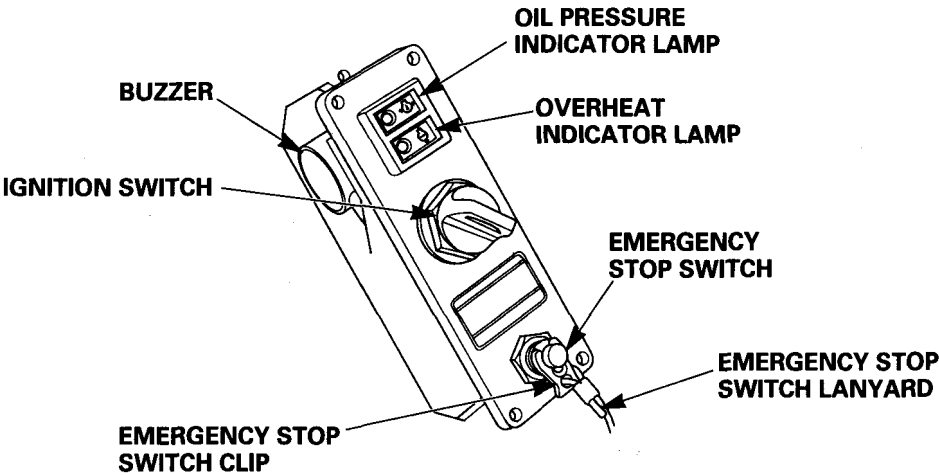


For dual lever type:



• **SWITCH PANEL (Optional equipment)**
(for PANEL/TOP MOUNT type)

The switch panel is not included in the remote control kit. It is available as an optional part. Purchase this genuine Honda part as needed.



- IGNITION SWITCH For starting and stopping the outboard motor.
- EMERGENCY STOP SWITCH Will be activated in case of an emergency stop, or when the operator falls overboard.
- INDICATOR LAMP Indicates the operating condition of the outboard motor.
(Engine oil and overheat warning)

Control Cable Selection

CAUTION:

The remote control cable must be of the correct length, which must be installed properly.

Sharp bend of the short cable causes damage to the cable.

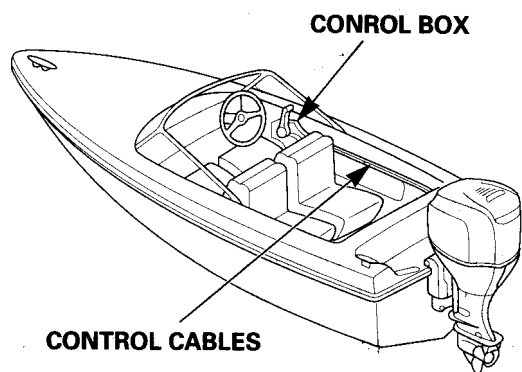
While, when the cable is too long, it involves bend or loop, that is not required normally, which can cause the following problems.

- The control lever becomes too heavy to operate.
- Due to insufficient stroke of the cable, it causes serious damage to the shift mechanism and you can't shift the gear properly.

1. Select a mounting location which allows easy access and unrestricted operation of the control lever, and make sure that there are no other parts obstructing the cables and all components between the remote control box and the outboard motor.

NOTE:

- The remote control box is normally mounted on the starboard side, but can be adapted to a reversed control lever position (port side installation).
- Recommended position to install the control is close to the corner of the front seat with the control lever in the "N" (NEUTRAL) position.
- The bottom of the remote control box should be at the same level as the upper surface of the seat.
- Insert a shim between the box and the installation surface, if the play of the operating lever is insufficient.
- Recommended control cable:
 - Morse 33C cable (commercially available)



Side mount control box:

The remote control box is normally mounted on the starboard side. The control lever can be reversed to accommodate port side (see page 22).

Position the spacer plate between the control box and the installation surface.

Panel mount control box:

It is necessary to make a clearance to route the control cable behind the control box.

If the thickness of the mounting location is 25 mm (0.98 in) or more, this location is not suitable to mounting, select other location.

Top mount control box:

It is necessary to make a clearance to route the control cable under the control box.

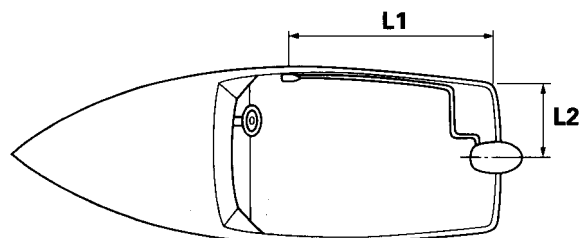
2. Calculate the control cable length.

Measure the distance of L1 and L2 and calculate the required control cable length as follows.

Side mount control box, Panel mount control box:

Required control cable length =

$$L1 + L2 + 300 \text{ to } 450 \text{ mm (12" to 18")}$$



Top mount control box:

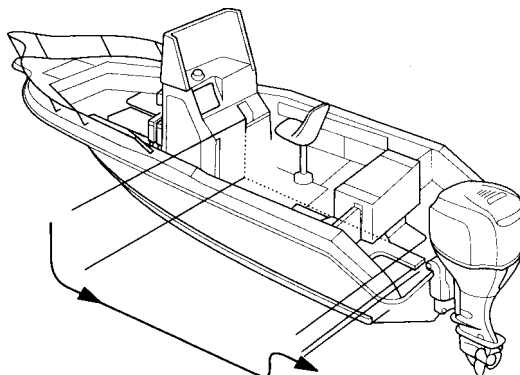
- Measure the length of the control cable route on the boat and add 300 to 400 mm (12" to 18") to this length.
- When the boat is mounted with dual outboard motors, measure the length to the respective outboard motors.

Do not bend the control cable sharp with the radius of the cable bend being 300 mm (12 in) or below.

Bending the cable sharp will increase the operation load of the control lever which deteriorates the operationability of the lever.

It must be long enough that allows proper tilt-up or down of the outboard motor and secure steering operation.

Add the extra length to the cable if it is obliged to route the cable with slackness or if it is not possible to route the cable in an ordinary route.

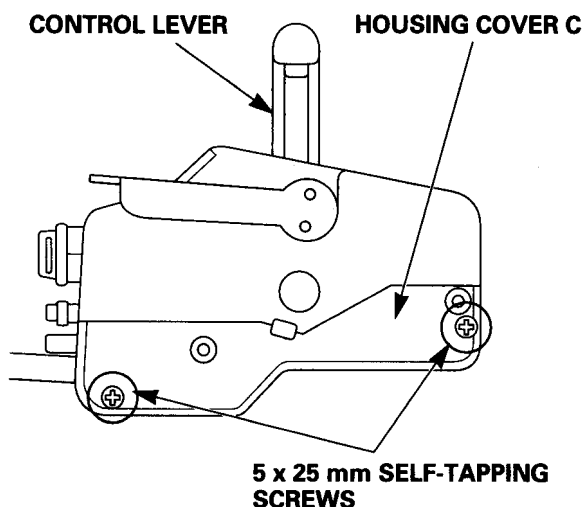


Control Lever Direction Change

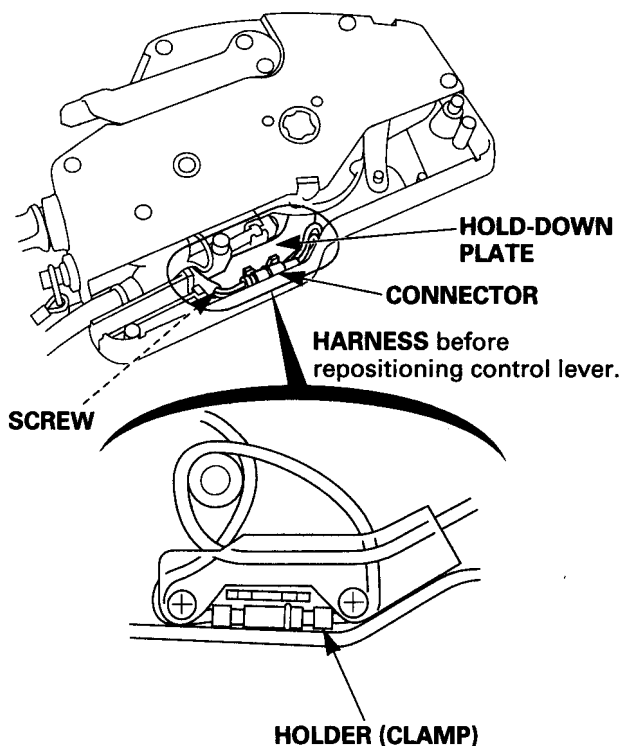
Side mount control box:

This surface-mounted remote control box can be mounted on the right or left side by reversing the installation direction of the control lever.

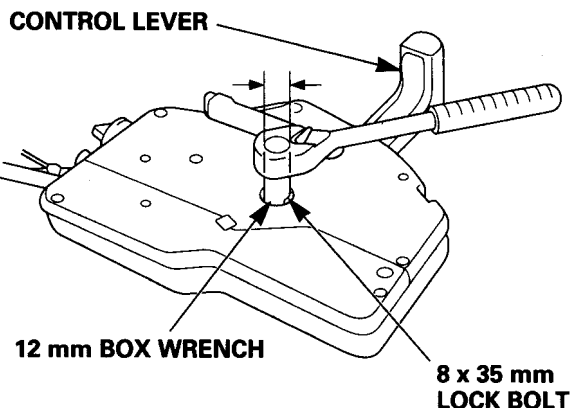
1. Remove the two screws and the housing cover C.



2. Remove the two screws and the hold-down plate.
3. Disconnect the switch wire connector.



4. Remove the remote control lever's 8 x 35 mm lock bolt using the 12 mm box wrench, and remove the remote control lever.



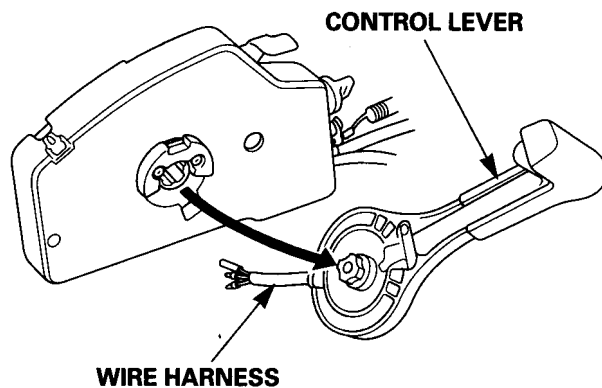
NOTE:

- Take care not to damage the power trim/tilt switch wire harness.
- Remove the 8 x 35 mm lock bolt with the remote control lever set in the neutral "N" (NEUTRAL) position.

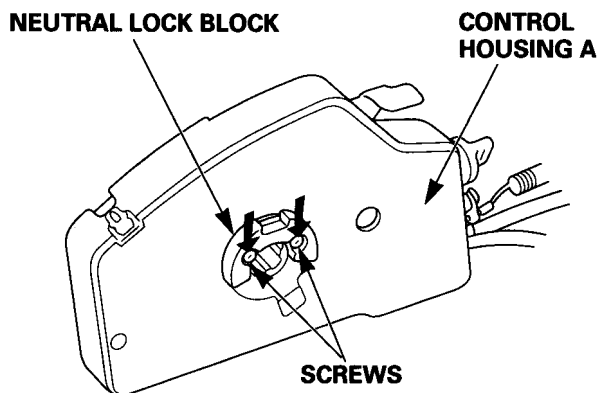
5. Remove the remote control lever from the remote control box.

NOTE:

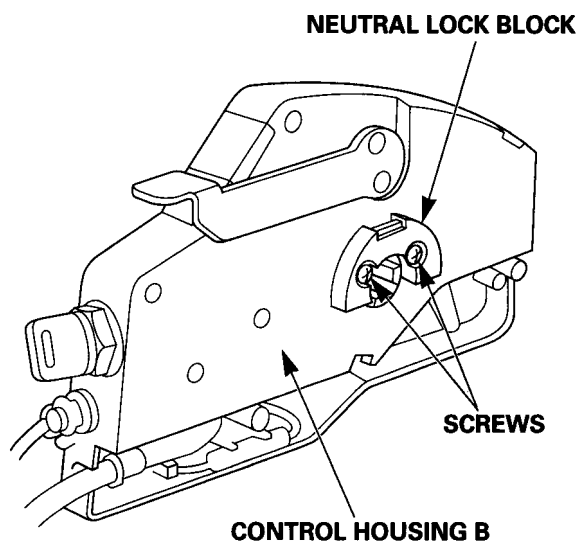
Take care not to damage the power trim/tilt switch wire harness.



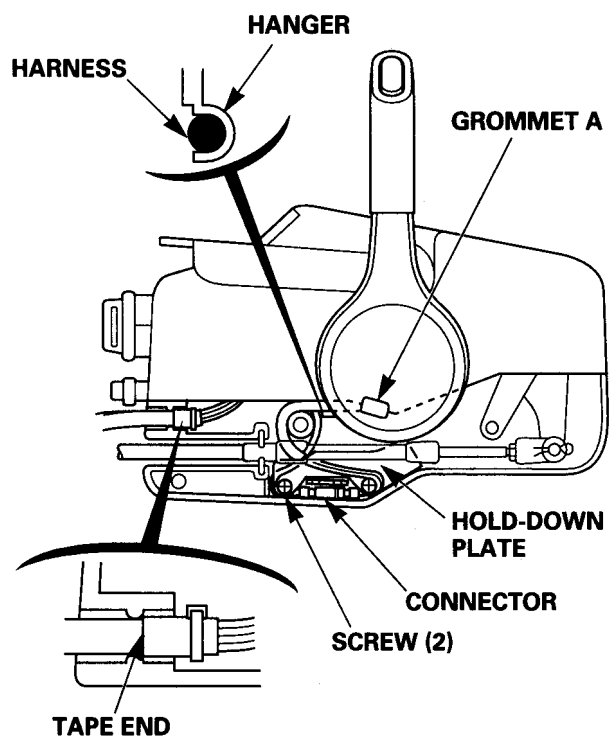
6. Remove the two screws and remove the neutral lock block from the control housing A.



7. Assemble the neutral lock block with the control housing B and tighten the two screws.
Torque: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)



8. Connect the switch wire connector.
9. Set the power trim/tilt switch harness as shown. Install the hold-down plate and tighten the two screws.

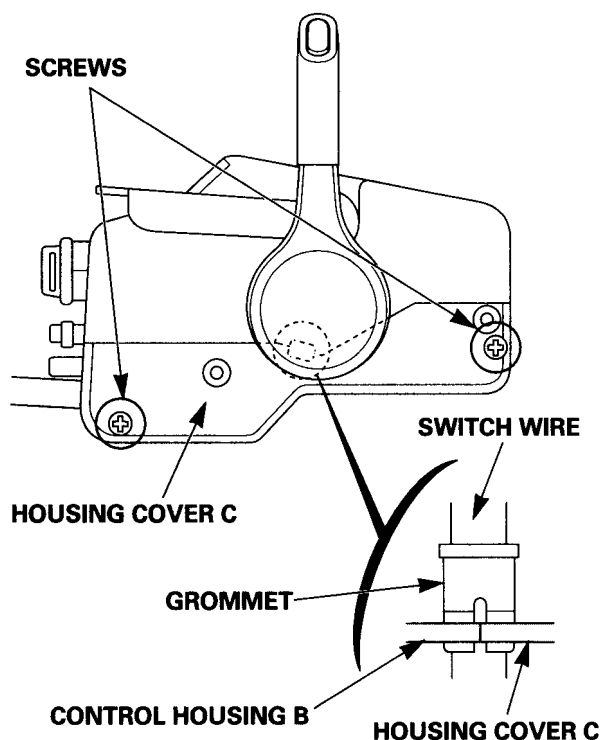


10. Repositioning control lever must be made after installing the control cable (see page 24).

11. Tighten the housing cover C with the two screws.
Torque: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)

NOTE:

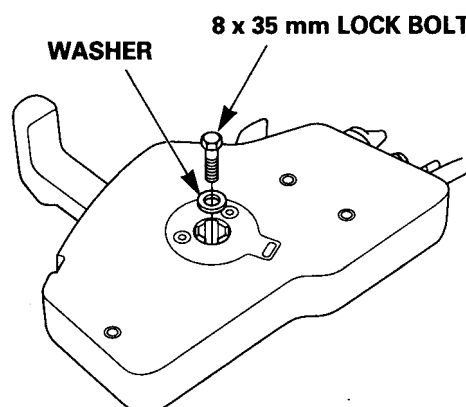
- Set the switch wire grommet by aligning it with the cutout in the control housing B.
- Do not overtighten the screws.



