YAMAHA

YFM35FAS
YFM350FAS

5UH2-AE1

SUPPLEMENTARY SERVICE MANUAL

FOREWORD

This Supplementary Service Manual has been prepared to introduce new service and data for the YFM35FAS/YFM350FAS. For complete service information procedures it is necessary to use this Supplementary Service Manual together with the following manual.

YFM4FAR/YFM400FAR SERVICE MANUAL: 5TE2-AE1

YFM35FAS/YFM350FAS
SUPPLEMENTARY
SERVICE MANUAL

First edition, July 2003

EB001000

NOTICE

This manual was produced by the Yamaha Motor Company primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual, so it is assumed that anyone who uses this book to perform maintenance and repairs on Yamaha machine has a basic understanding of the mechanical ideas and the procedures of machine repair. Repairs attempted by anyone without this knowledge are likely to render the machine unsafe and unfit for use.

Yamaha Motor Company, Ltd. is continually striving to improve all its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

NOTE:
Designs and specifications are subject to change without notice.

IMPORTANT INFORMATION

Particularly important information is distinguished in this manual by the following notations.

⚠ The Safety Alert Symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED!

⚠ WARNING Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander or a person inspecting or repairing the machine.

CAUTION: A CAUTION indicates special precautions that must be taken to avoid damage to the machine.

NOTE: A NOTE provides key information to make procedures easier or clearer.

EB002000

HOW TO USE THIS MANUAL

MANUAL ORGANIZATION

This manual consists of chapters for the main categories of subjects. (See “Illustrated symbols”)

1st title ①: This is the title of the chapter with its symbol in the upper right corner of each page.

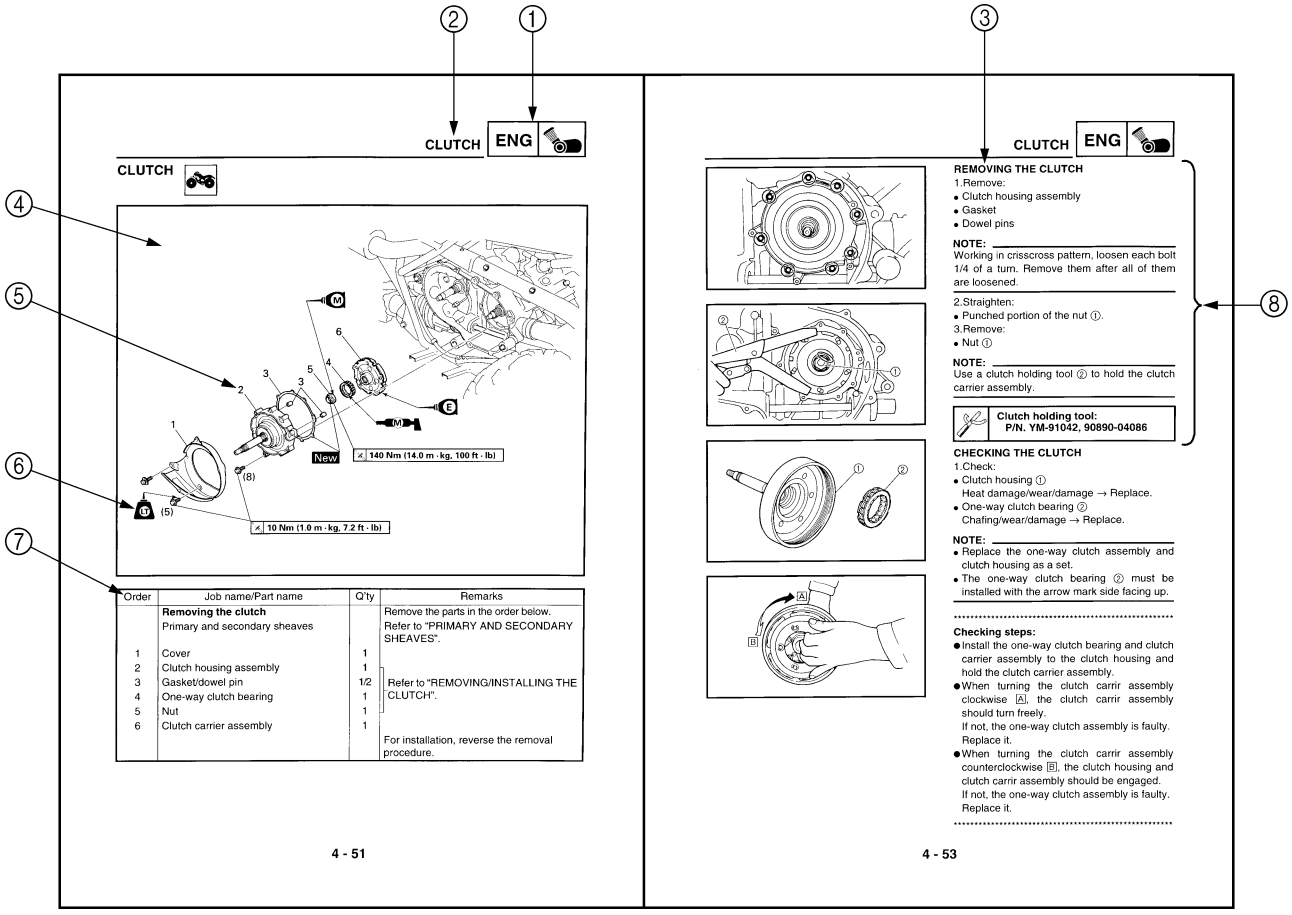
2nd title ②: This title indicates the section of the chapter and only appears on the first page of each section. It is located in the upper left corner of the page.

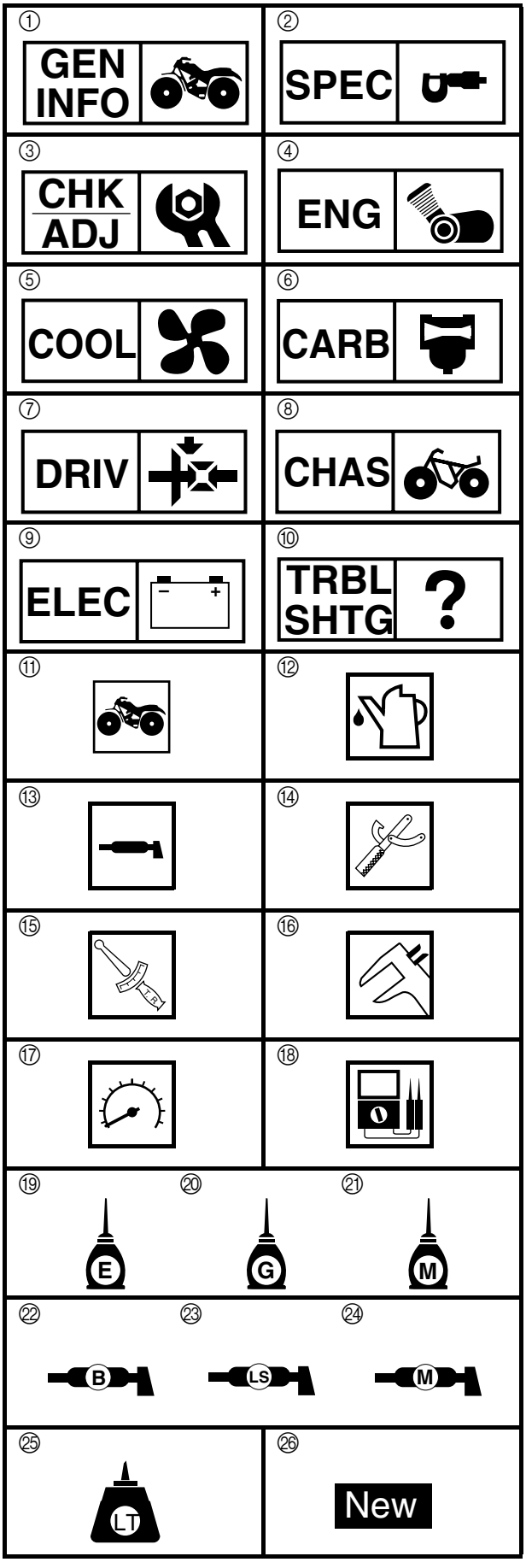
3rd title ③: This title indicates a sub-section that is followed by step-by-step procedures accompanied by corresponding illustrations.

EXPLODED DIAGRAMS

To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.

1. An easy-to-see exploded diagram ④ is provided for removal and disassembly jobs.
2. Numbers ⑤ are given in the order of the jobs in the exploded diagram. A number that is enclosed by a circle indicates a disassembly step.
3. An explanation of jobs and notes is presented in an easy-to-read way by the use of symbol marks ⑥. The meanings of the symbol marks are given on the next page.
4. A job instruction chart ⑦ accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
5. For jobs requiring more information, the step-by-step format supplements ⑧ are given in addition to the exploded diagram and the job instruction chart.





EB003000

ILLUSTRATED SYMBOLS

Illustrated symbols ① to ⑩ are printed on the top right of each page and indicate the subject of each chapter.

① General information
② Specifications
③ Periodic checks and adjustments
④ Engine
⑤ Cooling system
⑥ Carburetion
⑦ Drive train
⑧ Chassis
⑨ Electrical
⑩ Troubleshooting

Illustrated symbols ⑪ to ⑱ are used to identify the specifications appearing in the text.

⑪ Can be serviced with engine mounted
⑫ Filling fluid
⑬ Lubricant
⑭ Special tool
⑮ Torque
⑯ Wear limit, clearance
⑰ Engine speed
⑱ Ω, V, A

Illustrated symbols ⑲ to ㉔ in the exploded diagrams indicate the types of lubricants and lubrication points.

⑲ Apply engine oil
⑳ Apply gear oil
㉑ Apply molybdenum disulfide oil
㉒ Apply wheel bearing grease
㉓ Apply lithium-soap-based grease
㉔ Apply molybdenum disulfide grease

Illustrated symbols ㉕ to ㉖ in the exploded diagrams indicate where to apply a locking agent ㉕ and when to install a new part ㉖.

㉕ Apply the locking agent (LOCTITE®)
㉖ Replace

CONTENTS

TROUBLESHOOTING

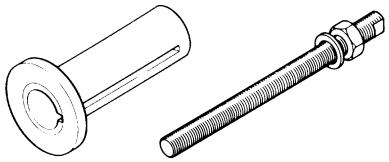
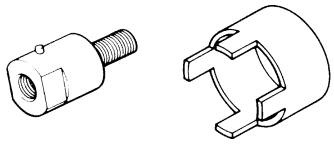
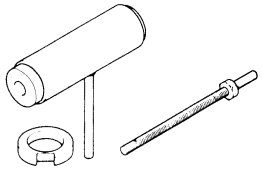
YFM35FAS/YFM350FAS WIRING DIAGRAM

GENERAL INFORMATION

EB102001
SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools; this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools may differ by shape and part number from country to country. In such a case, two types are provided.
When placing an order, refer to the list provided below to avoid any mistakes.

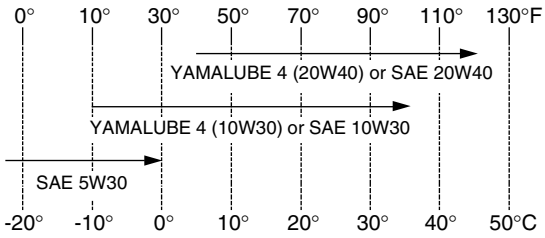
For US and CDN
P/N. YM-, YU-, YS-, YK-, ACC-
Except for US and CDN
P/N. 90890-

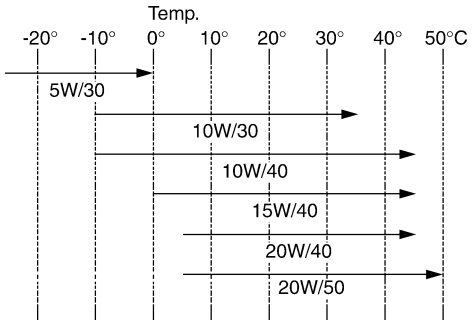
Tool No.	Tool name/How to use	Illustration
Pot 90890-01274 Bolt 90890-01275	Crankshaft installer pot Crankshaft installer bolt These tools are used to install the crankshaft.	
90890-01309	Spacer This tool is used to install the crankshaft.	
Adapter 90890-01383 YM-1383 Spacer 90890-04081 YM-91044	Adapter Spacer (crankshaft installer) These tools are used to install the crankshaft.	
YU-90050	Crankshaft installer set These tools are used to install the crankshaft.	

