










F50F
FT50G
F60C
FT60D

SERVICE MANUAL

290551

6C1-28197-3G-11

Contents

General information		1
	GEN INFO	
Specifications		2
	SPEC	
Periodic checks and adjustments		3
	CHK ADJ	
Fuel system		4
	FUEL	
Power unit		5
	POWR	
Lower unit		6
	LOWR	
Bracket unit		7
	BRKT	
Electrical systems		8
	ELEC	
Troubleshooting		9
	TRBL SHTG	
Index		

General information

How to use this manual	1-1
Manual format.....	1-1
Symbols.....	1-2
 Safety while working	 1-3
Fire prevention.....	1-3
Ventilation.....	1-3
Self-protection	1-3
Parts, lubricants, and sealants	1-3
Good working practices	1-4
Disassembly and assembly	1-4
 Identification	 1-4
Applicable models	1-4
Serial number	1-5
 Outline of features	 1-6
 Features and benefits	 1-7
Fuel system	1-7
Solenoid valve	1-8
Electronic control system.....	1-9
ECM (Electric Control Module).....	1-10
Variable trolling RPM switch (optional).....	1-11
 Propeller selection	 1-12
Propeller size.....	1-12
Selection.....	1-12
 Predelivery checks	 1-13
Checking the fuel system	1-13
Checking the engine oil level.....	1-13
Checking the gear oil level	1-13
Checking the battery.....	1-13
Checking the outboard motor mounting height.....	1-14
Checking the remote control cables	1-14
Checking the steering system	1-14
Checking the gear shift and throttle operation.....	1-15
Checking the power trim and tilt system.....	1-15
Checking the hydro tilt system.....	1-15
Checking the engine start switch and engine stop lanyard switch	1-16
Checking the cooling water pilot hole	1-16
Test run	1-17
Break-in	1-17
After test run	1-17



How to use this manual

Manual format

The format of this manual has been designed to make service procedures clear and easy to understand. Use the information below as a guide for effective and quality service.

- ① Parts are shown and detailed in an exploded diagram and are listed in the components list.
- ② Tightening torque specifications are provided in the exploded diagrams and after a numbered step with tightening instructions.
- ③ Symbols are used to indicate important aspects of a procedure, such as the grade of lubricant and lubrication point.
- ④ The components list consists of part names and part quantities, as well as bolt and screw dimensions.
- ⑤ Service points regarding removal, checking, and installation are shown in individual illustrations to explain the relevant procedure.

NOTE:

For troubleshooting procedures, see Chapter 9, "Troubleshooting."

LOWR **Lower unit**

③ ②

Lower unit

No.	Part name	Q'ty	Remarks
1	Lower unit	1	
2	Plastic tie	1	Not reusable
3	Hose	1	
4	Check screw	1	
5	Gasket	2	Not reusable
6	Dowel pin	2	
7	Bolt	4	M10 × 40 mm
8	Drain screw	1	
9	Grommet	1	
10	Bolt	1	M10 × 45 mm
11	Bolt	1	M8 × 60 mm
12	Thrust washer	1	
13	Propeller	1	
14	Washer	1	
15	Washer	1	
16	Cotter pin	1	Not reusable
17	Propeller nut	1	
18	Trim tab	1	

6-5
62Y5A11

LOWR **Lower unit**

Lower unit

Removing the drive shaft

- Remove the drive shaft assembly and pinion, and then pull out the forward gear.

Drive shaft holder 4 ①: 90890-06518
Pinion nut holder ②: 90890-06505
Socket adapter 2 ③: 90890-06507

Disassembling the drive shaft

- Install the pinion nut ①, tighten it finger tight, and then remove the drive shaft bearing ② using a press.

CAUTION:

- Do not press the drive shaft threads ③ directly.
- Do not reuse the bearing, always replace it with a new one.

Bearing inner race attachment ③: 90890-06639

Disassembling the forward gear

- Remove the taper roller bearing from the forward gear using a press.

Bearing separator ①: 90890-06534

- Remove the needle bearing from the forward gear.

CAUTION:

Do not reuse the bearing, always replace it with a new one.

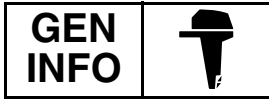
Stopper guide plate ②: 90890-06501
Stopper guide stand ③: 90890-06538
Bearing puller ④: 90890-06535
Bearing puller claw 1 ⑤: 90890-06536

6-19
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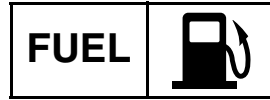
Symbols

The symbols below are designed to indicate the content of a chapter.

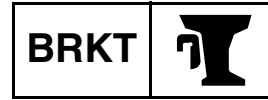
General information



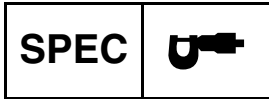
Fuel system



Bracket unit



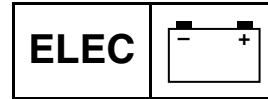
Specifications



Power unit



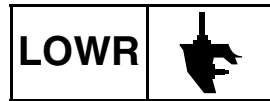
Electrical systems



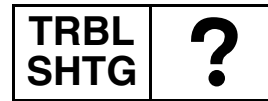
Periodic checks and adjustments



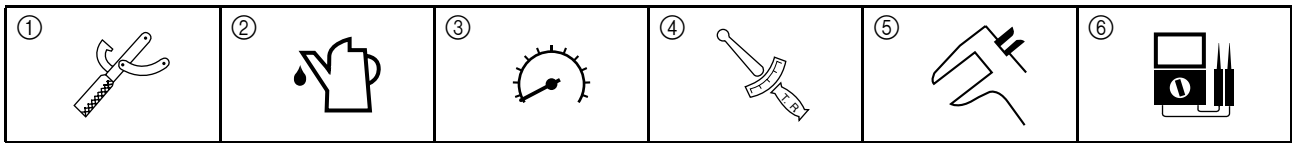
Lower unit



Troubleshooting

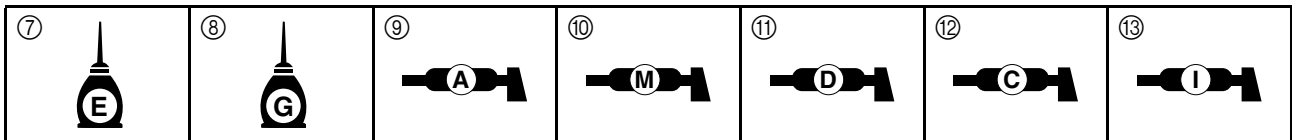


Symbols ① to ⑥ indicate specific data.



- ① Special tool
- ② Specified oil or fluid
- ③ Specified engine speed
- ④ Specified tightening torque
- ⑤ Specified measurement
- ⑥ Specified electrical value (resistance, voltage, electric current)

Symbols ⑦ to ⑬ in an exploded diagram indicate the grade of lubricant and the lubrication point.



- ⑦ Apply Yamaha 4-stroke motor oil
- ⑧ Apply gear oil
- ⑨ Apply water resistant grease (Yamaha grease A)
- ⑩ Apply molybdenum disulfide grease
- ⑪ Apply corrosion resistant grease (Yamaha grease D)
- ⑫ Apply low temperature resistant grease (Yamaha grease C)
- ⑬ Apply injector grease

Symbols ⑭ to ⑱ in an exploded diagram indicate the type of sealant or locking agent and the application point.



- ⑭ Apply Gasket Maker
- ⑮ Apply LOCTITE 271 (red)
- ⑯ Apply LOCTITE 242 (blue)
- ⑰ Apply LOCTITE 572
- ⑱ Apply silicon sealant

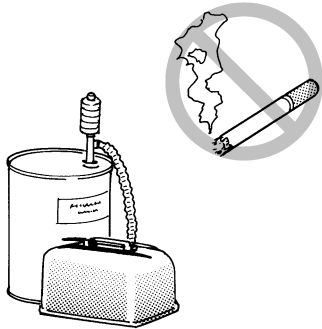


Safety while working

To prevent an accident or injury and to ensure quality service, follow the safety procedures provided below.

Fire prevention

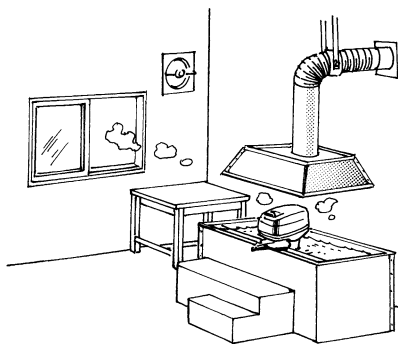
Gasoline is highly flammable. Keep gasoline and all flammable products away from heat, sparks, and open flames.



S69J1010

Ventilation

Gasoline vapor and exhaust gas are heavier than air and extremely poisonous. If inhaled in large quantities they may cause loss of consciousness and death within a short time. When test running an engine indoors (e.g., in a water tank) be sure to do so where adequate ventilation can be maintained.

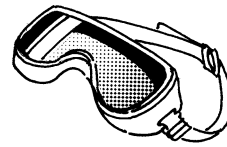


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Self-protection

Protect your eyes by wearing safety glasses or safety goggles during all operations involving drilling and grinding, or when using an air compressor.

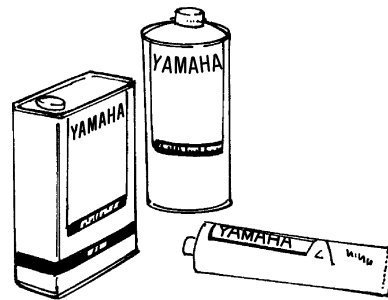
Protect your hands and feet by wearing protective gloves and safety shoes when necessary.



S69J1030

Parts, lubricants, and sealants

Use only genuine Yamaha parts, lubricants, and sealants or those recommended by Yamaha, when servicing or repairing the outboard motor.



S69J1040

Under normal conditions, the lubricants mentioned in this manual should not harm or be hazardous to your skin. However, you should follow these precautions to minimize any risk when working with lubricants.

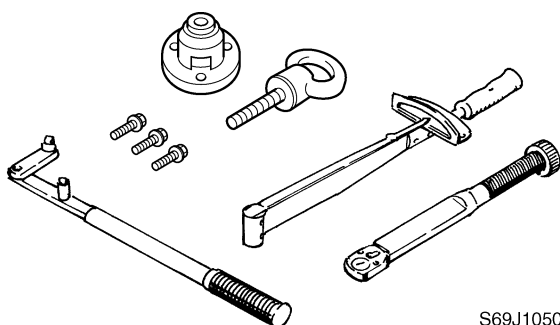
1. Maintain good standards of personal and industrial hygiene.
2. Change and wash clothing as soon as possible if soiled with lubricants.
3. Avoid contact with skin. Do not, for example, place a soiled rag in your pocket.
4. Wash hands and any other part of the body thoroughly with soap and hot water after contact with a lubricant or lubricant soiled clothing has been made.
5. To protect your skin, apply a protective cream to your hands before working on the outboard motor.

6. Keep a supply of clean, lint-free cloths for wiping up spills, etc.

Good working practices

Special service tools

Use the recommended special service tools to protect parts from damage. Use the right tool in the right manner—do not improvise.



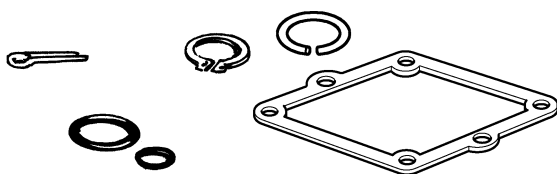
S69J1050

Tightening torques

Follow the tightening torque specifications provided throughout the manual. When tightening nuts, bolts, and screws, tighten the large sizes first, and tighten fasteners starting in the center and moving outward.

Non-reusable parts

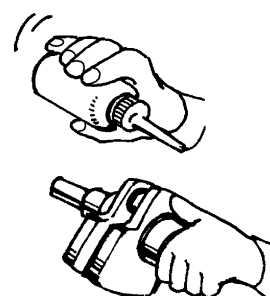
Always use new gaskets, seals, O-rings, cotter pins, circlips, etc., when installing or assembling parts.



S69J1060

Disassembly and assembly

1. Use compressed air to remove dust and dirt during disassembly.
2. Apply engine oil to the contact surfaces of moving parts before assembly.



S69J1070

3. Install bearings with the manufacture identification mark in the direction indicated in the installation procedure. In addition, be sure to lubricate the bearings liberally.
4. Apply a thin coat of water-resistant grease to the lip and periphery of an oil seal before installation.
5. Check that moving parts operate normally after assembly.

Identification

Applicable models

This manual covers the following models.

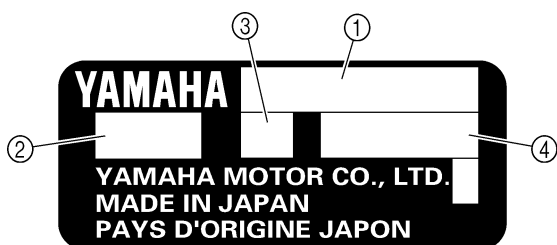
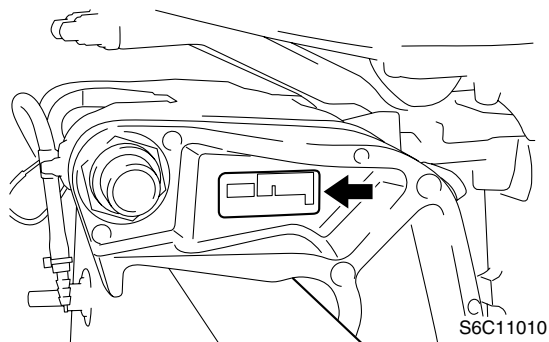
Applicable models
F50FED, F50FEHT, F50FET, FT50GET, F60CEHT, F60CET, FT60DET

- (*) Hydro tilt model (For Europe)
- (*) Tiller handle model (For Oceania)



Serial number

The outboard motor serial number is stamped on a label attached to the port clamp bracket.