12. Install the remote control lever and tighten with the 8 x 35 mm lock bolt and washer.
Torque: 20 N·m (2.0 kgf·m, 14.5 lbf·ft)

NOTE:

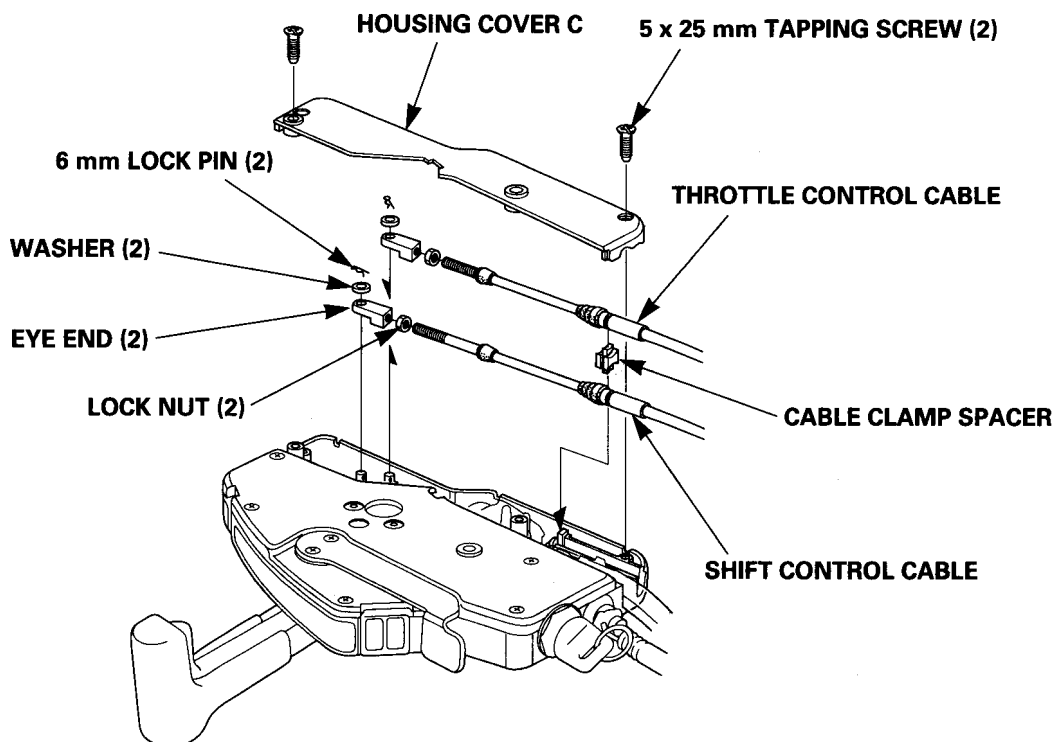
Install the remote control lever by setting it in the neutral "N" (NEUTRAL) position.



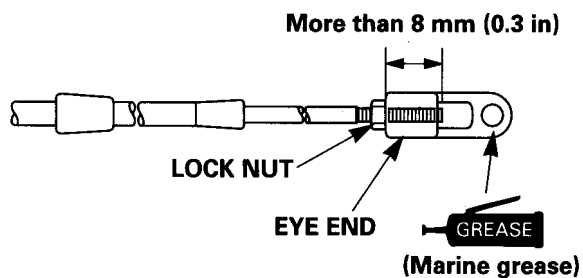
CONTROL CABLE INSTALLATION

CONTROL BOX SIDE

Side Mount Control Box:



1. Remove the two 5 x 25 mm tapping screws and housing cover C.
2. Screw the lock nuts and eye ends more than 8 mm (0.3 in) onto the thread of the control cables and tighten the lock nuts securely to hold the pivots. Apply marine grease to the hole of the eye end.

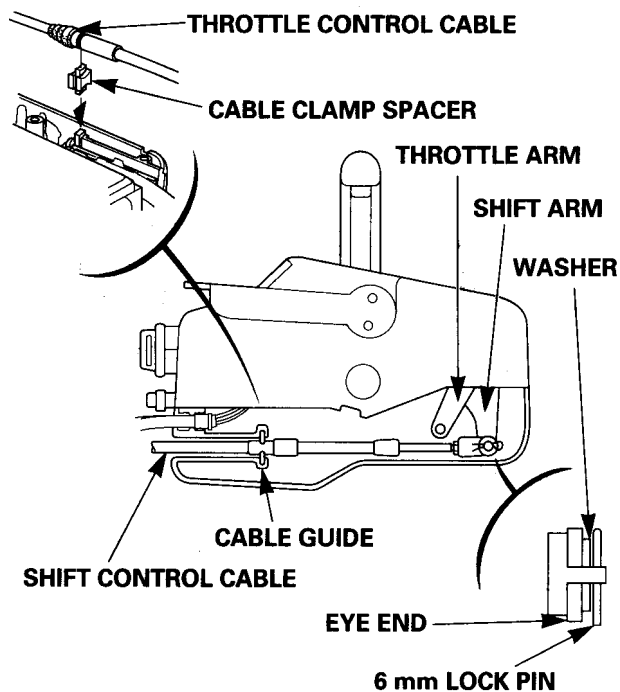


3. Install the shift control cable by aligning the groove of the control cable with the cable guide plate. Then connect the eye end to the shift arm pin using the washer and 6 mm lock pin.

NOTE:

Install the washer on the lock pin side.

4. Install the cable clamp spacer and throttle control cable by aligning the groove with the cable guide plate. Then connect the eye end to throttle arm pin using the washer and 6 mm lock pin.



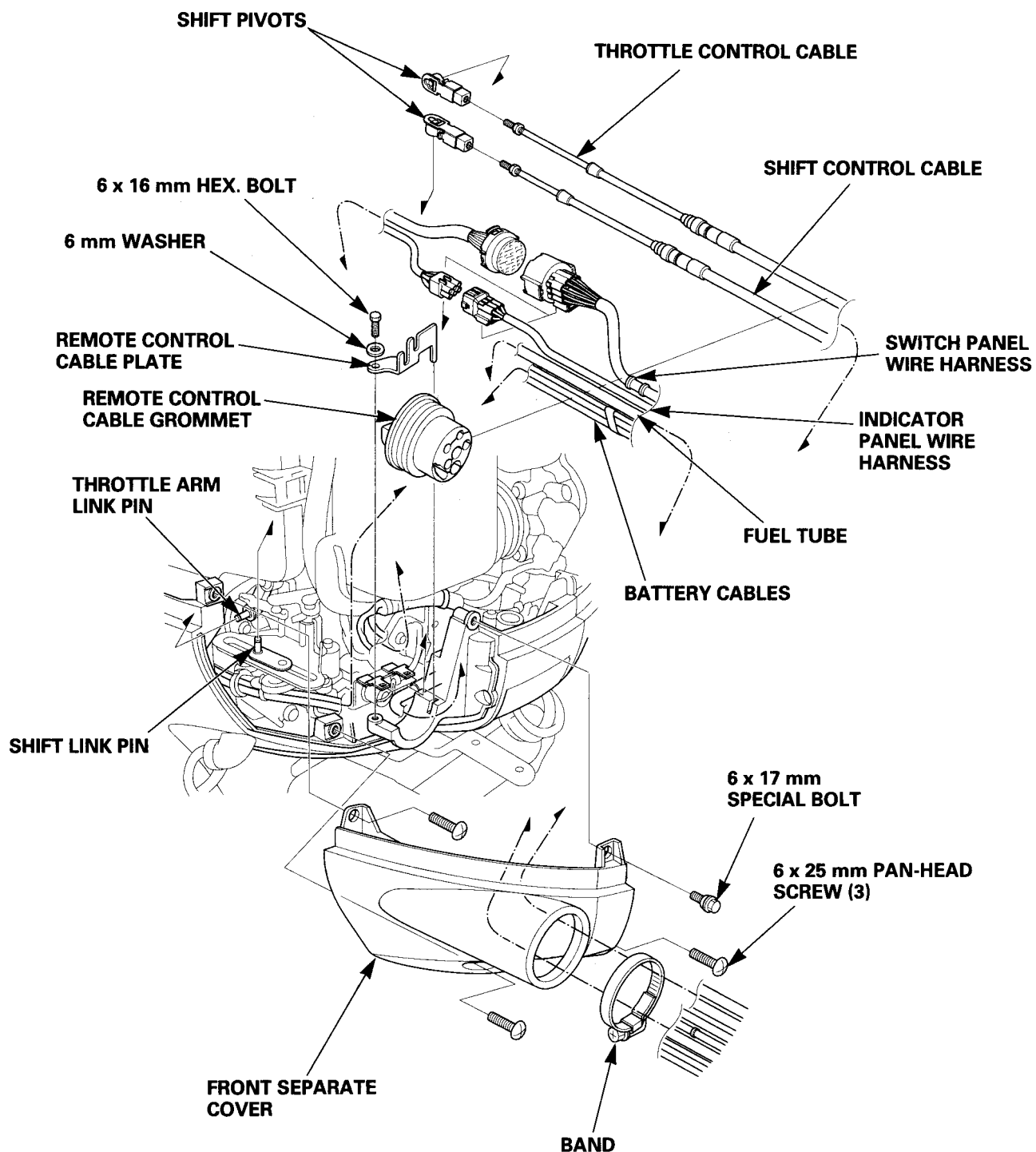
5. Reinstall the housing cover C and tighten the 5 x 25 mm tapping screws.

Torque: 2 N·m (0.2 kgf·m, 1.4 lbf·ft)

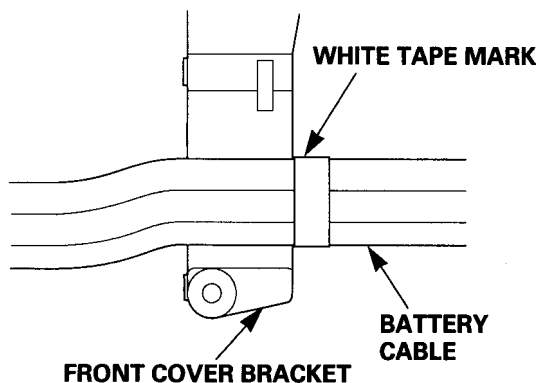
• OUTBOARD MOTOR SIDE

NOTE:

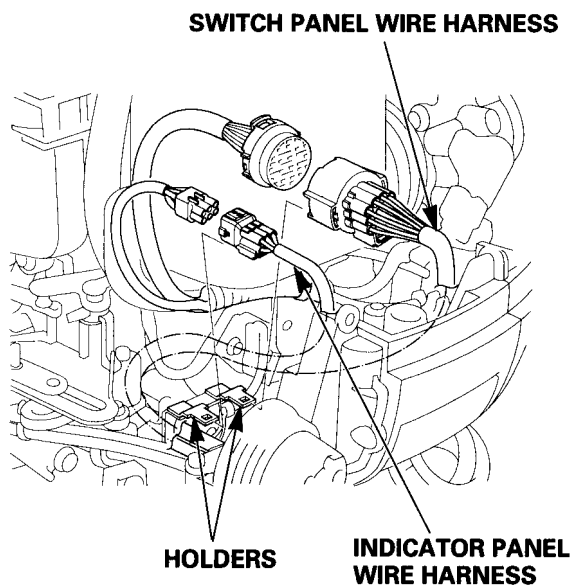
After installing the control cable to the remote control box, then install the control cable to the outboard motor.



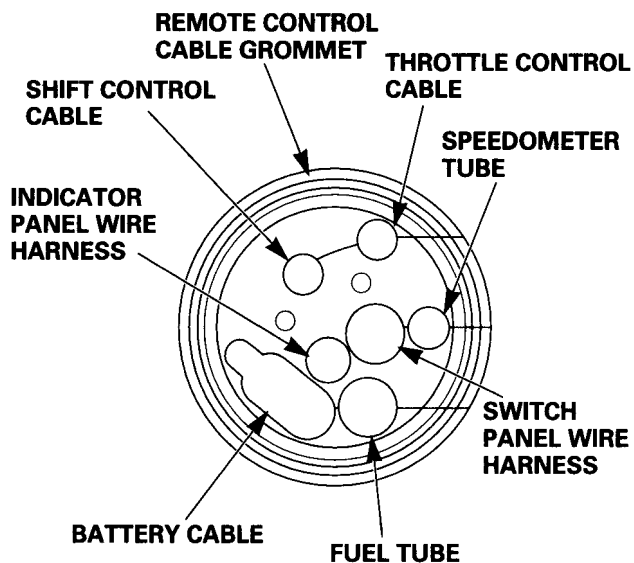
1. Pass the battery cable, throttle control cable, shift control cable indicator panel and the control box side wire harness through the front separate cover.
2. Route the battery cable to the front cover bracket.
 - Position the white tape mark on the battery cable so it aligns with the edge of the front cover bracket.



3. Connect the main wire harness 14P connector to the switch panel wire harness connector and the 6P connector to the indicator panel wire harness connector, then attach them to the connector holders.

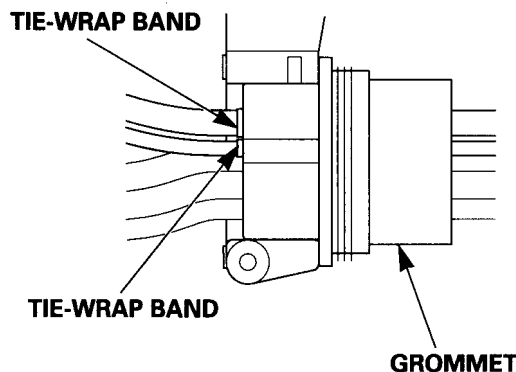
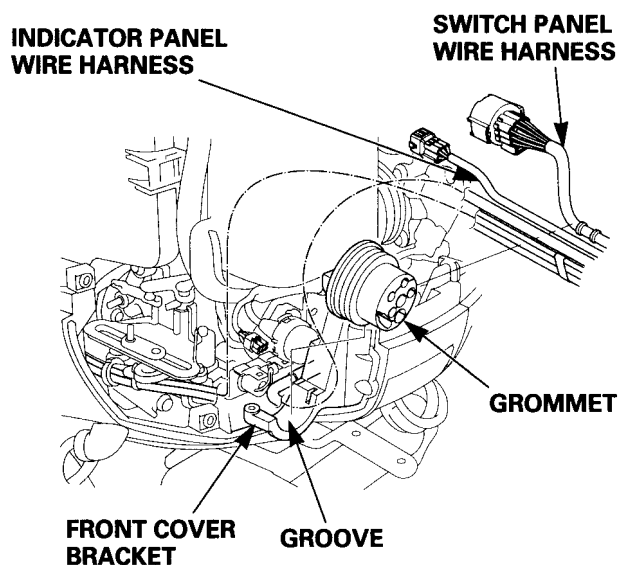


4. Pass the fuel tube, indicator panel wire harness, battery cables, switch panel wire harness and speedometer tube through the grommet.

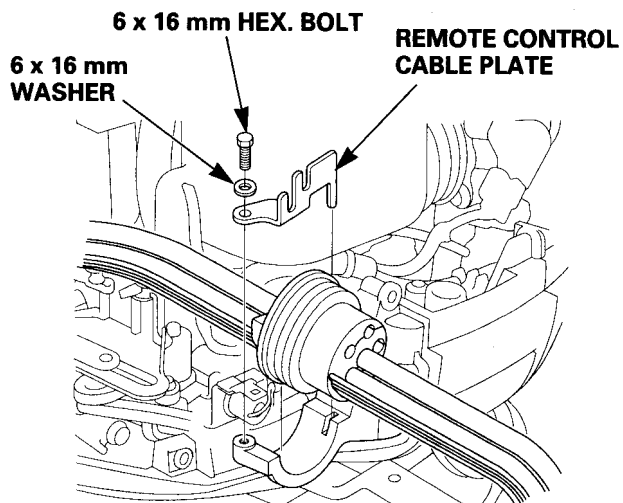


View from outside

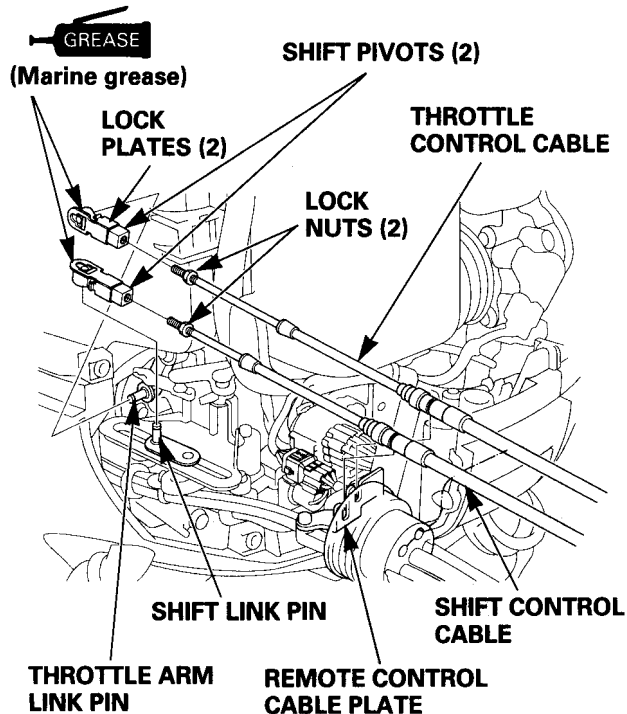
5. Install the grommet by aligning it with the groove in the front cover bracket.
6. Position the tie-wrap band on the switch panel wire harness and indicator panel wire harness at the inside of the grommet.



7. Install the remote control cable plate with the 6 x 16 mm hex bolt and 6 mm washer.



8. Install the remote control cables by aligning it with the groove in the remote control cable plate.
9. Install the shift pivots and lock nuts to the remote control cables.
10. Apply marine grease to the joint hole of the shift pivots and link pins.
11. Adjust the shift pivots until it will attach to the link pins.
12. Position to release the lock plate on the shift pivot.