SPECIFICATIONS

GENERAL SPECIFICATIONS

Item	Standard
Model code:	5UH2 (for CDN) 5UH4 (for Europe) 5UH5 (for Oceania)
Dimensions:	
Overall length	1,984 mm (78.1 in)
Overall width	1,085 mm (42.7 in)
Overall height	1,120 mm (44.1 in)
Seat height	827 mm (32.6 in)
Wheelbase	1,233 mm (48.5 in)
Minimum ground clearance	245 mm (9.7 in)
Minimum turning radius	3,000 mm (118.1 in)
Basic weight:	
With oil and full fuel tank	258 kg (569 lb)
Engine:	
Engine type	Air-cooled 4-stroke, SOHC
Cylinder arrangement	Forward-inclined single cylinder
Displacement	348 cm^3
Bore × stroke	83.0 × 64.5 mm (3.27 × 2.54 in)
Compression ratio	9.2 : 1
Standard compression pressure (at sea level)	1,050 kPa (10.5 kg/cm^2, 149.3 psi) at 750 r/min
Starting system	Electric and recoil starter
Lubrication system:	Wet sump
Oil type or grade:	
Engine oil	
For CDN	API service SE, SF, SG type or higher
For Europe, Oceania	
Final gear oil	SAE 80API “GL-4” Hypoid Gear Oil
Differential gear oil	SAE 80API “GL-4” Hypoid Gear Oil



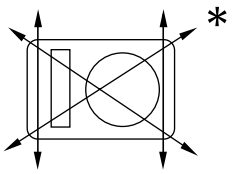
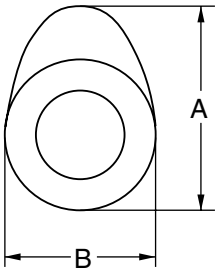
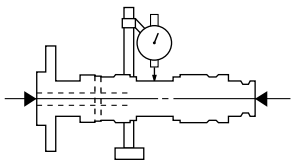


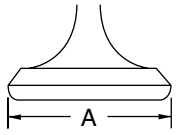
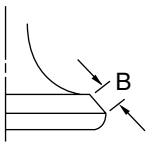
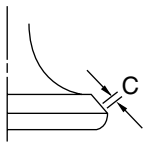
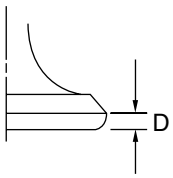
Item		Standard
Oil capacity:		
Engine oil		
Periodic oil change		2.2 L (1.94 Imp qt, 2.33 US qt)
With oil filter replacement		2.3 L (2.02 Imp qt, 2.43 US qt)
Total amount		3.1 L (2.73 Imp qt, 3.28 US qt)
Final gear case oil		
Periodic oil change		0.23 L (0.20 Imp qt, 0.24 US qt)
Total amount		0.25 L (0.22 Imp qt, 0.26 US qt)
Differential gear case oil		
Periodic oil change		0.35 L (0.31 Imp qt, 0.37 US qt)
Total amount		0.40 L (0.35 Imp qt, 0.42 US qt)
Air filter:		Wet type element
Fuel:		
Type		Regular unleaded gasoline only (for CDN, Europe) Unleaded gasoline only (for Oceania)
Fuel tank capacity		13.5 L (2.97 Imp gal, 3.57 US gal)
Fuel reserve amount		3.3 L (0.73 Imp gal, 0.87 US gal)
Carburetor:		
Type/quantity		BSR33/1
Manufacturer		MIKUNI
Spark plug:		
Type/manufacturer		DR8EA/NGK
Spark plug gap		0.6 ~ 0.7 mm (0.024 ~ 0.028 in)
Clutch type:		Wet, centrifugal automatic
Transmission:		
Primary reduction system		V-belt
Secondary reduction system		Shaft drive
Secondary reduction ratio		41/21 × 24/18 × 33/9 (9.545)
Transmission type		V-belt automatic
Operation		Left hand operation
Single speed automatic		2.60 ~ 0.75 : 1
Sub transmission ratio		35/20 (1.750)
Reverse gear		26/15 (1.733)
Chassis:		
Frame type		Steel tube frame
Caster angle		4°
Camber angle		1°
Kingpin angle		11°
Kingpin offset		–5.0 mm (–0.20 in)
Trail		21 mm (0.83 in)
Tread (STD)	front	850 mm (33.46 in)
	rear	825 mm (32.48 in)
Toe-in		0 ~ 10 mm (0 ~ 0.39 in)

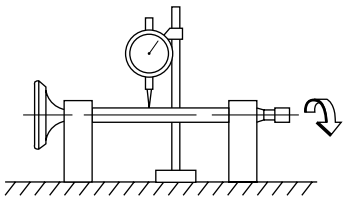
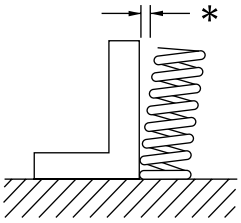
Item		Standard
Tires:		
Type		Tubeless
Size	front	AT25 × 8–12
	rear	AT25 × 10–12
Manufacturer	front	MAXXIS (for CDN, Europe) CHENG SHIN (for Oceania)
	rear	MAXXIS (for CDN, Europe) CHENG SHIN (for Oceania)
Type	front	M911Y (for CDN, Europe) C828 (for Oceania)
	rear	M912Y (for CDN, Europe) C828 (for Oceania)
Tire pressure (cold tire):		
Maximum load*		210 kg (463 lb)
Off-road riding	front	22 ~ 28 kPa (0.22 ~ 0.28 kg/cm^2, 3.2 ~ 4.0 psi)
	rear	22 ~ 28 kPa (0.22 ~ 0.28 kg/cm^2, 3.2 ~ 4.0 psi)
*Load in total weight of rider accessories		
Brakes:		
Front brake	type	Dual disc brake
	operation	Right hand operation
Rear brake	type	Drum brake
	operation	Left hand and right foot operation
Suspension:		
Front suspension		Double wishbone
Rear suspension		Swingarm (monocross)
Shock absorbers:		
Front shock absorber		Coil spring/oil damper
Rear shock absorber		Coil spring/oil damper
Wheel travel:		
Front wheel travel		160 mm (6.30 in)
Rear wheel travel		180 mm (7.09 in)
Electrical:		
Ignition system		D.C. C.D.I.
Generator system		A.C. magneto
Battery type		YTX14AH
Battery capacity		12 V 12 Ah
Headlight type:		Krypton bulb
Bulb wattage × quantity:		
Headlight		12 V 30 W/30 W × 2
Tail/brake light		12 V 5 W/21 W × 1
Meter light		14 V 3 W × 1
Indicator lights		
Neutral		12 V 1.7 W × 1
Reverse		12 V 1.7 W × 1
Oil temperature		12 V 1.7 W × 1
Four-wheel drive		14 V 1.7 W × 1

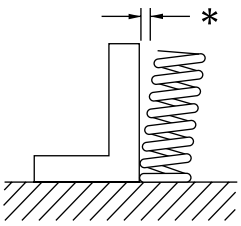
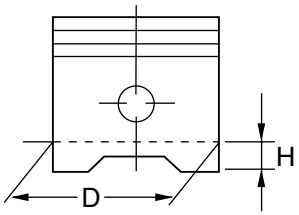
MAINTENANCE SPECIFICATIONS

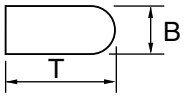
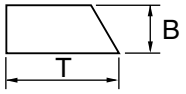
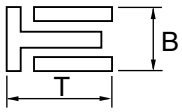
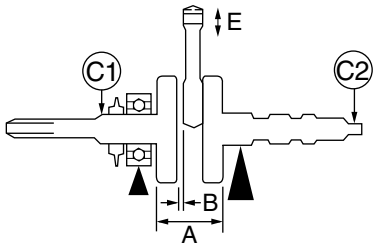
ENGINE

Item	Standard	Limit
Cylinder head:		
Warp limit * 	----	0.03 mm (0.0012 in)
Cylinder:		
Bore size	82.970 ~ 83.020 mm (3.2665 ~ 3.2685 in)	83.100 mm (3.2720 in)
Taper limit	----	0.05 mm (0.0016 in)
Out of round limit	----	0.01 mm (0.0004 in)
Camshaft:		
Drive method	Chain drive (left)	----
Cam dimensions 		
Intake “A”	40.62 ~ 40.72 mm (1.5992 ~ 1.6031 in)	40.52 mm (1.5953 in)
“B”	32.18 ~ 32.28 mm (1.2669 ~ 1.2709 in)	32.08 mm (1.2630 in)
Exhaust “A”	40.62 ~ 40.72 mm (1.5992 ~ 1.6031 in)	40.52 mm (1.5953 in)
“B”	32.18 ~ 32.28 mm (1.2669 ~ 1.2709 in)	32.08 mm (1.2630 in)
Camshaft runout limit 	----	0.03 mm (0.0012 in)

Item		Standard	Limit
Cam chain:			
Cam chain type/No. of links		92RH2005/110	----
Cam chain adjustment method		Automatic	----
Rocker arm/rocker arm shaft:			
Rocker arm inside diameter		11.980 ~ 11.998 mm (0.4717 ~ 0.4724 in)	12.058 mm (0.4747 in)
Rocker arm shaft outside diameter		11.961 ~ 11.971 mm (0.4709 ~ 0.4713 in)	11.931 mm (0.4697 in)
Rocker-arm-to-rocker-arm-shaft clearance		0.009 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.080 mm (0.0031 in)
Valves, valve seats, valve guides:			
Valve clearance (cold)	IN	0.06 ~ 0.10 mm (0.0024 ~ 0.0039 in)	----
	EX	0.16 ~ 0.20 mm (0.0063 ~ 0.0079 in)	----
Valve dimensions			
 Head Diameter	 Face Width	 Seat Width	 Margin Thickness	
"A" head diameter	IN	39.9 ~ 40.1 mm (1.5709 ~ 1.5787 in)	----
	EX	33.9 ~ 34.1 mm (1.3346 ~ 1.3425 in)	----
"B" face width	IN	2.26 mm (0.0890 in)	----
	EX	2.26 mm (0.0890 in)	----
"C" seat width	IN	1.2 ~ 1.4 mm (0.0472 ~ 0.0551 in)	1.6 mm (0.0630 in)
	EX	1.2 ~ 1.4 mm (0.0472 ~ 0.0551 in)	1.6 mm (0.0630 in)
"D" margin thickness	IN	1.0 ~ 1.4 mm (0.0394 ~ 0.0551 in)	----
	EX	0.8 ~ 1.2 mm (0.0315 ~ 0.0472 in)	----
Stem outside diameter	IN	6.975 ~ 6.990 mm (0.2746 ~ 0.2752 in)	6.950 mm (0.2736 in)
	EX	6.955 ~ 6.970 mm (0.2738 ~ 0.2744 in)	6.915 mm (0.2722 in)
Guide inside diameter	IN	7.000 ~ 7.012 mm (0.2756 ~ 0.2761 in)	7.03 mm (0.2768 in)
	EX	7.000 ~ 7.012 mm (0.2756 ~ 0.2761 in)	7.03 mm (0.2768 in)
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.080 mm (0.0031 in)
	EX	0.030 ~ 0.057 mm (0.0012 ~ 0.0022 in)	0.100 mm (0.0039 in)

Item		Standard	Limit
Stem runout limit		----	0.01 mm (0.0004 in)
			
Valve seat width	IN	1.2 ~ 1.4 mm (0.0472 ~ 0.0551 in)	----
	EX	1.2 ~ 1.4 mm (0.0472 ~ 0.0551 in)	----
Valve spring:			
Inner spring			
Free length	IN	39.9 mm (1.57 in)	37.9 mm (1.49 in)
	EX	39.9 mm (1.57 in)	37.9 mm (1.49 in)
Set length (valve closed)	IN	33.6 mm (1.32 in)	----
	EX	33.6 mm (1.32 in)	----
Compressed pressure (installed)	IN	104.9 ~ 120.6 N (10.7 ~ 12.3 kg, 23.58 ~ 27.11 lb)	----
	EX	104.9 ~ 120.6 N (10.7 ~ 12.3 kg, 23.58 ~ 27.11 lb)	----
Tilt limit *	IN		2.5°/1.7 mm (2.5°/0.07 in)
	EX		2.5°/1.7 mm (2.5°/0.07 in)
			
Direction of winding (top view)	IN	Counterclockwise	----
	EX	Counterclockwise	----

