PREFACE

This manual covers the construction, function and servicing procedures of the Honda BF75A / BF90A outboard motors.

Careful observance of these instructions will result in better, safer service work.
Illustrations in this manual are based primarily on the BF90A LRTC.

HONDA MOTOR CO., LTD.
SERVICE PUBLICATIONS OFFICE

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1. SPECIFICATIONS

DIMENSIONS AND WEIGHTS

Item \ Model	BF75A							
Description code	BBAL							BBAU
Type	LHD	LHTD	LHTC	LRTD	LRTG	LRTB	LRTC	XRTC
Overall length	*1: 910 mm (35.8 in) *2: 1,365 mm (53.7 in)			760 mm (29.9 in)				
Overall width	590 mm (23.2 in)			480 mm (18.9 in)				
Overall height	1,590 mm (62.6 in)							1,720 mm (67.7 in)
Dry weight	169 kg (373 lbs)	174 kg (384 lbs)		169 kg (373 lbs)				174 kg (384 lbs)
Operating weight (including oil)	174 kg (384 lbs)	179 kg (395 lbs)		174 kg (384 lbs)				179 kg (395 lbs)

*1: With Tiller Handle raised
*2: With Tiller Handle extended

Item \ Model	BF90A							
Description code	BBBL						BBBU	
Type	LHD	LHTD	LHTC	LRTD	LRTB	LRTC	XRTD	XRTC
Overall length	*1: 910 mm (35.8 in) *2: 1,365 mm (53.7 in)			760 mm (29.9 in)				
Overall width	590 mm (23.2 in)			480 mm (18.9 in)				
Overall height	1,590 mm (62.6 in)						1,720 mm (67.7 in)	
Dry weight	169 kg (373 lbs)	174 kg (384 lbs)		169 kg (373 lbs)			174 kg (384 lbs)	
Operating weight (including oil)	174 kg (384 lbs)	179 kg (395 lbs)		174 kg (384 lbs)			179 kg (395 lbs)	

*1: With Tiller Handle raised
*2: With Tiller Handle extended

FRAME

Item \ Model / Type	BF75A							
	LHD	LHTD	LHTC	LRTD	LRTG	LRTB	LRTC	XRTC
Transom height (*1)	537 mm (21.1 in)							664 mm (26.1 in)
Transom angle	5 stage adjustment (8°,12°,16°,20°,24°)							
Tilting angle	72°							
Tilting stage	Stage less							
Swivel angle	30° right and left							
Trim angle (*1)	———	–4°—16°						

(*1) Transom angle is at 12°.

Item \ Model / Type	BF90A							
	LHD	LHTD	LHTC	LRTD	LRTB	LRTC	XRTD	XRTC
Transom height (*1)	537 mm (21.1 in)						664 mm (26.1 in)	
Transom angle	5 stage adjustment (8°,12°,16°,20°,24°)							
Tilting angle	72°							
Tilting stage	Stage less							
Swivel angle	30° right and left							
Trim angle (*1)	———	–4°—16°						

(*1) Transom angle is at 12°.

TYPES OF HONDA BF75A / 90A OUTBOARD MOTORS

It may be necessary to refer to this chart for reference purposes when reading this manual.

Model	Type	Shaft Length		Tiller Handle	Remote Control	Gas assisted Tilt	Power Trim / Tilt	Tachometer	Trimmeter
		Long	Extra-Long						
BF75A	LHD	●		●		●		(●)	
	LHTD	●		●			●	(●)	(●)
	LHTC	●		●			●	(●)	(●)
	LRTD	●			●		●	●	●
	LRTG	●			●		●	●	●
	LRTB	●			●		●	●	●
	LRTC	●			●		●	●	●
	XRTC		●		●		●	●	●
BF90A	LHD	●		●		●		(●)	
	LHTD	●		●			●	(●)	(●)
	LHTC	●		●				(●)	(●)
	LRTD	●			●		●	●	●
	LRTB	●			●		●	●	●
	LRTC	●			●		●	●	●
	XRTD		●		●		●	●	●
	XRTC		●		●		●	●	●

H: Tiller Handle R: Remote Control T: Power Trim / Tilt ( ): Optional part

The gas assisted tilt type motors use a gas spring/damper to assist when manually tilting the motor.

The power trim / tilt type motors use an electric / hydraulic power cylinder to trim or tilt the motor.

ENGINE

Model	BF75A	BF90A
Type	4–stroke, O.H.C., 4–cylinder	
Displacement	1,590 cm^3 (97.0 cu in)	
Bore x stroke	75 x 90 mm (3.0 x 3.5 in)	
Rated power *1	75 HP (55.2 kW) at 5,000 – 6,000 min^{-1} (rpm)	90 HP (66.8 kW) at 5,000 – 6,000 min^{-1} (rpm)
Maximum torque	117.6 N·m(12.0 kgf·m, 87 lbf·ft) at 4,000 min^{-1} (rpm)	125.5 N·m(12.8 kgf·m, 93 lbf·ft) at 4,500 min^{-1} (rpm)
Compression ratio	8.8 : 1	
Fuel consumption ratio	241 g/HP·hr (8.5 oz/HP·hr) 〔Except LRTG type〕 222 g/HP·hr (7.8 oz/HP·hr) 〔LRTG type only〕	227 g/HP·hr (8.0 oz/HP·hr)
Cooling system	Forced water circulation by impeller pump with thermostat	
Ignition system	CDI	
Ignition timing	5–29° B.T.D.C.	
Spark plug	DR7EA (NGK), X22ESR–U (NIPPONDENSO)	
Carburetor	Horizontal type, butterfly valve (4 carburetor)	
Lubrication system	Pressure lubrication by trochoid pump	
Lubrication capacity	4.0 ℓ (4.2 US qt, 3.5 Imp qt) 〔with oil filter replacement: 4.5 ℓ (4.8 US qt, 4.0 Imp qt)〕	
Starter system	Electric starter	
Stopping system	Grounding of primary circuit	
Fuel	Unleaded gasoline with a pump octane rating of 86 or higher.	
Optional fuel tank capacity	25 ℓ (6.6 US gal, 5.5 Imp gal)	
Fuel pump	Mechanical plunger type	
Exhaust system	Underwater type	
Recommended oil	SAE 10 W – 30 / 40	

*1: Full throttle range.