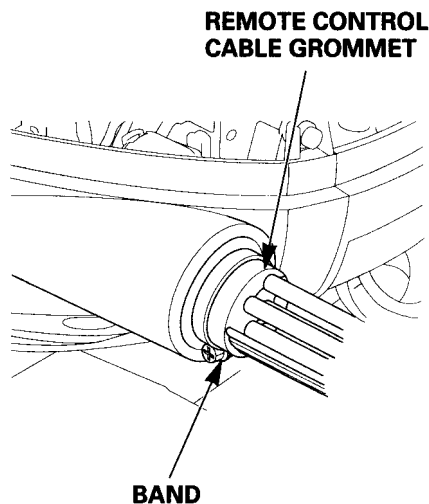
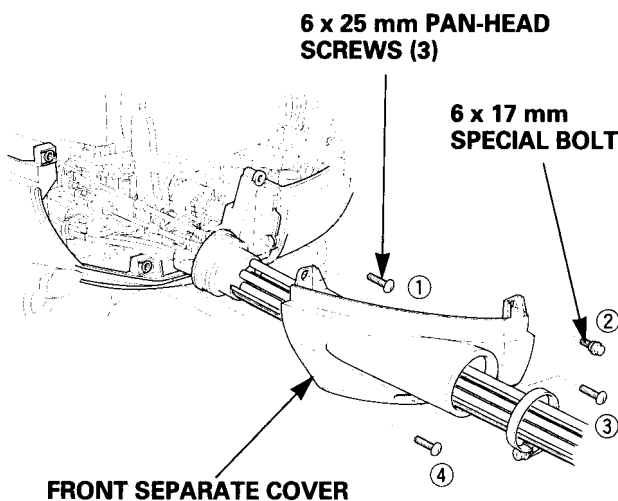


13. Install the front separate cover then tighten the screws and bolt securely (follow the numbers of ① to ④).

NOTE:

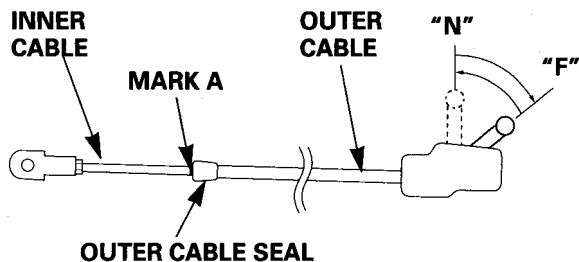
It binds tight in a band so that there may be no turned over in remote control cable grommet.

14. Check to pass the cables, wire harnesses and tubes through the grommet securely.
15. Tighten the grommet with the band securely. Make sure the fuel tube is not pinched by the grommet.

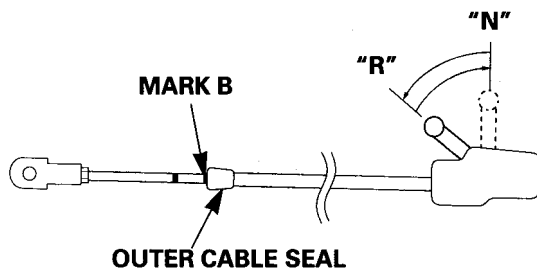


Shift Control Cable Connection

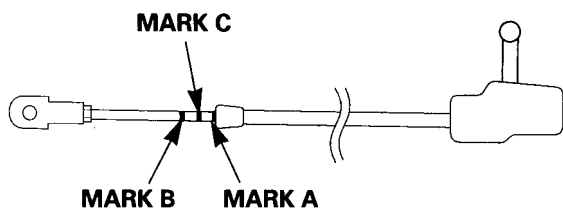
1. Install the shift pivot to the remote control cable (see page 27).
2. Move the control lever to the full forward "F" position.
3. Then slowly return the control lever to the neutral "N" position, and make a mark (A) on the inner cable at the end of the outer cable seal as shown.



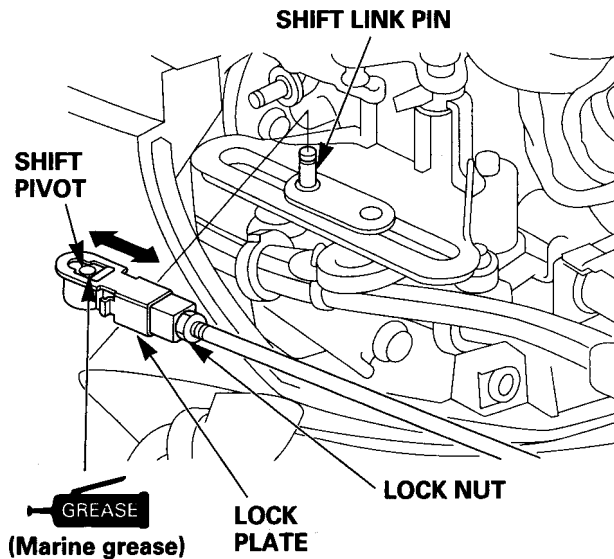
4. Move the control lever to the full reverse "R" position.
5. Then slowly return the control lever to the neutral "N" position, and make a mark (B) on the inner cable at the end of the outer cable seal as shown.



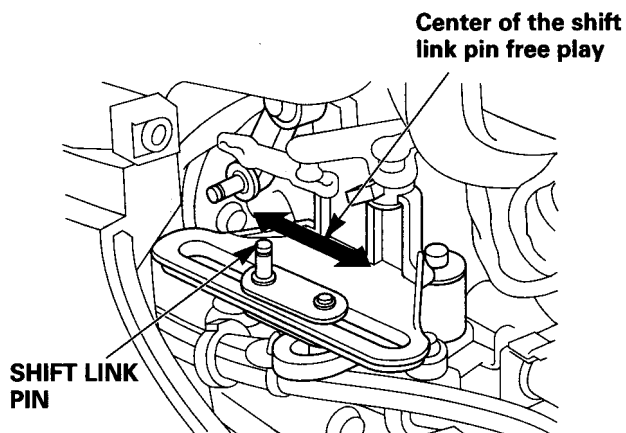
6. Make a mark (C) at the center between the A and B marks.



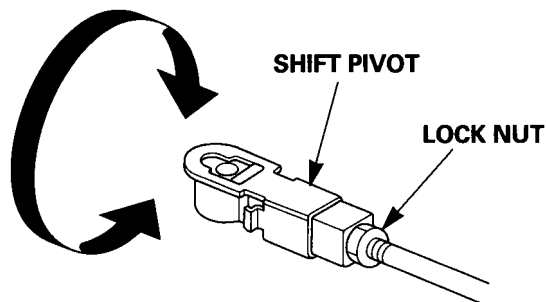
7. Apply marine grease to the joint hole of the shift pivot shift link pin.
8. Align the mark (C) on the shift control cable to the edge of the outer cable seal, then install the shift pivot to the shift link pin.



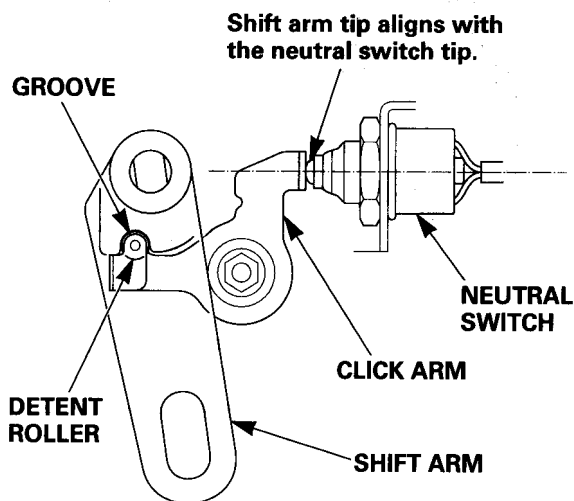
9. Make sure that the shift pivot is in the center of the shift link pin joint hole, adjust by turning the shift pivot if necessary.



10. If necessary, remove the shift pivot from the shift link pin for adjusting.
11. If necessary, loosen the lock nut and turn the shift pivot for adjusting. After adjusting, tighten the lock nut securely.



12. Make sure that outboard motor is in the neutral position; shift arm tip aligns with the neutral switch tip and the detent roller of the click arm is set in the groove in the shift arm



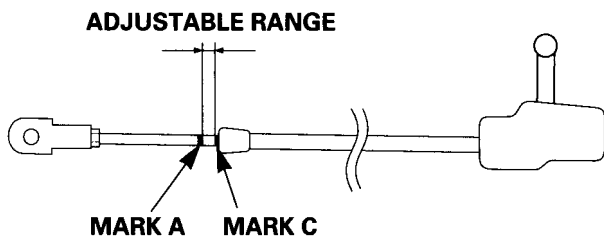
13. After attaching the shift cable to the shift link, check for smooth operation by moving the remote control lever to forward and reverse positions.
14. Make sure that the shift link moves smoothly and returns to the neutral detent position when the remote control lever is returned to the neutral.

CAUTION:

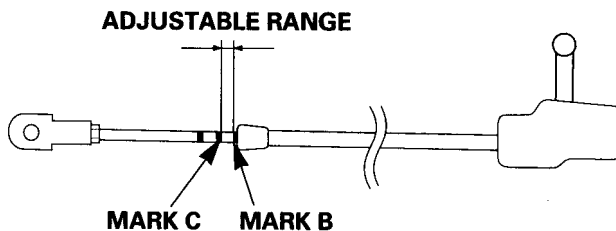
If it is hard to shift, turn propeller shaft. Shifting with force will damage the shift mechanism.

If shift arm moves smoothly and neutral detent aligns, tighten the cable lock nut securely.

- If the shift position is not in neutral position when the shift lever moves from forward position to neutral position, loosen the lock nut of the shift pivot and turn the shift pivot close to mark (A). After adjusting, tighten the lock nut.

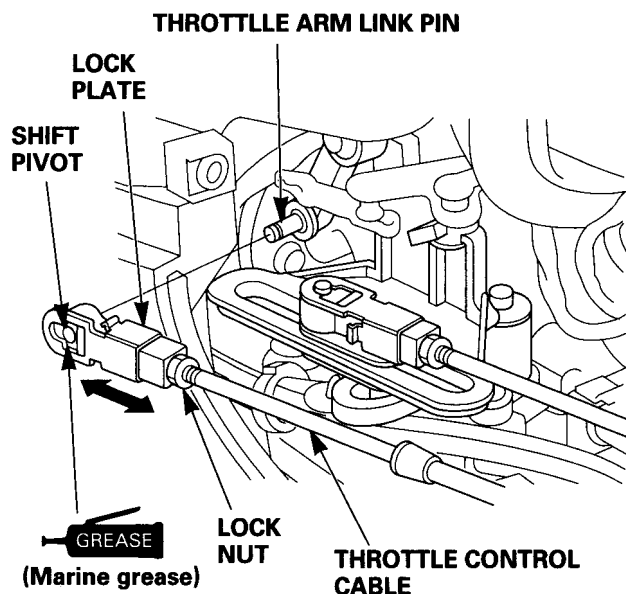


- If the shift position is not in neutral position when the shift lever moves from reverse position to neutral position, loosen the lock nut of the shift pivot and turn the shift pivot close to mark (B). After adjusting, tighten the lock nut.



Throttle Control Cable Connection

1. Apply marine grease to the joint hole of the shift pivot and throttle arm link pin.
2. Adjust the shift pivot until it will attach to the throttle arm link pin.
3. Install the shift pivot to the throttle arm link pin, then tighten the lock nut securely.

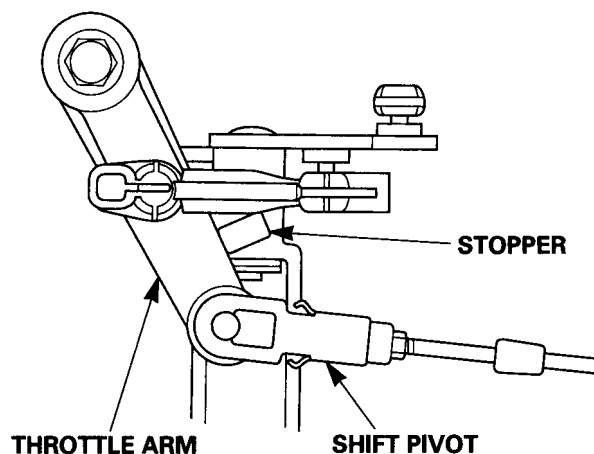


4. Move the remote control lever to the full throttle position.
5. Make sure that the throttle arm contacts the throttle arm stopper.

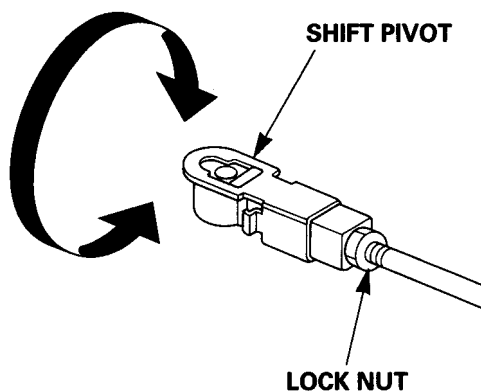
CAUTION:

If it is hard to shift, turn propeller shaft. Shifting with force will damage the shift mechanism.

Adjust by turning the shift pivot if necessary.



6. Remove the shift pivot from the throttle arm.
7. Loosen the lock nut and turn the shift pivot for adjusting.



8. After adjustment, recheck and tighten the lock nut.

Control Box Installation

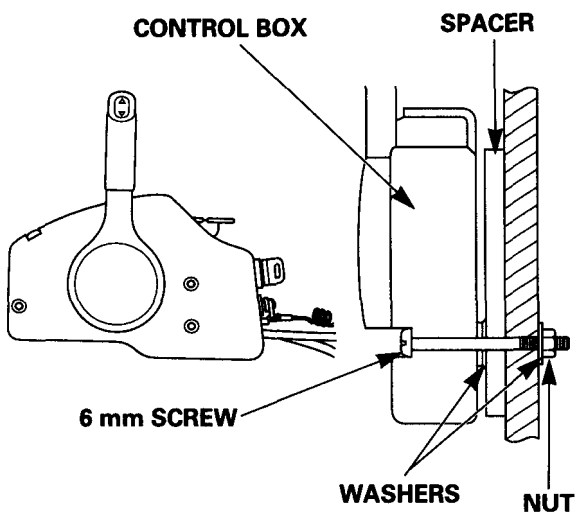
Side Mount Control Box

This control box is designed to be mounted on the starboard side. When it is mounted on the port side, reverse the control lever installation for the port mount type (see page 22).

Set a spacer between the control box and the boat to obtain the clearance for operation of the lever.

Connect the control cable to the control box before installing the control box.

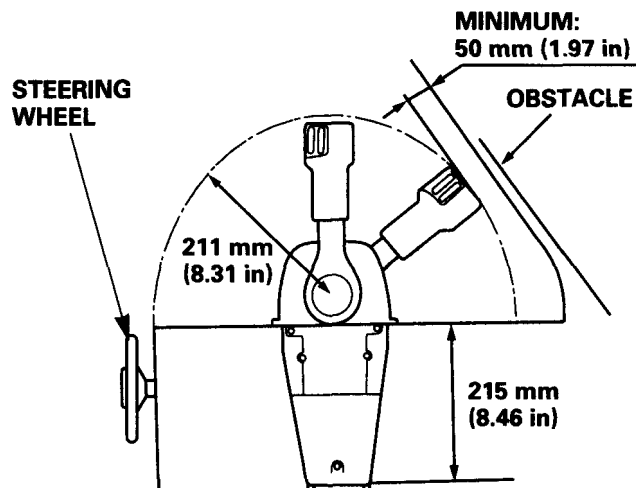
1. Select the control box installation position for boat and suitable type of the control box.
Recommended installation position:
 - Convenient for the control lever operation
 - Free from interference or restriction in routing the cables and harnesses between the control box and the outboard motor.
 - Near a corner of the driver's seat.
 - Underside of the control box is level with the upper surface of the seat.
2. Set the remote control box at the installation position and mark the drilling points for the control box mounting screws.
3. Drill at the marked points using the 7 mm-diameter drill.
4. Connect the control cables to the remote control box (see page 24).
5. Install the remote control box using the washer, nuts and the screws.
6. Set the spacer and washers between the remote control box and the mounting surface on the boat as shown to obtain the clearance for smooth operation of the control lever.
7. Install the control box with the control lever set in the neutral position.



Top Mount Control Box

Select the remote control installation position on the boat.

- Install the remote control in the position that allows proper remote control lever operation, and where the cables and harnesses can be routed properly without strain between the remote control and the outboard motor.



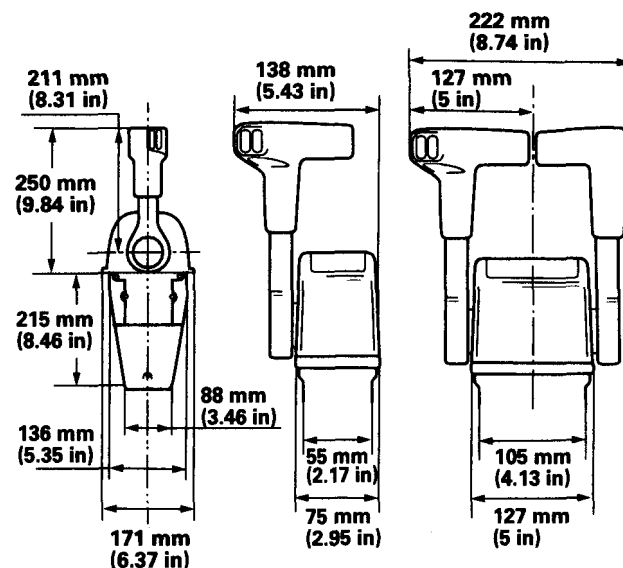
Obtain adequate space between the bottom of the remote control and the surrounding parts so that the remote control does not interfere with any of the surrounding parts (e.g. steering wheel, etc.)

Do not bend the cables and harnesses sharp. Route the cables/harnesses with the bending radius of 300 mm (11.8 in) or more.

Recommended Installation Position

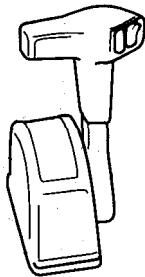
- Near a corner of the driver's seat.
- Underside of the control box is level with the upper surface of the seat.

See the following drawings for the space necessary to install the remote control.



- Both the single and the dual lever type remote controls are available in the right-hand handle type and the left-hand handle type respectively. Select the correct type for the boat.