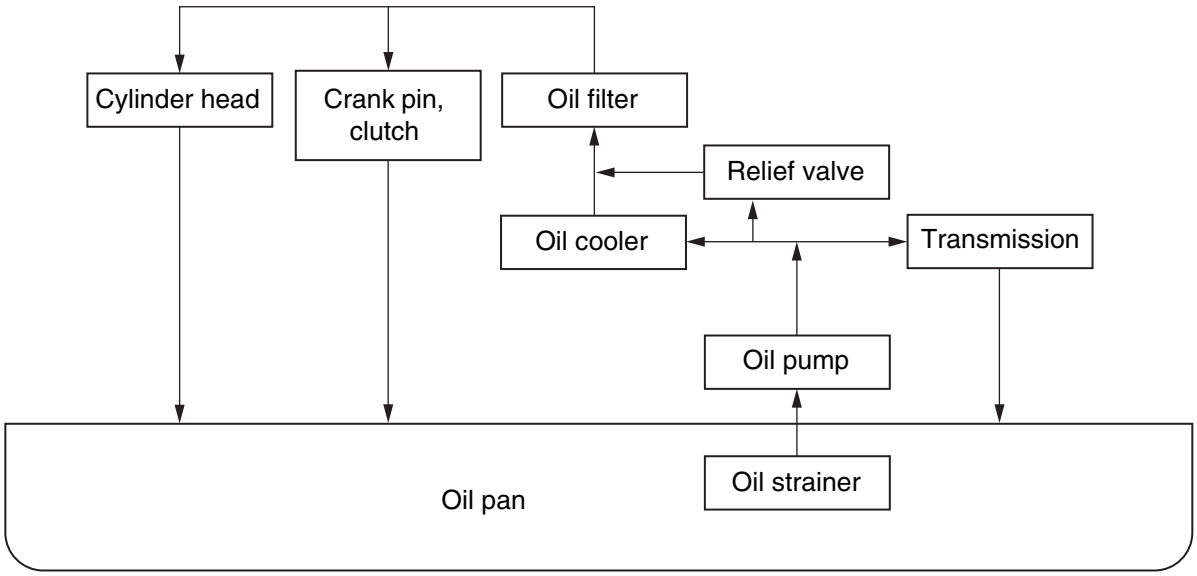
Item		Standard	Limit
Outer spring			
Free length	IN	43.27 mm (1.70 in)	41.27 mm (1.62 in)
	EX	43.27 mm (1.70 in)	41.27 mm (1.62 in)
Set length (valve closed)	IN	36.6 mm (1.44 in)	----
	EX	36.6 mm (1.44 in)	----
Compressed pressure (installed)	IN	235.4 ~ 251.1 N (24.0 ~ 25.6 kg, 52.92 ~ 56.45 lb)	----
	EX	235.4 ~ 251.1 N (24.0 ~ 25.6 kg, 52.92 ~ 56.45 lb)	----
Tilt limit *	IN	----	2.5°/1.9 mm (2.5°/0.07 in)
	EX	----	2.5°/1.9 mm (2.5°/0.07 in)
			
Direction of winding (top view)	IN	Clockwise	----
	EX	Clockwise	----
Piston:			
Piston to cylinder clearance		0.040 ~ 0.060 mm (0.0016 ~ 0.0024 in)	0.150 mm (0.0059 in)
Piston size "D"		82.920 ~ 82.970 mm (3.2646 ~ 3.2665 in)	----
			
Measuring point "H"		5 mm (0.20 in)	----
Piston offset		0.5 mm (0.0200 in)	----
Offset direction		Intake side	----
Piston pin bore inside diameter		19.004 ~ 19.015 mm (0.7482 ~ 0.7486 in)	19.045 mm (0.7498 in)
Piston pin outside diameter		18.991 ~ 19.000 mm (0.7477 ~ 0.7480 in)	18.971 mm (0.7469 in)

Item	Standard	Limit
Piston rings:		
Top ring		
		
Type	Barrel	----
Dimensions (B × T)	1.2 × 3.3 mm (0.05 × 0.13 in)	----
End gap (installed)	0.20 ~ 0.40 mm (0.008 ~ 0.016 in)	0.65 mm (0.0256 in)
Side clearance (installed)	0.03 ~ 0.08 mm (0.0012 ~ 0.0032 in)	0.13 mm (0.0051 in)
2nd ring		
		
Type	Taper	----
Dimensions (B × T)	1.5 × 3.4 mm (0.06 × 0.13 in)	----
End gap (installed)	0.20 ~ 0.40 mm (0.008 ~ 0.016 in)	0.75 mm (0.0295 in)
Side clearance	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in)	0.13 mm (0.0051 in)
Oil ring		
		
Dimensions (B × T)	2.8 × 2.8 mm (0.11 × 0.11 in)	----
End gap (installed)	0.3 ~ 0.9 mm (0.01 ~ 0.04 in)	----
Crankshaft:		
		
Crank width “A”	58.95 ~ 59.00 mm (2.321 ~ 2.323 in)	----
Runout limit C1	----	0.03 mm (0.0012 in)
C2	----	0.03 mm (0.0012 in)
Big end side clearance “B”	0.35 ~ 0.85 mm (0.0138 ~ 0.0335 in)	1.0 mm (0.04 in)
Big end radial clearance “E”	0.004 ~ 0.023 mm (0.0002 ~ 0.0009 in)	----

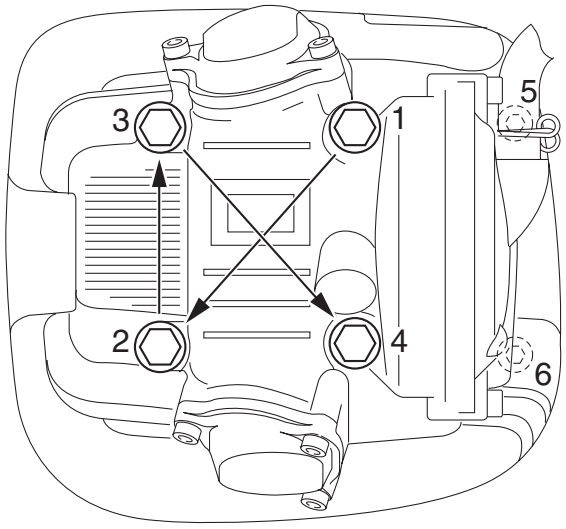
Item		Standard	Limit
Balancer:			
Balancer drive method		Gear	----
Automatic centrifugal clutch:			
Clutch shoe thickness		1.5 mm (0.06 in)	1.0 mm (0.04 in)
Clutch-in revolution		1,950 ~ 2,350 r/min	----
Clutch-stall revolution		3,350 ~ 3,850 r/min	----
Transmission:			
Main axle deflection limit		----	0.08 mm (0.0031 in)
Drive axle deflection limit		----	0.08 mm (0.0031 in)
Shifter:			
Shifter type		Shift cam and guide bar	----
Air filter oil grade:		Engine oil	----
Carburetor:			
I. D. mark		5UH1 00	----
Main jet	(M.J)	#130	----
Main air jet	(M.A.J)	#70	----
Jet needle	(J.N)	5ETY1-2	----
Needle jet	(N.J)	P-2M	----
Pilot air jet	(P.A.J.1)	#80	----
Pilot air jet	(P.A.J.2)	1.3	----
Pilot outlet	(P.O)	0.8	----
Pilot jet	(P.J)	#17.5	----
Bypass 1	(B.P.1)	0.8	----
Bypass 2	(B.P.2)	0.8	----
Bypass 3	(B.P.3)	0.8	----
Pilot screw	(P.S)	1-1/2 turns out	----
Valve seat size	(V.S)	2.0	----
Starter jet	(G.S.1)	57.5	----
Starter jet	(G.S.2)	0.9	----
Throttle valve size	(Th.V)	100	----
Float height	(F.H)	13.0 mm (0.51 in)	----
Fuel level	(F.L)	4.0 ~ 5.0 mm (0.16 ~ 0.20 in)	----
Engine idle speed		1,450 ~ 1,550 r/min	----
Intake vacuum		32 kPa (240 mmHg, 9.4 inHg)	----

Item	Standard	Limit
Oil pump:		
Oil filter type	Foam	----
Oil pump type	Trochoid	----
Tip clearance	0.15 mm (0.006 in)	0.20 mm (0.008 in)
Side clearance	0.04 ~ 0.09 mm (0.002 ~ 0.004 in)	----
Bypass valve setting pressure	78 ~ 118 kPa (0.78 ~ 1.18 kg/cm^2, 11.3 ~ 17.1 psi)	----
Oil pressure (hot)	20 kPa (0.20 kg/cm^2, 2.9 psi) at 1,500 r/min	----
Pressure check location	Cylinder head	----
Shaft drive:		
Middle gear backlash	0.1 ~ 0.3 mm (0.004 ~ 0.012 in)	----
Final gear backlash	0.1 ~ 0.2 mm (0.004 ~ 0.008 in)	----
Differential gear backlash	0.05 ~ 0.25 mm (0.0020 ~ 0.0098 in)	----

Lubrication chart:



Item	Standard	Limit
Cylinder head tightening sequence:		



Tightening torques

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Cylinder head (exhaust pipe)	Stud bolt	M6	2	7	0.7	5.1	
Cylinder head	Bolt	M10	4	32	3.2	23	
	Bolt	M8	2	20	2.0	14	
Camshaft bearing retainer	Bolt	M6	2	8	0.8	5.8	
Spark plug	—	M12	1	18	1.8	13	
Oil gallery bolt	Bolt	M6	1	7	0.7	5.1	
Cylinder	Bolt	M6	1	10	1.0	7.2	
Starter pulley	Bolt	M10	1	55	5.5	40	
Balancer driven gear	Nut	M16	1	60	6.0	43	
Valve adjusting screw	Nut	M7	2	20	2.0	14	
Tappet cover (intake)	Bolt	M6	2	10	1.0	7.2	
Tappet cover (exhaust)	Bolt	M6	3	10	1.0	7.2	
Camshaft sprocket	Bolt	M10	1	60	6.0	43	
Camshaft sprocket cover	Bolt	M6	2	10	1.0	7.2	
Timing chain tensioner cap	Bolt	M11	1	23	2.3	17	
Timing chain tensioner	Bolt	M6	2	11	1.1	8.0	
Timing chain guide (intake)	Bolt	M6	2	10	1.0	7.2	
Oil strainer	Bolt	M5	2	4	0.4	2.9	
Oil filter union bolt	—	M20	1	68	6.8	49	
Oil filter cartridge	—	M20	1	17	1.7	12	
Oil cooler	Bolt	M6	4	7	0.7	5.1	
Oil cooler fan	Bolt	M6	3	6	0.6	4.3	
Oil hose union bolt	—	M14	2	50	5.0	36	
Oil hose (oil cooler side)	—	M16	2	21	2.1	15	
Oil hose (crankcase side)	—	M16	2	35	3.5	25	
Oil pump assembly	Bolt	M6	3	7	0.7	5.1	
Oil pump housing	Screw	M5	1	5	0.5	3.6	
Plate (oil pump driven gear)	Bolt	M6	2	7	0.7	5.1	
Intake manifold	Bolt	M8	2	20	2.0	14	
Crankcase	Bolt	M8	3	20	2.0	14	
	Bolt	M6	15	10	1.0	7.2	
Oil drain bolt	Bolt	M12	1	23	2.3	17	
Bearing retainer (right crankcase)	Bolt	M6	2	10	1.0	7.2	LT
Bearing retainer (left crankcase)	Torx screw	M6	1	11	1.1	8.0	
Crankcase oil passage plug	—	M14	1	25	2.5	18	
Lead holder (stator assembly)	Bolt	M5	2	7	0.7	5.1	
Drive belt case	Bolt	M6	9	10	1.0	7.2	
Bearing housing (primary sheave)	Bolt	M6	4	10	1.0	7.2	
Drive belt case cover	Bolt	M6	14	10	1.0	7.2	
Crankcase cover	Bolt	M6	12	10	1.0	7.2	
Stator assembly	Screw	M6	3	7	0.7	5.1	LT