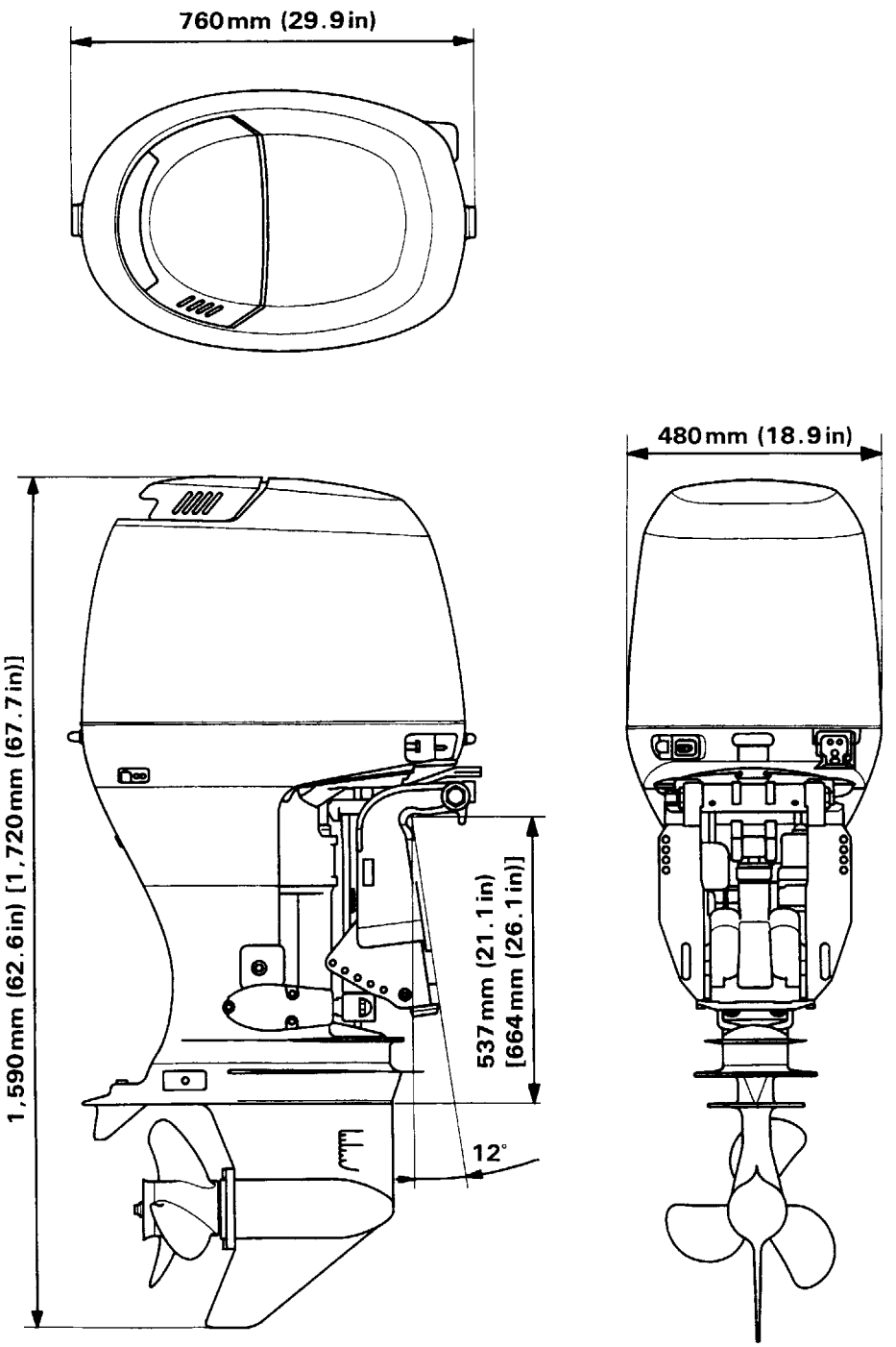
LOWER UNIT

Clutch	Dog clutch (Forward–Neutral–Reverse)
Gear ratio	0.43 (13 / 30)
Reduction	Spiral bevel
Gear case oil capacity	0.66 ℓ (0.70 US qt, 0.58 Imp qt)
Propeller rotating direction	Clockwise (viewed from rear)
Propeller driving system	Spline