LEFT-HAND HANDLE
SINGLE LEVER TYPE

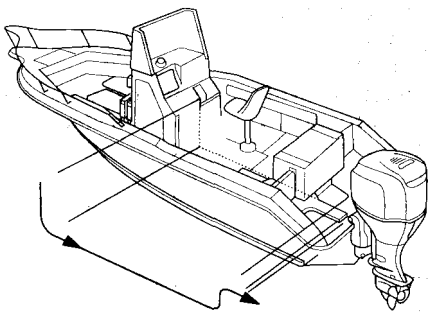


RIGHT-HAND HANDLE
SINGLE LEVER TYPE



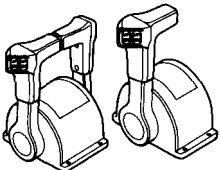
Control Cable Routing

- Top mount control:**
Measure the control cable routing length along the actual cable route, and add 300 – 450 mm (11.8 – 17.72 in) to the measurement.
- Dual mount remote control:**
Measure the control cable routing length to the respective outboard motors.



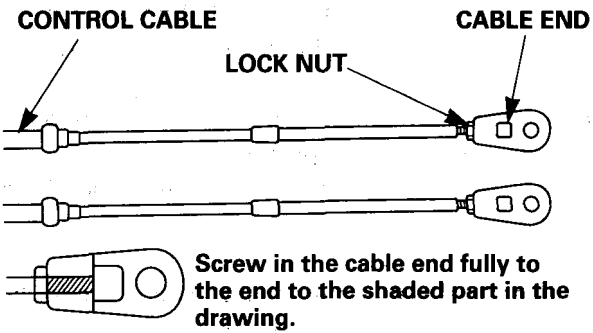
NOTICE

- Bending the control cable sharp (i.e. with small bending diameter) will increase the remote control lever resistance, which will cause the remote control to fail. Cable bend diameter must never be less than 600 mm (24 in).
- If the cable loop is too small at the motor end, there will be an increase in load on the control lever operation resulting in a shorter service life of the cable and controls.
- The control cable loop at the motor end should be long enough to provide unrestricted outboard motor movement when it is tilted up/down and steered.

Remote Control and Control Cable matching table	
Remote Control	Control Cable
TOP MOUNT TYPE 	TELEFLEX UNIVERSAL OR MORSE 33C CABLE 

33C Cable and Cable End Installation

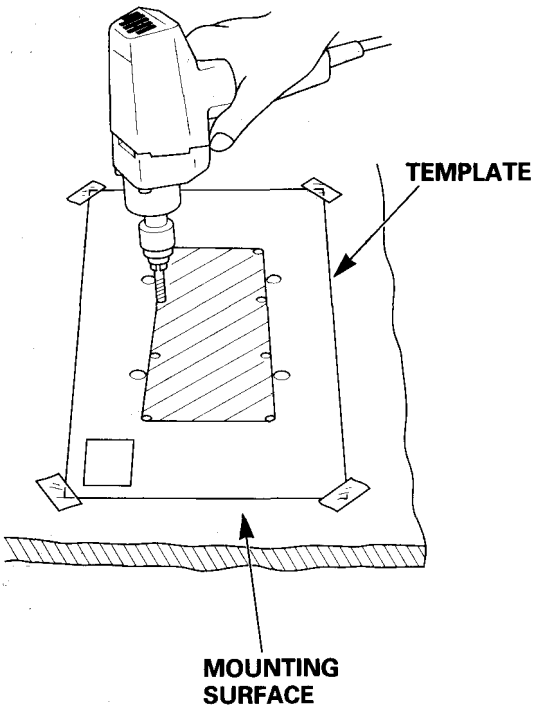
- Screw on the cable end over the threaded part at the end of the control cable and secure with the lock nut not to allow the cable end to turn.



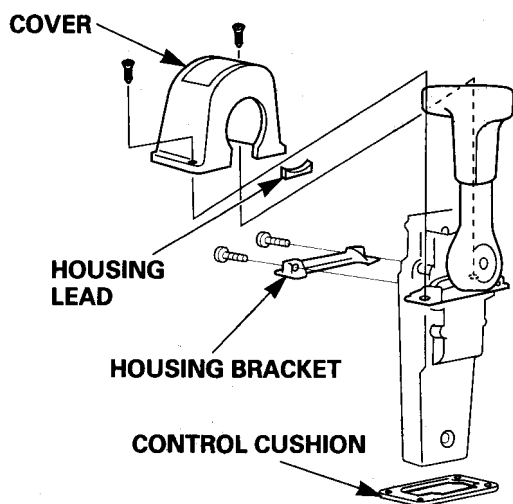
Top Mount Remote Control Installation
(Right-hand handle, Single lever type)

This section explains the installation procedure of the right-hand handle single lever type remote control. The left-hand handle single lever type remote control and the left-hand/right-hand handle dual lever type remote controls can be installed in the same manner.

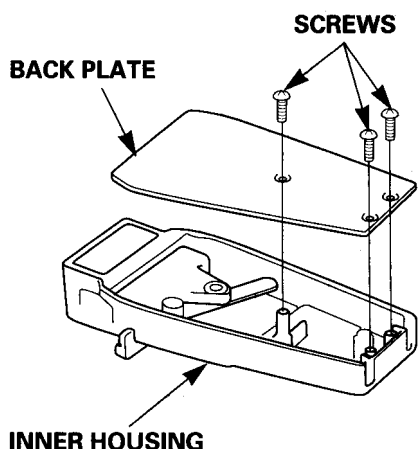
- Attach the drilling template (included in kit of the remote control box) to the remote control mounting surface using pieces of adhesive tape.
- Drill the installation holes and cut out the center.
- Install the control cushion around the opening and spacer (if used).
- Pass the remote control wire harness and the control cables along the route properly.



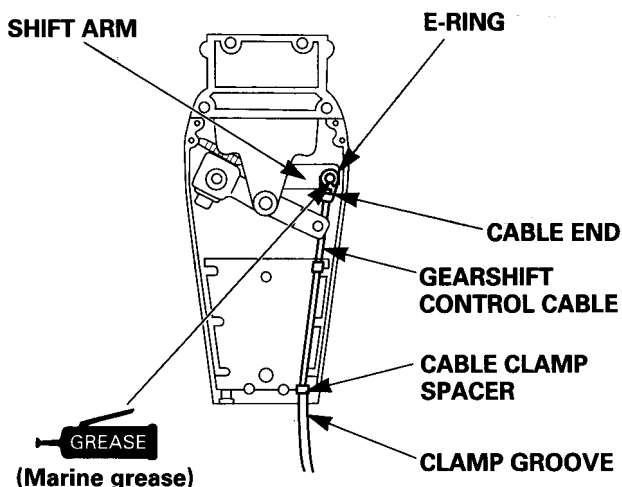
5. Remove the cover and the other parts as shown.



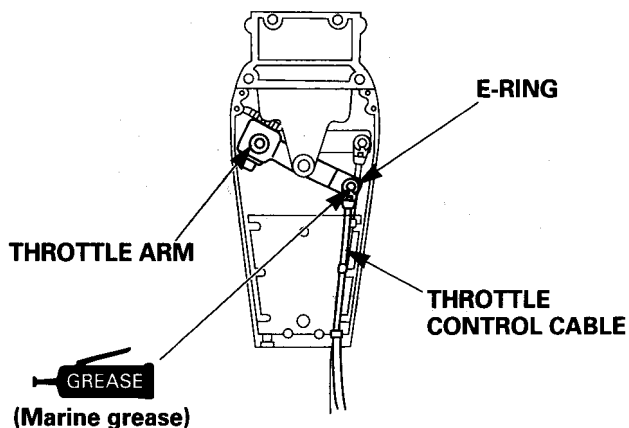
6. Remove the screw and remove the back plate from the inner housing.



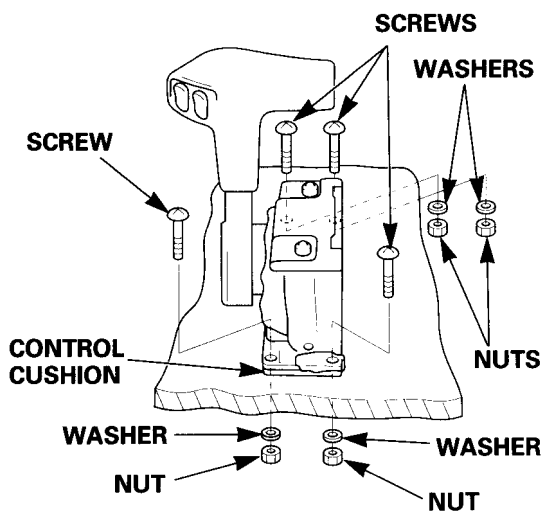
7. Apply marine grease to both the shift and throttle pins at the end of each arm.
 8. Install the gearshift control cable groove in the housing clamp groove. Insert the cable end into the pin at the end of the shift arm, and secure with an E-ring.
 9. Insert the cable clamp spacer in the clamp groove.



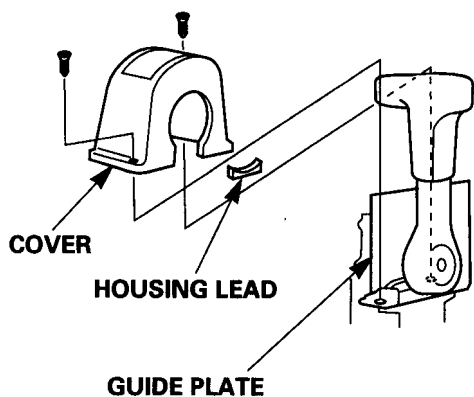
10. Apply marine grease to the throttle cable pin where it contacts the throttle arm.
 11. Connect the throttle control cable to the throttle arm, in the same manner as the gearshift control cable, with an E-ring.



12. Install the back plate and the housing bracket in the reverse order of removal.
 13. Install the remote control as shown. Be sure to connect the switch wire to the remote control wire harness before installation.

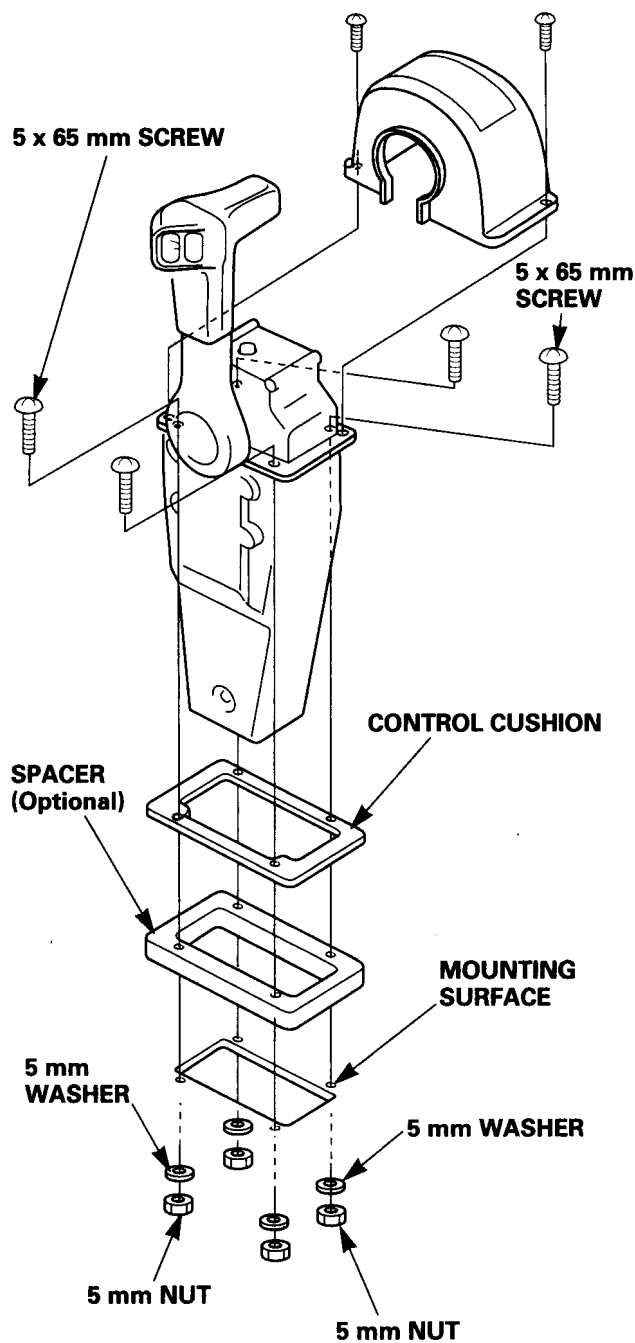


14. Use the guide plate (provided with the kit) and install the cover and the housing lead. Follow the instructions on the guide plate carefully.



Spacer Installation (Optional equipment)

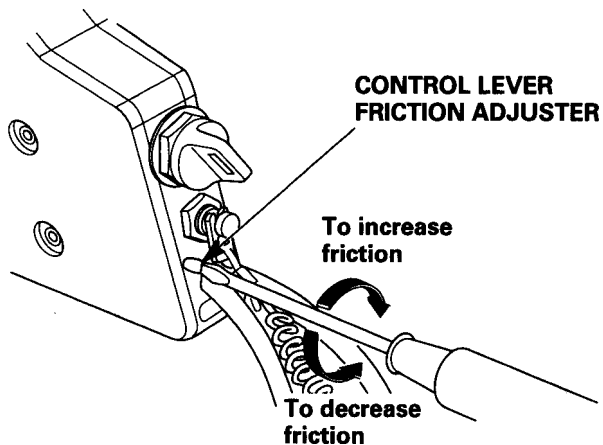
Install the spacer, if necessary, between the control cushion and the mounting surface as shown, and secure with the 5 x 65 mm screws, 5 mm washers and 5 mm nuts (provided with the spacer).



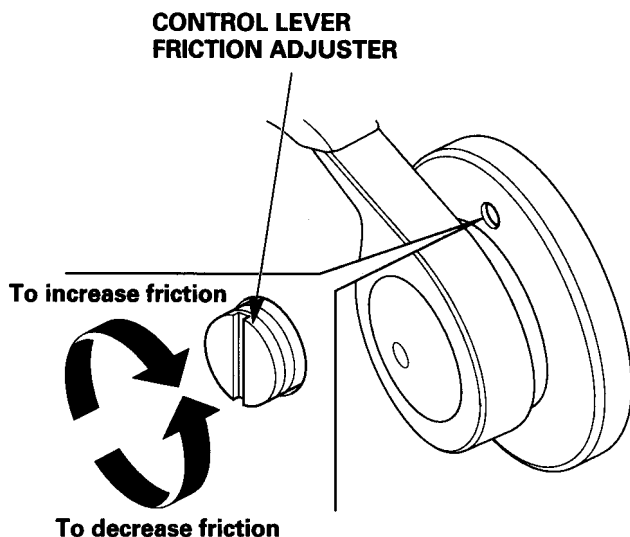
Control Lever Friction Adjustment

Adjust the friction by turning the control lever friction adjuster.

Side Mount Control Box



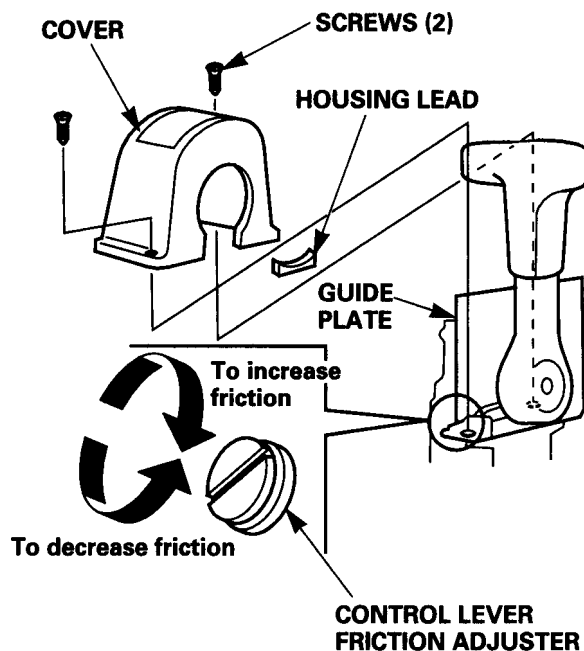
Panel Mount Control Box



Top Mount Control Box

Adjust the friction by turning the control lever friction adjuster.

1. Remove the two screws, cover and the housing lead.



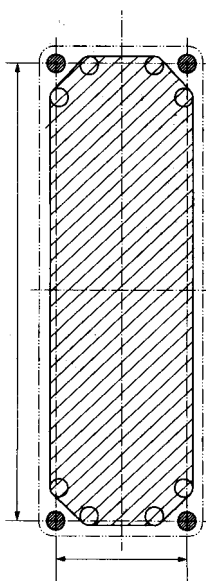
2. Adjust the friction by turning the control lever friction adjuster.
3. After adjusting, install the housing lead, cover and the two screws securely.

8. SWITCH PANEL/INDICATOR PANEL

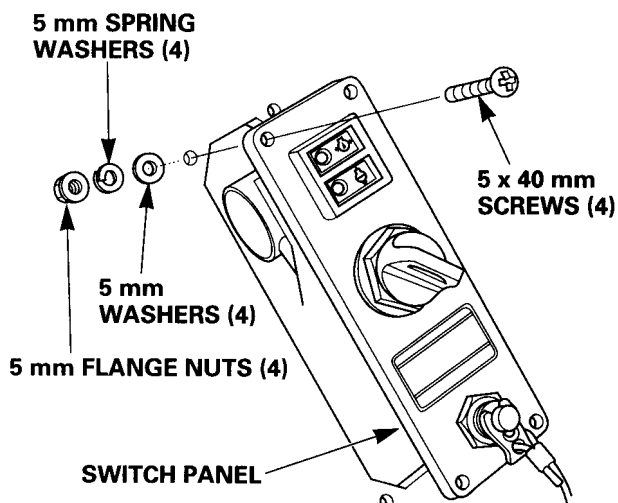
Switch Panel Installation

When the panel mount control box or the top mount control box is used, install the switch panel on the boat at the position near the driver's seat.

1. Determine the switch panel installation position.
It should be near the driver's seat where the switch panel does not interfere with the driving operation.
2. Attach the template shown at the end of this manual at the switch panel installation position.
3. Drill the holes according to the indication on the template.