Part to be tightened	Part name	Thread size	Q'ty	Tightening torque			Remarks
				Nm	m·kg	ft·lb	
Pickup coil	Bolt	M5	2	7	0.7	5.1	
Starter one-way clutch	Bolt	M8	3	30	3.0	22	LT
Recoil starter	Bolt	M6	4	10	1.0	7.2	LT
Clutch carrier assembly	Nut	M22	1	140	14.0	100	Stake.
Clutch housing assembly	Bolt	M6	8	10	1.0	7.2	
Middle drive shaft bearing retainer	Torx screw	M8	4	25	2.5	18	
Middle drive shaft drive pinion gear	Nut	M22	1	130	13.0	94	Stake.
Middle drive shaft bearing housing	Bolt	M8	4	32	3.2	23	
Middle driven pinion gear bearing retainer	Nut	M65	1	110	11.0	80	LT Left-handed threads
Universal joint yoke (middle driven pinion gear)	Nut	M14	1	97	9.7	70	LT
Middle driven pinion gear bearing housing	Bolt	M8	4	25	2.5	18	
Middle driven shaft bearing retainer	Nut	M55	1	80	8.0	58	LT Left-handed threads
Primary sliding sheave cap	Screw	M4	3	3	0.3	2.2	
Primary sliding sheave assembly	Nut	M16	1	100	10.0	72	
Secondary sheave assembly	Nut	M16	1	100	10.0	72	
Secondary sheave spring retainer	Nut	M36	1	90	9.0	65	
Shift shaft stopper bolt	—	M14	1	18	1.8	13	
Shift lever assembly	Bolt	M6	1	14	1.4	10	
Neutral switch	—	M10	1	17	1.7	12	
Reverse switch	—	M10	1	17	1.7	12	
Thermo unit	—	M12	1	20	2.0	14	
Muffler and exhaust pipe	Bolt	M8	2	15	1.5	11	
Exhaust pipe	Nut	M6	2	12	1.2	8.7	
Muffler	Bolt	M10	2	25	2.5	18	
Exhaust pipe bracket (exhaust pipe)	Bolt	M6	2	14	1.4	10	
Exhaust pipe bracket (engine)	Bolt	M6	2	10	1.0	7.2	
Starter motor	Bolt	M6	2	10	1.0	7.2	
Speedometer gear unit	Bolt	M6	2	10	1.0	7.2	LT
	Screw	M6	2	7	0.7	5.1	

CHASSIS

Item		Standard	Limit
Steering system:			
Steering bearing type		Ball and race bearing	----
Front suspension:			
Shock absorber travel		99 mm (3.90 in)	----
Spring free length		265 mm (10.43 in)	----
Spring fitting length		231.9 mm (9.13 in)	----
Spring rate	(K1)	13.5 N/mm (1.35 kg/mm, 75.60 lb/in)	----
Stroke	(K1)	0 ~ 99 mm (0 ~ 3.90 in)	----
Optional spring		No	----
Rear suspension:			
Shock absorber travel		126 mm (4.96 in)	----
Spring free length		317 mm (12.48 in)	----
Spring fitting length		283.1 mm (11.15 in)	----
Spring rate	(K1)	27.4 N/mm (2.74 kg/mm, 153.43 lb/in)	----
Stroke	(K1)	0 ~ 126 mm (0 ~ 4.96 in)	----
Optional spring		No	----
Swingarm:			
Free play limit	end	----	1 mm (0.04 in)
	side	----	1 mm (0.04 in)
Front wheel:			
Type		Panel wheel	----
Rim size		12 × 6.0 AT	----
Rim material		Steel	----
Rim runout limit	radial	----	2 mm (0.08 in)
	lateral	----	2 mm (0.08 in)
Rear wheel:			
Type		Panel wheel	----
Rim size		12 × 7.5 AT	----
Rim material		Steel	----
Rim runout limit	radial	----	2 mm (0.08 in)
	lateral	----	2 mm (0.08 in)

Item		Standard	Limit
Front disc brake:			
Type		Dual	----
Disc outside diameter × thickness		200.0 × 3.5 mm (7.87 × 0.14 in)	----
Pad thickness	inner	4.5 mm (0.18 in)	1 mm (0.04 in)
Pad thickness	outer	4.5 mm (0.18 in)	1 mm (0.04 in)
Master cylinder inside diameter		14 mm (0.55 in)	----
Caliper cylinder inside diameter		32 mm (1.26 in)	----
Brake fluid type		DOT 4	----
Rear drum brake:			
Type		Leading, trailing	----
Brake drum inside diameter		160 mm (6.30 in)	161 mm (6.34 in)
Lining thickness		4.0 mm (0.16 in)	2 mm (0.08 in)
Brake lever and brake pedal:			
Brake lever free play (pivot)	front	0 mm (0 in)	----
	rear	3 ~ 5 mm (0.12 ~ 0.20 in)	----
Brake pedal free play		20 ~ 30 mm (0.79 ~ 1.18 in)	----
Throttle lever free play		3 ~ 5 mm (0.12 ~ 0.20 in)	----

Tightening torques

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Engine bracket (front-upper) and frame	M8	33	3.3	24	
Engine bracket (front-lower) and frame	M8	33	3.3	24	
Engine bracket (front-upper) and engine	M10	42	4.2	30	
Engine bracket (front-lower) and engine	M10	42	4.2	30	
Engine and frame (rear-upper)	M10	56	5.6	40	
Engine and frame (rear-lower)	M10	56	5.6	40	
Frame and bearing retainer (steering stem holder bearing)	M42	40	4.0	29	
Select lever assembly and frame	M8	23	2.3	17	
Swingarm	M12	82	8.2	59	
Rear shock absorber and frame	M12	82	8.2	59	
Final gear case and swingarm	M10	63	6.3	45	LT
Final gear case and rear axle housing	M10	63	6.3	45	
Swingarm and rear axle housing	M12	63	6.3	45	
Differential gear case and frame	M10	55	5.5	40	
Front arm and frame	M10	45	4.5	32	LS
Front shock absorber and frame	M10	45	4.5	32	
Front shock absorber and upper front arm	M10	45	4.5	32	
Steering stem, pitman arm and frame	M14	190	19.0	140	
Steering stem holder and frame	M8	23	2.3	17	Use lock washer
Steering stem and handlebar holder	M8	23	2.3	17	
Pitman arm and tie-rod end	M12	30	3.0	22	
Tie-rod and locknut	M12	40	4.0	29	
Steering knuckle and upper front arm	M12	30	3.0	22	
Steering knuckle and lower front arm	M12	30	3.0	22	
Steering knuckle and tie-rod	M12	30	3.0	22	
Fuel tank and fuel cock	M6	4	0.4	2.9	
Fuel tank	M6	10	1.0	7.2	
Front wheel and wheel hub	M10	55	5.5	40	
Front axle and wheel hub	M16	150	15.0	110	
Steering knuckle and brake caliper	M8	30	3.0	22	
Front brake disc and wheel hub	M8	30	3.0	22	LT
Rear wheel and rear wheel hub	M10	55	5.5	40	
Rear axle and nut	M16	150	15.0	110	
Brake drum cover and brake shoe plate	M6	7	0.7	5.1	
Front brake hose and steering knuckle	M6	7	0.7	5.1	
Front brake hose and upper front arm	M6	7	0.7	5.1	
Front brake hose and frame	M6	7	0.7	5.1	
Front brake pipe nut	M10	19	1.9	13	
Front brake hose union bolt	M10	27	2.7	19	
Bleed screw	M8	6	0.6	4.3	

Part to be tightened	Thread size	Tightening torque			Remarks
		Nm	m·kg	ft·lb	
Master cylinder and handlebar	M6	7	0.7	5.1	
Footrest bracket and frame	M8	16	1.6	11	
Front bumper and frame	M8	34	3.4	24	
Front carrier and frame	M8	34	3.4	24	
Front carrier and front bumper	M8	34	3.4	24	
Rear carrier and frame	M8	34	3.4	24	
Engine skid plate	M6	7	0.7	5.1	
Differential gear oil filler bolt	M14	23	2.3	17	
Differential gear oil drain bolt	M10	10	1.0	7.2	
Differential gear case and bearing housing	M8	25	2.5	18	
Gear motor	M8	13	1.3	9.4	
Final gear oil filler bolt	M14	23	2.3	17	
Final gear oil drain bolt	M14	23	2.3	17	
Bearing retainer (drive pinion gear)	M65	100	10.0	72	
Final gear case and bearing housing	M10	40	4.0	29	
	M8	23	2.3	17	
Battery holding bracket	M6	7	0.7	5.1	
Footrest board and footrest bracket	M6	7	0.7	5.1	
Trailer hitch bracket	M10	32	3.2	23	
Front brake pad holding bolt	M8	17	1.7	12	
Front brake caliper retaining bolt	M8	17	1.7	12	
Rear brake light switch bracket	M8	23	2.3	17	
Rear brake light switch cover	M6	7	0.7	5.1	
Rear brake lever holder bracket	M6	7	0.7	5.1	
Brake camshaft lever	M6	9	0.9	6.5	
Oil hose protector	M6	7	0.7	5.1	

ELECTRICAL

Item	Standard	Limit
Voltage:	12 V	----
Ignition system:		
Ignition timing (B.T.D.C.)	10°/ 1,500 r/min	----
Advancer type	Digital	----
C.D.I.:		
Magneto model/manufacturer	F4T475/MITSUBISHI	----
Pickup coil resistance/color	459 ~ 561 Ω at 20 °C (68 °F)/ White/Red – White/Green	----
Rotor rotation direction sensing coil resistance/color	0.086 ~ 0.105 Ω at 20 °C (68 °F)/ Red – White/Blue	----
C.D.I. unit model/manufacturer	F8T40371/MITSUBISHI	----
Ignition coil:		
Model/manufacturer	2JN/YAMAHA	----
Minimum spark gap	6 mm (0.24 in)	----
Primary winding resistance	0.18 ~ 0.28 Ω at 20 °C (68 °F)	----
Secondary winding resistance	6.32 ~ 9.48 kΩ at 20 °C (68 °F)	----
Spark plug cap:		
Type	Resin	----
Resistance	10 kΩ	----
Charging system:		
Type	A.C. magneto generator	----
Model/manufacturer	F4T475/MITSUBISHI	----
Nominal output	14 V 18 A at 5,000 r/min	----
Charging coil resistance/color	0.49 ~ 0.62 Ω at 20 °C (68 °F)/ White – White	----
Rectifier/regulator:		
Regulator type	Semi conductor-short circuit	----
No-load regulated voltage (DC)	14.1 ~ 14.9 V	----
Model/manufacturer	SH640E-11/SHINDENGEN	----
Capacity	14 A	----
Withstand voltage	200 V	----
Battery:		
Specific gravity	1.32	----
Electric starter system:		
Type	Constant mesh	----
Starter motor		
Model/manufacturer	SM-13/MITSUBA	----
Output	0.7 kW	----
Armature coil resistance	0.0015 ~ 0.0025 Ω at 20 °C (68 °F)	----

Item	Standard	Limit
Brush overall length	12.0 mm (0.47 in)	4 mm (0.16 in)
Spring force	7.65 ~ 10.01 N (780 ~ 1,021 g, 27.53 ~ 36.04 oz)	----
Commutator diameter	28 mm (1.10 in)	27 mm (1.06 in)
Mica undercut	0.7 mm (0.03 in)	----
Starter relay		
Model/manufacturer	MS5F-561/JIDECO	----
Amperage rating	180 A	----
Coil winding resistance	4.18 ~ 4.62 Ω at 20 °C (68 °F)	----
Electric fan:		
Running rpm	6,350 r/min	----
Thermostat switch:		
Thermo unit		
Model/manufacturer	4GB/DENSO	----
Circuit breakers:		
Type	Fuse	----
Amperage for individual circuit		
Main fuse	30 A × 1	----
Headlight fuse	15 A × 1	----
Ignition fuse	15 A × 1	----
Auxiliary DC jack fuse	10 A × 1	----
Four-wheel drive fuse	3 A × 1	----
Signaling system fuse	10 A × 1	----
Reserve	30 A × 1	----
Reserve	15 A × 1	----
Reserve	10 A × 1	----
Reserve	3 A × 1	----