2. DIMENSIONAL DRAWINGS

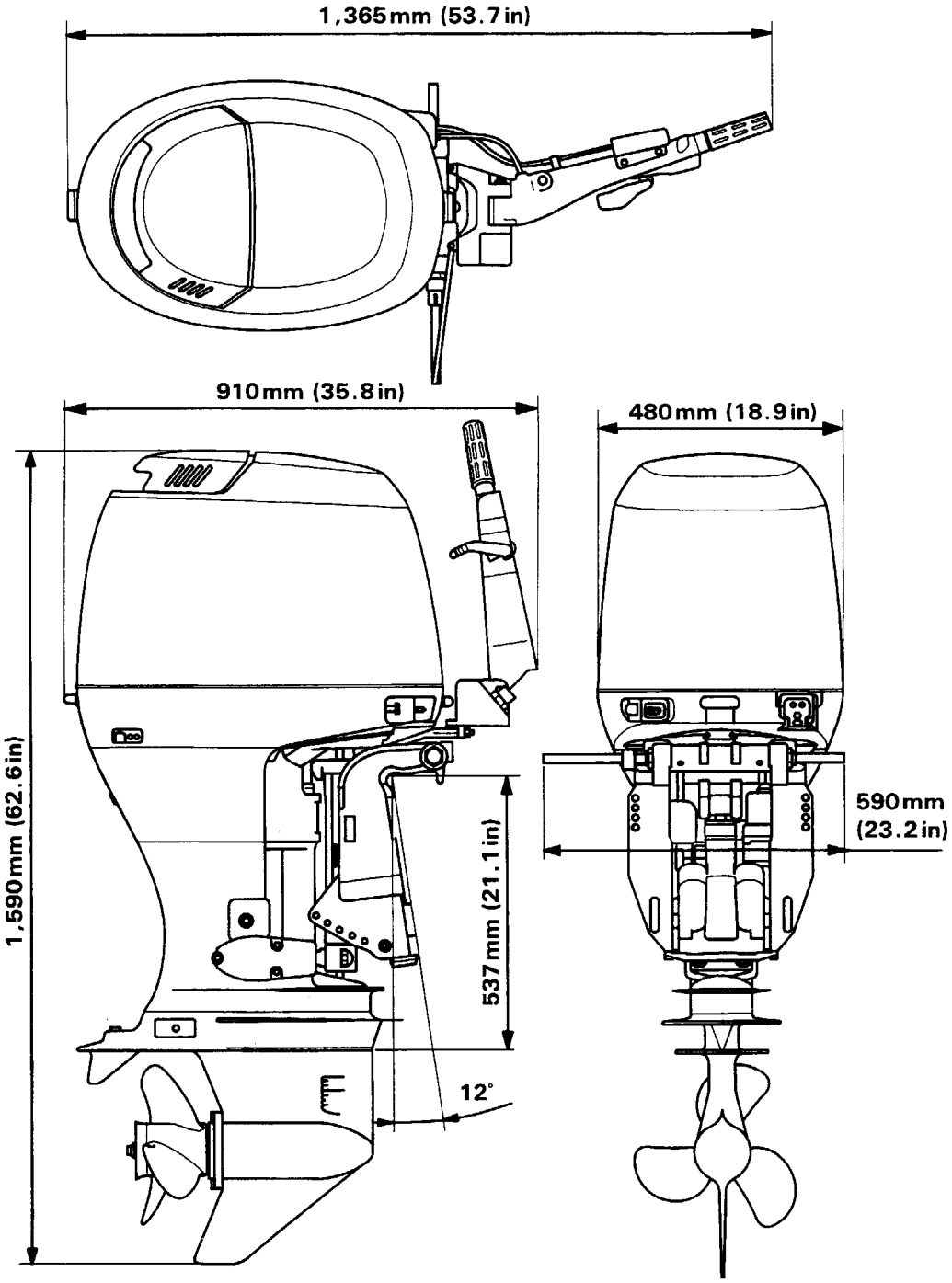
Unit: mm (in)

Remote control type
[ ] : Extra-long shaft type



Tiller handle type

Unit: mm (in)



2. SERVICE INFORMATION

1. THE IMPORTANCE OF PROPER SERVICING

Proper servicing is essential to the safety of the operator and the reliability of the outboard motor. Any error or oversight made by the technician while servicing can easily result in faulty operation, damage to the outboard motor, or injury to the operator.

⚠ WARNING

- **Improper servicing can cause an unsafe condition that can lead to serious injury or death.**
- **Follow the procedures and precautions in this shop manual carefully.**

Some of the most important precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing maintenance or repairs. Only you can decide whether or not you should perform a given task.

⚠ WARNING

- **Failure to follow maintenance instructions and precautions can cause you to be seriously hurt or killed.**
- **Follow the procedures and precautions in this shop manual carefully.**

2. IMPORTANT SAFETY PRECAUTIONS

Be sure you have a clear understanding of all basic shop safety practices and that you are wearing appropriate clothing and safety equipment. When performing maintenance or repairs, be especially careful of the following:

- **Read the instructions before you begin, and be sure you have the tools and skills required to perform the tasks safely.**

  Be sure the engine is off before you begin any maintenance or repairs. This will reduce the possibility of several hazards:

- **Carbon monoxide poisoning from engine exhaust.**
  Be sure there is adequate ventilation whenever you run the engine.

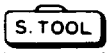
- **Burns from hot parts.**
  Let the engine cool before you touch it.

- **Injury form moving parts.**
  Do not run the engine unless the instruction tells you to do so. Even then, keep your hands, fingers, and clothing away.

To reduce the possibility of a fire or explosion, be careful when working around gasoline. Use only a nonflammable solvent, not gasoline, to clean parts. Keep all cigarettes, sparks, and flames away from the battery and all fuel-related parts.