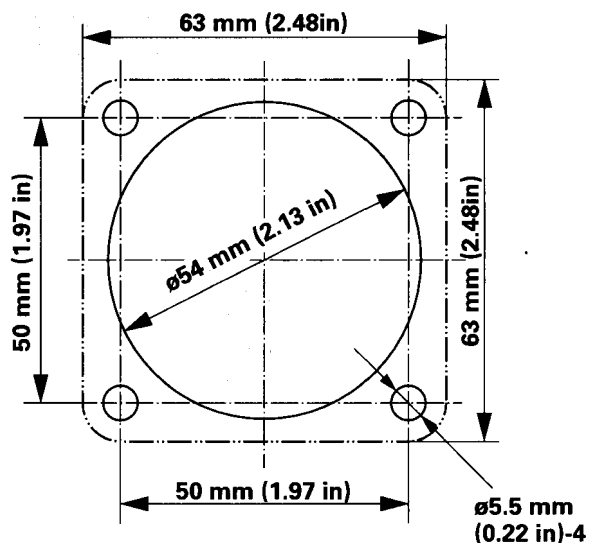


4. Connect the wire harness to the switch panel wire harness and power trim/tilt wire harness of the outboard motor side. (Refer to page 39)
5. Install the switch panel by tightening the four 5 x 40 mm screws, four 5 mm washers, four 5 mm spring washers, and the four 5 mm flange nuts.

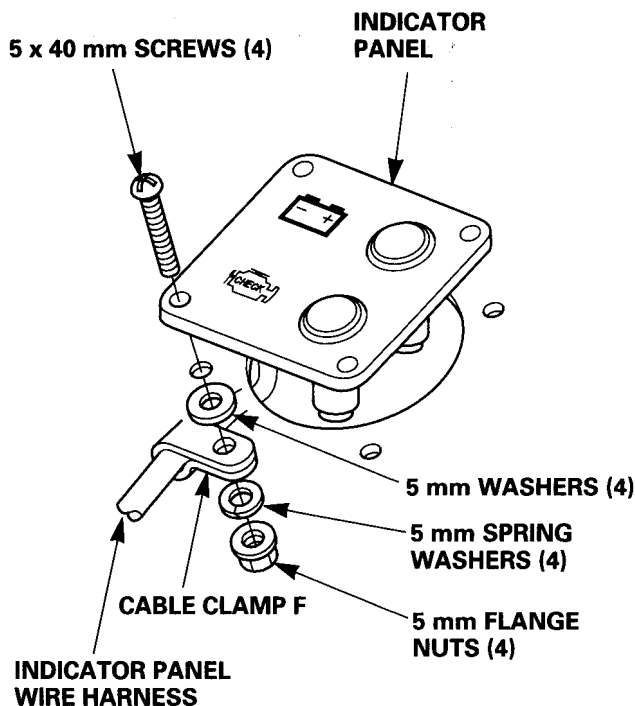


Indicator Panel Installation

1. Determine the indicator panel installation position.
2. Attach the template shown at the end of this manual at the indicator panel installation position.
3. Drill the holes according to the indication on the template.



4. Connect the wire harness to the indicator panel wire harness of the outboard motor side. (Refer to pages 38 and 39)
5. Install the indicator panel by tightening the four 5 x 40 mm screws, four 5 mm washers, four 5 mm spring washers, and the four 5 mm flange nuts.
6. Clamp the indicator panel wire harness with the cable clamp to prevent damage to the harness caused by vibration.



9. WIRE HARNESS CONNECTION

Route and connect the wire harness properly, as shown in the wiring diagram.

Use switch panel wire harness and indicator panel wire harness and modify it if necessary.

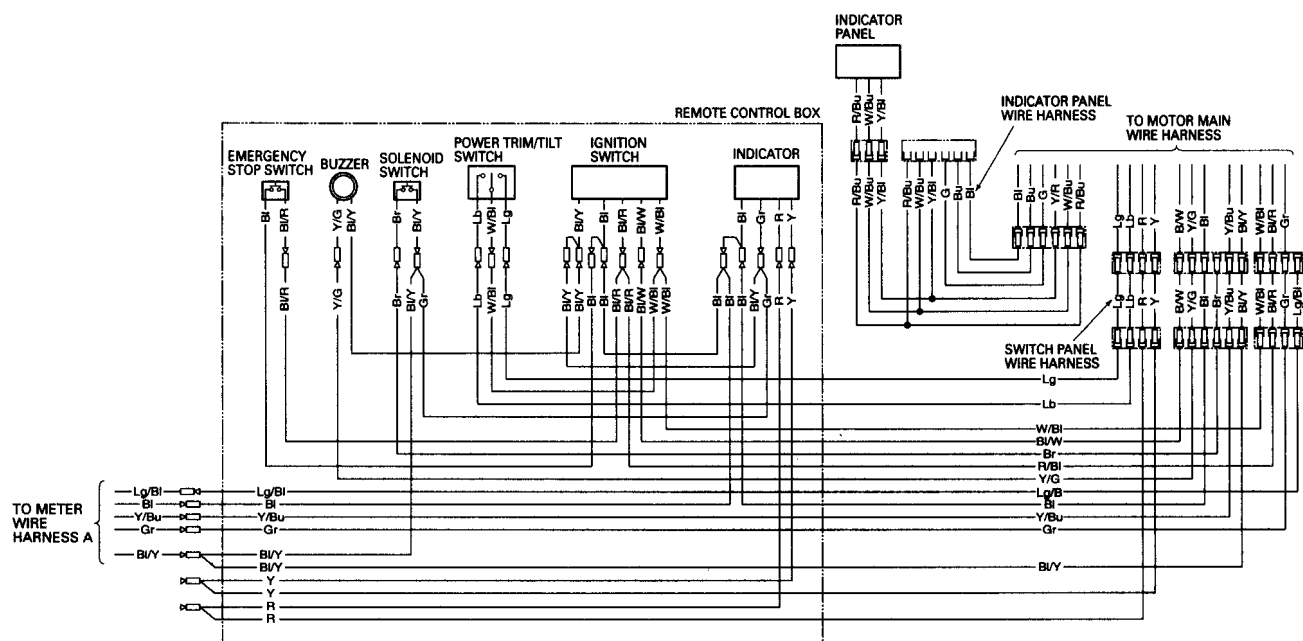
NOTE:

- Stake the lead wire against the terminal securely using the special tool.
- Use the 1.25 mm dia. (AWG #6) lead wire to put them together. Solder the joint section and protect it by wrapping with a piece of insulation tape.

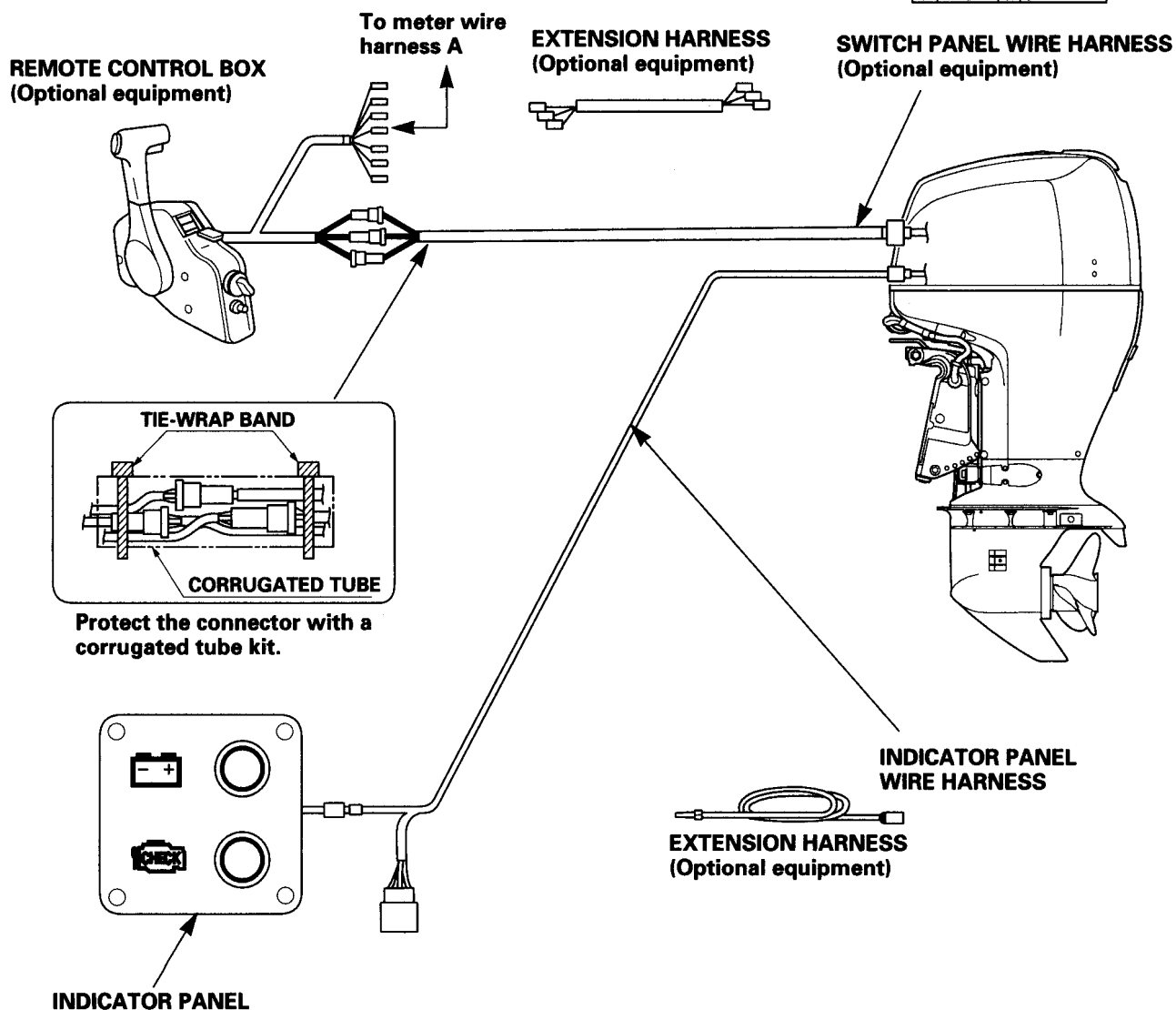
CAUTION:

- **First, check whether the wire harnesses are connected as shown in the wiring diagram, then connect the battery and turn the power switch ON to check for proper condition of the electrical parts and wire harness.**
- Connect the connectors securely. If a terminal is oxidized or corroded, remove the oxidation or corrosion with a nonconductive plastic scrub pad or contact cleaner before reconnecting it.
- The switch panel wire harness is 5 m (16.4 ft) in length.
If this is too short to route, we recommended that you use the extension harness (2 m/6.6 ft in length). Note that the extension harnesses can be used up to two harnesses with the total length 9 m (29.7 ft) or below.
If the indicator panel wire harness is too short to route, use the extension harness (5 m/16.4 ft in length) for indicator panel wire harness.
- Make sure insulators surround their connectors completely and that the ends are not folded up.
- Do not break the wire harness coverings. If the covering of a wire is broken, either repair it with electrician's tape, or replace it.
- Attach unused terminals to the adjacent main harness with a piece of vinyl tape so that the terminals don't interfere with the surrounding parts.

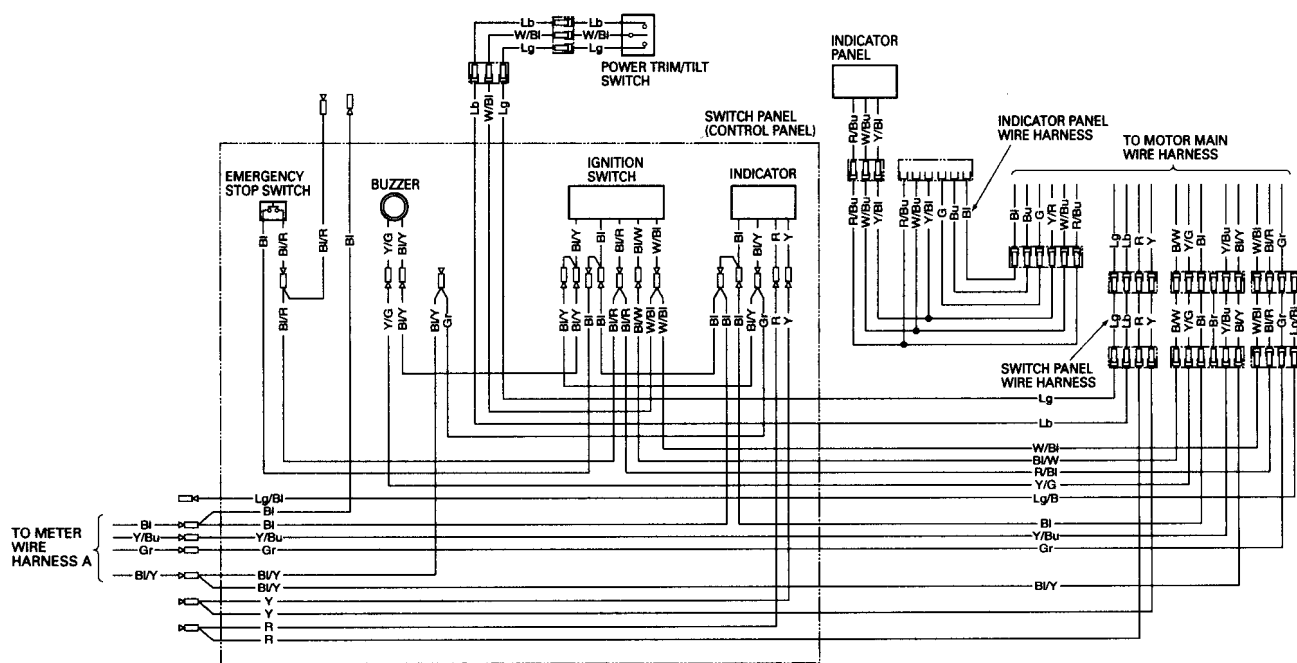
Side Mount Control Box (Optional equipment)



Bl	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY



Panel Mount / Top Mount Control Box (Optional equipment)



REMOTE CONTROL BOX (Optional equipment)

INDICATOR PANEL

INDICATOR PANEL WIRE HARNESS

EXTENSION HARNESS (Optional equipment)

POWER TILT/TRIM SUB HARNESS (Included in the remote control box)

(Not used)

SWITCH PANEL WIRE HARNESS (Optional equipment)

TIE-WRAP BAND

CORRUGATED TUBE

Protect the connector with a
corrugated tube kit.

SWITCH PANEL (Optional equipment)

To meter wire
harness A

EXTENSION HARNESS (Optional equipment)

10. METERS

Meter Installation

Meters and other instruments should be installed on the instrument/mounting panel. If any other location is selected, it will be necessary to use a mounting plate with a thickness of 2 – 11 mm (1/16 – 7/16 in).

- If mounting plate thickness exceeds 11 mm (0.4 in), the mounting bracket must be modified accordingly.
- Tighten the mounting nuts evenly on both sides.
- Meter installation angle should be within 45° - 75°.
- If the boat has a magnetic compass, install the tachometer a minimum of 130 mm (5 in) away from the compass.

Installation hole diameter:

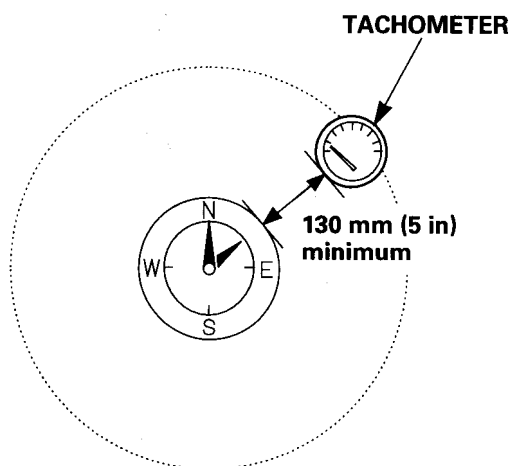
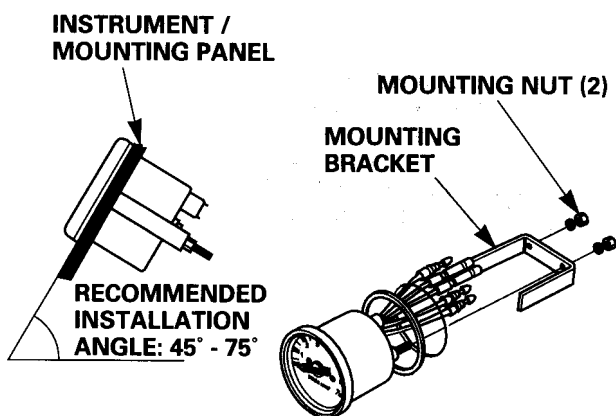
Tachometer: Ø 80.5 mm (3.2 in)

Trim meter: Ø 52.5 mm (2.1 in)

Speedometer: Ø 86.5 mm (3.4 in)

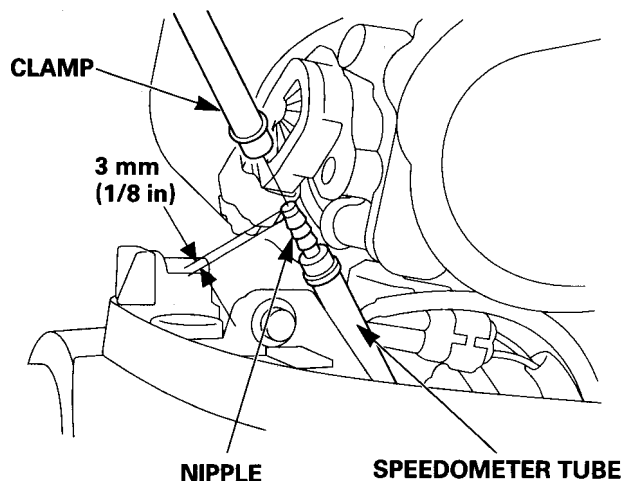
Hour meter: Ø 54.0 mm (2.1 in)

Voltmeter: Ø 54.0 mm (2.1 in)

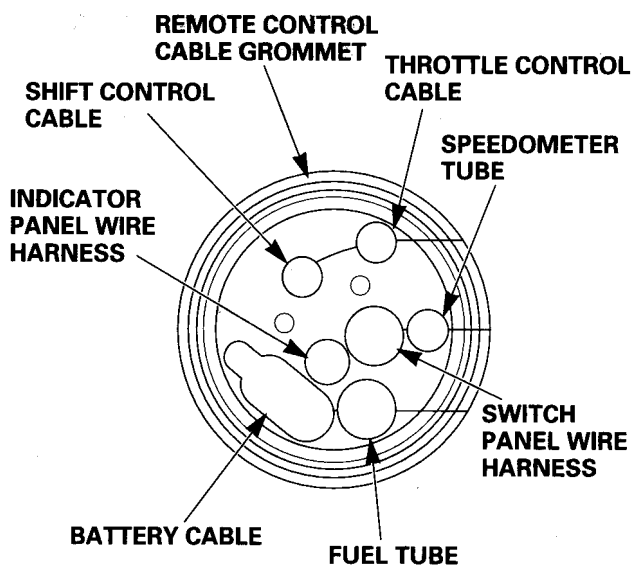


Speedometer Tube Installation

- Cut off about 3 mm (1/8 in) of the nipple end of the outboard motor sensor, then insert it into the speedometer tube. Attach securely with a clamp.