S69J1090N

- ① Model name
- ② Approved model code
- ③ Transom height
- ④ Serial number

Model name	Approved model code	Starting serial No.
F50FED	6C1	1000001-
F50FEHT		
F50FET		
FT50GET	6C2	1000001-
F60CEHT	6C5	1000001-
F60CET		
FT60DET	6C6	1000001-

(*) Hydro tilt model (For Europe)

(*) Tiller handle model (For Oceania)

Outline of features

New electronic fuel injected F50 and F60 outboard motors have a mainly redesigned fuel and intake system based on the carbureted F60 outboard motor.

Power unit

- Single throttle body, single throttle valve
- Multi-point injection system, group injection (#1/#4 and #2/#3)
- Group ignition system (#1/#4 and #2/#3)
- Large plastic intake manifold
- Compact plastic fuel rail
- Modularized intake system components
- Vapor separator with built-in pressure regulator
- Solenoid valve
- Fuel cooler
- Aluminum rocker arm

Electrical

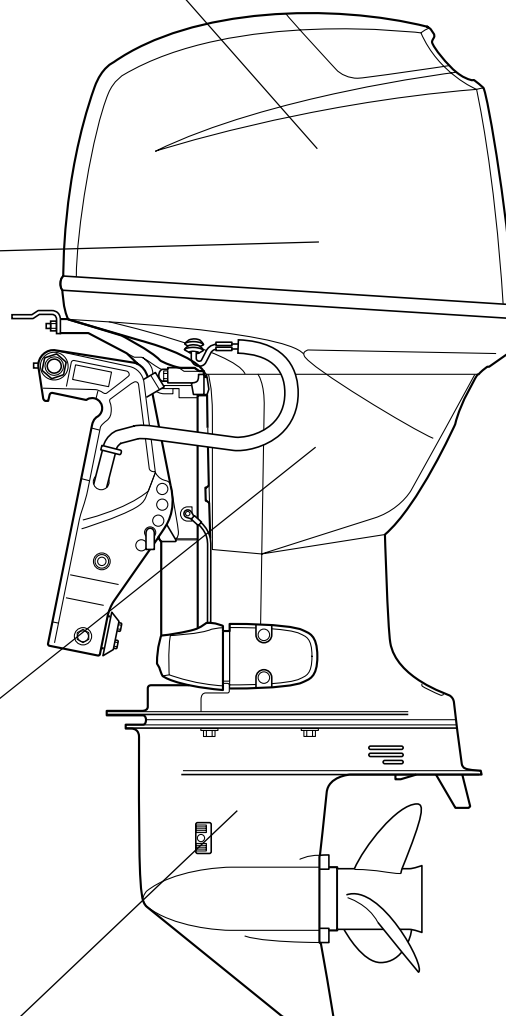
- Compact electronic fuel injection system
- Self-diagnosis system and Yamaha Diagnostic System
- Variable trolling RPM switch (optional for tiller handle model)
- Throttle position sensor with learning function (adjustment free)
- Compact charging system at low rpm
- Compact fuel injectors
- Fuel filter with water separator

Clamp bracket/upper case

- 2-piece upper case
- Upper portion case with oil sump
- Big capacity water wall structure around muffler
- Idle exhaust labyrinth structure
- Exclusive clamp bracket for permanent mounting

Lower unit

- Same lower drive unit as carbureted F60 model



S6C11120



Features and benefits

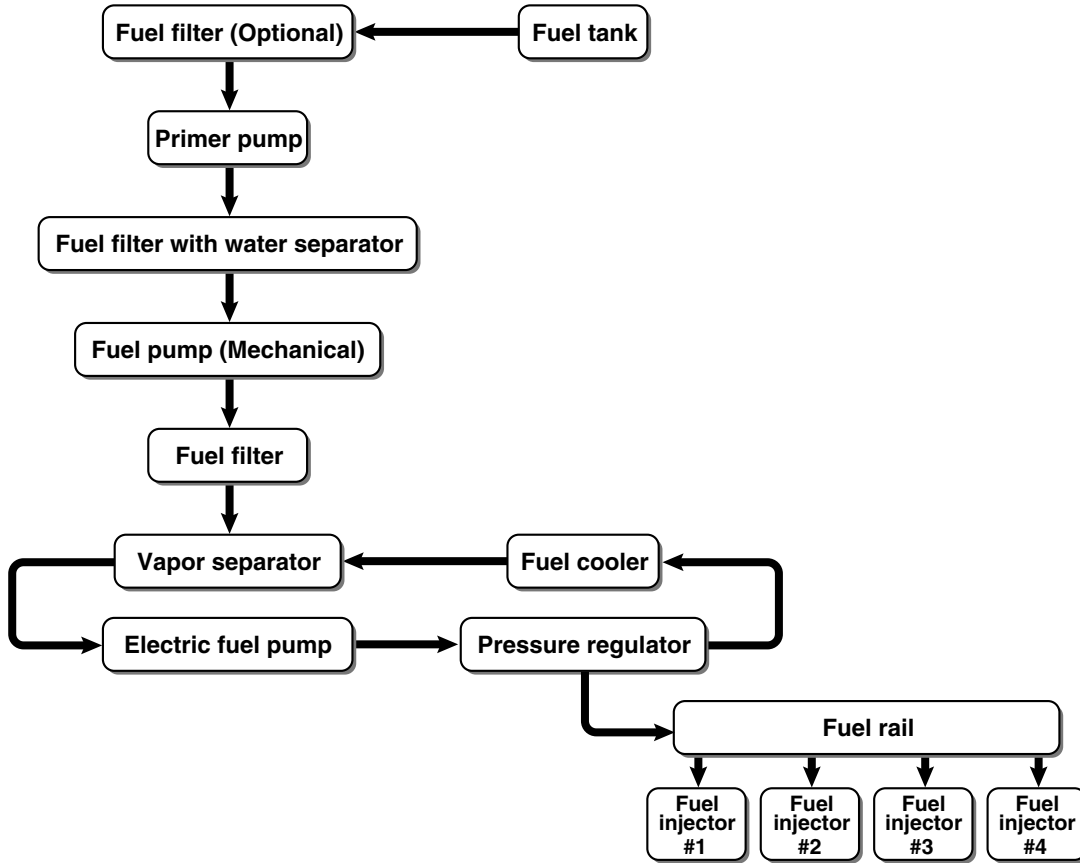
Fuel system

A pressure regulator is built into the vapor separator to obtain compact and simple fuel delivery structure.

A plastic fuel rail is used to prevent it from corrosion and for light weight.

Fuel discharged from the pressure regulator returns to the vapor separator after cooling down through the fuel cooler.

The fuel joint is used on the high pressure fuel hose to remove and/or install the intake unit easily.



S6C11130

Solenoid valve

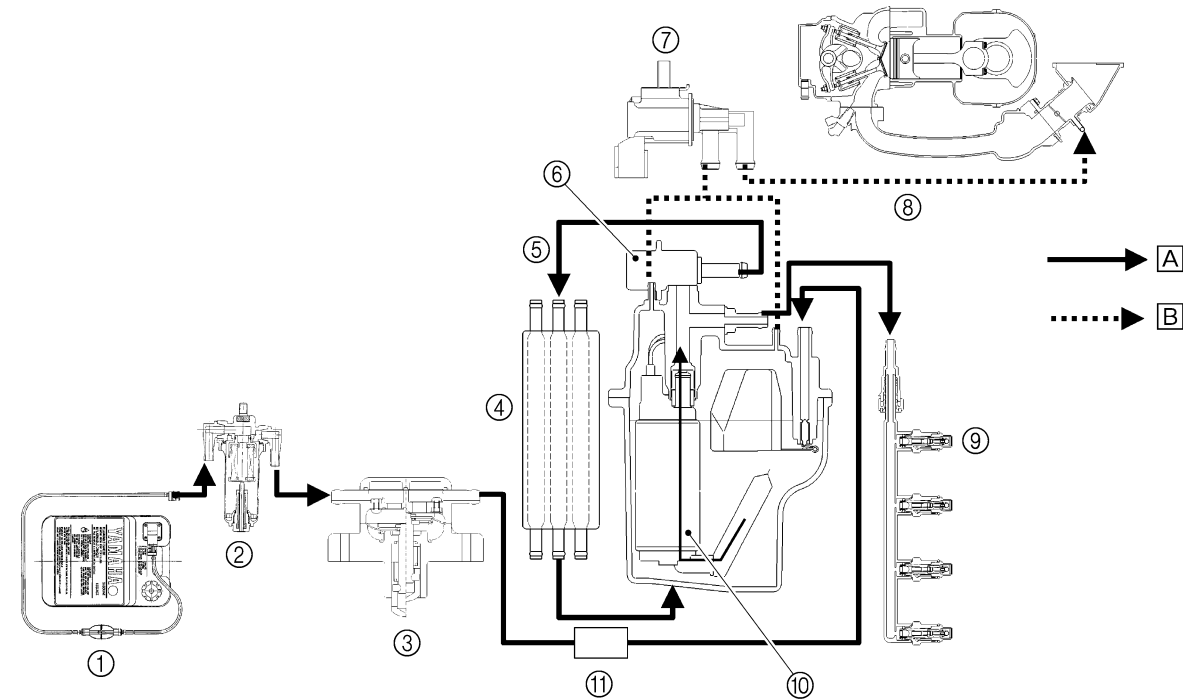
Just after the engine is stopped, the cooling water supply is also stopped and the heat is conducted to the vapor separator from the engine, causing birth of many fuel vapor gases.

The vapor gases are fed into the intake silencer to return them.

However, many vapor gases are sucked into the combustion chambers, causing a rich air and fuel mixture, which is difficult to restart the engine.

So the solenoid valve has been used for better restarting engine while the engine is warm.

The solenoid valve stops the vapor gases not to return into the intake silencer.



S6C11140

- | | |
|----------------------|----------------------|
| ① Fuel tank | ⑧ To throttle body |
| ② Fuel filter | ⑨ Fuel injector |
| ③ Fuel pump | ⑩ Electric fuel pump |
| ④ Fuel cooler | ⑪ Fuel filter |
| ⑤ Return fuel hose | |
| ⑥ Pressure regulator | Ⓐ Fuel |
| ⑦ Solenoid valve | Ⓑ Vapor gas |



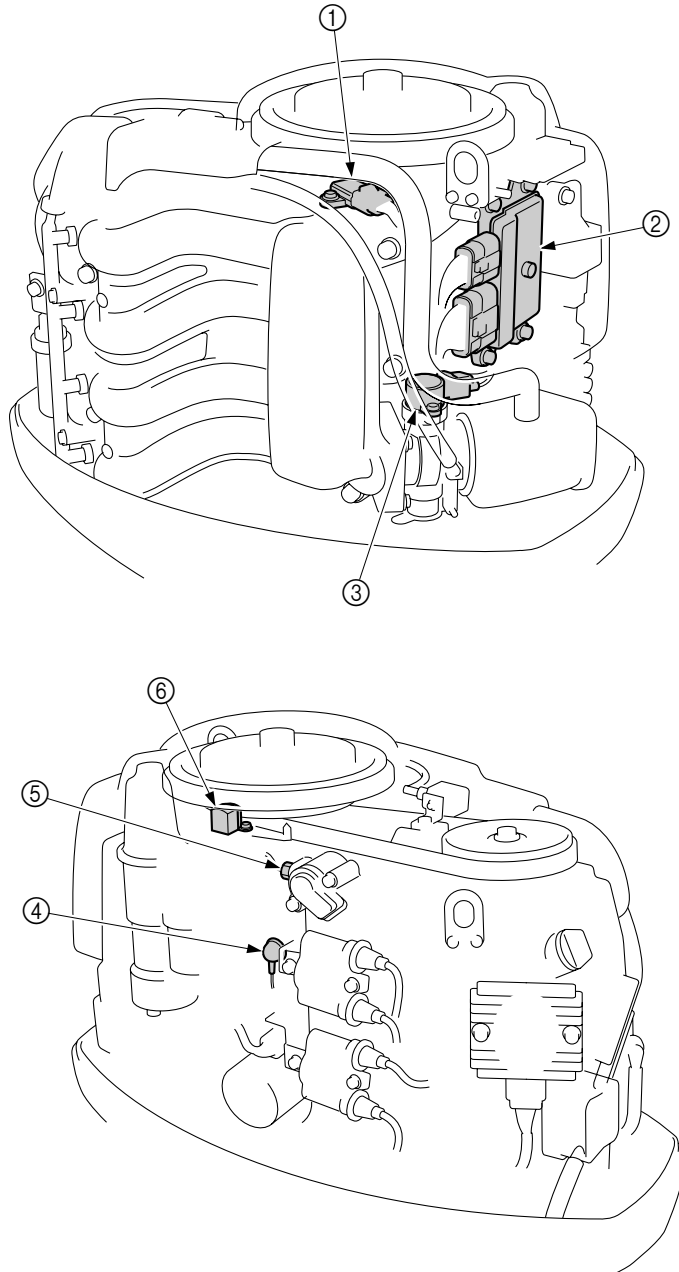


Electronic control system

The electronic control system is built up by the sensors and the ECM (Electric control Module). The ECM receives signals from the sensors and determines the air and fuel mixture (A/F), and ignition timing.