3. SERVICE RULES

1. Use genuine Honda or Honda-recommended parts and lubricants or their equivalents. Parts that do not meet Honda's design specifications may damage the unit.
2. Use the special tools designed for the product.
3. Install new gaskets, O-rings, etc. when assembling.
4. When torquing bolts or nuts, begin with larger-diameter or inner bolts first, and tighten to the specified torque diagonally, unless a particular sequence is specified.
5. Clean parts in cleaning solvent upon disassembly. Lubricate any sliding surfaces before assembly.
6. After assembly, check all parts for proper installation and operation.
7. Many screws used in this machine are self-tapping. Be aware that cross-threading or overtightening these screws will strip the female threads and ruin the hole.
8. Use only metric tools when servicing this unit. Metric bolts, nuts and screws are not interchangeable with nonmetric fasteners. The use of incorrect tools and fasteners will damage the unit.
9. Follow the instructions represented by these symbols when they are used:

: Apply oil 

: Use special tool 

: Apply grease

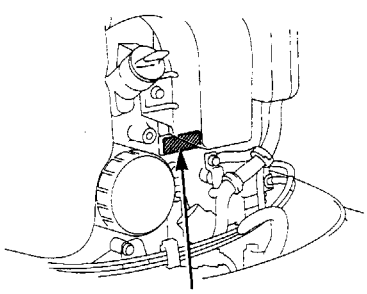
○×○(○) : Indicates the type, length, and number of the flange bolt used.

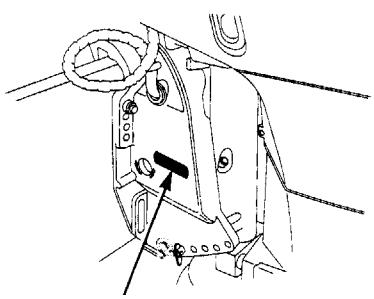
P. : Indicates the reference page.

(Molybdenum disulfide oil) : Use molybdenum oil solution (mixture of the engine oil and molybdenum grease with the ratio 1 : 1).

4. SERIAL NUMBER LOCATION

The engine serial number is stamped on the cylinder block and the product identification number is located on the L. stern bracket. Always specify these numbers when inquiring about the engine or when ordering parts in order to obtain the correct parts for the outboard motor being serviced.


ENGINE SERIAL NUMBER


PRODUCT IDENTIFICATION NUMBER

5. MAINTENANCE STANDARDS

ENGINE

Unit : mm (in)

Part	Item			Standard	Service limit
Engine	Idle speed (in neutral)			950 ± 50 min^{-1} (rpm)	———
	Cylinder compression			1,471 ± 98 kPa (15 ± 1 kgf/cm^2, 213 ± 14 psi) at 300 min^{-1} (rpm)	———
Carburetor	Main jet		BF75A	# 128 (Except LRTG type)	———
				# 122 (LRTG type only)	———
			BF90A	# 132	———
	Pilot screw opening		BF75A	1 – 7/8 turns out (Except LRTG type)	———
				2 turns out (LRTG type only)	———
			BF90A	2 – 1/4 turns out	———
	Float height			11.5 (0.45)	———
Spark plug	Gap			0.6 – 0.7 (0.024 – 0.028)	———
Valves	Valve clearance		IN	0.18 – 0.22 (0.007 – 0.009)	———
			EX	0.26 – 0.30 (0.010 – 0.012)	———
	Stem O.D.		IN	5.475 – 5.490 (0.2156 – 0.2161)	5.45 (0.215)
			EX	6.555 – 6.570 (0.2581 – 0.2587)	6.53 (0.258)
	Guide I.D.		IN	5.500 – 5.512 (0.2165 – 0.2170)	5.54 (0.218)
			EX	6.600 – 6.615 (0.2598 – 0.2604)	6.64 (0.261)
	Seat width		IN/EX	1.25 – 1.55 (0.049 – 0.061)	2.0 (0.08)
	Spring free length	IN		46.0 (1.81)	———
		EX	Inner	41.7 (1.64)	———
			Outer	44.1 (1.74)	———
	Stem-to-guide clearance		IN	0.010 – 0.037 (0.0004 – 0.0014)	0.07 (0.0028)
			EX	0.030 – 0.060 (0.0012 – 0.0024)	0.12 (0.005)
Rocker arm	Rocker arm I.D.			17.000 – 17.018 (0.6693 – 0.6700)	17.04 (0.671)
	Rocker arm shaft O.D.			16.962 – 16.980 (0.6678 – 0.6685)	16.92 (0.666)
	Rocker arm shaft-to-rocker arm clearance			0.020 – 0.056 (0.0008 – 0.0022)	0.07 (0.0028)
Piston	Skirt O.D.			74.980 – 74.990 (2.9520 – 2.9524)	74.92 (2.950)
	Piston-to-cylinder clearance			0.010 – 0.035 (0.0004 – 0.0013)	0.1 (0.004)
	Pin bore I.D.			19.010 – 19.016 (0.7484 – 0.7487)	———
	Pin O.D.			18.996 – 19.000 (0.7479 – 0.7480)	18.97 (0.747)
	Pin-to-pin bore clearance			0.010 – 0.020 (0.0004 – 0.0008)	———

Unit : mm (in)