- Pass the speedometer tube through the remote control cable grommet.
- Route the tube that the tube cannot be cut, bent or crushed. Then, route the tube to the speedometer.
- If the sensor opening is plugged with salt or a foreign object, remove it with a piece of wire, etc. When the boat is stored, remove the water in the sensor tube.
- Before the final tube attachment, make sure the tube is not pulled too tight or crushed when the motor is tilted UP or DOWN or turned fully to the right or left.



View from outside

Meter Wire Connection

Route and connect the wire harness properly, as shown in the wiring diagram.

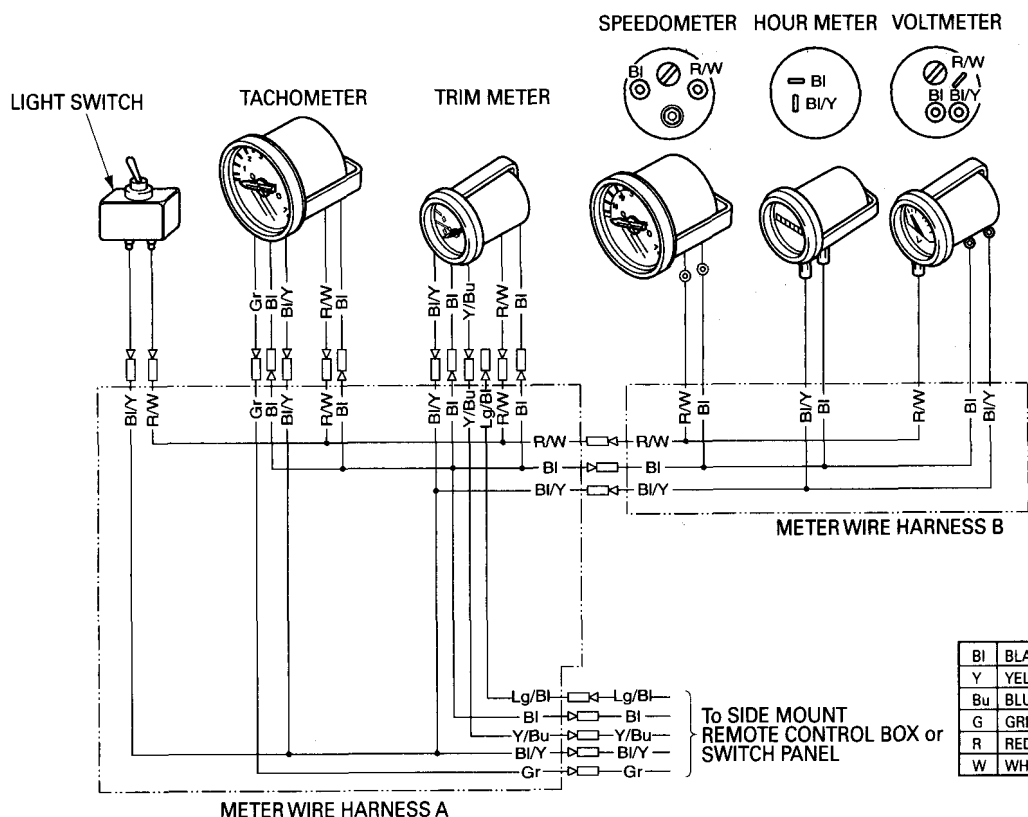
Use Meter Wire Harness A and B for meter.

- Connect leads and terminals securely. Make sure terminals are waterproof.
- Use 19-gauge (1.25 mm diameter) wire.
- Connect the connectors securely. If a terminal is oxidized or corroded, remove the oxidation or corrosion with a nonconductive plastic scrub pad or contact cleaner before reconnecting it.
- Make sure insulators surround their connectors completely and that the ends are not folded up.
- Do not break the wire harness coverings. If the covering of a wire is broken, either repair it with electrician's tape or replace it.
- Attach unused terminals to the adjacent main harness with a piece of vinyl tape so that the terminals don't interfere with the surrounding parts.
- Connect each wire properly, as shown in the wiring diagram. After each wire and harness is connected, check for proper connections by referring to the wiring diagram.
- Connect the battery and turn the main power on to check for proper operation.

This is an independent engine-control system. Do not attempt to integrate it with the boat's system or other accessories, except for the instrument light switch. There are three ways to illuminate the instrument lights:

- Connect a commercially available switch (Teleflex 1A 16970 or equivalent) between the BI/Y and R/W terminals.
- Connect 12V (+) from the boat's instrument lights to the R/W terminal.
- Connect the BI/Y and R/W terminals together for "lights on" with the engine switch.

Meter Wiring Diagram



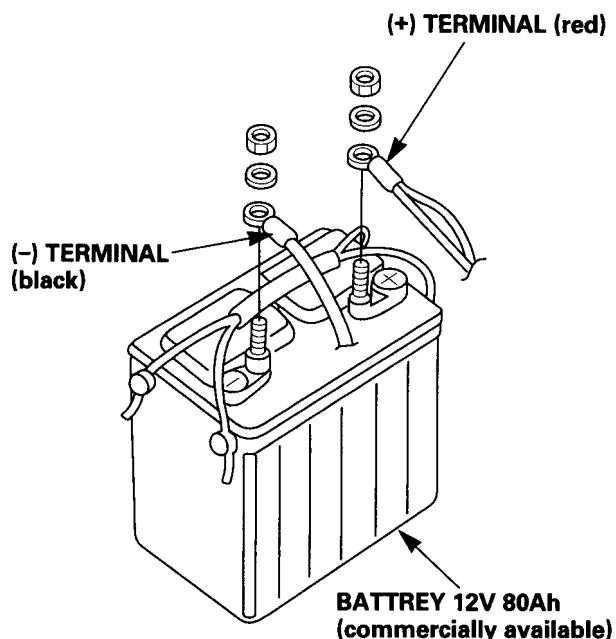
11. BATTERY (not included)

Minimum requirements:

12V – 80Ah (CCA622A) marine cranking battery

If boat is equipped with dual outboard motors, two batteries must be installed, one for each motor.

In the event that a battery failure makes it necessary to temporarily use one battery for two motors, disconnect the engine ground wire from between the two switch panels.



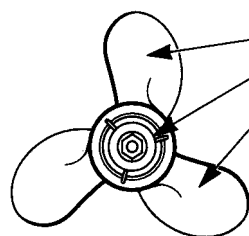
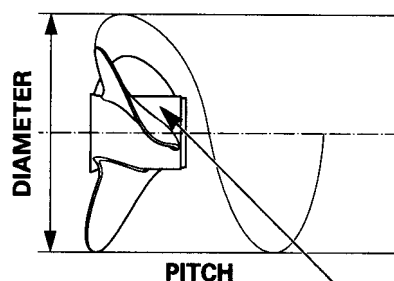
- Install the battery in the correct size corrosion-resistant battery box, in a dry, well-ventilated location protected from water and direct sunlight.
- Connect the positive (+) battery cable first, then connect the negative (-) battery cable. Tighten cable nuts securely.

CAUTION:

- To disconnect, disconnect at the negative (-) terminal first, then at positive (+) terminal. Never dis/connect the battery cables in the reverse order.
- Coat the battery terminal ends with the non-conductive grease. Cover the battery positive (+) terminal.
- Secure the corrosion-resistant battery box properly to the boat. To keep potential sparks away from the fuel tank, do not secure or place battery near the fuel tank.

12. PROPELLER

Propeller Selection



Pitch Advanced Distance During One Turn (Apparent Advanced Distance)

Pitch Ratio $\frac{P}{D}$ P: Pitch (mm)
D: Outer Diameter of Propeller

Slip Ratio $\frac{(\text{Visual Advanced Distance} - \text{Measured Distance})}{\text{Visual Advanced Distance}} \times 100$

During running; the actually advanced distance is reduced by about 10 – 15% due to propeller display pitch.

Recommended full throttle engine speed range:

BF135A: 5,000 – 6,000 min⁻¹

BF150A: 5,000 – 6,000 min⁻¹

Engine speed varies with propeller size and boat condition.

A propeller must be selected to adjust maximum engine speed to the recommended engine speed range.

Using the wrong propeller can cause motor damage.

The proper propeller will assure powerful acceleration, top speed, good fuel economy, cruising comfort, and engine service life.

Propeller Selection Precaution

- Outboard motor must be installed vertically in relation to boat bottom. Set moderate trim angle, and adjust power trim angle to lowest setting.
- Set trim tab, so boat will run in a straight line.
- Protect propeller from foreign objects, check regularly for damage, and/or deformation, and aquatic plants wrapped around propeller hub.
- Keep bottom clean of shells, algae froth and dirt. These will cause a significant drop in top speed.
- When doing propeller checks, select a calm day with little waves action.
- Avoid strong winds. Wind speed should be less than 15 km/h (10 miles/h).
- The boat should carry its average load (crew, load arrangement, ballast).

Select the correct propeller so that full throttle engine speed is within the recommended range.

- If the engine min⁻¹ is under the recommended min⁻¹ range, lower the propeller pitch by one size (1 to 2 inches) or more as needed.
- If the engine min⁻¹ is over the recommended min⁻¹ range, select a propeller with a pitch one size larger or as needed.
- If the following conditions exist, acceleration will improve and outboard motor service life will increase by lowering the propeller pitch.
 - Heavy loads such as crew, load, equipment, water skiing, etc;
 - High temperatures and high humidity conditions;
 - When operating at high altitude;
 - When boat bottom needs cleaning;
 - When area around gear case is obstructed;

To increase motor service life and ensure safe navigation, do not use full throttle for extended periods, but run the motor at 70 to 80% of full throttle.

CAUTION:

If full throttle engine min⁻¹ exceeds the recommended range, it can cause increased vibration, noise, reduced boat performance, and possible engine wear damage.

If full throttle engine min⁻¹ is below the recommended range, it indicates that the engine is being overloaded.

Propeller Selection Chart

• BF135A

Propeller Type	Propeller Size Dia. x pitch (in)	Speed [km/h]		Speed within recommended engine speed (km/h)											
		5,000 min ⁻¹	6,000 min ⁻¹	30	40	50	60	70	80	90	100	110	120		
AL	15-1/2 x 13	35	54												
	15-1/4 x 15	45	65												
	15 x 17	49	71												
	14-3/4 x 19	49	75												
	14-1/2 x 21	71	94												
	14-1/4 x 23	78	103												
SUS	14-1/2 x 15	37	59												
	14-1/4 x 17	47	70												
	14 x 19	55	79												
	14 x 21	60	87												
	14-1/2 x 23*	72	99												
	14 x 25	84	111												

* : USED TITANIUM PROPELLER

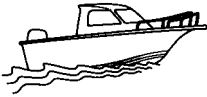
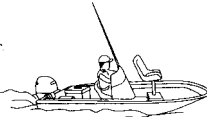
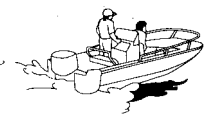
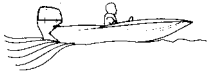
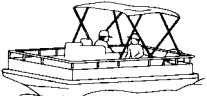
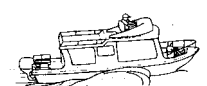
• BF150A

Propeller Type	Propeller Size Dia. x pitch (in)	Speed [km/h]		Speed within recommended engine speed (km/h)											
		5,000 min ⁻¹	6,000 min ⁻¹	30	40	50	60	70	80	90	100	110	120		
AL	15-1/2 x 13	34	52												
	15-1/4 x 15	44	62												
	15 x 17	47	68												
	14-3/4 x 19	47	71												
	14-1/2 x 21	70	92												
	14-1/4 x 23	77	101												
SUS	14-1/2 x 15	36	56												
	14-1/4 x 17	45	66												
	14 x 19	54	76												
	14 x 21	59	83												
	14-1/2 x 23*	70	96												
	14 x 25	82	108												

* : USED TITANIUM PROPELLER

AL: Aluminum, SUS: Stainless Steel

Boat Type and Applicable Size (Length and Weight)

Boat Type	Hull Shape (Example)	Overall length (ft)	Weight (kg) [lbs]	Example				
				Outboard motor	Overall length [ft]	Weight [kg]	Recommended full throttle speed [km/h]	
							BF135A	BF150A
Fishing boat (off shore)		16 – 22	363 – 1,288 [800 – 2,840]	Single	20	1,288	62	64
					18	816	66	69
					19	758	69	72
					23	862	73	76
					21	807	70	73
Bass boat		16–19	340–785 [750 – 1,730]	Single	18	476	86	90
					18	454	86	90
					18	386	90	94
Center console		17–21	408– 1,225 [900 – 2,700]	Single	20	1,229	63	65
					19	862	67	69
					18	667	69	72
					20	590	75	78
Runabout		17–21	295– 1,043 [650 – 2,300]	Single	20	708	71	74
					19	413	77	80
					21	544	77	80
					18	1,048	62	65
Water ski		17–19	295–658 [650 – 1,450]	Single	17	658	67	70
					18	488	73	76
					17	374	75	78
					19	295	80	84
Deck boat		17–43	417– 2,676 [920 – 5,900]	Single	43	2,449	38	40
					20	875	35	37
					24	875	38	40
Pontoon boat		20–29	771– 1,724 [1,700 – 3,800]	Single	28	1,715	34	36
					25	830	39	41
					29	871	42	44
House boat		34–52	2,903– 6,350 [6,400 – 14,000]	Single	44	5,606	28	29
					34	2,903	32	33
					50	4,445	33	34

Propeller type

[Aluminum propeller]

Propeller size Dia. x pitch (in)	Material	Rotation
15-1/2 x 13	AL	STD
15-1/4 x 15	AL	STD
15 x 17	AL	STD
14-3/4 x 19	AL	STD
14-1/2 x 21	AL	STD
14-1/4 x 23	AL	STD

STD: STANDARD ROTATION

[Stainless steel propeller]

Propeller size Dia. x pitch (in)	Material	Rotation
14-1/2 x 15	SUS	STD&CR
14-1/4 x 17	SUS	STD&CR
14 x 19	SUS	STD&CR
14 x 21	SUS	STD&CR
14-1/2 x 23	SUS	STD&CR
14 x 25	SUS	STD&CR

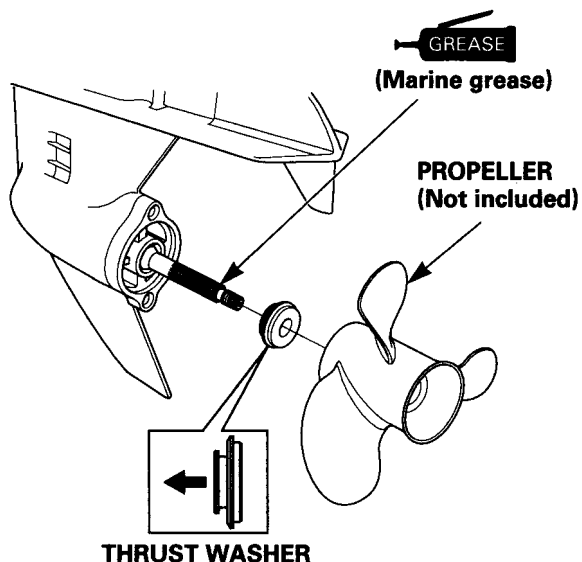
CR: COUNTER ROTATION

Propeller Installation

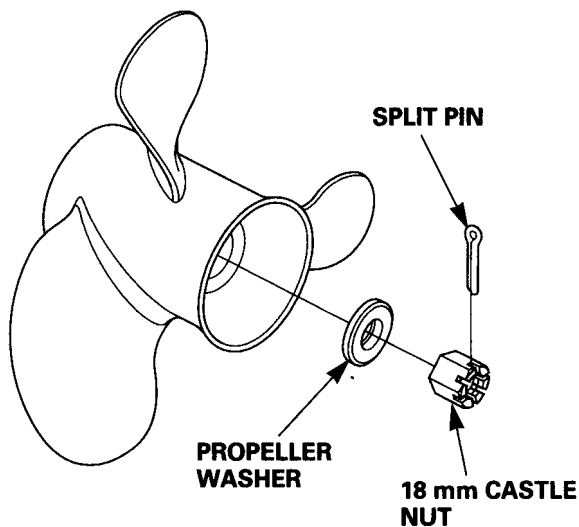
Disconnect the battery cable terminal to prevent the engine from starting accidentally.