Under various condition, the ECM gives the best-suitable engine operation.

In addition, warning control, fail-safe control, a self-diagnosis function, etc., are equipped to increase reliability.



- ① Sensor assembly
(intake air temperature and intake air pressure)
- ② ECM
- ③ Throttle position sensor
- ④ Oil pressure switch
- ⑤ Cooling water temperature sensor
- ⑥ Pulser coil

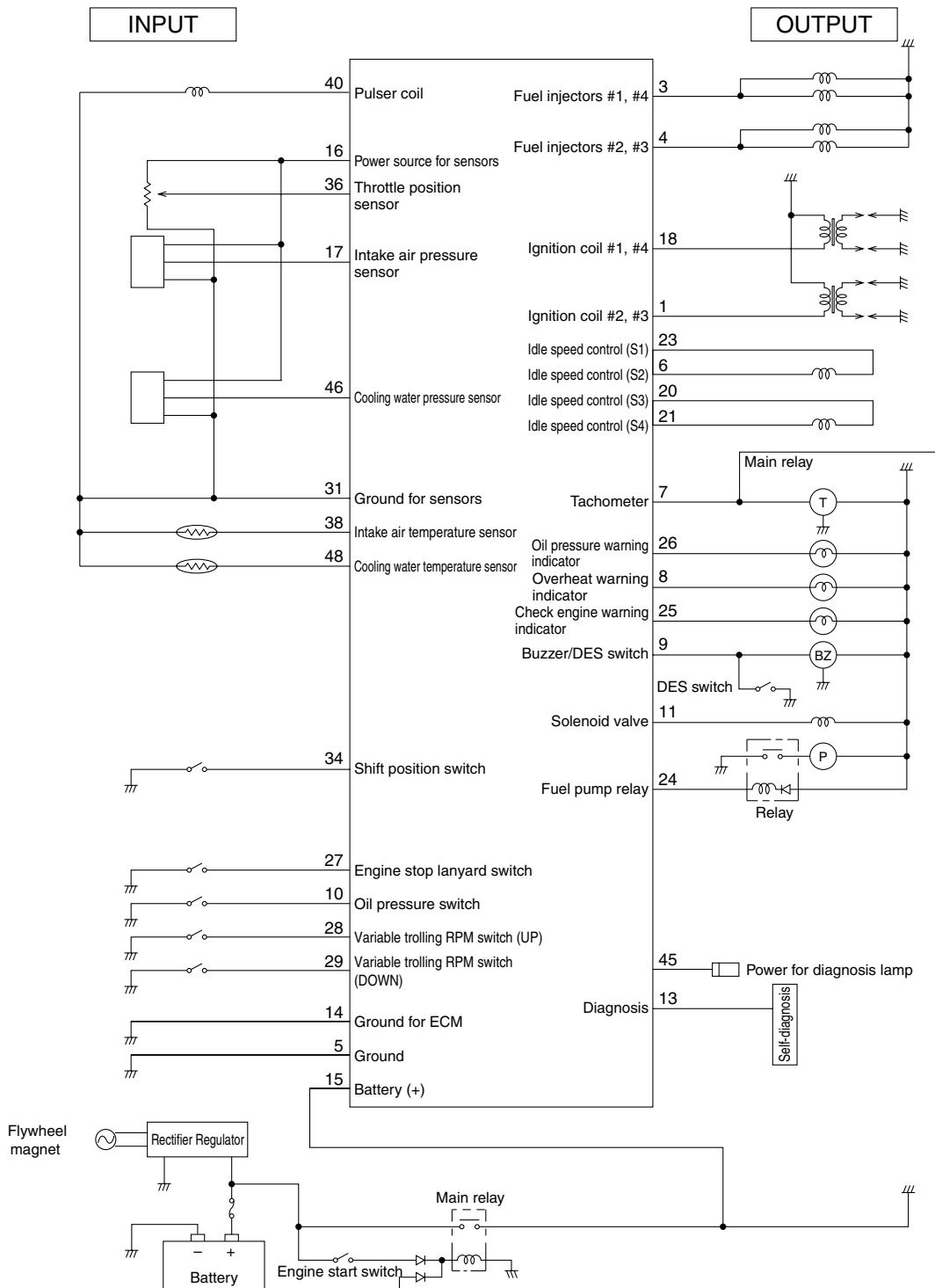
S6C11150

ECM (Electric Control Module)

This engine is controlled by the ECM to obtain precision combustion under various operations, and can realize high power output, low fuel consumption, and low emission.

The ECM controls the ignition timing, fuel injection timing, and the fuel injection volume, and ensures that the optimum ignition timing and air and fuel ratio can be achieved in all operating conditions such as engine starting, normal operation, and quick acceleration.

The self-diagnosis function is incorporated into the ECM and can be easily found a malfunction point by a personal computer with the optional software installed.



S6C11160

**Variable trolling RPM switch (optional)**

This device is an optional equipment for tiller handle model.

The idling and/or trolling rpm can be controlled in the range of 620 through 900 r/min with 50 r/min interval.

Especially for 620 through 700 r/min, the engine rpm is controlled with 40 r/min interval.

Pushing and holding the switch changes rpm continuously at 50 r/min interval.

If engine rpm reaches to the ends of specified range, the rpm is no longer changed.

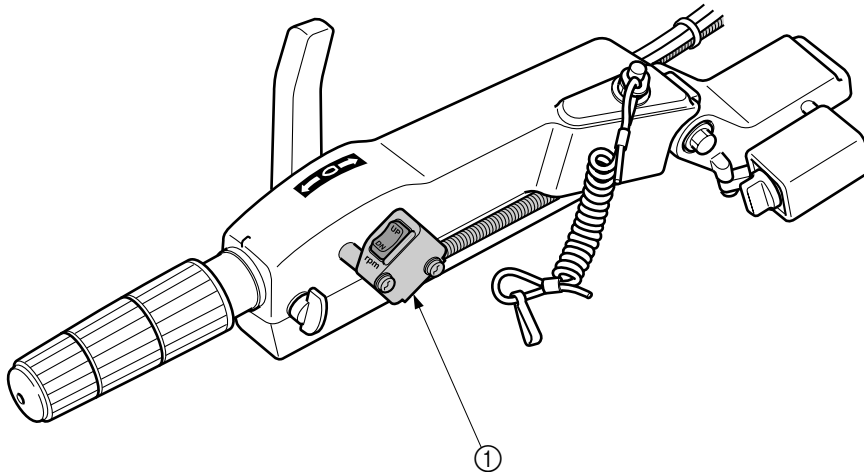
CAUTION:

Do not modify the variable trolling RPM switch.

Modification such as wire extension, disassembly, etc., can malfunction for the system and/or damage the electrical components.

NOTE:

Variable trolling RPM switch kit P/N: 6C5-W8186-00



S6C11170

① Variable trolling RPM switch (optional)

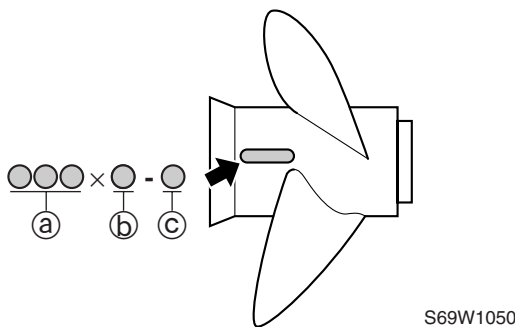
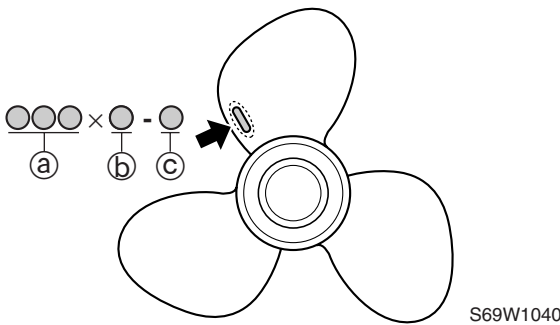
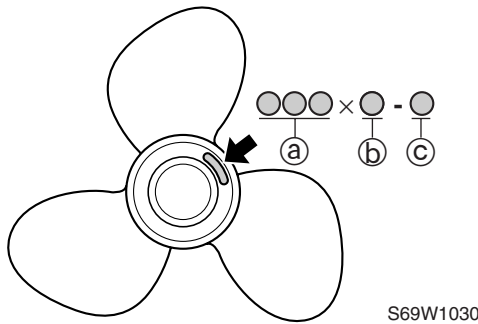
Propeller selection

The performance of a boat and outboard motor will be critically affected by the size and type of propeller you choose. Propellers greatly affect boat speed, acceleration, engine life, fuel economy, and even boating and steering capabilities. An incorrect choice could adversely affect performance and could also seriously damage the engine.

Use the following information as a guide for selecting a propeller that meets the operating conditions of the boat and the outboard motor.

Propeller size

The size of the propeller is indicated on a propeller blade, on the propeller boss end.



- Ⓐ Propeller diameter (in inches)
- Ⓑ Propeller pitch (in inches)
- Ⓒ Propeller type (propeller mark)

Selection

When the engine speed is at the full throttle operating range (5,000–6,000 r/min), the ideal propeller for the boat is one that provides maximum performance in relation to boat speed and fuel consumption.

F50, F60

Propeller size (in)	Material
10 × 15 - G	Aluminum
10 1/4 × 14 - G	
10 3/8 × 13 - G	
10 5/8 × 12 - G	
10 3/4 × 16 - G	
10 3/4 × 17 - G	
11 × 15 - G	
11 1/8 × 13 - G	
11 1/4 × 14 - G	
11 3/8 × 12 - G	
11 5/8 × 11 - G	Stainless
12 1/4 × 9 - G	
10 1/4 × 14 - G	
10 1/4 × 15 - G	
10 1/4 × 16 - G	
10 5/8 × 13 - G	
11 1/4 × 14 - G	
11 1/2 × 13 - G	
11 3/4 × 12 - G	
12 × 11 - G	

FT50, FT60

Propeller size (in)	Material
14 × 11 - K	Aluminum

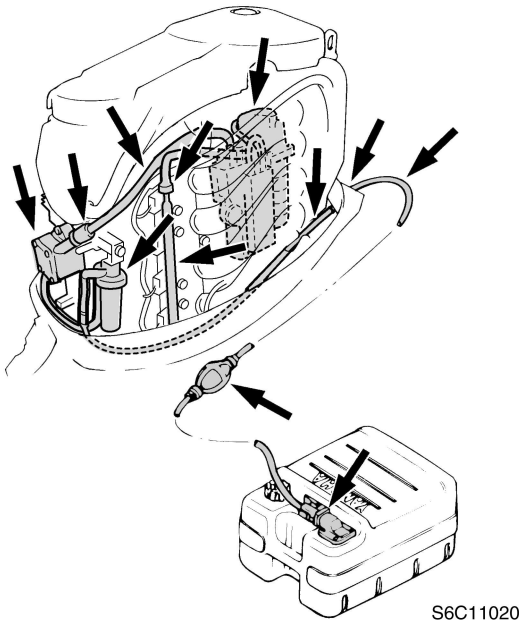


Predelivery checks

To make the delivery process smooth and efficient, the predelivery checks should be completed as explained below.

Checking the fuel system

1. Check that the fuel hoses are securely connected and that the fuel tank is full with fuel.

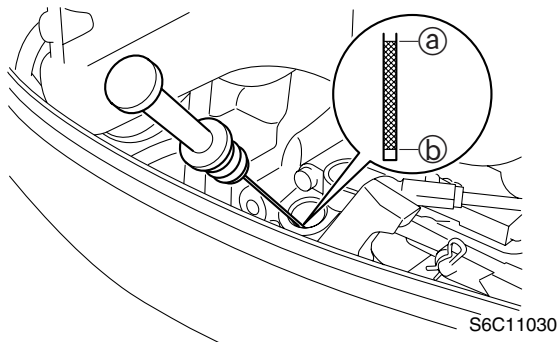


CAUTION:

This is a 4-stroke engine. Never use pre-mixed fuel.

Checking the engine oil level

1. Check the engine oil level.



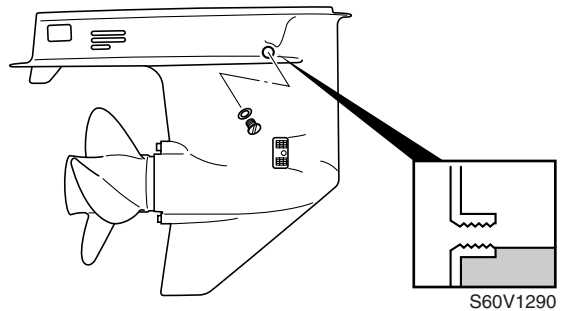
NOTE:

If the engine oil is below the minimum level mark (b), add sufficient oil until the level is between (a) and (b).