Part	Item		Standard	Service limit
Piston ring	Ring side clearance	Top	0.030 – 0.060 (0.0012 – 0.0024)	0.1 (0.004)
		Second	0.030 – 0.055 (0.0012 – 0.0022)	0.1 (0.004)
		Oil	0.045 – 0.145 (0.0018 – 0.0057)	0.2 (0.008)
	Ring end gap	Top	0.15 – 0.30 (0.006 – 0.012)	0.6 (0.024)
		Second	0.15 – 0.30 (0.006 – 0.012)	0.6 (0.024)
		Oil	0.20 – 0.80 (0.008 – 0.031)	0.9 (0.035)
	Ring thickness	Top	1.170 – 1.190 (0.0461 – 0.0469)	1.08 (0.043)
		Second	1.475 – 1.490 (0.0581 – 0.0587)	1.38 (0.054)
Cylinder/ cylinder head	Cylinder sleeve I.D.		75.000 – 75.015 (2.9528 – 2.9533)	75.055 (2.9549)
	Distortion of cylinder head		0.05 (0.0019)	0.1 (0.004)
	I.D. of camshaft journal	#1	32.000 – 32.025 (1.2598 – 1.2608)	32.06 (1.262)
		#2	48.000 – 48.025 (1.8898 – 1.8907)	48.06 (1.892)
		#3	48.500 – 48.525 (1.9094 – 1.9104)	48.56 (1.912)
		#4	49.000 – 49.025 (1.9291 – 1.9301)	49.06 (1.931)
	(Oil pump journal)	#5	36.000 – 36.025 (1.4173 – 1.4183)	36.06 (1.420)
Connecting rod	Small end I.D.		18.960 – 18.980 (0.7465 – 0.7472)	———
	Small end press fitting clearance		0.016 – 0.040 (0.0006 – 0.0016)	———
	Big end axial clearance		0.15 – 0.30 (0.006 – 0.012)	0.4 (0.02)
	Connecting rod big end oil clearance		0.020 – 0.038 (0.0008 – 0.0015)	0.05 (0.0019)
Crankshaft	Journal O.D.	Main	54.976 – 55.000 (2.1644 – 2.1654)	54.96 (2.164)
		Pin	44.976 – 45.000 (1.7707 – 1.7717)	44.96 (1.770)
	Crankshaft main bearing oil clearance		0.025 – 0.043 (0.0010 – 0.0017)	0.06 (0.0024)
	Crankshaft side clearance		0.10 – 0.35 (0.004 – 0.014)	0.45 (0.018)
Camshaft	Shaft axial clearance		0.03 – 0.11 (0.0012 – 0.0043)	0.3 (0.012)
	Shaft runout		0.03 (0.0012) Max	0.05 (0.0019)
	Journal O.D.	#1	31.950 – 31.975 (1.2579 – 1.2589)	31.93 (1.257)
		#2	47.930 – 47.955 (1.8870 – 1.8880)	47.90 (1.886)
		#3	48.430 – 48.455 (1.9067 – 1.9077)	48.40 (1.906)
		#4	48.930 – 48.955 (1.9264 – 1.9274)	48.90 (1.925)
		#5	35.950 – 35.975 (1.4154 – 1.4163)	35.93 (1.415)

Unit : mm (in)

Part	Item		Standard	Service limit
Camshaft	Cam height	IN	40.008 – 40.248 (1.5751 – 1.5846)	39.808 (1.5672)
		EX	39.857 – 40.097 (1.5691 – 1.5786)	39.657 (1.5613)
	Shaft oil clearance	#1	0.025 – 0.075 (0.0010 – 0.0030)	0.10 (0.004)
		#2	0.045 – 0.095 (0.0018 – 0.0037)	0.12 (0.005)
		#3	0.045 – 0.095 (0.0018 – 0.0037)	0.12 (0.005)
		#4	0.045 – 0.095 (0.0018 – 0.0037)	0.12 (0.005)
		#5	0.025 – 0.075(0.0010 – 0.0030)	0.10 (0.004)
Oil pump	Body I.D.		80.00 – 80.04 (3.150 – 3.151)	80.06 (3.152)
	Inner rotor-to-outer rotor clearance		0.02 – 0.16 (0.0008 – 0.0063)	0.2 (0.008)
	Outer rotor-to-body clearance		0.10 – 0.19 (0.004 – 0.007)	0.23 (0.009)
	Outer rotor height		17.98 – 18.00 (0.708 – 0.709)	17.96 (0.707)
	Pump body depth		18.02 – 18.05 (0.709 – 0.711)	18.09 (0.712)
	Pump end clearance		0.02 – 0.07 (0.0008 – 0.0028)	0.10 (0.004)
Ignition coil	Resistance	Primary coil	0.35 – 0.43 Ω	———
		Secondary coil	23.1 – 34.7 kΩ	———
Pulser coil	Resistance		168 – 252 Ω	———
Alternator	Stator resistance		0.46 – 0.69 Ω	———
Starter motor	Brush length		12.3 (0.48)	7.0 (0.3)
	Insulation depth		0.4 – 0.5 (0.016 – 0.020)	0.2 (0.010)
	Commutator O.D.		29.4 (1.15)	28.8 (1.13)
	Commutator runout		———	0.1 (0.004)

FRAME

Unit : mm (in)

Part	Item		Standard	Service limit
Vertical shaft	Shaft O.D. (at needle bearing)		28.562 – 28.575 (1.1245 – 1.1250)	28.541 (1.1237)
Propeller shaft	Shaft O.D. (at needle bearing)	Forward bevel gear	25.390 – 25.425 (0.9996 – 1.0010)	25.369 (0.9988)
		Holder	30.149 – 30.162 (1.1870 – 1.1875)	30.128 (1.1861)