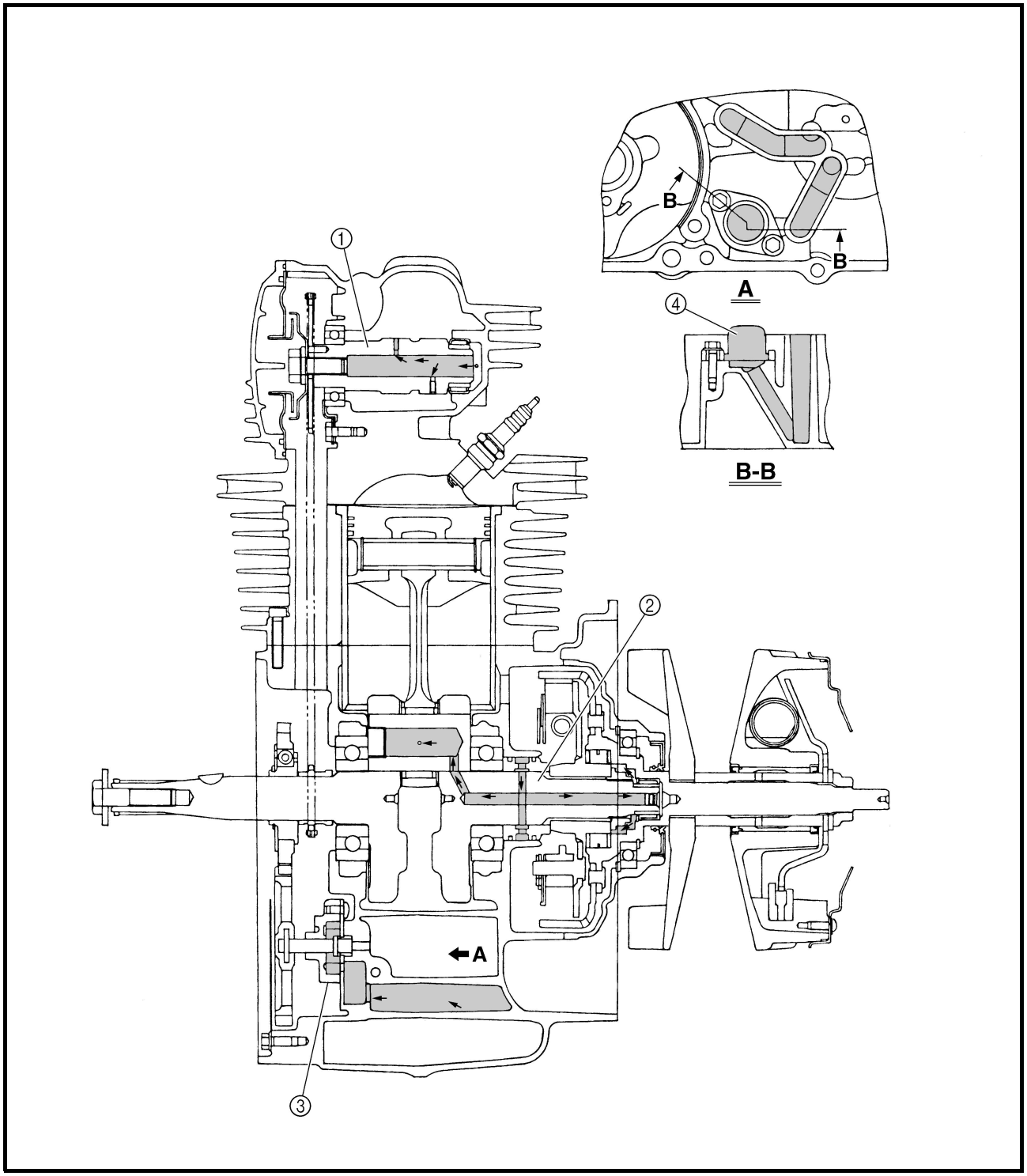
LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE

Lubrication points	Lubricant type
Oil seal lip (all)	LS
Bearing (all)	E
O-ring (all)	LS
Crank pin	E
Connecting rod (bearing)	E
Piston surface/piston rings	E
Piston pin	E
Timing chain sprocket inner surface (crankshaft)	M
Buffer boss	E
Crankshaft seal	E
Valve stem/valve stem end	M
Rocker arm shaft	E
Rocker arm	M
Camshaft lobe/journal	M
Cylinder head bolt	E
Oil pump shaft, rotor, housing	E
Oil filter cartridge O-ring	LS
Starter idle gear shaft	E
Starter idle gear	E
Starter one-way clutch bearing	E
Clutch housing assembly shaft end	LS
Clutch housing	E
One-way bearing	M
Transmission gear (wheel/pinion)	M
Axle (main/drive)	M
Chain/sprocket (transmission)	E
Damper cam (middle driven shaft)	M
Gear coupling (middle driven shaft)	E
Shift shaft	E
Shift fork/guide bar	E
Shift shaft stopper ball	E
Shift lever collar	LS
Crankcase mating surface	Sealant (Quick Gasket®) Yamaha Bond No.1215
Stator lead grommet (left side crankcase)	Sealant (Quick Gasket®) Yamaha Bond No.1215