	Recommended engine oil:
	4-stroke motor oil
	API: SE, SF, SG, SH, or SJ
	SAE: 10W-30 or 10W-40
	Engine oil quantity:
	Without oil filter replacement:
	2.5 L (2.64 US qt, 2.20 Imp qt)

Checking the gear oil level

1. Check the gear oil level.



Checking the battery

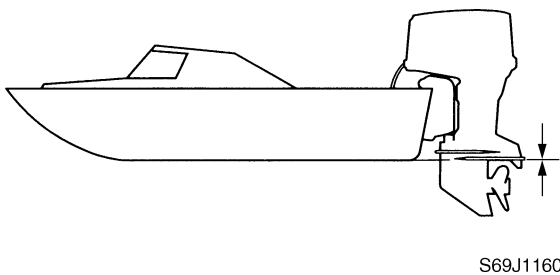
1. Check the capacity, electrolyte level, and specified gravity of the battery.

	Recommended battery capacity:
	CCA/EN: 430 A
	20HR/IEC: 70 Ah
	Electrolyte specified gravity:
1.280 at 20 °C (68 °F)	

2. Check that the positive and negative battery leads are securely connected.

Checking the outboard motor mounting height

1. Check that the anti-cavitation plate is aligned with the bottom of the boat. If the mounting height is too high, cavitation will occur and propulsion will be reduced. Also, the engine speed will increase abnormally and cause the engine to overheat. If the mounting height is too low, water resistance will increase and reduce engine efficiency.



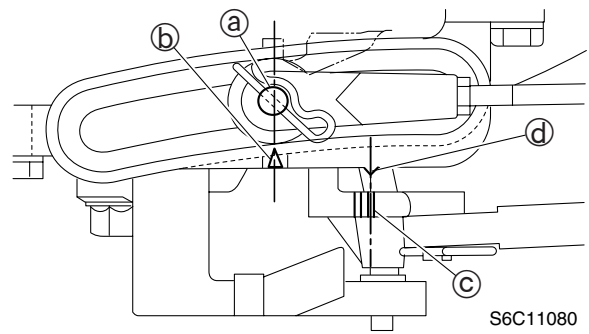
NOTE:

The optimum mounting height is affected by the combination of the boat and the outboard motor. To determine the optimum mounting height, test run the outboard motor at different heights.

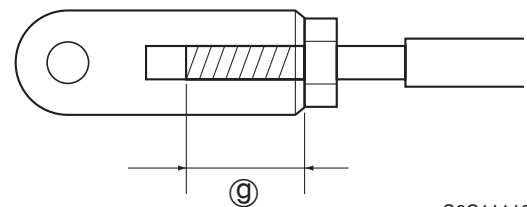
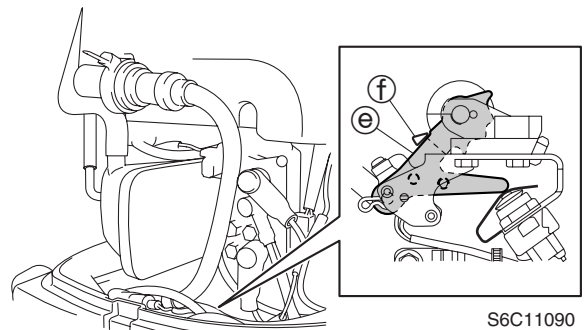
2. Check that the clamp brackets are secured with the clamp bolts.

Checking the remote control cables

1. Set the remote control lever or shift lever to the neutral position and fully close the throttle lever or throttle grip.
2. Check that the set pin (a) is aligned with the alignment mark (b).
3. Check that the alignment mark (c) is aligned with the mark (d).



4. Check that the edge of a shift rod (e) is aligned with the alignment mark (f) on the bottom cowling.



⚠ WARNING

The shift/throttle cable joint must be screwed in a minimum of 8.0 mm (0.31 in) (g).

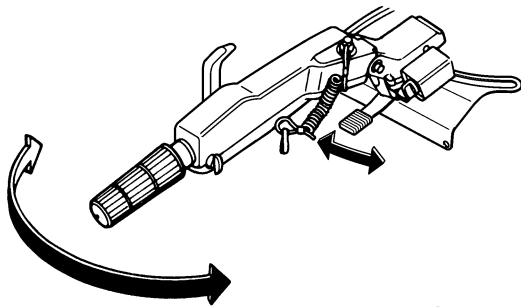
Checking the steering system

1. Check the steering friction for proper adjustment.



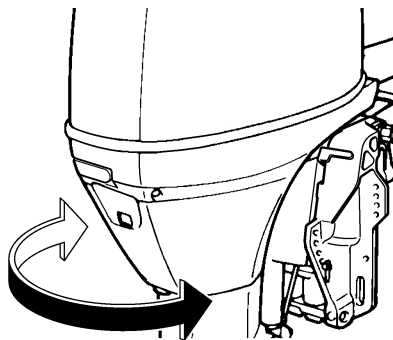
2. Check that the steering operates smoothly.

A



S69W1120

B



S68S1040

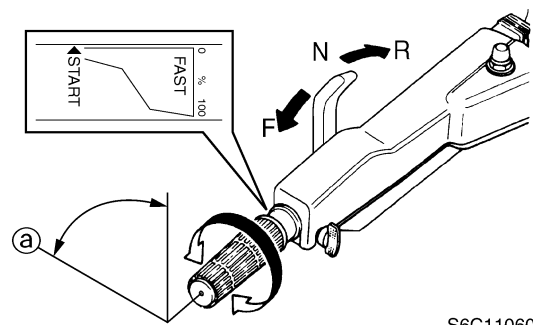
- A** Tiller handle model
- B** Remote control model

3. Check that there is no interference with wires or hoses when the outboard motor is steered.

Checking the gear shift and throttle operation

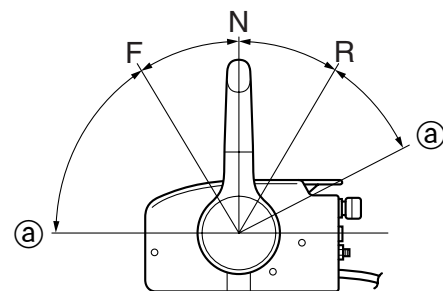
1. Check that the gear shift operates smoothly when the remote control lever or shift lever is shifted from neutral to forward or reverse.
2. Check that the throttle operates smoothly when the throttle grip (tiller handle model) is turned from the fully closed position to the fully open position (a). Check that the throttle operates smoothly when the remote control lever (remote control model) is shifted from forward or reverse to the fully open position (a).

A



S6C11060

B



S69J1210

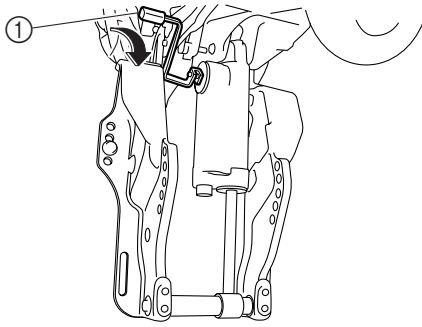
- A** Tiller handle model
- B** Remote control model

Checking the power trim and tilt system

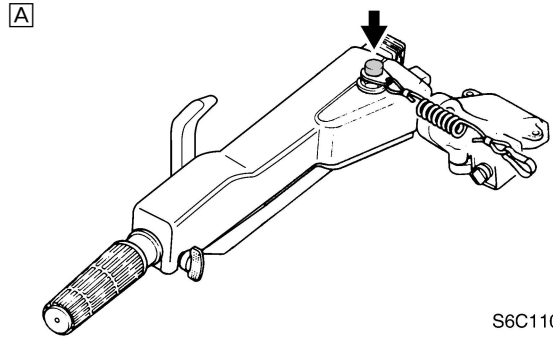
1. Check that the outboard motor tilts up and down smoothly when operating the power trim and tilt unit.
2. Check that there is no abnormal noise produced when the outboard motor is tilted up or down.
3. Check that there is no interference with wires or hoses when the tilted-up outboard motor is steered.
4. Check that the trim meter points down when the outboard motor is tilted all the way down.

Checking the hydro tilt system

1. Check that the outboard motor tilts up and down smoothly.
2. Fully tilt the outboard motor up, and then lock the tilt stop lever (1) to check the lock mechanism of the hydro tilt. Replace the hydro tilt unit if necessary.



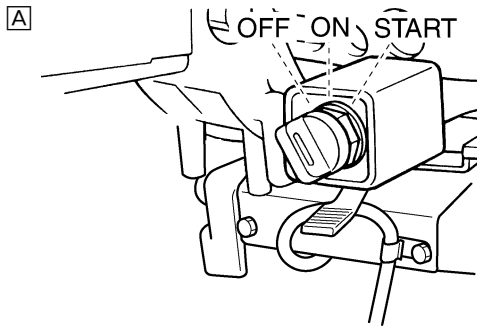
S6C11100



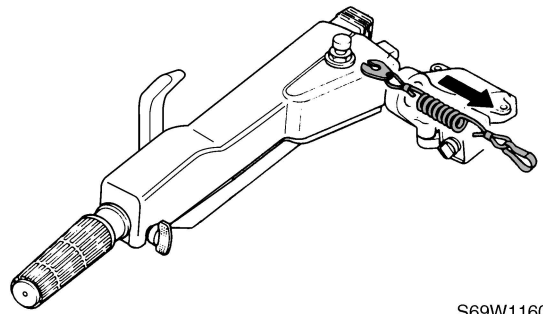
S6C11050

Checking the engine start switch and engine stop lanyard switch

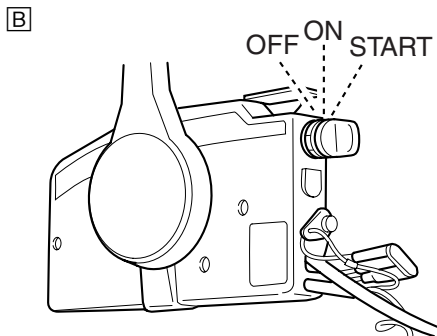
1. Check that the engine starts when the engine start switch is turned to START.
2. Check that the engine turns off when the engine start switch is turned to OFF.



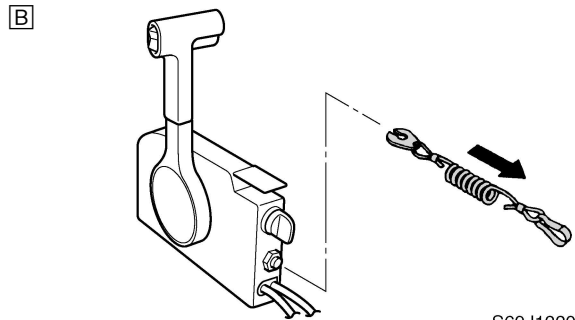
S6C11040



S69W1160



S60V1070



S69J1220

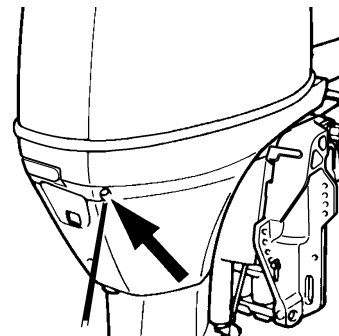
- A Tiller handle model
- B Remote control model

- A Tiller handle model
- B Remote control model

3. Check that the engine turns off when the engine stop lanyard switch is pushed or engine stop lanyard is pulled from the engine stop lanyard switch.

Checking the cooling water pilot hole

1. Check that cooling water is discharged from the cooling water pilot hole.



S68S1050



Test run

1. Start the engine, and then check that the gear shift operates smoothly.
2. Check the engine idle speed after the engine has been warmed up.
3. Operate at trolling speed.
4. Run the outboard motor for 1 hour at 2,000 r/min or at half throttle, then for another hour at 3,000 r/min or at 3/4 throttle.
5. Check that the outboard motor does not tilt up when shifting into reverse and that water does not flow in over the transom.

After test run

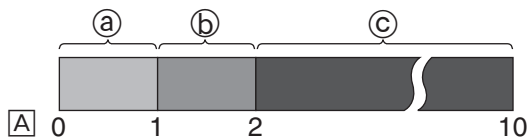
1. Check for water in the gear oil.
2. Check for fuel leakage in the cowling.
3. Flush the cooling water passage with fresh water using the flushing kit and with the engine running at idle.

NOTE: _____
 The test run is part of the break-in operation.

Break-in

During the test run, perform the break-in operation in the following three stages.