6. TORQUE VALUES

Item		Thread Dia. (mm) and pitch (length)	Torque values		
			N · m	kgf · m	lbf · ft
• **ENGINE**					
Crankcase bolt	*1	M10 x 1.25	25	2.5	18
	*3		44	4.5	33
		M8 x 1.25	26	2.7	20
Oil filter		M22 x 1.5	22	2.2	16
Cylinder head bolt		M10 x 1.25	69	7.0	51
		M8 x 1.25	26	2.7	20
Connecting rod nut		M8 x 0.75	31	3.2	23
Valve adjusting lock nut		M7 x 0.75	23	2.3	17
Oil drain plug		M12 x 1.5	23	2.3	17
Oil strainer nut		M10 x 1.25	39	4.0	29
Flywheel bolt		M12 x 1.0	103	10.5	76
Oil pump bolt		M8 x 1.25	26	2.7	20
		M6 x 1.0	12	1.2	9
18mm sealing bolt		M18 x 1.5	39	4.0	29
Starter pulley bolt		M6 x 1.0	12	1.2	9
Alternator rotor bolt	*2	M14 x 1.25	20	2.0	14
	*3		181	18.5	134
Timing belt driven pulley bolt		M10 x 1.25	56	5.7	41
Timing belt tensioner bolt		M10 x 1.25	44	4.5	33
Timing belt adjusting spring bolt		M6 x 1.0	12	1.2	9
Throttle cam bolt		M6 x 1.0	12	1.2	9
Choke arm bolt		M6 x 1.0	12	1.2	9
Choke solenoid bracket bolt (Remote control type only)		M6 x 1.0	9	0.9	6.5
Engine mount bolt, nut		M10 x 1.25	39	4.0	29
Intake manifold bolt, nut		M8 x 1.25	26	2.7	20
Carburetor bolt		M6 x 1.0	10	1.0	7
Diaphragm torx. bolt		M6 x 1.0	9	0.9	6.5
Fuel pump bolt		M6 x 1.0	9	0.9	6.5
Thermoswitch		M16 x 1.5	12	1.2	9
Oil pressure switch		PT1/8	9	0.9	6.5
Starter magnetic switch nut		M6 x 1.0	5	0.5	3.6
CDI unit bolt		M6 x 1.0	5	0.5	3.6
Starter motor bolt		M10 x 1.25	39	4.0	29
Rear bracket bolt		M5 x 0.8	5	0.5	3.6
Starter solenoid screw		M6 x 1.0	6	0.6	4.3
nut		M8 x 1.25	10	1.0	7

*1 : Tighten the cranckase bolts to 25N · m (2.5 kgf · m, 18 lbf · ft) first, then tighten them an additional 40° (Snag torque [Angle method]).

*2 : Tighten the alternator rotor bolts to 20N · m (2.0 kgf · m, 14 lbf · ft) first, then tighten them an additional 90° (Snag totque [Angle method])

*3 : Tighten to the specified torque (Torque method).

Item	Thread Dia. (mm) and pitch (length)	Torque values		
		N · m	kgf · m	lbf · ft
• GEAR CASE				
Propeller shaft nut	M18 x 1.5	75	7.6	55
Propeller shaft holder nut	M8 x 1.25	30	3.1	22
Gear case bolt	M10 x 1.25	34	3.5	25
nut (UL type only)	M10 x 1.25	34	3.5	25
Extension separator stud bolt (UL type only)	M10 x 1.25	15	1.5	11
Oil drain bolt	M8 x 1.25	7	0.7	5.1
Oil level screw	M8 x 1.25	7	0.7	5.1
Vent screw	M8 x 1.25	7	0.7	5.1
Trim tab bolt	7/16 – 14 UNC	29.8	3.0	22
Anode metal nut	M6 x 1.0	7	0.7	5.1
Seal holder bolt	M6 x 1.0	7	0.7	5.1
Pinion gear nut	5/8 – 18 UNF	95	9.7	70
Impeller housing bolt	M6 x 1.0	7	0.7	5.1
Water pump housing bolt	M6 x 1.0	7	0.7	5.1
• EXTENSION/MOUNT				
Lower rubber motor mount nut	M12 x 1.25	83	8.5	61
Lower rubber motor mount housing bolt	M8 x 1.25	22	2.2	16
Extension case bolt	M10 x 1.25	34	3.5	25
Under cover bolt	M6 x 1.0	6.4	0.65	4.7
Upper rubber mount nut	M12 x 1.25	83	8.5	61
• STERN BRACKET				
Stern bracket nut	M25 x 2.0	17	1.7	12
	7/8 – 14 UNC	17	1.7	12
	M10 x 1.25	34	3.5	25
• POWER TRIM/TILT ASSEMBLY				
Cylinder cap	———	162	16.5	119
Rod guide comp.	———	78	8.0	58
Manual valve	M14 x 1.5	3.5	0.35	2.5
Socket bolt A/B	———	8.3	0.85	6.1
Power tilt motor assembly bolt	1/4 – 20 UNC	5	0.5	3.6
Oil tank bolt	———	5	0.5	3.6
Oil tank cap	———	2.5	0.25	1.8
• GAS ASSISTED ASSEMBLY				
Tilt lever nut	M6 x 1.0	10	1.0	7
• FRAME/ELECTRICAL				
Separate top cover bolt	M6 x 1.0 (Flange)	12	1.2	9
	(Hex.)	10	1.0	7
Steering rod bolt/nut (Remote control type only)	3/8 – 24 UNF	22	2.2	16
Remote control lever bolt (Panel-mount/single top-mount/dual top-mount remote control type only)	———	17	1.7	12
Shoulder bolt (Panel-mount/single top-mount/dual top-mount remote control type only)	———	4	0.4	2.9
Tiller handle bolt/nut (Tiller handle type only)	M10 x 1.25	35	3.6	26
	M8 x 1.25	22	2.2	16

Item	Thread Dia. (mm) and pitch (length)	Torque values		
		N · m	kgf · m	lbf · ft
• **FRAME / ELECTRICAL**				
Steering bracket nut (Tiller handle type only)	M12 X 1.25	31	3.2	23
Shift link cover screw (Tiller handle type only)	M6 x 1.0	3	0.3	2.2
Tilt handle nut	M6 x 1.0	6.4	0.65	4.7
Ignition switch nut	M22 x 1.0	4.8	0.49	3.5
Emergency stop switch nut	M16 x 1.0	1.5	0.15	1.1
Neutral switch nut	M20 x 1.0	2.5	0.25	1.8
Grease fitting	M6 x 1.0	3	0.3	2.2

NOTE : Use standard torque values for fasteners that the are not listed in this table.