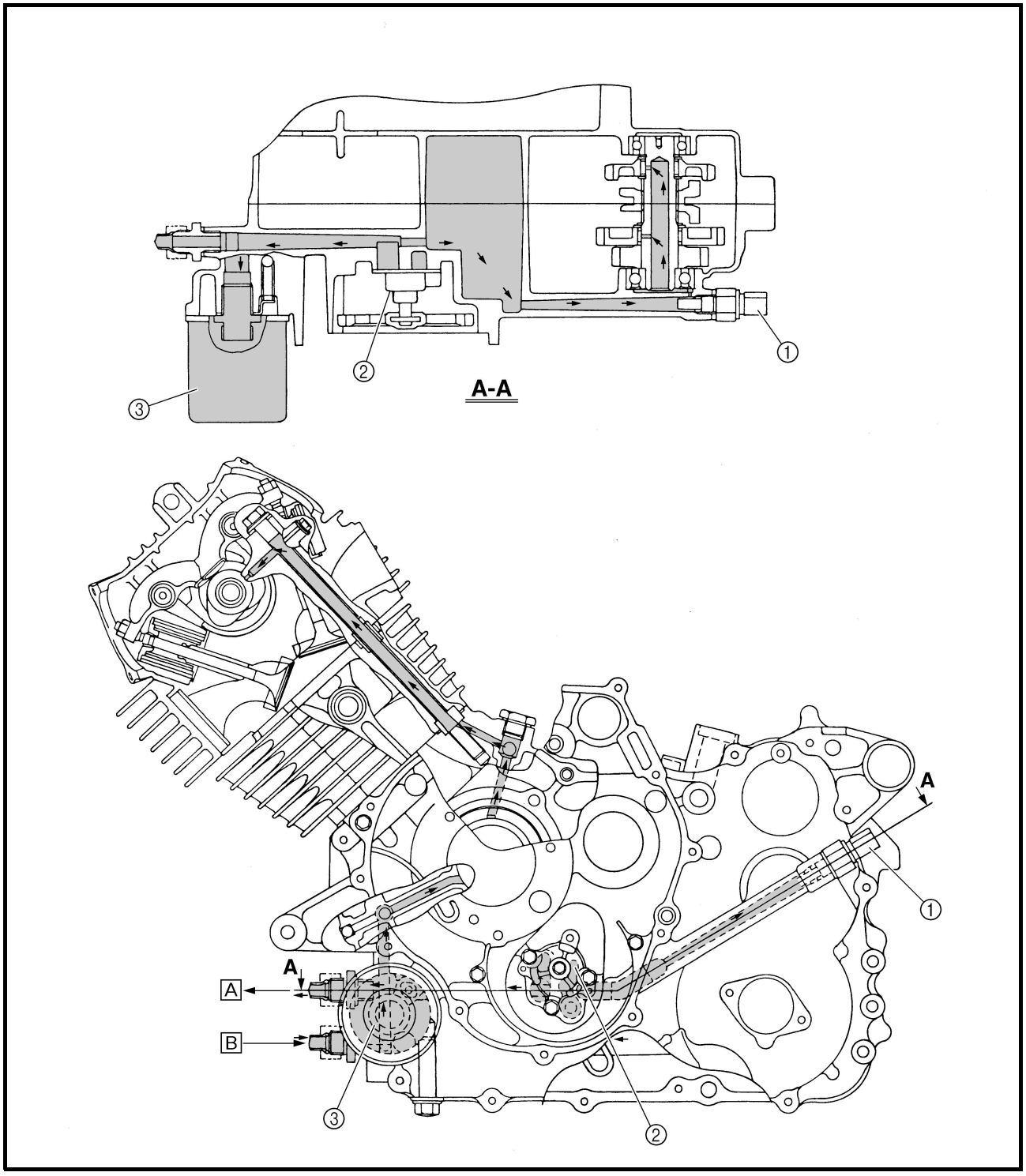
OIL FLOW DIAGRAMS

① Camshaft
② Crankshaft
③ Oil pump
④ Oil strainer

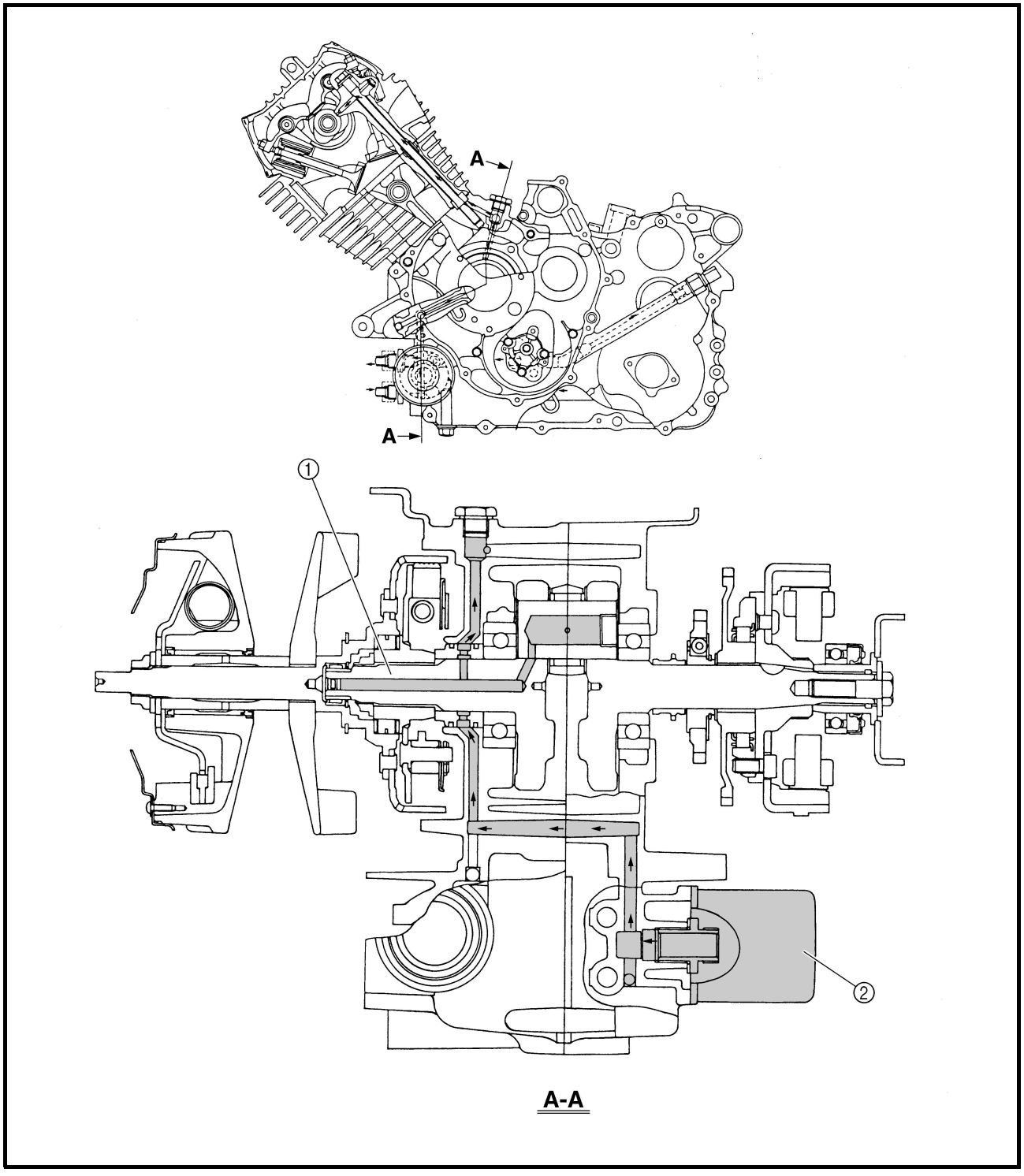


① Thermo unit
② Oil pump
③ Oil filter

A To oil cooler
B From oil cooler



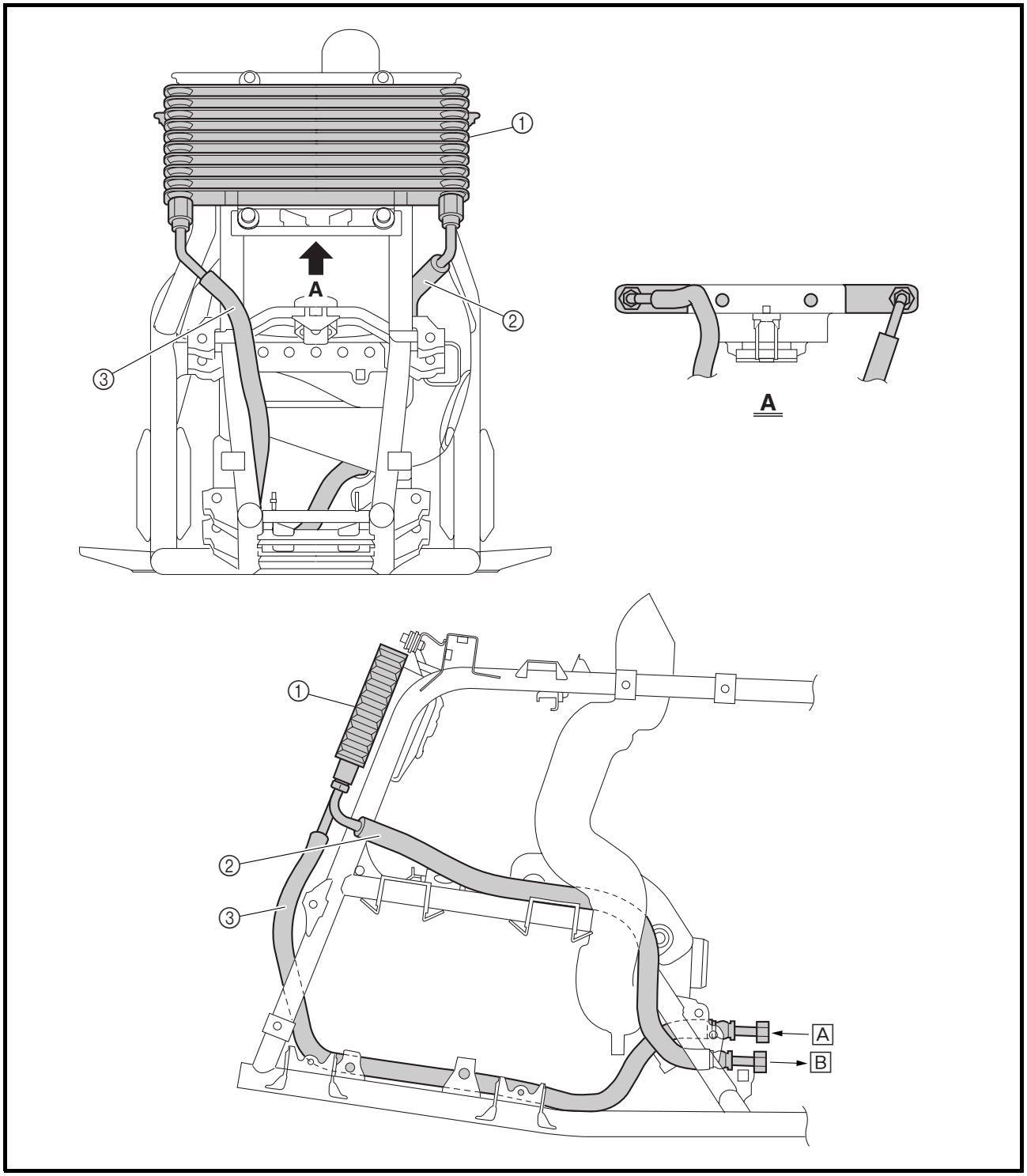
① Crankshaft
② Oil filter



A-A

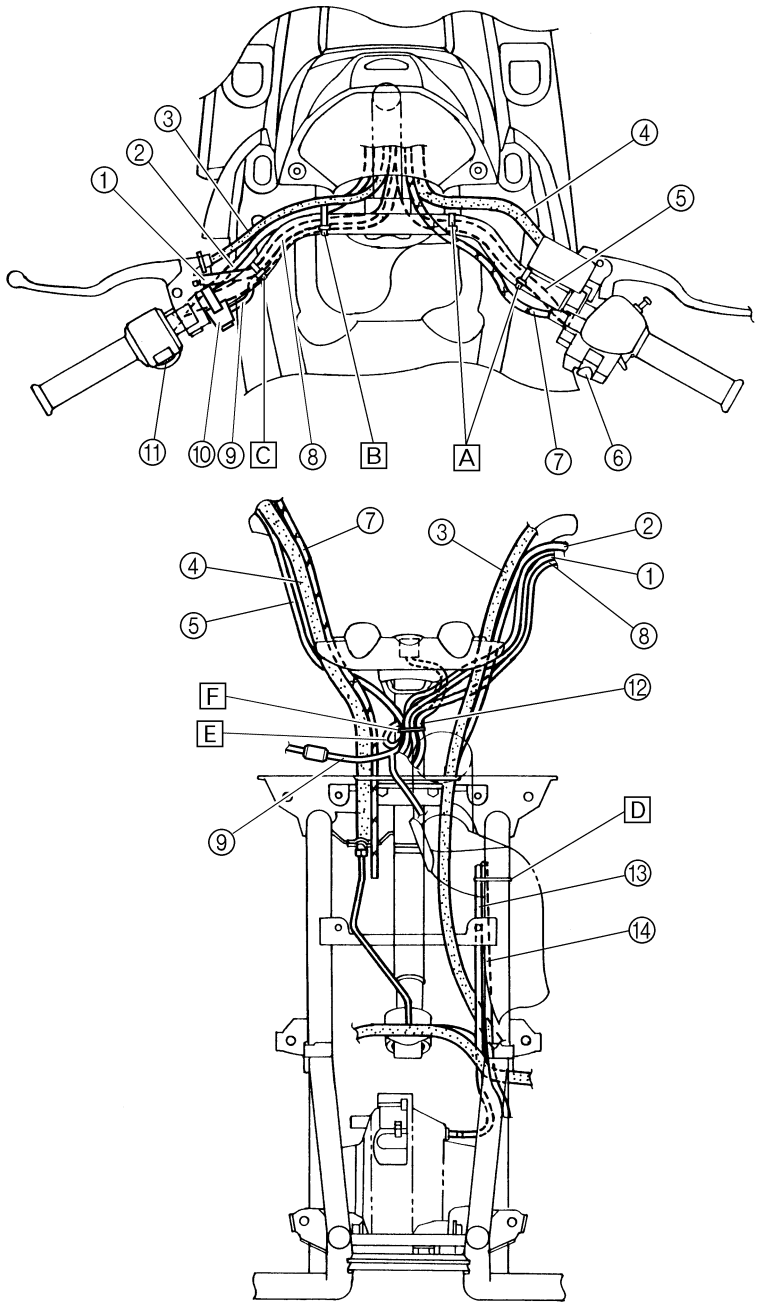
① Oil cooler
② Oil cooler outlet pipe
③ Oil cooler inlet pipe

A From engine
B To engine

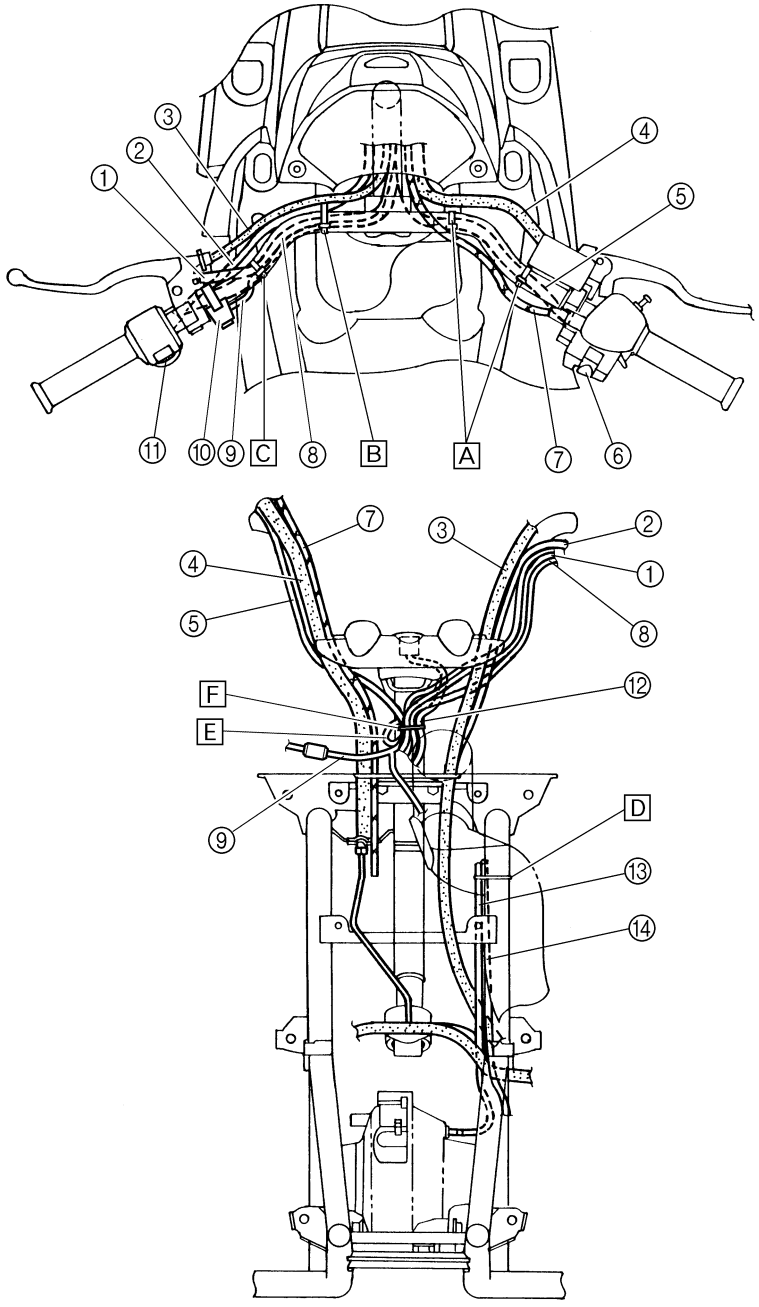


CABLE ROUTING

① Rear brake switch lead
② Starter cable
③ Rear brake lever cable
④ Front brake hose
⑤ On-command four-wheel drive switch lead
⑥ On-command four-wheel drive switch
⑦ Throttle cable
⑧ Handlebar switch lead
⑨ Horn switch lead (for Europe and Oceania)
⑩ Horn switch (for Europe and Oceania)
⑪ Handlebar switch
⑫ Main switch lead
⑬ Differential gear case breather hose
⑭ Gear motor lead