1. One hour (a) at 2,000 r/min or at approximately half throttle
2. One hour (b) at 3,000 r/min or 3/4 throttle and 1 minute out of every 10 at full throttle
3. Eight hours (c) at any speed, however, avoid running at full speed for more than 5 minutes



S69J1240

[A] Hour

Specifications

General specifications.....2-1

Maintenance specification2-5

- Power unit.....2-5
- Lower unit2-8
- Electrical2-9
- Power unit.....2-11
- Lower unit2-14
- Electrical2-15
- Dimensions.....2-17

Tightening torques.....2-21

- Specified torques.....2-21
- General torques.....2-24

General specifications

Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Dimension					
Overall length	mm (in)	706 (27.8)	1,339 (52.7)	706 (27.8)	
Overall width	mm (in)	384 (15.1)			
Overall height (L)	mm (in)	1,415 (55.7)			1,455 (57.3)
(X) ^(*)	mm (in)	—			1,569 (61.8)
Boat transom height (L)	mm (in)	508 (20.0)			
(X) ^(*)	mm (in)	—			635 (25.0)
Weight					
(with aluminium propeller) (L)	kg (lb)	107.0 (236)	114.0 (251)	110.0 (243)	115.0 (254)
(X) ^(*)	kg (lb)	—			119.0 (262)
Performance					
Maximum output	kW (hp)	36.8 (50.0) at 5,500 r/min			
Full throttle operating range	r/min	5,000–6,000			
Maximum fuel consumption	L (US gal, Imp gal)/hr	18.5 (4.89, 4.07) at 6,000 r/min			
Engine idle speed	r/min	700–800			
Power unit					
Type		In-line, 4-stroke, SOHC, 8 valves			
Cylinder quantity		4			
Total displacement	cm ³ (cu. in)	996 (60.8)			
Bore × stroke	mm (in)	65.0 × 75.0 (2.56 × 2.95)			
Compression ratio		9.50			
Control system		Remote control	Tiller handle	Remote control	
Starting system		Electric			
Fuel system		Fuel injection			
Ignition system		TCI			
Advance system		Micro computer			
Maximum generator output		12, 16			
Spark plug		DPR6EB-9 (NGK)			
Cooling system		Water			
Exhaust system		Propeller boss			
Lubrication system		Wet sump			
	V, A				

(*) For Oceania

General specifications

Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Fuel and oil		Regular unleaded gasoline			
Fuel type		Regular unleaded gasoline			
Fuel minimum rating	RON ^(*)	90			
	PON	86			
Engine oil		4-stroke motor oil			
Engine oil grade	API SAE	SE, SF, SG, SH, or SJ 10W-30 or 10W-40			
Engine oil quantity (without oil filter replacement)	L (US qt, Imp qt)	2.5 (2.64, 2.20)			
(with oil filter replacement)	L (US qt, Imp qt)	2.7 (2.85, 2.38)			
Gear oil type		Hypoid gear oil			
Gear oil grade ^(*)	API SAE	GL-4 90			
Gear oil quantity	cm ³ (US oz, Imp oz)	430 (14.5, 15.2)		670 (22.7, 23.6)	
Bracket unit		-4 to 20			
Trim angle (at 12° boat transom)	Degree	-4 to 20			
Tilt-up angle	Degree	67	69		
Steering angle	Degree	40 + 40			
Drive unit		F-N-R			
Gear shift positions		F-N-R			
Gear ratio		1.85 (13/24)		2.31 (13/30)	
Reduction gear type		Spiral bevel gear			
Clutch type		Dog clutch			
Propeller shaft type		Spline			
Propeller direction (rear view)		Clockwise			
Propeller identification mark		G		K	
Electrical		430			
Battery minimum capacity ^(*)		430			
CCA/EN	A	430			
20HR/IEC	Ah	70			

^(*) RON: Research Octane Number

PON: Pump Octane Number = (RON + Motor Octane Number)/2

^(*) Meeting both API and SAE requirements

^(*) CCA: Cold Cranking Ampere

EN: European Norm (European standard)

IEC: International Electrotechnical Commission



Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
Dimension				
Overall length	mm (in)	1,339 (52.7)	706 (27.8)	
Overall width	mm (in)	384 (15.1)		
Overall height				
(L)	mm (in)	1,415 (55.7)		1,455 (57.3)
(X) ^(*1)	mm (in)	—		1,569 (61.8)
Boat transom height				
(L)	mm (in)	508 (20.0)		
(X) ^(*1)	mm (in)	—		635 (25.0)
Weight				
(with aluminium propeller)				
(L)	kg (lb)	114.0 (251)	110.0 (243)	115.0 (254)
(X) ^(*1)	kg (lb)	—		119.0 (262)
Performance				
Maximum output	kW (hp)	44.1 (60.0) at 5,500 r/min		
Full throttle operating range	r/min	5,000–6,000		
Maximum fuel consumption	L (US gal, Imp gal)/hr	20.0 (5.28, 4.40) at 6,000 r/min		
Engine idle speed	r/min	700–800		
Power unit				
Type		In-line, 4-stroke, SOHC, 8 valves		
Cylinder quantity		4		
Total displacement	cm ³ (cu. in)	996 (60.8)		
Bore × stroke	mm (in)	65.0 × 75.0 (2.56 × 2.95)		
Compression ratio		9.50		
Control system		Tiller handle	Remote control	
Starting system		Electric		
Fuel system		Fuel injection		
Ignition system		TCI		
Advance system		Micro computer		
Maximum generator output	V, A	12, 16		
Spark plug		DPR6EB-9 (NGK)		
Cooling system		Water		
Exhaust system		Propeller boss		
Lubrication system		Wet sump		

(*1) For Oceania

General specifications

Item	Unit	Model	
		F60CEHT	F60CET
Fuel and oil			
Fuel type		Regular unleaded gasoline	
Fuel minimum rating	RON ^(*1)	90	
	PON	86	
Engine oil		4-stroke motor oil	
Engine oil grade	API	SE, SF, SG, SH, or SJ	
	SAE	10W-30 or 10W-40	
Engine oil quantity (without oil filter replacement)	L (US qt, Imp qt)	2.5 (2.64, 2.20)	
(with oil filter replacement)	L (US qt, Imp qt)	2.7 (2.85, 2.38)	
Gear oil type		Hypoid gear oil	
Gear oil grade ^(*2)	API	GL-4	
	SAE	90	
Gear oil quantity	cm ³ (US oz, Imp oz)	430 (14.5, 15.2)	670 (22.7, 23.6)
Bracket unit			
Trim angle (at 12° boat transom)	Degree	-4 to 20	
Tilt-up angle	Degree	69	
Steering angle	Degree	40 + 40	
Drive unit			
Gear shift positions		F-N-R	
Gear ratio		1.85 (13/24)	2.31 (13/30)
Reduction gear type		Spiral bevel gear	
Clutch type		Dog clutch	
Propeller shaft type		Spline	
Propeller direction (rear view)		Clockwise	
Propeller identification mark		G	K
Electrical			
Battery minimum capacity ^(*3)			
CCA/EN	A	430	
20HR/IEC	Ah	70	

(*1) RON: Research Octane Number

PON: Pump Octane Number = (RON + Motor Octane Number)/2

(*2) Meeting both API and SAE requirements

(*3) CCA: Cold Cranking Ampere

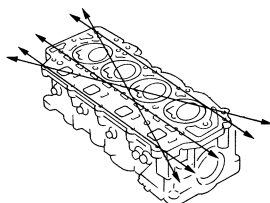
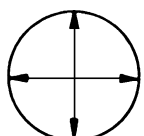
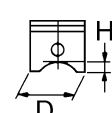
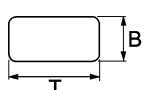
EN: European Norm (European standard)

IEC: International Electrotechnical Commission

2

Maintenance specification

Power unit

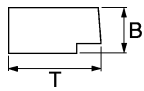
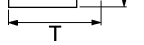
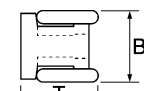

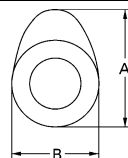
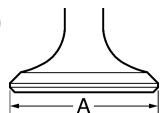
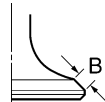
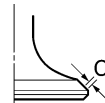
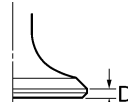
Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Power unit Minimum compression pressure ^(*1) Oil pressure ^(*2)	kPa (kgf/cm ² , psi) kPa (kgf/cm ² , psi)	960 (9.6, 139.2) 125 (1.25, 18.1) at engine idle speed			
Cylinder head Warpage limit  (lines indicate straightedge position) Journal inside diameter	mm (in) mm (in)	0.10 (0.0039) 37.000–37.025 (1.4567–1.4577)			
Cylinders Bore size Taper limit Out-of-round limit	 mm (in) mm (in) mm (in)	65.000–65.015 (2.5591–2.5596) 0.08 (0.0032) 0.05 (0.0020)			
Pistons Piston diameter (D) Measuring point (H) Piston clearance Piston pin boss bore Oversize piston diameter 1st 2nd	 mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	64.950–64.965 (2.5571–2.5577) 5.0 (0.20) 0.035–0.065 (0.0014–0.0026) 15.974–15.985 (0.6289–0.6293) 65.200–65.215 (2.5669–2.5675) 65.450–65.465 (2.5768–2.5774)			
Piston pins Outside diameter	mm (in)	15.965–15.970 (0.6285–0.6287)			
Piston rings Top ring Dimension B Dimension T End gap Side clearance	 mm (in) mm (in) mm (in) mm (in)	1.17–1.19 (0.0461–0.0469) 2.30–2.50 (0.0905–0.0984) 0.15–0.30 (0.0059–0.0118) 0.02–0.06 (0.0008–0.0024)			

(*1) Measure conditions:

Ambient temperature 20 °C (68 °F), wide open throttle, with spark plugs removed from all cylinders.

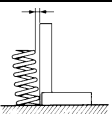
The figures are for reference only.

(*2) The figures are for reference only.

Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
2nd piston ring Dimension B  Dimension T  End gap Side clearance Oil ring Dimension B  Dimension T ^(*1)  End gap Side clearance	mm (in)	mm (in)	mm (in)	mm (in)	1.47–1.49 (0.0579–0.0587) 2.60–2.80 (0.1024–0.1102) 0.30–0.50 (0.0118–0.0197) 0.02–0.06 (0.0008–0.0024) 2.36–2.48 (0.0929–0.0976) 2.75 (0.1083) 0.20–0.70 (0.0079–0.0276) 0.04–0.18 (0.0016–0.0071)
Camshaft Intake (A)  Exhaust (A) Intake and exhaust (B) Camshaft journal diameter #1 Camshaft journal diameter #2, #3, #4 Camshaft journal oil clearance Camshaft runout limit	mm (in)	mm (in)	mm (in)	mm (in)	30.888–30.988 (1.2161–1.2200) 30.824–30.924 (1.2135–1.2175) 25.950–26.050 (1.0216–1.0256) 36.925–36.945 (1.4537–1.4545) 36.935–36.955 (1.4541–1.4549) 0.045–0.090 (0.0018–0.0035) 0.03 (0.0012)
Rocker arm shaft Rocker arm shaft outside diameter	mm (in)	15.971–15.991 (0.6288–0.6296)			
Rocker arms Rocker arm inside diameter	mm (in)	16.000–16.018 (0.6299–0.6306)			
Valves Valve clearance (cold) Intake Exhaust Head diameter (A)  Intake Exhaust Face width (B)  Intake Exhaust Seat contact width (C)  Intake and exhaust Margin thickness (D)  Intake Exhaust	mm (in)	mm (in)	mm (in)	mm (in)	0.20 ± 0.05 (0.008 ± 0.002) 0.30 ± 0.05 (0.012 ± 0.002) 31.90–32.10 (1.256–1.264) 26.60–26.80 (1.047–1.055) 1.98–2.40 (0.078–0.094) 2.16–2.79 (0.085–0.110) 1.3–1.5 (0.051–0.059) 0.8–1.2 (0.031–0.047) 1.0–1.4 (0.039–0.055)

(*1) The figures are for reference only.

SPEC		Specifications
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Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Stem diameter					
Intake	mm (in)	5.475–5.490 (0.2156–0.2161)			
Exhaust	mm (in)	5.460–5.475 (0.2150–0.2156)			
Guide inside diameter					
Intake and exhaust	mm (in)	5.500–5.512 (0.2165–0.2170)			
Stem-to-guide clearance					
Intake and exhaust	mm (in)	0.025–0.052 (0.0010–0.0020)			
Stem runout limit					
Intake	mm (in)	0.05 (0.0020)			
Exhaust	mm (in)	0.03 (0.0012)			
Valve springs					
Free length	mm (in)	39.85 (1.5689)			
Tilt limit	mm (in)	1.7 (0.07)			
					
Connecting rods					
Small end inside diameter	mm (in)	15.985–15.998 (0.6293–0.6298)			
Big end inside diameter	mm (in)	36.000–36.024 (1.4173–1.4183)			
Connecting rod big end side clearance	mm (in)	0.05–0.22 (0.0020–0.0087)			
Crankpin oil clearance	mm (in)	0.016–0.040 (0.0006–0.0016)			
Big end bearing thickness					
Yellow	mm (in)	1.500–1.504 (0.0591–0.0592)			
Red	mm (in)	1.496–1.500 (0.0589–0.0591)			
Pink	mm (in)	1.492–1.496 (0.0587–0.0589)			
Green	mm (in)	1.488–1.492 (0.0586–0.0587)			
Crankshaft					
Crankshaft journal diameter	mm (in)	42.984–43.000 (1.6923–1.6929)			
Crankpin diameter	mm (in)	32.984–33.000 (1.2986–1.2992)			
Crankpin width	mm (in)	21.000–21.070 (0.8268–0.8295)			
Runout limit	mm (in)	0.03 (0.0012)			
Crankcase					
Crankshaft main journal oil clearance	mm (in)	0.012–0.036 (0.0005–0.0014)			
Crankcase main journal bearing thickness					
Yellow	mm (in)	1.502–1.506 (0.0591–0.0592)			
Red	mm (in)	1.498–1.502 (0.0590–0.0591)			
Pink	mm (in)	1.494–1.498 (0.0588–0.0590)			
Green	mm (in)	1.490–1.494 (0.0587–0.0588)			