STANDARD TORQUE VALUES

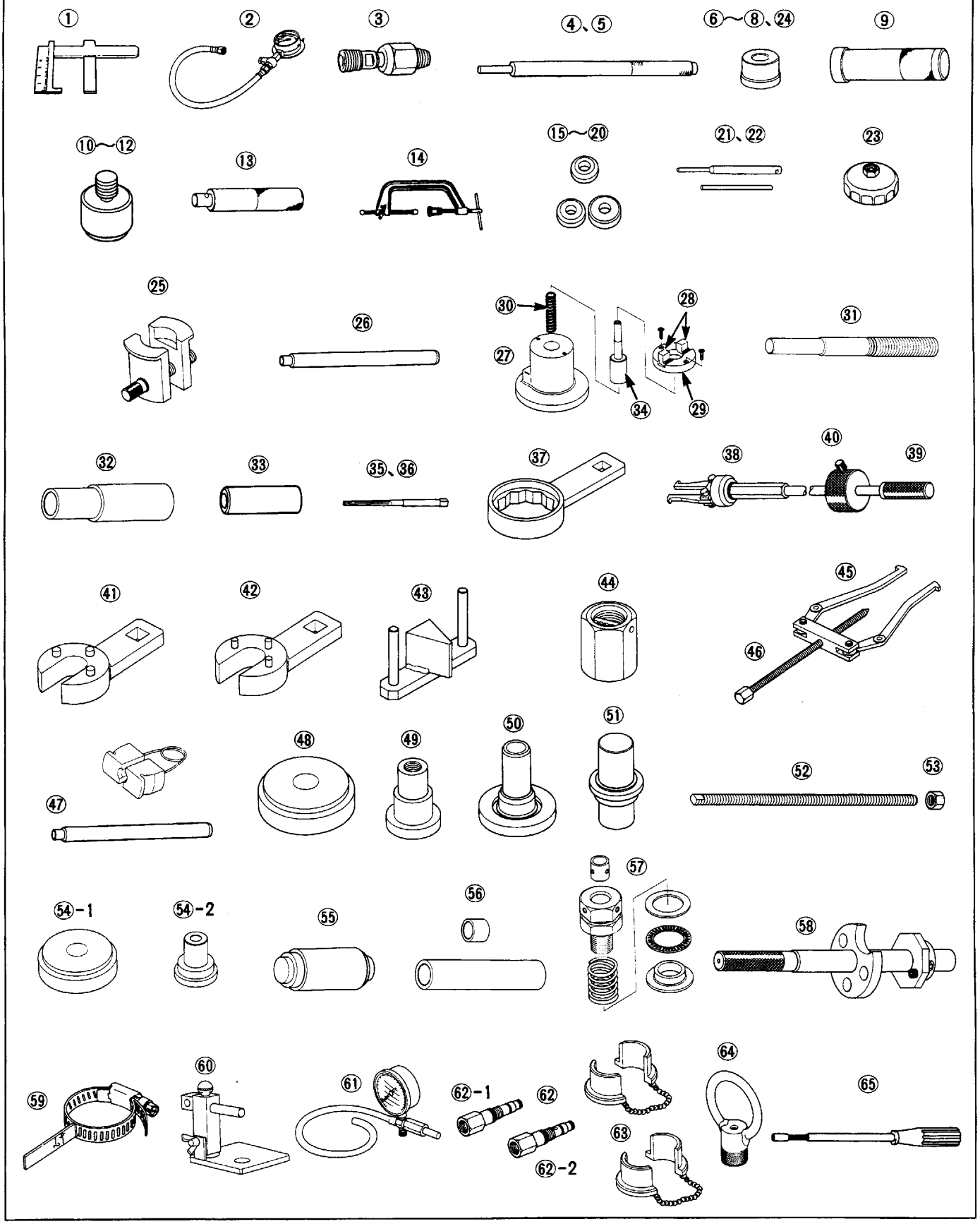
Item	Thread Dia. (mm) and pitch (length)	Torque values		
		N · m	kgf · m	lbf · ft
Bolt and nut	5 mm	5.2	0.52	3.8
	6 mm	10	1.0	7
	8 mm	21.5	2.15	15.6
	10 mm	34	3.5	25
	12 mm	54	5.5	40
Flange bolt and nut	6 mm (SH Flange bolt)	9	0.9	6.5
	6 mm	12	1.2	9
	8 mm	26	2.7	20
	10 mm	39	4.0	29
Screw	5 mm	4.2	0.42	3.0
	6 mm	9	0.9	6.5