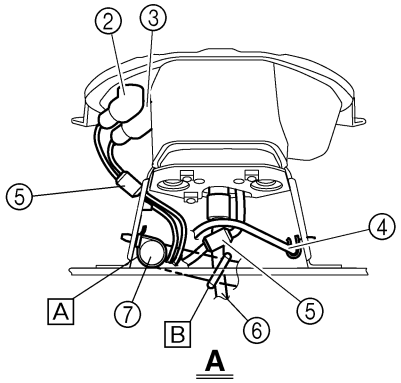


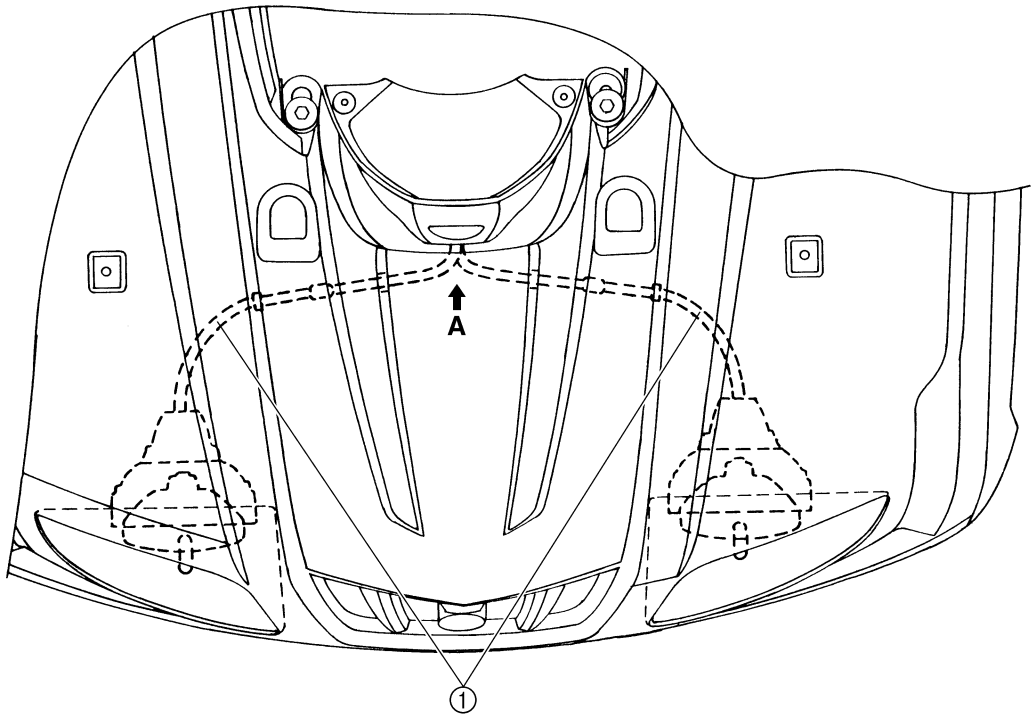
A Fasten the on-command four-wheel drive switch lead behind the handlebar with a plastic band.
B Fasten the starter cable, handlebar switch lead, rear brake switch lead, and horn switch lead (for Europe and Oceania) behind the handlebar with a plastic band.
C Fasten the handlebar switch lead, rear brake switch lead, and horn switch lead (for Europe and Oceania) behind the handlebar with a plastic band.
D Fasten the gear motor lead, differential gear case breather hose, fan motor lead with a plastic band.
E Loop the horn switch lead (for Europe and Oceania) around the plastic band as shown.
F Fasten the on-command four-wheel drive switch lead, rear brake switch lead, main switch lead, and handlebar switch lead with a plastic band.



① Headlight lead
② Oil temperature warning light
③ Four-wheel drive indicator light
④ Differential gear case breather hose
⑤ Indicator light/speedometer light couplers
⑥ Speedometer cable
⑦ Wire harness

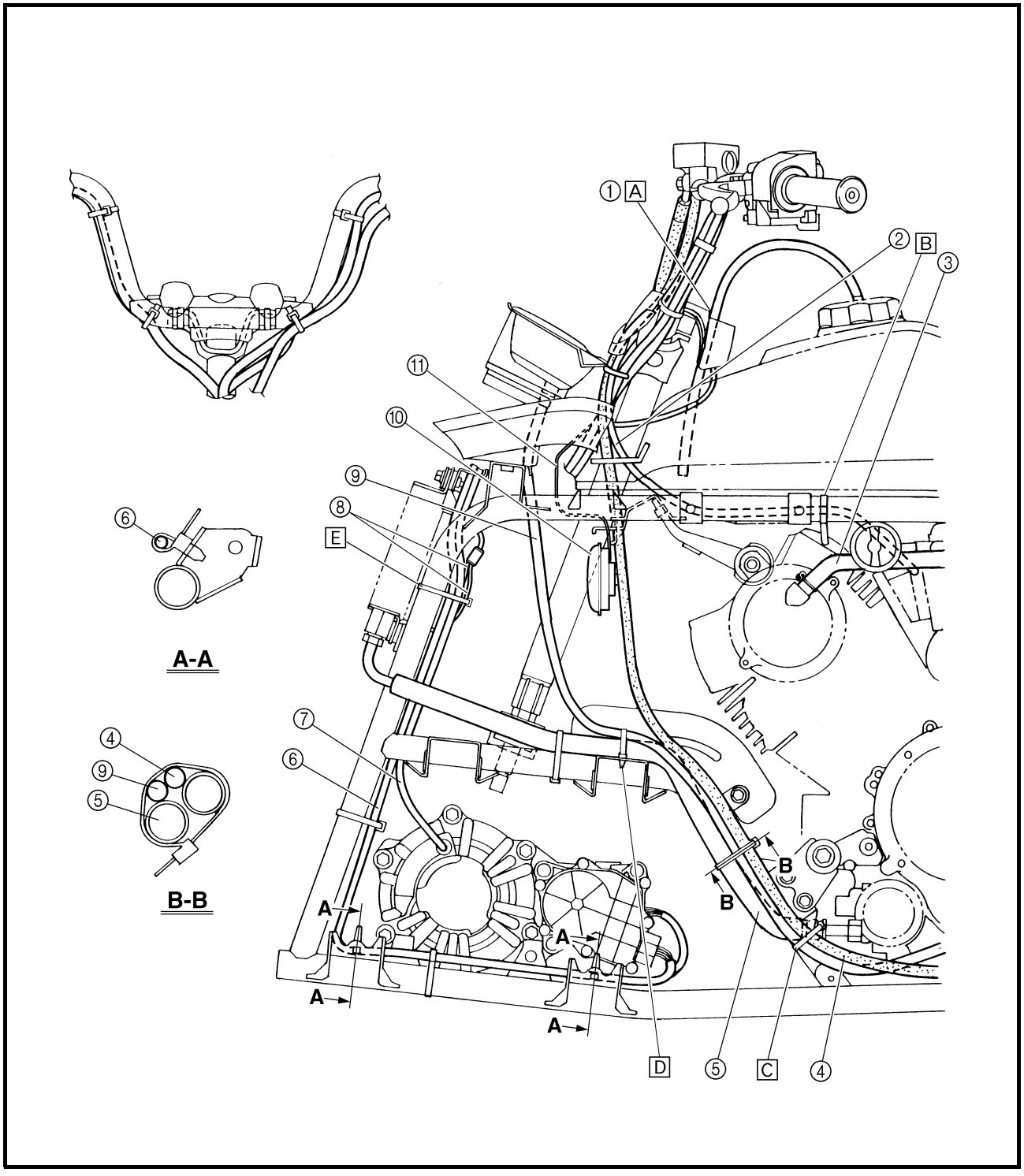
A Fasten the wire harness with a plastic band.
B Fasten the wire harness and speedometer cable with a plastic band.



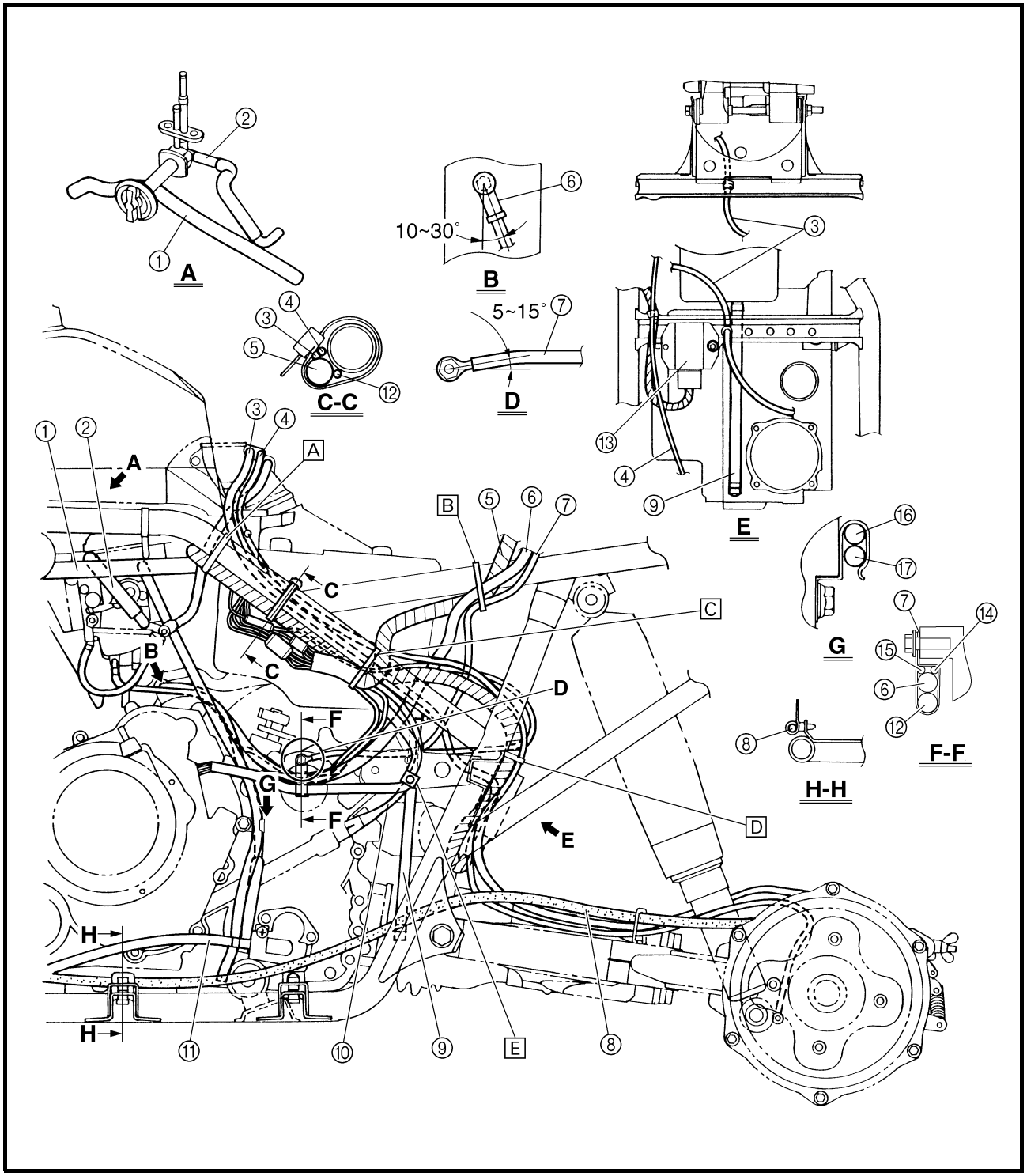


① Fuel tank breather hose
② Starter cable
③ Cylinder head breather hose
④ Rear brake lever cable
⑤ Oil cooler hose
⑥ Gear motor lead
⑦ Differential gear case breather hose
⑧ Fan motor lead
⑨ Speedometer cable
⑩ Horn (for Europe and Oceania)
⑪ Horn lead (for Europe and Oceania)