Wear heavy gloves to protect your hands from sharp or nicked propeller blades.

1. Apply marine grease to the propeller shaft.
2. Install the thrust washer and the propeller on the propeller shaft.



3. Install the propeller washer and 18 mm castle nut.
Torque: 1.0 N·m (0.1 kgf·m, 0.7 lbf·ft)

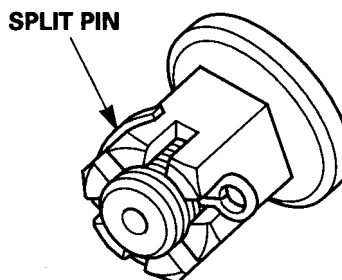


4. Tighten the 18 mm castle nut and secure with the split pin.
If the split pin does not align with the hole in the propeller shaft, adjust by turning the nut in the tightening direction. Do not exceed the maximum torque.

Maximum tightening torque:
44 N·m (4.5 kgf·m, 33 lbf·ft)

After installation, bend the split pin ends as shown to secure.

If the commercially available parts are used, select the stainless steel parts.



13. ADJUSTMENT AFTER INSTALLATION

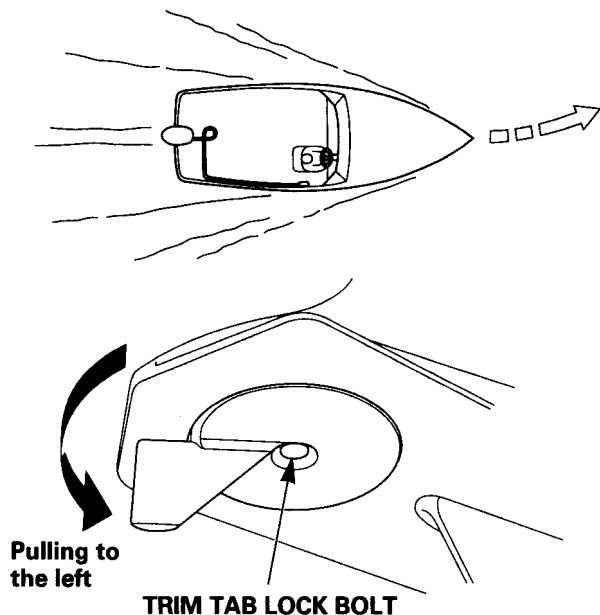
Trim Tab Adjustment

Single Motor

After the engine break-in, run the boat at full speed and check to see if the boat pulls to the left or right. Adjust the trim tab as required to ensure good and straight running characteristics.

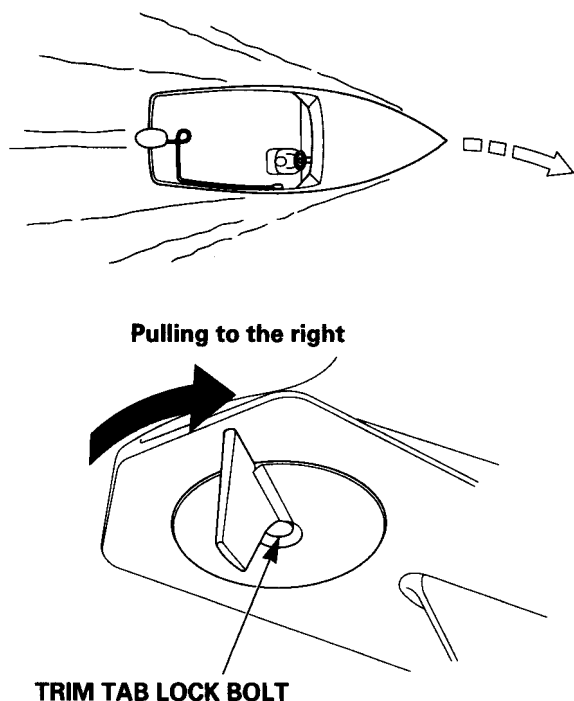
If the boat pulls to the left:

Loosen the trim tab lock bolt, and move the trim tab trailing edge to the left.



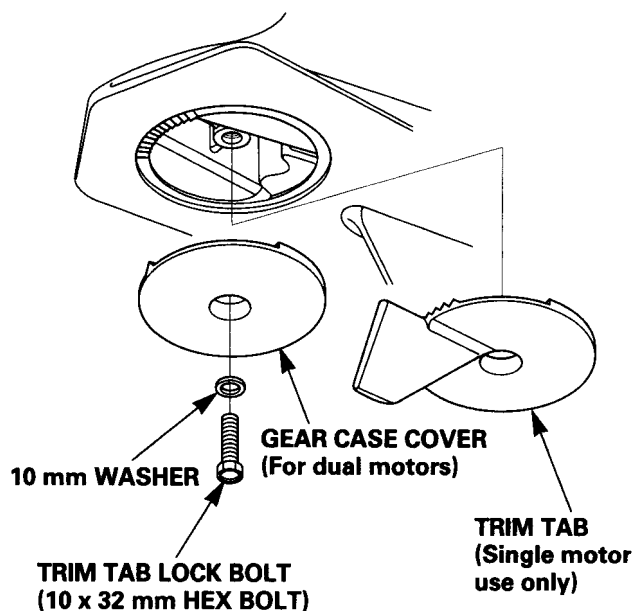
If the boat pulls to the right:

Loosen the trim tab lock bolt, and move the trim tab trailing edge to the right.



Dual Motors

1. Remove the trim tab lock bolt and trim tab from the standard rotation outboard motor.



2. Replace the trim tab to the gear case cover and tighten it with a trim tab lock bolt (10 x 32 mm hex bolt) as specified torque.

Torque: 34 N·m (3.5 kgf·m, 25 lbf·ft)

14. PRE-DELIVERY SERVICE CHECK LIST

Check all items on the following list. Refer to Owner's Manual or Shop Manual for the specifications and the detailed procedures. Test every unit to be sure it is functioning properly.

On land

• EXTERNAL APPEARANCE

- ☐ Check for Transport Damage.
- ☐ Check for paint scratches, touch-up if necessary.

• INSTALLATION LOCATION

- ☐ Check for correct installation location.
- ☐ Check outboard motor for correct installation height.
- ☐ Make sure the motor mounting bolts are tight.
- ☐ Check to be sure sealant has been supplied to the transom mounting bolt holes.

• GEAR OIL

- ☐ Check for proper gear oil level. Make sure the oil level and drain plugs are tight.
OIL CAPACITY: 0.98 lit. (1.04 US qt, 0.86 Imp qt)
Recommended oil: SAE #90 gear oil
Use gear oil that meets or exceeds the requirement for API Service Classification GL4.

• FUELL SYSTEM

- ☐ Be sure fuel lines are connected securely.
- ☐ Make sure the fuel tank is full of fresh gasoline.
- ☐ Check for fuel leaks. If necessary, repair immediately.

• STEERING SYSTEM

- ☐ Check the steering system for smooth operation.
- ☐ Make sure the outboard motor does not interfere with the steering cable and/or link arm, control cables, wire harness, etc. when the steering wheel is turned full left and full right and with the motor in all tilt positions.

• REMOTE CONTROL SYSTEM

- ☐ Check the remote control for proper operation.
- ☐ Make sure the control lever selects the forward, neutral, and the reverse gears.
- ☐ Check for full throttle capability.
- ☐ Check to be sure the throttle operates smoothly with the remote control lever at full throttle position. On side-surface mount controls, the fast idle lever must be in the idle position.

• ELECTRICAL SYSTEM

- ☐ Check the wire harnesses for proper connections.
- ☐ Check the battery connections for correct polarity and tightness.
- ☐ Make sure the battery is fully charged and installed securely.
- ☐ Make sure the meters, indicators and switches are connected correctly.

• TILT MECHANISM

- ☐ Push the power trim/tilt switch and make sure the outboard motor tilts up and down smoothly.
- ☐ Check for the tilt motor noise while tilting up or down.
- ☐ Tilt down the outboard motor and check to see that the trim meter functions and indicates "DOWN".
- ☐ Operate the steering with the outboard motor in the tilt-down position, and check to be sure that the cables, harnesses, etc. do not interfere with the outboard motor.
- ☐ Tilt up the outboard motor to the full tilt-up position and check the power trim/tilt oil level.
- ☐ Check the manual tilt valve for proper function.
- ☐ Make sure the tilt stopper sets in the lock position at full tilt-up position.

• ENGINE OIL

- ☐ Check the engine oil level.
ENGINE OIL CAPACITY:
Total: 7.35 lit. (7.77 US qt, 6.47 Imp qt)
Change: 6.5 lit. (6.87 US qt, 5.72 Imp qt)
Recommended oil: SAE 10W-30
Use 4-stroke motor oil that meets or exceeds the requirement for API Service Classification SG, SH or SJ.
Always check the API SERVICE label on the oil container to be sure it includes the letters SG, SH or SJ.

• PROPELLER

- ☐ Check for deformation (e.g. bend, etc.).
- ☐ Check for excessive wear.
- ☐ Check the castle nut for secure tightening.
- ☐ Check the cotter pin for any abnormality.

• ALL NUTS, BOLTS & OTHER FASTENERS

- ☐ Check security and tighten if necessary.

15. OPERATION CHECK LIST

In the Water

• OUTBOARD MOTOR INSTALLATION

- ☐ Check that there are no water leaks from the motor mounting bolt holes.
- ☐ Check for the balanced weight distribution on the boat.

• OUTBOARD MOTOR OPERATION

- ☐ Check the neutral switch for proper operation.
- ☐ Turn the ignition switch ON and check whether the buzzer sounds twice.
- ☐ Turn the ignition switch ON and check whether the PGM light, charging light and the OP light come ON.
- ☐ Turn the ignition switch to the START position and check whether the engine starts.
- ☐ Check the outboard motor for any abnormal noise.
- ☐ Check to be sure cooling water flows out of the cooling system indicator.

After the engine warms up:

- ☐ Make sure the motor returns smoothly to idle.
- ☐ Check the idle speed.
IDLE SPEED: $750 \pm 50 \text{ min}^{-1}$
- ☐ Snap the throttle and check the engine response.
- ☐ Check to see that the emergency stop switch functions securely.

• LEAKS

- ☐ Make sure that there are no leaks from the fuel lines and/or connections. If necessary, repair immediately.
- ☐ Check the outboard motor for cooling water/oil leaks. Repair if necessary.
- ☐ Check the exhaust system for gas leaks.

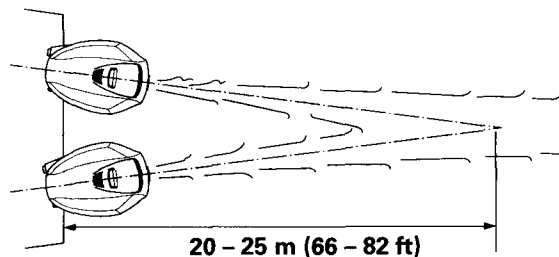
During Sea Trials

- ☐ Check the gearshift operation with the remote control lever.
- ☐ Check the motor operation at trolling speed. Use the minimum amount of the throttle opening necessary to operate the boat at a safe trolling speed for 15 minutes.

☐ Dual Motors:

Adjust the tie bar length so that the motors toe-out. Toe-out is when the motor's forward measurement is wider than the motors' after measurement.

Motors toe-out (viewed from the stern) will (viewed from the stern) will ensure better boat stability. It is best if the waves of two motors joint 20 – 25 m (66 – 82 ft) astern.



Not all boats will follow this specification. Consult your boat manufacturer for toe-in or toe-out recommendation.

• PROPELLER SELECTION

- ☐ Check the engine min^{-1} with the boat under way.
Before engine break-in, avoid continuous full throttle operation (100% throttle opening). Do not run the outboard motor at full throttle for more than 2 minutes at a time.
MAXIMUM RECOMMENDED ENGINE SPEED: 5,000 – 6,000 min^{-1}
- ☐ Make sure that there is no propeller ventilation in a straight line. There is the possibility of some propeller ventilation when turning at full throttle with the motor trimmed out.

After Sea Trials

• CHECK & CLEAN THE OUTBOARD MOTOR

- ☐ Check that there is no water in the gear oil.
- ☐ Check that there are no signs of fuel, oil or water leaks. Repair if necessary.
- ☐ After running in salty or dirty water, use a flushing kit to flush the cooling system with clean water. Run the outboard motor at idle during flushing for approximately 10 minutes.
- ☐ Clean the entire outboard motor thoroughly with a cloth.
- ☐ Check the outboard motor for external damage, defects, or cracks.

16. WHEN RADIO STATION/GPS MOUNTED ON THE BOAT

The ECM and its wires are designed so that they are not affected by the external jamming, but the ECM can function erroneously when it receives the extremely strong electric wave. Check the ECM for erroneous operation whenever a radio station or navigation system is mounted on the boat.

Observe the following instructions to prevent erroneous operation.

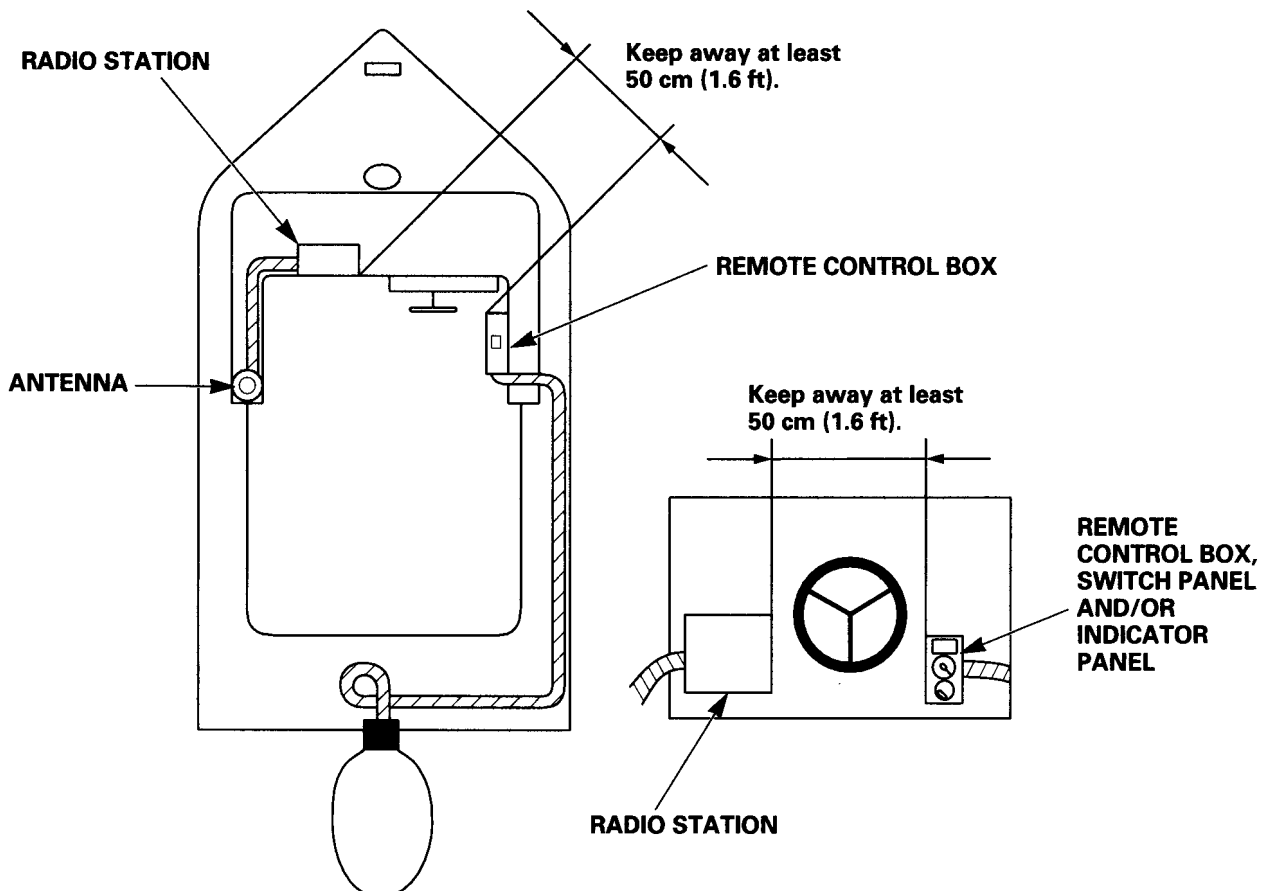
- Set the antenna and radio station at least 50 cm (1.6 ft) or more away from the ECM, switch panel wire harness, indicator wire harness, switch panel or remote control box and the indicator panel.
- Avoid routing the antenna wire lead too long compared to the remote control wire leads.
- Do not install the radio station that does not conform with the laws and regulations concerned (10W or below).

- Set the GPS antenna and navigation unit at least 3 m (9.8 ft) or more away from the ECM.
- Ground the GPS antenna ground securely.

CAUTION:

After installing a radio station or GPS, the ECM must be inspected for erroneous operation.

(Installation example)



17. BREAK-IN PROCEDURE

Break-in period: 10 hours

Break-in operation allows the moving parts to wear-in evenly and thus ensures proper performance and longer outboard motor service life.

First 15 minutes:

Run the outboard motor at trolling speed. Use the minimum amount of throttle opening necessary to operate the boat at a safe trolling speed.

Next 45 minutes:

Run the outboard motor up to a maximum of 2,000 to 3,000 min⁻¹ or 10% to 30% throttle opening.

Next 60 minutes:

Run the outboard motor up to a maximum of 4,000 to 5,000 min⁻¹ or 50% to 80% throttle opening. Short bursts of full throttle are acceptable but do not operate the motor continuously at full throttle.