7. SPECIAL TOOLS

Tool name	Tool number	Application
1. Float level gauge	07401–0010000	Inspection for carburetor float level
2. Oil pressure gauge	07506–3000000	Inspection for oil pressure
3. Oil pressure gauge attachment	07406–0030000	Inspection for oil pressure
4. Valve guide driver, 5.5 mm	07742–0010100	Valve guide removal/installation (IN)
5. Valve guide driver, 6.6 mm	07742–0012000	Valve guide removal/installation (EX)
6. Attachment, 32 x 35 mm	07746–0010100	22x35x7 mm water seal installation, propeller shaft holder needle bearing, propeller shaft holder water innner/outer seal, lower mount center housing removal
7. Attachment, 37 x 40 mm	07746–0010200	Taper roller bearing (inner race) removal
8. Attachment, 52 x 55 mm	07746–0010400	Taper roller bearing (inner race) installation
9. Driver, 40 mm I.D.	07746–0030100	Lower mount center housing installation
10. Pilot, 25 mm	07746–0040600	Taper roller bearing (inner race) removal, forward bevel gear roller bearing installation
11. Pilot, 30 mm	07746–0040700	Lower mount center housing removal
12. Pilot. 22 mm	07746–0041000	22x35x7 mm water seal installation
13. Driver	07749–0010000	Driver for 6,7,8,10,11,12 and 24
14. Valve spring compressor	07757–0010000	Valve cotter removal/installation
15. Valve seat cutter, 45° ø29	07780–0010300	Valve seat reconditioning (IN)
16. Valve seat cutter, 45° ø33	07780–0010800	Valve seat reconditioning (EX)
17. Valve seat cutter, 32° ø30	07780–0012200	Valve seat reconditioning (IN)
18. Valve seat cutter, 32° ø35	07780–0012300	Valve seat reconditioning (EX)
19. Valve seat cutter, 60° ø30	07780–0014000	Valve seat reconditioning (IN)
20. Valve seat cutter, 60° ø37.5	07780–0014100	Valve seat reconditioning (EX)
21. Cutter holder, 5.5 mm	07781–0010101	Valve seat reconditioning (IN)
22. Cutter holder, 6.6 mm	07781–0010202	Valve seat reconditioning (EX)
23. Oil filter wrench	07912–6110001	Oil filter replacement
24. Attachment, 28 x 30 mm	07946–1870100	Forward bevel gear roller bearing installation, propeller shaft holder roller bearing removal
25. Bearing race remover	07946–3710500	Propeller shaft holder roller bearing removal
26. Driver	07949–3710001	Driver for 6 and 24
27. Piston base	07973–6570500	Piston pin removal/installation
28. Head	07PAF–0010500	
29. Head base	07PAF–0010400	
30. Return spring	07973–6570600	
31. Insert adjuster	07PAF–0010800	
32. Insert pin	07PAF–0010700	
33. Pilot collar, 19 mm	07PAF–0010650	
34. Pilot pin	07PAF–0010300	
35. Valve guide reamer, 5.5 mm	07984–2000001	Valve guide reaming (IN)
36. Valve guide reamer, 6.6 mm	07984–ZE20001	Valve guide reaming (EX)
37. Lock nut wrench, 56 mm	07LPA–ZV30200	Timing belt driven pulley removal/installation
38. Bearing race puller	07LPC–ZV30100	Gear case taper roller bearing (outer race) removal
39. Remover handle	07936–3710100	
40. Remover weight	07741–0010201	
41. ø6 pin type wrench	07SPA–ZW10100	Piston rod comp. removal/installation
42. ø4 pin type wrench	07SPA–ZW10200	Rod guide comp. removal/installation
43. Ring gear holder	07SPB–ZW10100	Alternator rotor, starter pulley, flywheel removal/ installation

Tool name	Tool number	Application
44. Vertical shaft holder	07SPB–ZW10200	Vertical shaft pinion gear nut removal/installation
45. Puller jaws	07SPC–ZW0010Z	Propeller shaft holder assembly removal, forward bevel gear backlash inspection
46. Puller bolt	07SPC–ZW0011Z	Propeller shaft holder assembly removal, forward bevel gear backlash inspection
47. Bearing race puller	07SPC–ZW0020Z	Gear case taper bearing (outer race) removel
48. Mandrel	07SPD–ZW0010Z	Gear case taper roller bearing (outer race) installation
49. Mandrel	07SPD–ZW0020Z	Propeller shaft holder needle bearing installation
50. Bearing installation tool	07SPD–ZW0030Z	Propeller shaft holder needle bearing, propeller shaft holder water inner/outer seal, propeller shaft holder roller bearing installation
51. Oil seal driver	07SPD–ZW0040Z	Propeller shaft holder water inner/outer seal installation
52. Rod	07SPD–ZW0050Z	Gear case bearing assembly, gear case taper bearing (outer race) installation
53. Nut	07SPD–ZW0060Z	Gear case bearing assembly, gear case taper bearing (outer race) installation
54. Bearing installation tool kit	07SPD–ZW0070Z	Use the mandrel (91–13780, 91–13781) only
54–1. Mandrel	91–13780 *	Gear case bearing assembly, gear case taper bearing (outer race) installation
54–2. Mandrel	91–13781 *	Gear case bearing assembly, gear case taper bearing (outer race) installation
55. Water seal driver	07SPD–ZW0080Z	Water pump housing upper/lower water seal installation
56. Wear sleeve installation tool	07SPF–ZW0010Z	Wear sleeve installation
57. Bearing preload tool	07SPJ-ZW0010Z	Pinion gear shim adjustment, forward bevel gear backlas inspection
58. Pinion gear locating tool	07SPJ–ZW0020Z	Pinion gear shim adjustment
59. Backlash indicator tool	07SPJ–ZW0030Z	Forward bevel gear backlash inspection
60. Dial indicator adapter kit	07SPJ–ZW0040Z	Forward bevel gear backlash inspection
61. Leakage tester	07SPJ–ZW0050Z	Gear case pressure test (Use the tip of the gear lubricant pump, too).
62. Oil pressure gauge set	07SPJ–ZW10000	Power Trim/tilt assembly blow pressue inspection
62–1. -Oil pressure gauge joint A	07SPJ–ZW10100	
62–2. -Oil pressure gauge joint B	07SPJ–ZW10200	
63. Vertical shaft indicator attachment	07SPK–ZW10100	Pinion gear shim adjustment, forward bevel gear backlash inspection
64. Lifting eye	07SPZ–ZW0010Z	Engine removal/installation
65. Pilot screw wrench	07KMA–MS60101	Pilot screw adjustment (Bodensee type only)

* Tools contained in the bearing installation tool kit (07SPD–ZW0070Z).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