Maintenance specification

Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Oil pump		Trochoid			
Type		Trochoid			
Outer rotor-to-housing clearance	mm (in)	0.09–0.15 (0.0035–0.0059)			
Outer rotor-to-inner rotor clearance limit	mm (in)	0.12 (0.0047)			
Rotor-to-cover clearance	mm (in)	0.03–0.08 (0.0012–0.0031)			
Relief valve operating pressure	kPa (kgf/cm ² , psi)	350–450 (3.5–4.5, 50.8–62.3)			
Thermostat					
Opening temperature	°C (°F)	58–62 (136–144)			
Fully open temperature	°C (°F)	70 (158)			
Valve open lower limit	mm (in)	3.0 (0.12)			

Lower unit

Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Gear backlash					
Pinion-to-forward gear	mm (in)	0.35–0.81 (0.0138–0.0319)			0.09–0.62 (0.0035–0.0244)
Pinion-to-reverse gear	mm (in)	0.89–1.34 (0.0350–0.0528)			—
Pinion shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50			
Forward gear shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50			
Reverse gear shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50			—



Electrical

Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Ignition and ignition control system					
Ignition timing range ^(*)	Degree	ATDC 10-BTDC 25			
Spark plug gap	mm (in)	0.8–0.9 (0.031–0.035)			
Ignition coil resistance					
Primary coil (R – B/W) at 20 °C (68 °F)	Ω	1.53–2.07			
Secondary coil at 20 °C (68 °F)	kΩ	12.50–16.91			
Spark plug wire resistance	kΩ	1.9–5.0			
ECM output peak voltage (B/R, B/W – ground)					
at cranking (loaded)	V	240			
at 1,500 r/min (loaded)	V	290			
at 3,500 r/min (loaded)	V	300			
Pulser coil output peak voltage (W/R – W/B)					
at cranking (unloaded)	V	7.9			
at cranking (loaded)	V	7.2			
at 1,500 r/min (loaded)	V	20.7			
at 3,500 r/min (loaded)	V	32.0			
Pulser coil resistance ^(*) (W/B – W/R)	Ω	396–594			
Pulser coil air gap	mm (in)	0.75 ± 0.25 (0.030 ± 0.010)			
Throttle position sensor					
Output voltage (P – B)	V	0.8–1.2 at engine idle speed			
Sensor assembly resistance ^(*)					
at 20 °C (68 °F)	kΩ	5.4–6.6			
at 80 °C (176 °F)	kΩ	0.282–0.382			
Cooling water temperature sensor resistance ^(*) (B/Y – B)					
at 20 °C (68 °F)	kΩ	2.439			
at 60 °C (140 °F)	kΩ	0.589			
at 100 °C (212 °F)	kΩ	0.193			
Fuel control system					
Fuel injector resistance ^(*) at 21 °C (70 °F)	Ω	12.0			
Solenoid valve resistance ^(*) at 20 °C (68 °F)	Ω	30.0–34.0			

^(*) The actual ignition timing may vary according to environmental conditions.

The figures are for reference only and do not represent the ignition timing figures from the fully closed position to the fully open position of the throttle valve.

^(*) The figures are for reference only.

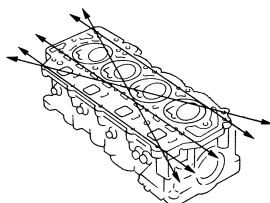
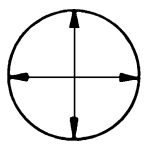
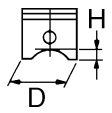
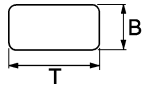
Maintenance specification



Item	Unit	Model			
		F50FED	F50FEHT	F50FET	FT50GET
Starter motor					
Type		Sliding gear			
Output	kW	1.4			
Cranking time limit	Second	30			
Brushes					
Standard length	mm (in)	15.5 (0.61)			
Wear limit	mm (in)	9.5 (0.37)			
Commutator					
Standard diameter	mm (in)	29.0 (1.14)			
Wear limit	mm (in)	28.0 (1.10)			
Mica					
Standard undercut	mm (in)	0.8 (0.03)			
Wear limit	mm (in)	0.2 (0.01)			
Charging system					
Fuse	A	20, 30			
Stator coil output peak voltage (W – W)					
at cranking (unloaded)	V	13.2			
at 1,500 r/min (unloaded)	V	42.2			
at 3,500 r/min (unloaded)	V	96.6			
Stator coil resistance ^(*)					
at 20 °C (68 °F) (W – W)	Ω	0.52–0.63			
Rectifier Regulator output peak voltage (R – B)					
at 1,500 r/min (unloaded)	V	13.0			
at 3,500 r/min (unloaded)	V	13.0			
Power trim and tilt system					
Trim sensor					
Setting resistance (P – B)	Ω	9–11			
Resistance (P – B)	Ω	9–288.3			
Fluid type		ATF Dexron II			
Brushes					
Standard limit	mm (in)	11.0 (0.43)			
Wear limit	mm (in)	4.5 (0.18)			
Commutator					
Standard limit	mm (in)	19.0 (0.75)			
Wear limit	mm (in)	18.0 (0.71)			
Mica					
Standard undercut	mm (in)	1.5 (0.06)			

^(*) The figures are for reference only.

Power unit

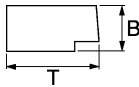

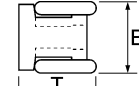
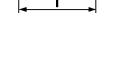
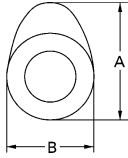
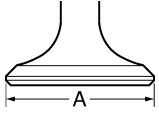
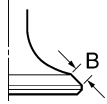
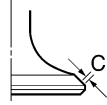
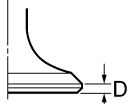
Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
Power unit Minimum compression pressure ^(*1) Oil pressure ^(*2)	kPa (kgf/cm ² , psi) kPa (kgf/cm ² , psi)	960 (9.6, 139.2) 125 (1.25, 18.1) at engine idle speed		
Cylinder head Warpage limit  (lines indicate straightedge position) Journal inside diameter	mm (in) mm (in)	0.10 (0.0039) 37.000–37.025 (1.4567–1.4577)		
Cylinders Bore size Taper limit Out-of-round limit 	mm (in) mm (in) mm (in)	65.000–65.015 (2.5591–2.5596) 0.08 (0.0032) 0.05 (0.0020)		
Pistons Piston diameter (D) Measuring point (H) Piston clearance Piston pin boss bore Oversize piston diameter 1st 2nd 	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	64.950–64.965 (2.5571–2.5577) 5.0 (0.20) 0.035–0.065 (0.0014–0.0026) 15.974–15.985 (0.6289–0.6293) 65.200–65.215 (2.5669–2.5675) 65.450–65.465 (2.5768–2.5774)		
Piston pins Outside diameter	mm (in)	15.965–15.970 (0.6285–0.6287)		
Piston rings Top ring Dimension B Dimension T End gap Side clearance 	mm (in) mm (in) mm (in) mm (in)	1.17–1.19 (0.0461–0.0469) 2.30–2.50 (0.0905–0.0984) 0.15–0.30 (0.0059–0.0118) 0.02–0.06 (0.0008–0.0024)		

(*1) Measure conditions:

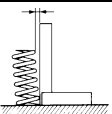
Ambient temperature 20 °C (68 °F), wide open throttle, with spark plugs removed from all cylinders.

The figures are for reference only.

(*2) The figures are for reference only.

Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
2nd piston ring Dimension B  Dimension T  End gap Side clearance Oil ring Dimension B  Dimension T ^(*)  End gap Side clearance	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	1.47–1.49 (0.0579–0.0587) 2.60–2.80 (0.1024–0.1102) 0.30–0.50 (0.0118–0.0197) 0.02–0.06 (0.0008–0.0024) 2.36–2.48 (0.0929–0.0976) 2.75 (0.1083) 0.20–0.70 (0.0079–0.0276) 0.04–0.18 (0.0016–0.0071)		
Camshaft Intake (A)  Exhaust (A) Intake and exhaust (B) Camshaft journal diameter #1 Camshaft journal diameter #2, #3, #4 Camshaft journal oil clearance Camshaft runout limit	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	30.888–30.988 (1.2161–1.2200) 30.824–30.924 (1.2135–1.2175) 25.950–26.050 (1.0216–1.0256) 36.925–36.945 (1.4537–1.4545) 36.935–36.955 (1.4541–1.4549) 0.045–0.090 (0.0018–0.0035) 0.03 (0.0012)		
Rocker arm shaft Rocker arm shaft outside diameter	mm (in)	15.971–15.991 (0.6288–0.6296)		
Rocker arms Rocker arm inside diameter	mm (in)	16.000–16.018 (0.6299–0.6306)		
Valves Valve clearance (cold) Intake Exhaust Head diameter (A)  Intake Exhaust Face width (B)  Intake Exhaust Seat contact width (C)  Intake and exhaust Margin thickness (D)  Intake Exhaust	mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in) mm (in)	0.20 ± 0.05 (0.008 ± 0.002) 0.30 ± 0.05 (0.012 ± 0.002) 31.90–32.10 (1.256–1.264) 26.60–26.80 (1.047–1.055) 1.98–2.40 (0.078–0.094) 2.16–2.79 (0.085–0.110) 1.3–1.5 (0.051–0.059) 0.8–1.2 (0.031–0.047) 1.0–1.4 (0.039–0.055)		

(*) The figures are for reference only.

Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
Stem diameter				
Intake	mm (in)	5.475–5.490 (0.2156–0.2161)		
Exhaust	mm (in)	5.460–5.475 (0.2150–0.2156)		
Guide inside diameter				
Intake and exhaust	mm (in)	5.500–5.512 (0.2165–0.2170)		
Stem-to-guide clearance				
Intake and exhaust	mm (in)	0.025–0.052 (0.0010–0.0020)		
Stem runout limit				
Intake	mm (in)	0.05 (0.0020)		
Exhaust	mm (in)	0.03 (0.0012)		
Valve springs				
Free length	mm (in)	39.85 (1.5689)		
Tilt limit	mm (in)	1.7 (0.07)		
				
Connecting rods				
Small end inside diameter	mm (in)	15.985–15.998 (0.6293–0.6298)		
Big end inside diameter	mm (in)	36.000–36.024 (1.4173–1.4183)		
Connecting rod big end side clearance	mm (in)	0.05–0.22 (0.0020–0.0087)		
Crankpin oil clearance	mm (in)	0.016–0.040 (0.0006–0.0016)		
Big end bearing thickness				
Yellow	mm (in)	1.500–1.504 (0.0591–0.0592)		
Red	mm (in)	1.496–1.500 (0.0589–0.0591)		
Pink	mm (in)	1.492–1.496 (0.0587–0.0589)		
Green	mm (in)	1.488–1.492 (0.0586–0.0587)		
Crankshaft				
Crankshaft journal diameter	mm (in)	42.984–43.000 (1.6923–1.6929)		
Crankpin diameter	mm (in)	32.984–33.000 (1.2986–1.2992)		
Crankpin width	mm (in)	21.000–21.070 (0.8268–0.8295)		
Runout limit	mm (in)	0.03 (0.0012)		
Crankcase				
Crankshaft main journal oil clearance	mm (in)	0.012–0.036 (0.0005–0.0014)		
Crankcase main journal bearing thickness				
Yellow	mm (in)	1.502–1.506 (0.0591–0.0592)		
Red	mm (in)	1.498–1.502 (0.0590–0.0591)		
Pink	mm (in)	1.494–1.498 (0.0588–0.0590)		
Green	mm (in)	1.490–1.494 (0.0587–0.0588)		

Maintenance specification

Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
Oil pump		Trochoid		
Type		Trochoid		
Outer rotor-to-housing clearance	mm (in)	0.09–0.15 (0.0035–0.0059)		
Outer rotor-to-inner rotor clearance limit	mm (in)	0.12 (0.0047)		
Rotor-to-cover clearance	mm (in)	0.03–0.08 (0.0012–0.0031)		
Relief valve operating pressure	kPa (kgf/cm ² , psi)	350–450 (3.5–4.5, 50.8–62.3)		
Thermostat				
Opening temperature	°C (°F)	58–62 (136–144)		
Fully open temperature	°C (°F)	70 (158)		
Valve open lower limit	mm (in)	3.0 (0.12)		

Lower unit

Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
Gear backlash				
Pinion-to-forward gear	mm (in)	0.35–0.81 (0.0138–0.0319)		0.09–0.62 (0.0035–0.0244)
Pinion-to-reverse gear	mm (in)	0.89–1.34 (0.0350–0.0528)		—
Pinion shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50		
Forward gear shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50		
Reverse gear shims	mm	0.10, 0.12, 0.15, 0.18, 0.30, 0.40, 0.50		—



Electrical

Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
Ignition and ignition control system				
Ignition timing range ^(*)	Degree	ATDC 10-BTDC 24		
Spark plug gap	mm (in)	0.8–0.9 (0.031–0.035)		
Ignition coil resistance				
Primary coil (R – B/W) at 20 °C (68 °F)	Ω	1.53–2.07		
Secondary coil at 20 °C (68 °F)	kΩ	12.50–16.91		
Spark plug wire resistance	kΩ	1.9–5.0		
ECM output peak voltage (B/R, B/W – ground)				
at cranking (loaded)	V	240		
at 1,500 r/min (loaded)	V	290		
at 3,500 r/min (loaded)	V	300		
Pulser coil output peak voltage (W/B – W/R)				
at cranking (unloaded)	V	7.9		
at cranking (loaded)	V	7.2		
at 1,500 r/min (loaded)	V	20.7		
at 3,500 r/min (loaded)	V	32.0		
Pulser coil resistance ^(*) (W/B – W/R)	Ω	396–594		
Pulser coil air gap	mm (in)	0.75 ± 0.25 (0.030 ± 0.010)		
Throttle position sensor				
Output voltage (P – B)	V	0.8–1.2 at engine idle speed		
Sensor assembly resistance ^(*)				
at 20 °C (68 °F)	kΩ	5.4–6.6		
at 80 °C (176 °F)	kΩ	0.282–0.382		
Cooling water temperature sensor resistance ^(*) (B/Y – B)				
at 20 °C (68 °F)	kΩ	2.439		
at 60 °C (140 °F)	kΩ	0.589		
at 100 °C (212 °F)	kΩ	0.193		
Fuel control system				
Fuel injector resistance ^(*) at 21 °C (70 °F)	Ω	12.0		
Solenoid valve resistance ^(*) at 20 °C (68 °F)	Ω	30.0–34.0		

^(*) The actual ignition timing may vary according to environmental conditions.