Next 8 hours:

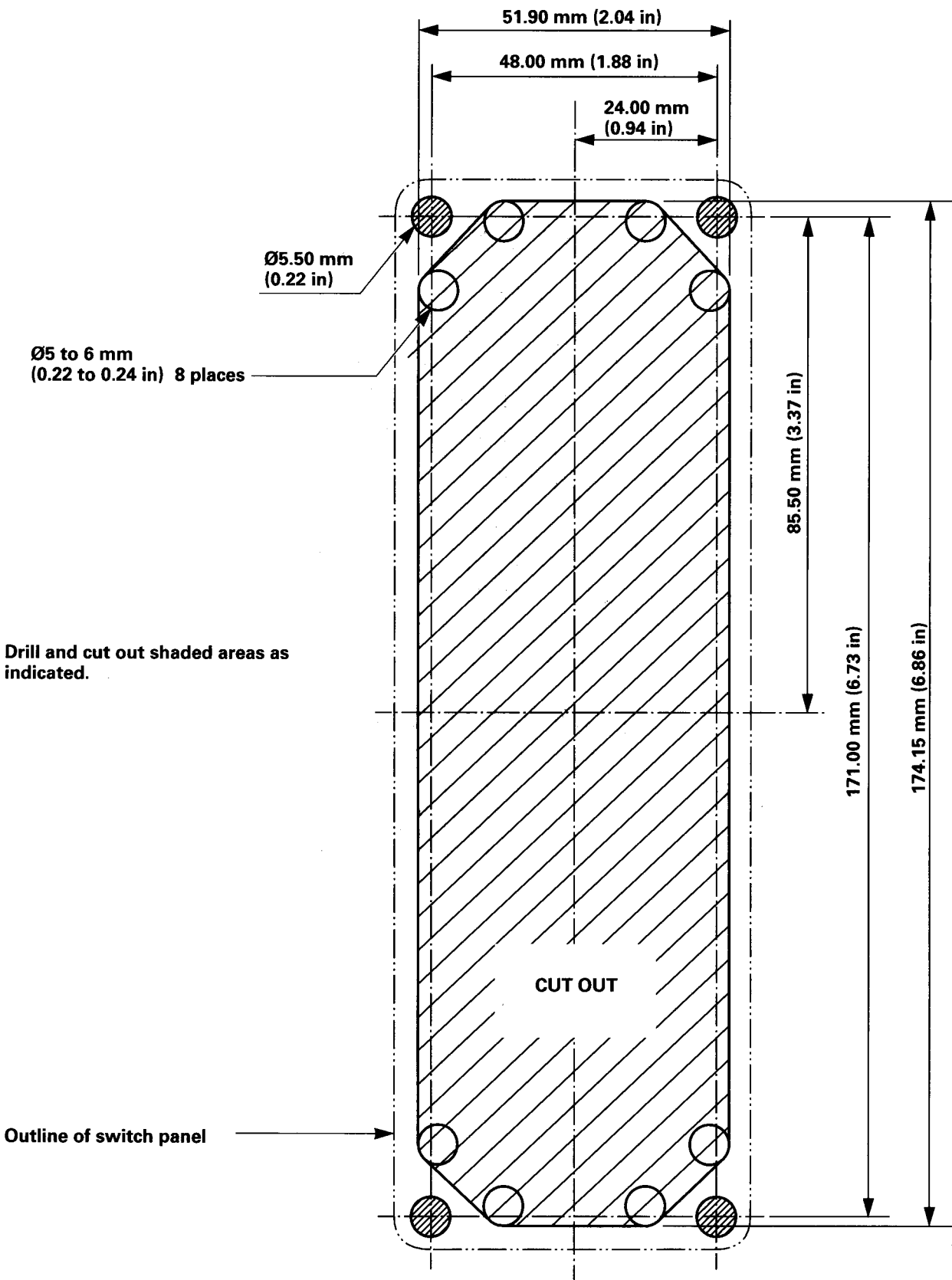
Avoid continuous full throttle operation (100% throttle opening). Do not run the outboard motor at full throttle for more than 5 minutes at a time.

For boats that plane easily, bring the boat up on plane then reduce the throttle opening to the specified break-in settings called out above.

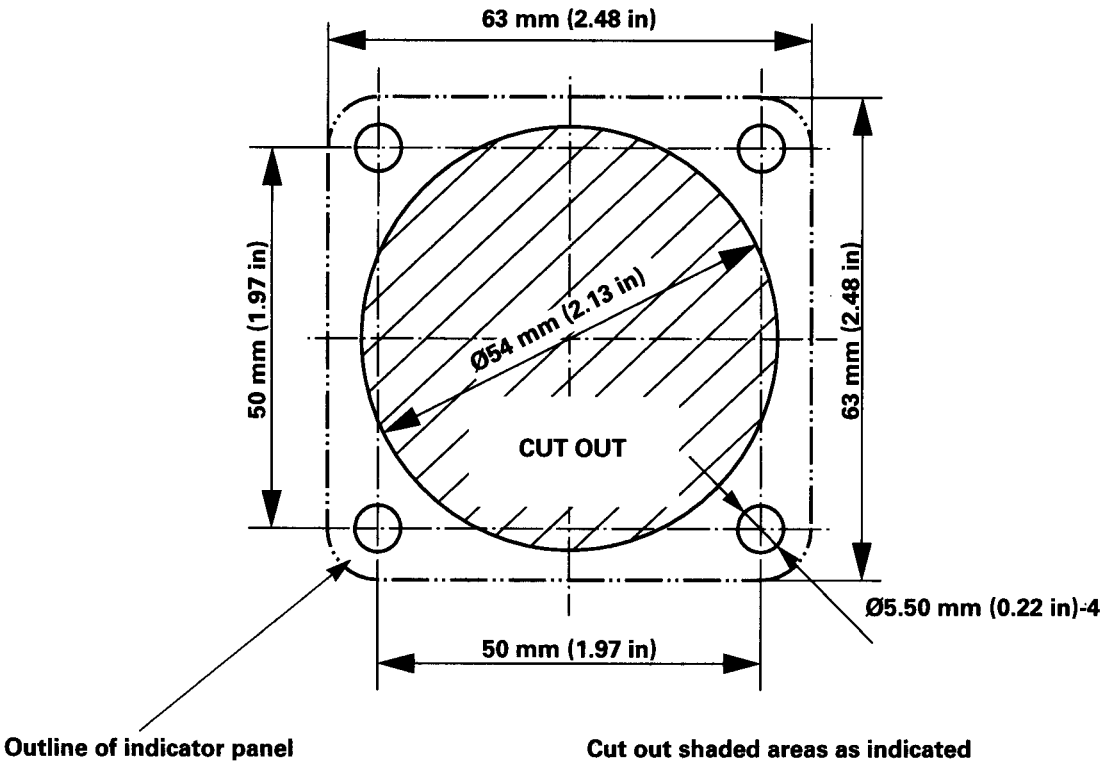
CAUTION:

In the area where the lowest temperature becomes 0°C (32°F) or less, if a cooling system may freeze, and warm-up operation after starting is not performed but a high-speed cruise is carried out, serious damage for engine may be done.

SWITCH PANEL TEMPLATE



INDICATOR PANEL TEMPLATE



WIRING DIAGRAMS

Side Mount Control Box

- [1] To LIGHTING SWITCH
- [2] TACHOMETER
- [3] TRIM METER
- [4] VOLTMETER
- [5] HOUR METER
- [6] OPTION
- [7] METER HARNESS B
- [8] METER HARNESS A
- [9] CONTROL PANEL ASSEMBLY
- [10] ACG.FUSE (90A)
- [11] GROUND
- [12] STARTER MOTOR
- [13] LAF RELAY
- [14] FUEL PUMP
- [15] STARTER
- [16] PGM-FI MAIN RELAY
- [17] FUEL
- [18] MAIN
- [19] TERM, ON FUSE
- [20] MAIN FUSE (10A)
- [21] BI (W-LINE)
- [22] BATTERY (12V)
- [23] PGM-FI ECU
- [24] CRANK SENSOR
- [25] TDC SENSOR
- [26] MAP SENSOR
- [27] PA SENSOR
- [28] THROTTLE POSITION SENSOR
- [29] TA SENSOR
- [30] TE SENSOR
- [31] TOH SENSOR 1
- [32] TOH SENSOR 2
- [33] TOH SENSOR 3
- [34] ENGINE OIL PRESSURE SWITCH (HIGH)
- [35] ENGINE OIL PRESSURE SWITCH (LOW)
- [36] WATER LEVEL SWITCH
- [37] KNOCK SENSOR
- [38] BLUE CONNECTOR
- [39] No.4 FUEL INJECTOR
- [40] No.3 FUEL INJECTOR
- [41] No.2 FUEL INJECTOR
- [42] No.1 FUEL INJECTOR
- [43] No.1 IGNITION COIL
- [44] No.2 IGNITION COIL
- [45] No.3 IGNITION COIL
- [46] No.4 IGNITION COIL
- [47] To PLUG
- [48] IGNITOR
- [49] AIR FUEL RATIO SENSOR
- [50] SPOOL SOLENOID VALVE
- [51] BF150A ONLY
- [52] INMN CONTROL SOLENOID VALVE
- [53] EACV

[54] SERVICE CHECK (TACHO)

[55] SERVICE CHECK

[56] POWER TILT SWITCH

[57] TRIM ANGLE SENSOR

[58] NEUTRAL SWITCH

	BI/Bu	BI
NEUTRAL		
GEAR IN		

[59] RED CONNECTOR

[60] BLACK CONNECTOR

[61] GREEN CONNECTOR

[62] POWER TILT RELAY

[63] POWER TILT MOTOR

[64] INDICATOR LIGHT (MIL, alternator)

[65] INDICATOR LIGHT (overheat, oil pressure)

[66] IGNITION SWITCH

	E	IG	BAT	LOAD	ST
COLOR	BI	BI/R	W/BI	BI/Y	BI/W
OFF					
ON					
START					

[67] POWER TRIM/TILT SWITCH

	Lg	W/BI	Lb
NORMAL			
UP			
DOWN			

[68] SOLENOID SWITCH

[69] BUZZER

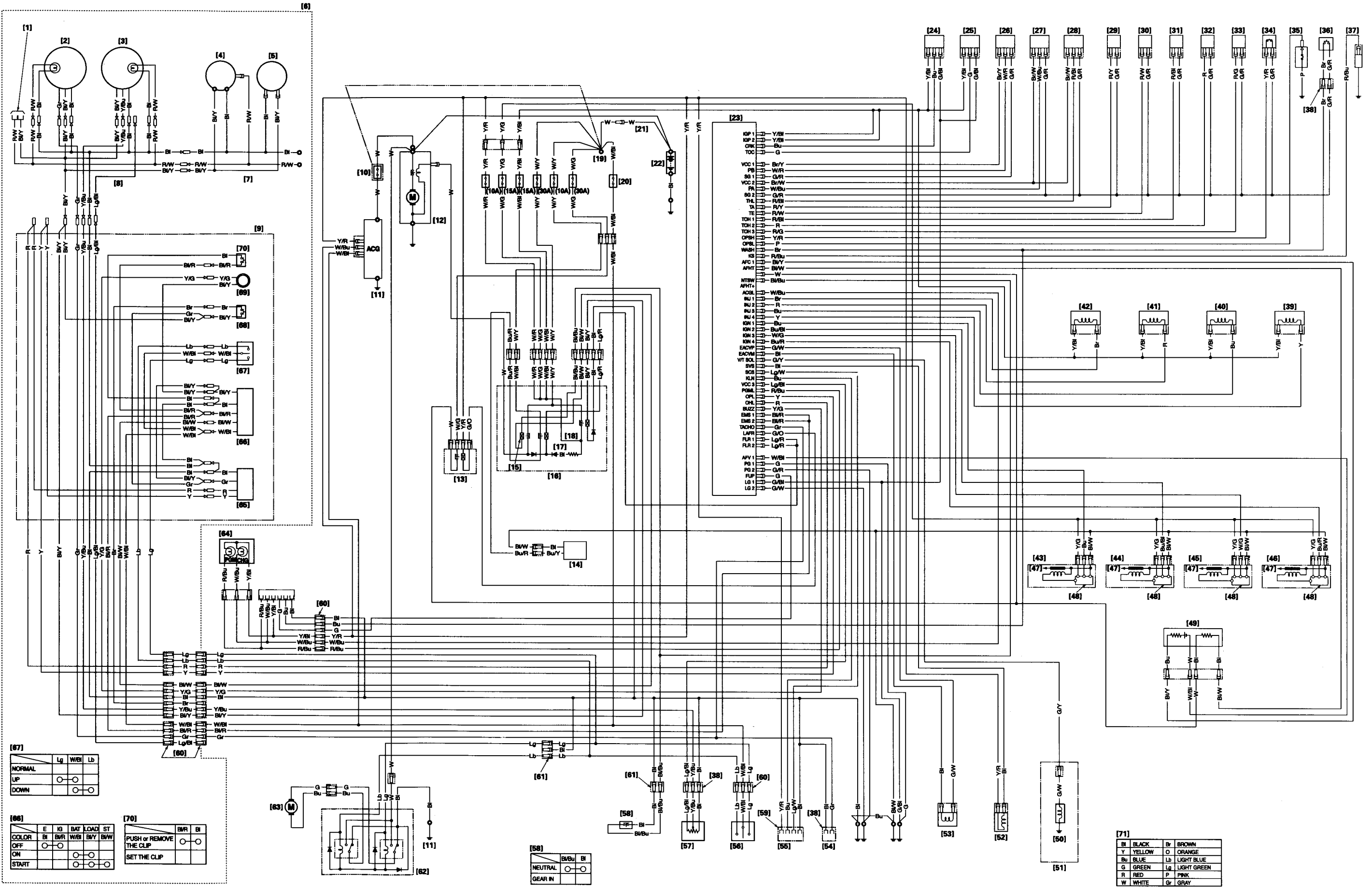
[70] EMERGENCY STOP SWITCH

	BI/R	BI
PUSH or REMOVE THE CLIP		
SET THE CLIP		

[71]

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

Side Mount Control Box



[67]

	Lg	W/Bi	Lb
NORMAL			
UP			
DOWN			

[66]

	E	IG	BAT	LOAD	ST
COLOR	BI	B/R	W/Bi	B/Y	B/W
OFF					
ON					
START					

[70]

	B/R	BI
PUSH or REMOVE THE CLIP		
SET THE CLIP		

[71]

BI	BLACK	Br	BROWN
Y	YELLOW	O	ORANGE
Bu	BLUE	Lb	LIGHT BLUE
G	GREEN	Lg	LIGHT GREEN
R	RED	P	PINK
W	WHITE	Gr	GRAY

WIRING DIAGRAMS

Top Mount/Panel Mount Control Box

- [1] To LIGHTING SWITCH
- [2] TACHOMETER
- [3] TRIM METER
- [4] VOLTMETER
- [5] HOUR METER
- [6] OPTION
- [7] METER HARNESS B
- [8] METER HARNESS A
- [9] CONTROL PANEL ASSEMBLY
- [10] ACG.FUSE (90A)
- [11] GROUND
- [12] STARTER MOTOR
- [13] LAF RELAY
- [14] FUEL PUMP
- [15] STARTER
- [16] PGM-FI MAIN RELAY
- [17] FUEL
- [18] MAIN
- [19] TERM, ON FUSE
- [20] MAIN FUSE (10A)
- [21] BI (W-LINE)
- [22] BATTERY (12V)
- [23] PGM-FI ECU
- [24] CRANK SENSOR
- [25] TDC SENSOR
- [26] MAP SENSOR
- [27] PA SENSOR
- [28] THROTTLE POSITION SENSOR
- [29] TA SENSOR
- [30] TE SENSOR
- [31] TOH SENSOR 1
- [32] TOH SENSOR 2
- [33] TOH SENSOR 3
- [34] ENGINE OIL PRESSURE SWITCH (HIGH)
- [35] ENGINE OIL PRESSURE SWITCH (LOW)
- [36] WATER LEVEL SWITCH
- [37] KNOCK SENSOR
- [38] BLUE CONNECTOR
- [39] No.4 FUEL INJECTOR
- [40] No.3 FUEL INJECTOR
- [41] No.2 FUEL INJECTOR
- [42] No.1 FUEL INJECTOR
- [43] No.1 IGNITION COIL
- [44] No.2 IGNITION COIL
- [45] No.3 IGNITION COIL
- [46] No.4 IGNITION COIL
- [47] To PLUG
- [48] IGNITOR
- [49] AIR FUEL RATIO SENSOR
- [50] SPOOL SOLENOID VALVE
- [51] BF150A ONLY
- [52] INMN CONTROL SOLENOID VALVE
- [53] EACV

- [54] SERVICE CHECK (TACHO)
- [55] SERVICE CHECK
- [56] POWER TILT SWITCH
- [57] TRIM ANGLE SENSOR

	BI/Bu	BI
NEUTRAL		
GEAR IN		

- [58] NEUTRAL SWITCH
- [59] RED CONNECTOR
- [60] BLACK CONNECTOR
- [61] GREEN CONNECTOR
- [62] POWER TILT RELAY
- [63] POWER TILT MOTOR
- [64] INDICATOR LIGHT (MIL, alternator)
- [65] INDICATOR LIGHT (overheat, oil pressure)
- [66] IGNITION SWITCH

	E	IG	BAT	LOAD	ST
COLOR	BI	BI/R	W/BI	BI/Y	BI/W
OFF					
ON					
START					

- [67] POWER TRIM/TILT SWITCH

	Lg	W/BI	Lb
NORMAL			
UP			
DOWN			

- [68] BUZZER
- [69] EMERGENCY STOP SWITCH

	BI/R	BI
PUSH or REMOVE THE CLIP		
SET THE CLIP		

- [70]

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

Top Mount/Panel Mount Control Box