The figures are for reference only and do not represent the ignition timing figures from the fully closed position to the fully open position of the throttle valve.

^(*) The figures are for reference only.

Maintenance specification

2

Item	Unit	Model		
		F60CEHT	F60CET	FT60DET
Starter motor				
Type		Sliding gear		
Output	kW	1.4		
Cranking time limit	Second	30		
Brushes				
Standard length	mm (in)	15.5 (0.61)		
Wear limit	mm (in)	9.5 (0.37)		
Commutator				
Standard diameter	mm (in)	29.0 (1.14)		
Wear limit	mm (in)	28.0 (1.10)		
Mica				
Standard undercut	mm (in)	0.8 (0.03)		
Wear limit	mm (in)	0.2 (0.01)		
Charging system				
Fuse	A	20, 30		
Stator coil output peak voltage (W – W)				
at cranking (unloaded)	V	13.2		
at 1,500 r/min (unloaded)	V	42.2		
at 3,500 r/min (unloaded)	V	96.6		
Stator coil resistance ^(*)				
at 20 °C (68 °F) (W – W)	Ω	0.52–0.63		
Rectifier Regulator output peak voltage (R – B)				
at 1,500 r/min (unloaded)	V	13.0		
at 3,500 r/min (unloaded)	V	13.0		
Power trim and tilt system				
Trim sensor				
Setting resistance (P – B)	Ω	9–11		
Resistance (P – B)	Ω	9–288.3		
Fluid type				
ATF Dexron II				
Brushes				
Standard limit	mm (in)	11.0 (0.43)		
Wear limit	mm (in)	4.5 (0.18)		
Commutator				
Standard limit	mm (in)	19.0 (0.75)		
Wear limit	mm (in)	18.0 (0.71)		
Mica				
Standard undercut	mm (in)	1.5 (0.06)		

^(*) The figures are for reference only.

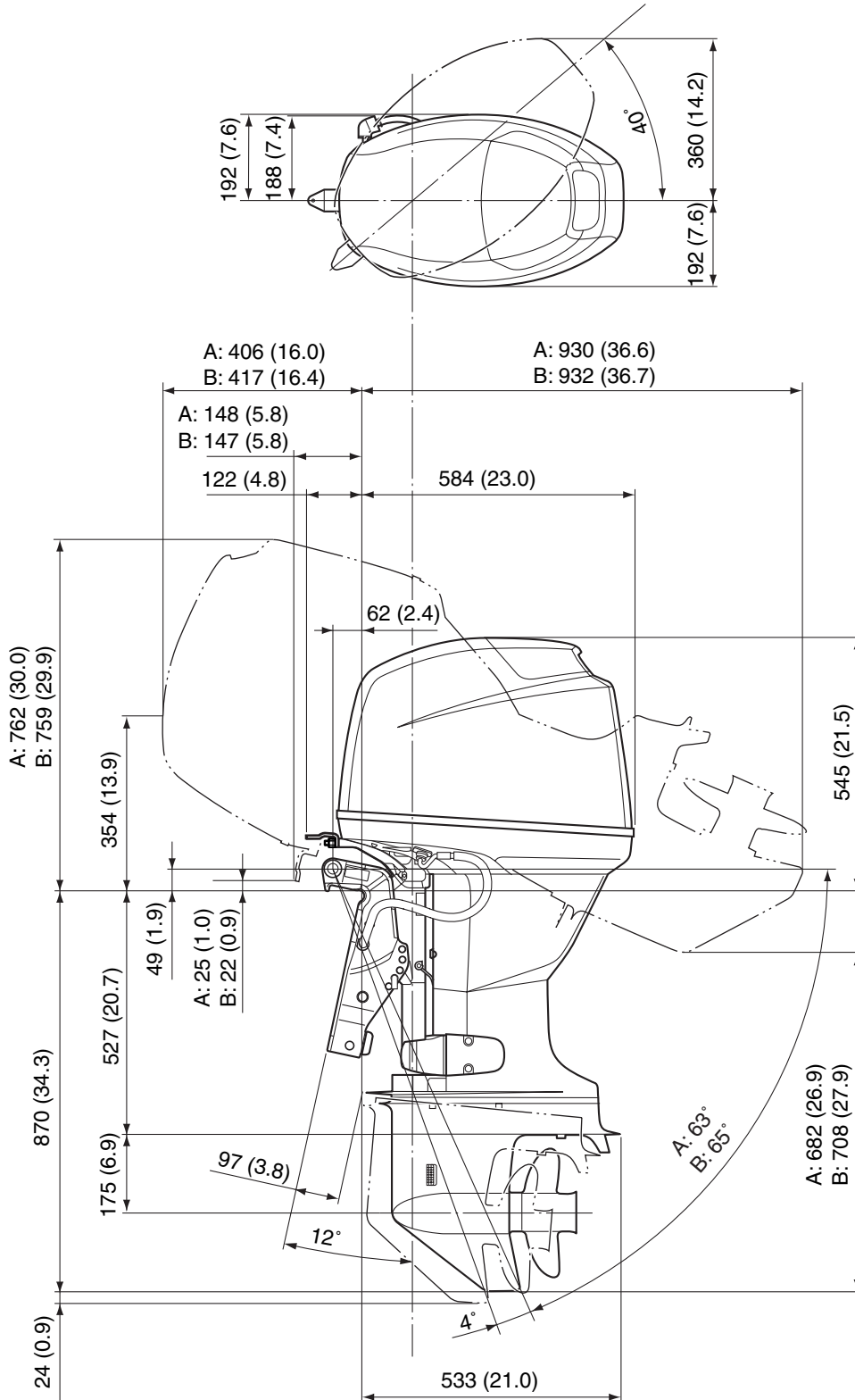


Dimensions

Exterior

F50, F60 (Remote control model)

mm (in)

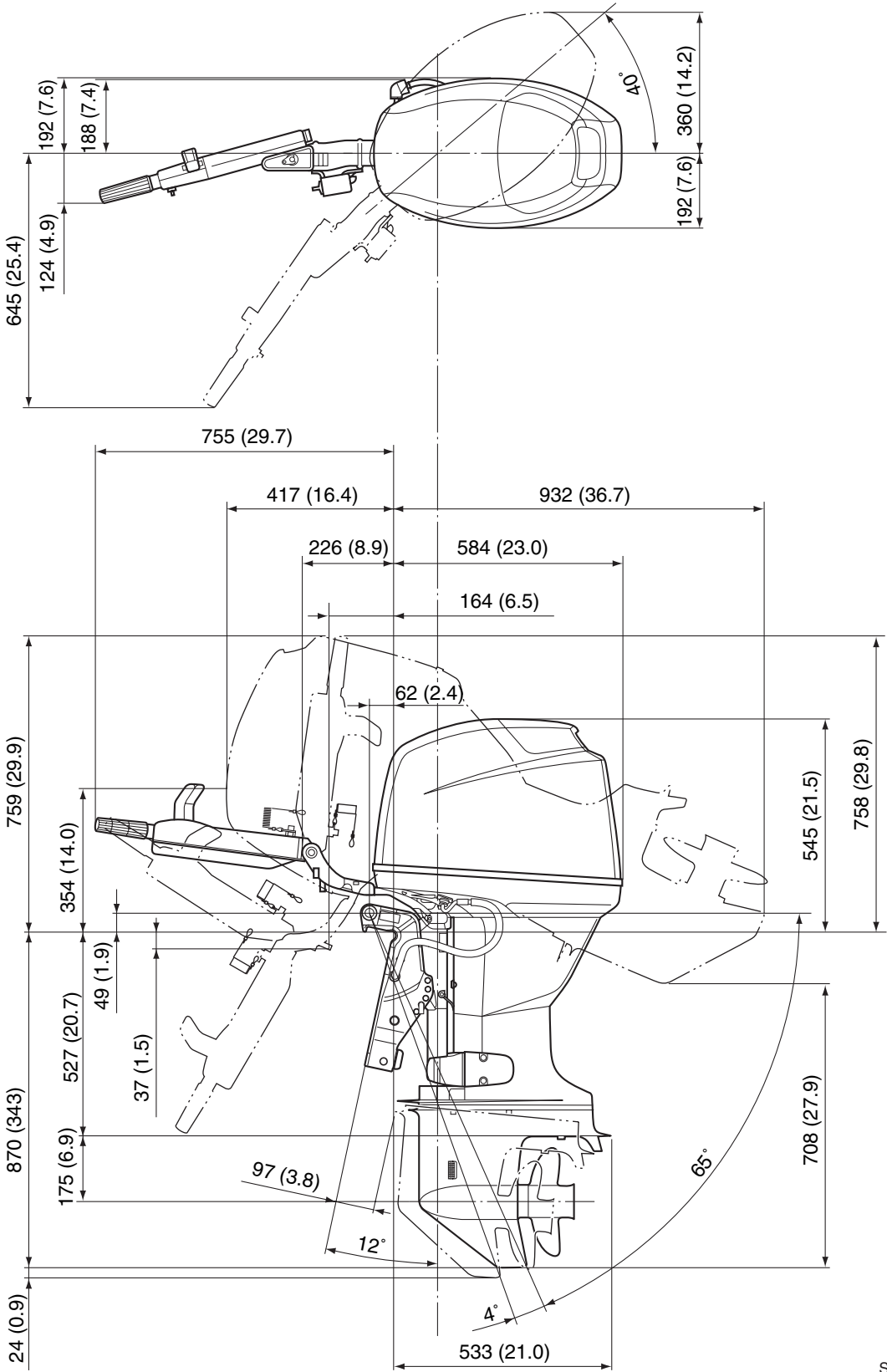


A: Hydro tilt model (For Europe)
 B: Power trim and tilt model

S6C12030

F50, F60 (Tiller handle model)^(*)

mm (in)



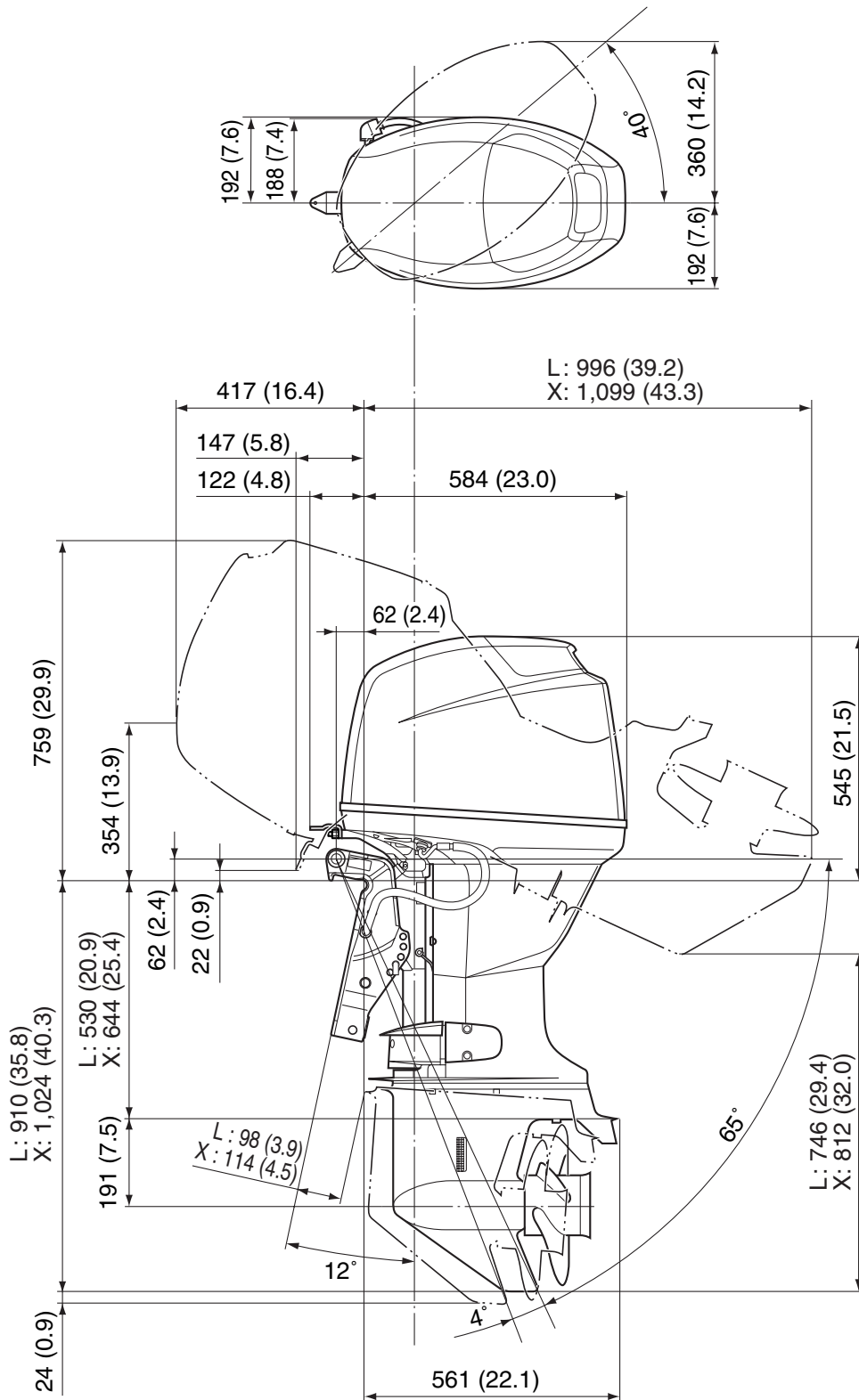
2

Power trim and tilt model
^(*) For Oceania

S6C12020E

FT50, FT60

mm (in)



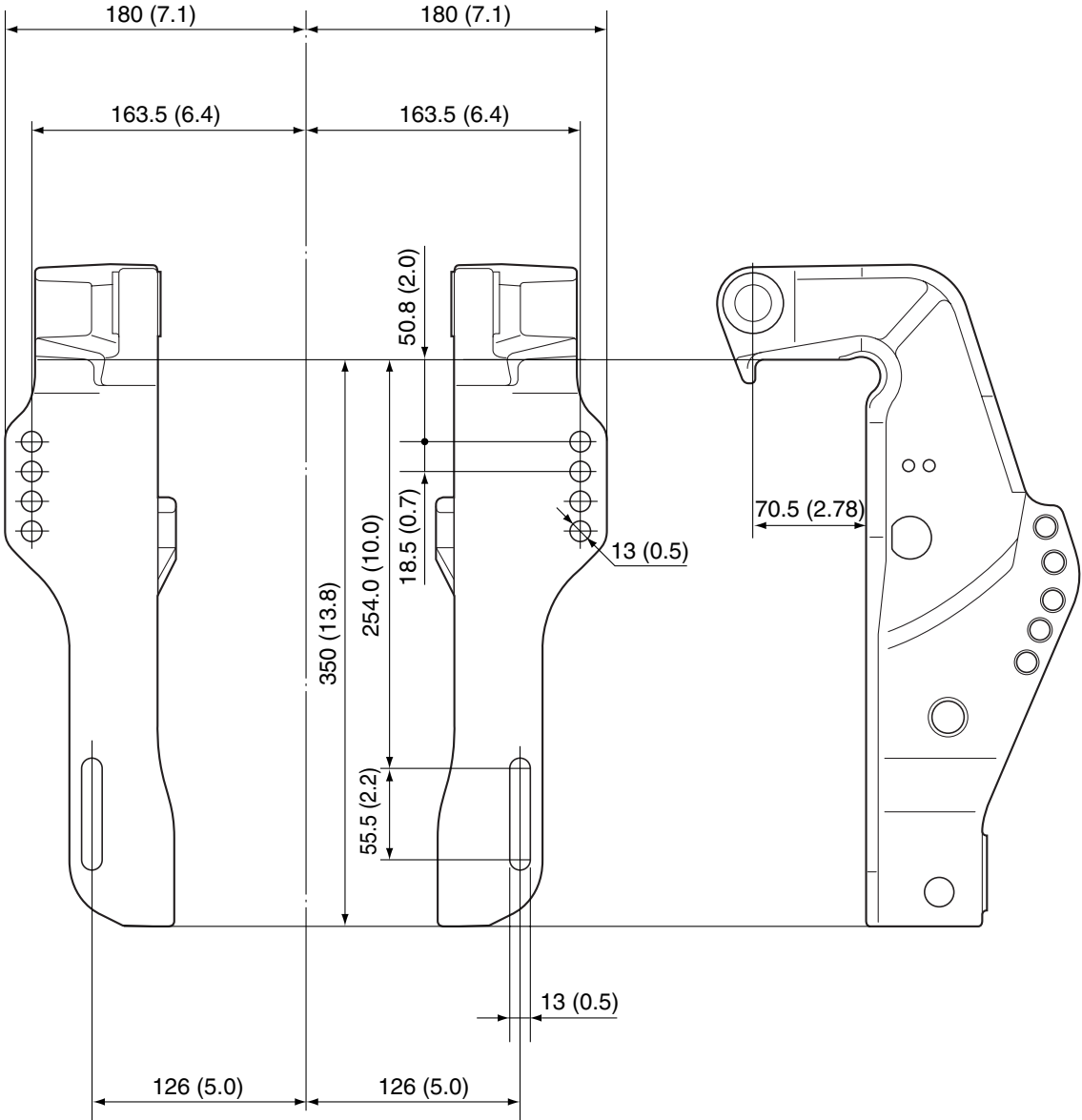
X: For Oceania

S6C12010

Clamp bracket

mm (in)

2



S6C12070

Tightening torques
Specified torques

Part to be tightened	Thread size	Tightening torques		
		N·m	kgf·m	ft·lb
Fuel system				
Fuel filter cup	—	3	0.3	2.2
Fuel pump screw	M5	3	0.3	2.2
Fuel pump valve screw	M3	0.5	0.05	0.36
Idle speed control screw	M5	4	0.4	3.0
Sensor assembly screw	M5	4	0.4	3.0
Fuel cooler screw	M6	3	0.3	2.2
Fuel rail mounting bolt	M6	9	0.9	6.6
Throttle body mounting bolt	M6	9	0.9	6.6
Pressure regulator bolt	M6	5	0.5	3.7
Drain screw	—	1.5	0.15	1.1
Joint screw	—	4	0.4	3.0
Vapor separator cover screw	M5	3	0.3	2.2
Plate screw	M4	2	0.2	1.5
Power unit				
Power unit mounting bolt	M8	27	2.7	20.0
Shift position switch screw	M4	2	0.2	1.5
Stator coil bracket bolt	M6	4	0.4	3.0
Pulser coil bolt	M5	4	0.4	3.0
Flywheel magnet nut	M20	157	15.7	115.8
Starter motor bolt	M8	29	2.9	21.4
Starter motor terminal nut	M8	9	0.9	6.6
Starter relay lead bolt	M6	4	0.4	3.0
Starter motor lead screw	M4	2	0.2	1.5
Starter relay holder screw	M6	3	0.3	2.2
Main and fuel pump relay screw	M6	3	0.3	2.2
ECM cover screw	M6	3	0.3	2.2
Self diagnosis connector screw	M6	3	0.3	2.2
Ignition coil bolt	M6	7	0.7	5.2
Oil filter	—	18	1.8	13.3
PTT relay nut	M6	4	0.4	3.0
PTT motor lead bolt	M6	4	0.4	3.0
Positive battery lead nut	M8	9	0.9	6.6
Drive sprocket nut	M41	140	14.0	103.3
Driven sprocket bolt	M10	38	3.8	28.0
Rocker arm lock nut	M10	14	1.4	10.3
Rocker arm shaft bolt	M8	18	1.8	13.3

Tightening torques

2

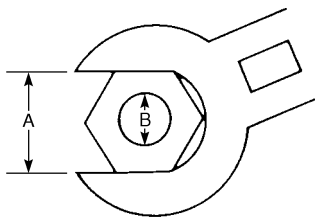
Part to be tightened		Thread size	Tightening torques		
			N·m	kgf·m	ft·lb
Cylinder head bolt	1st	M6	6	0.6	4.4
	2nd		12	1.2	8.9
	1st	M9	12	1.2	8.9
	2nd		23	2.3	17.0
	3rd		90°		
Spark plug		—	17	1.7	12.5
Cooling water temperature sensor		—	23	2.3	17.0
Oil pressure switch		—	8	0.8	5.9
Oil pressure switch lead bolt		M4	2	0.2	1.5
Exhaust cover bolt	1st	M6	6	0.6	4.4
	2nd		12	1.2	8.9
Exhaust cover plug		M14	23	2.3	17.0
		M18	55	5.5	40.6
Oil filter union bolt		—	40	4.0	29.5
Oil pump screw		M6	4	0.4	3.0
Crankcase bolt	1st	M6	6	0.6	4.4
	2nd		12	1.2	8.9
	1st	M8	15	1.5	11.1
	2nd		30	3.0	22.1
Connecting rod cap bolt	1st	—	6	0.6	4.4
	2nd		17	1.7	12.5
Lower unit (F50, F60)					
Gear oil drain screw		—	9	0.9	6.6
Gear oil check screw		—	9	0.9	6.6
Lower case mounting bolt		M10	39	3.9	28.8
Propeller nut		M16	34	3.4	25.1
Ring nut		—	103	10.3	76.0
Cooling water inlet cover screw		—	4	0.4	3.0
Pinion nut		M16	74	7.4	54.6
Propeller shaft housing bolt		M8	16	1.6	11.8
Lower unit (FT50, FT60)					
Gear oil drain screw		—	9	0.9	6.6
Gear oil check screw		—	9	0.9	6.6
Lower case mounting bolt (nut)		M10	39	3.9	28.8
Propeller nut		M16	34	3.4	25.1
Ring nut		—	103	10.3	76.0
Cooling water inlet cover screw		—	4	0.4	3.0
Pinion nut		M16	93	9.3	68.6
Propeller shaft housing bolt		M8	16	1.6	11.8

Part to be tightened	Thread size	Tightening torques		
		N-m	kgf-m	ft-lb
Bracket unit				
Retaining plate bolt	M6	10	1.0	7.4
Tiller handle nut	—	37	3.7	27.3
Self-locking nut	—	4	0.4	3.0
Engine stop lanyard switch nut	—	2	0.2	1.5
Tiller handle bracket nut	—	37	3.7	27.3
Tiller handle bracket bolt	M12	37	3.7	27.3
Engine start switch nut	—	4	0.4	3.0
Shift rod detent bolt	—	18	1.8	13.3
PTT switch bracket bolt	M6	10	1.0	7.4
Flushing hose adapter screw	M6	2	0.2	1.5
Engine oil drain bolt	M14	17	1.7	12.5
Muffler bolt	M6	10	1.0	7.4
Exhaust manifold bolt	M6	10	1.0	7.4
Oil pan bolt	M8	27	2.7	20.0
Oil strainer bolt	M6	10	1.0	7.4
Upper mounting nut	M8	24	2.4	17.7
Self-locking nut	—	22	2.2	16.2
Grease nipple	—	3	0.3	2.2
Power trim and tilt unit				
PTT motor bolt	M5	4	0.4	3.0
Reservoir cap	—	7	0.7	5.2
Manual valve	—	2	0.2	1.5
Gear pump bolt	M5	5	0.5	3.7
Lever bolt	M3	3	0.3	2.2
Relief valve seat cap bolt	M4	4	0.4	3.0
	M5	5	0.5	3.7
Gear pump housing bolt	M5	5	0.5	3.7
Gear pump bracket bolt	M3	3	0.3	2.2
	M5	4	0.4	3.0
Tilt cylinder end screw	—	110	11.0	81.1
Trim cylinder end screw	—	80	8.0	59.0
Tilt piston bolt	M12	61	6.1	45.0

General torques

This chart specifies tightening torques for standard fasteners with a standard ISO thread pitch. Tightening torque specifications for special components or assemblies are provided in applicable sections of this manual. To avoid warpage, tighten multi-fastener assemblies in a crisscross fashion and progressive stages until the specified torque is reached. Unless otherwise specified, torque specifications require clean, dry threads. Components should be at room temperature.

Nut (A)	Bolt (B)	General torque specifications		
		N·m	kgf·m	ft·lb
8 mm	M5	5	0.5	3.6
10 mm	M6	8	0.8	5.8
12 mm	M8	18	1.8	13
14 mm	M10	36	3.6	25
17 mm	M12	43	4.3	31



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Periodic checks and adjustments

Special service tools	3-1
Maintenance interval chart.....	3-2
Top cowling	3-3
Checking the top cowling.....	3-3
Fuel system	3-3
Checking the fuel joint and fuel hoses (fuel joint-to-fuel injector)	3-3
Checking the fuel filter	3-3
Power unit.....	3-3
Checking the engine oil level.....	3-3
Changing the engine oil using an oil changer.....	3-4
Changing the engine oil by draining it	3-4
Replacing the oil filter	3-5
Checking the timing belt	3-6
Replacing the timing belt	3-6
Checking the spark plugs	3-8
Checking the thermostat.....	3-9
Checking the cooling water passage.....	3-10
Control system.....	3-10
Checking the engine idle speed	3-10
Adjusting the throttle link and throttle cable.....	3-10
Checking the gear shift operation.....	3-12
Bracket unit	3-13
Checking the power trim and tilt operation	3-13
Checking the hydro tilt unit operation	3-13
Checking the power trim and tilt fluid level	3-14
Lower unit.....	3-14
Checking the gear oil level	3-14
Changing the gear oil	3-15
Checking the lower unit for air leakage	3-15
Checking the propeller.....	3-16
General.....	3-16
Checking the anodes.....	3-16
Checking the battery.....	3-17
Lubricating the outboard motor.....	3-18



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