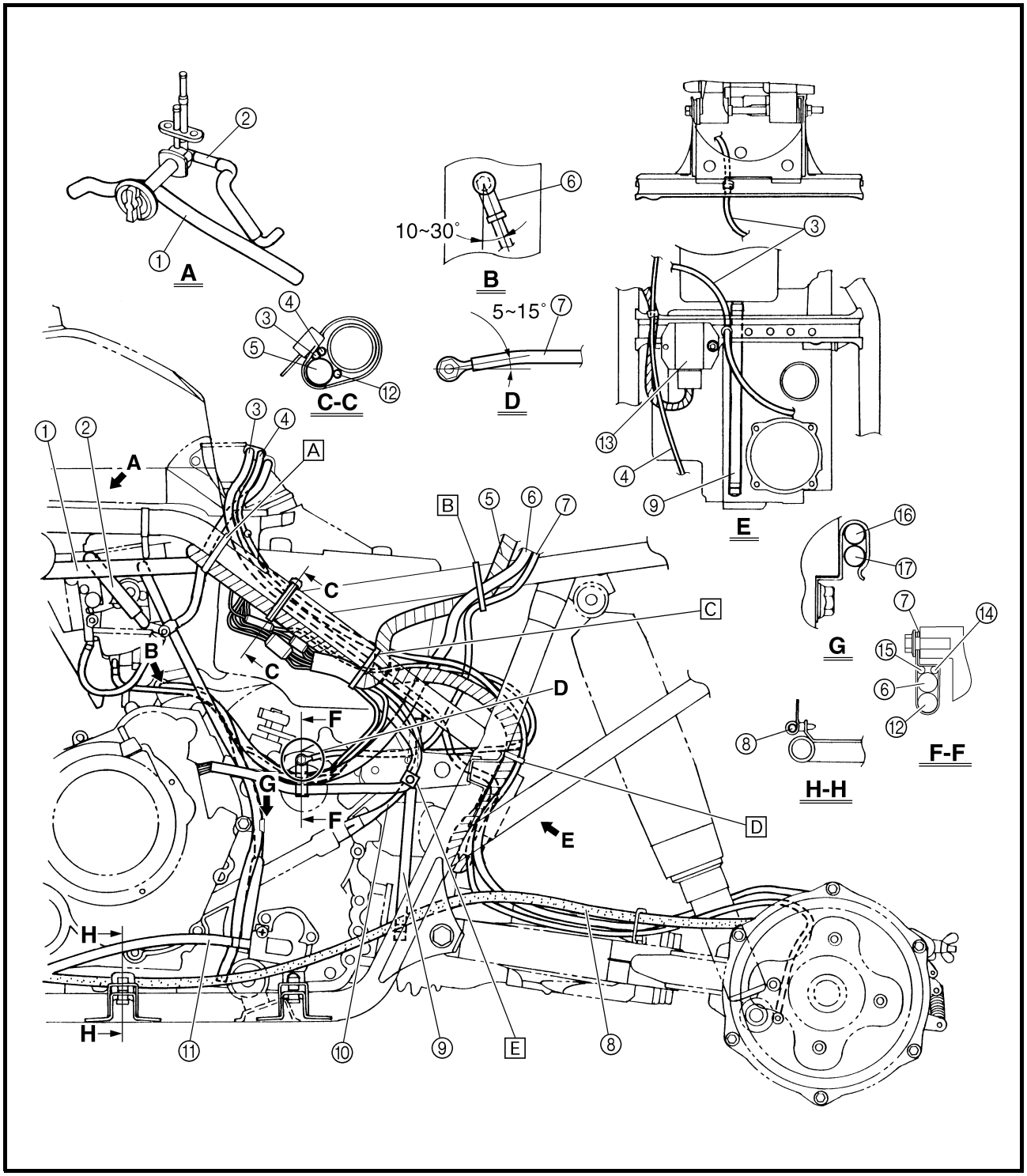
A Insert the fuel tank breather hose into the hole of the handlebar cover.
B Fasten the starter cable with a plastic band.
C Fasten the brake lever cable and speedometer cable with a plastic band.
D Fasten the oil cooler hose and speedometer cable with a plastic band.
E Fasten the gear motor lead, differential gear case breather hose, and fan motor lead with a plastic band.



① Cylinder head breather hose
② Fuel hose
③ Final drive gear case breather hose
④ Rear brake breather hose
⑤ Wire harness
⑥ Starter motor lead
⑦ Negative battery lead
⑧ Rear brake lever cable
⑨ Air filter case check hose
⑩ Thermo unit lead
⑪ Speedometer cable
⑫ A.C. magneto lead
⑬ Rectifier/regulator
⑭ Reverse switch lead
⑮ Neutral switch lead
⑯ Carburetor drain hose
⑰ Float chamber air vent hose

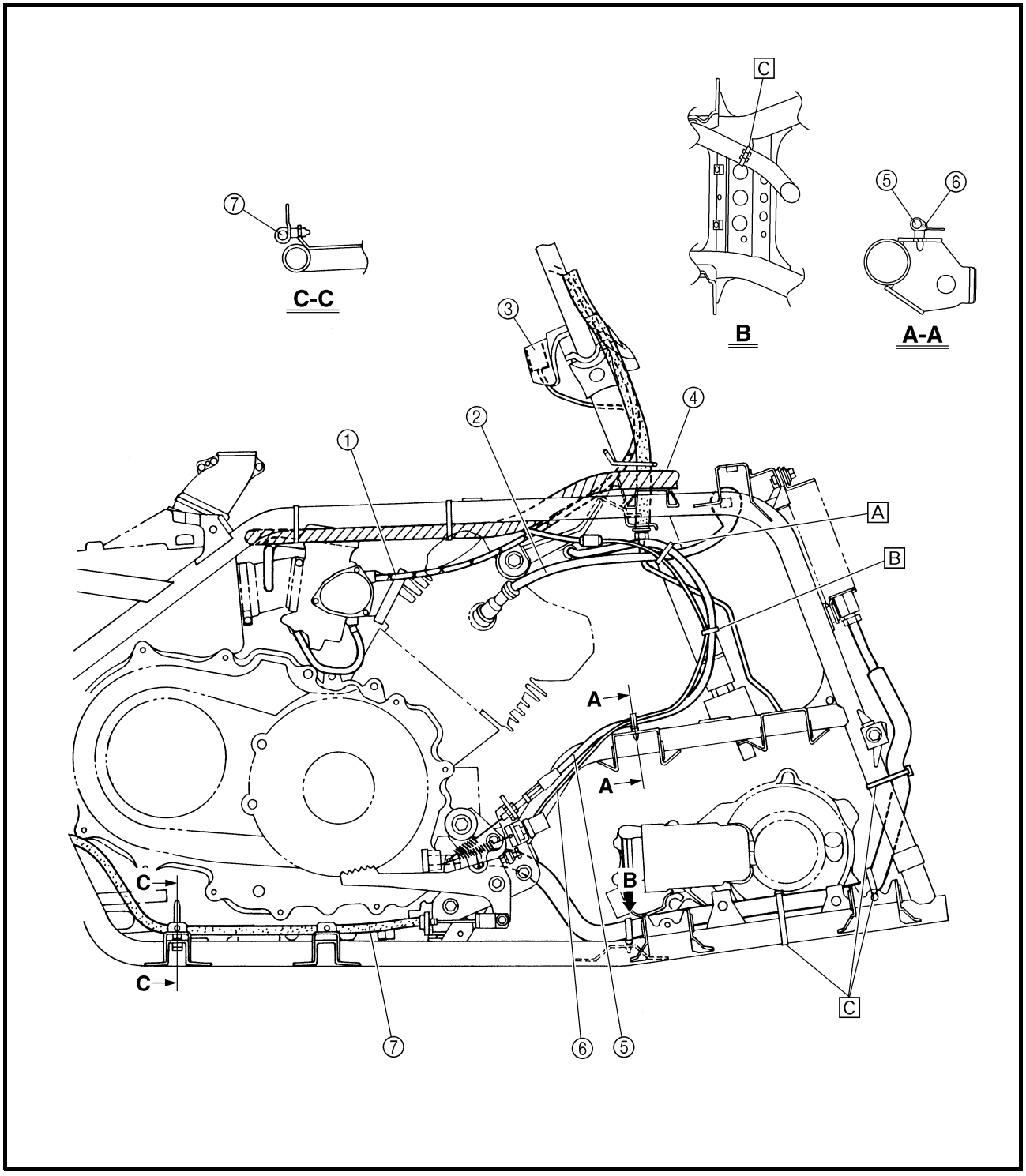


[A] Fasten the wire harness with a plastic band.
[B] Fasten the wire harness, starter motor lead, and negative battery lead with a plastic band.
[C] Fasten the final drive gear case breather hose, rear brake breather hose, ground lead, and A.C. magneto lead with a plastic band.
[D] Fasten the rectifier/regulator lead and rear brake breather hose with a plastic band.
[E] Fasten the thermo unit lead and A.C. magneto lead with a plastic clamp.

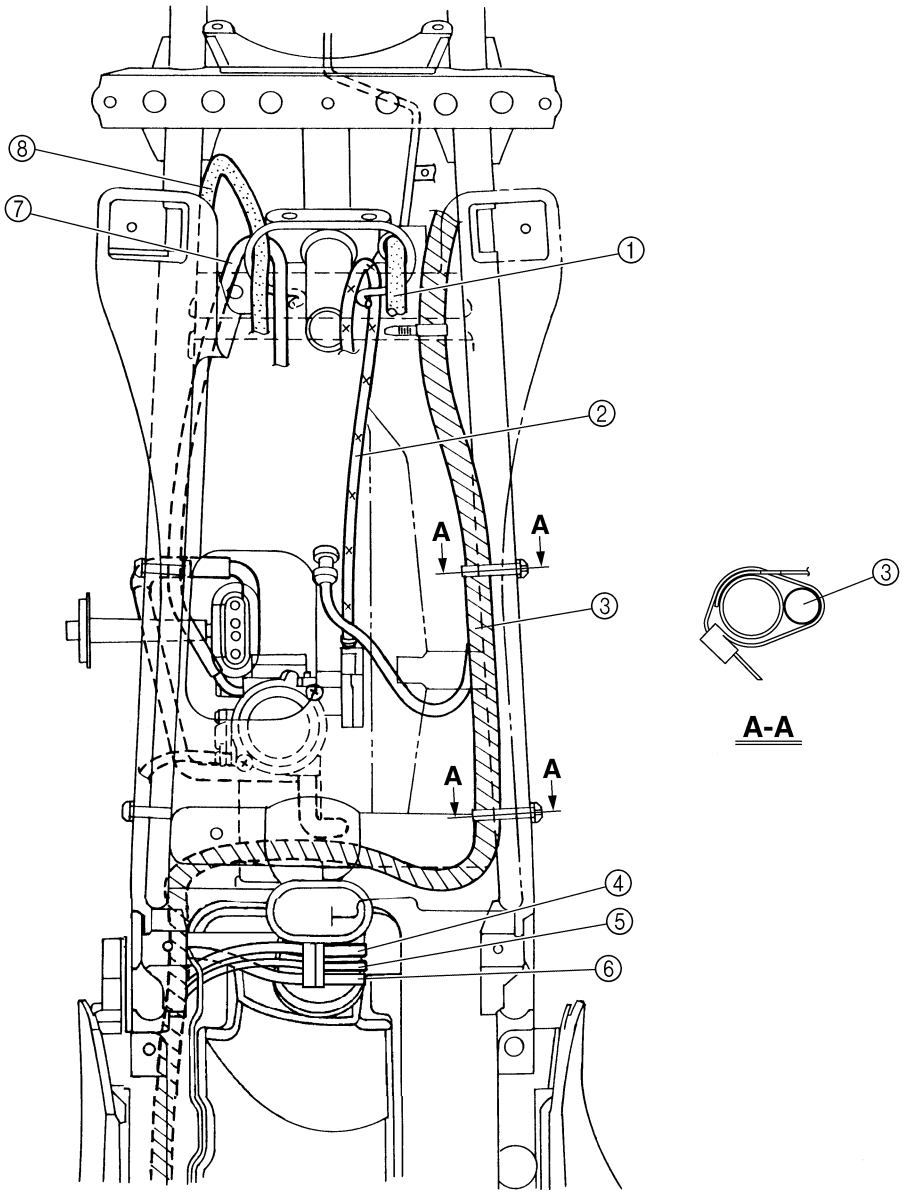


① Throttle cable
② Spark plug lead
③ Main switch
④ Wire harness
⑤ Select lever control cable
⑥ Rear brake light switch lead
⑦ Rear brake pedal cable

A Fasten the select lever control cable, rear brake light switch lead, and spark plug lead with a plastic band.
B Fasten the select lever control cable and rear brake light switch lead with a plastic band.
C Fasten the oil cooler hose with a plastic band.



① Front brake hose
② Throttle cable
③ Wire harness
④ Final drive gear case breather hose
⑤ Rear brake breather hose
⑥ Float chamber air vent hose
⑦ Starter cable
⑧ Rear brake lever cable



EB300000

PERIODIC CHECKS AND ADJUSTMENTS

INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. These preventive maintenance procedures, if followed, will ensure more reliable vehicle operation and a longer service life. The need for costly overhaul work will be greatly reduced. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

PERIODIC MAINTENANCE/LUBRICATION

ITEM	ROUTINE	INITIAL			EVERY	
		1 month	3 months	6 months	6 months	1 year
Valves*	• Check valve clearance. • Adjust if necessary.	○		○	○	○
Spark plug	• Check condition. • Adjust gap and clean. • Replace if necessary.	○	○	○	○	○
Air filter element	• Clean. • Replace if necessary.	Every 20 ~ 40 hours (More often in wet or dusty areas.)				
Carburetor*	• Check and adjust idle speed/starter operation. • Adjust if necessary.		○	○	○	○
Crankcase breather system*	• Check breather hose for cracks or damage. • Replace if necessary.			○	○	○
Exhaust system*	• Check for leakage. • Tighten if necessary. • Replace gasket(s) if necessary.			○	○	○
Fuel line*	• Check fuel hose for cracks or damage. • Replace if necessary.			○	○	○
Engine oil	• Replace. (Warm engine before draining.)	○		○	○	○
Engine oil filter cartridge	• Replace.	○		○		○
Engine oil strainer*	• Clean.	○		○		○
Final gear oil **Differential gear oil**	• Check for oil leakage. • Replace every 12 months.	○				○
Front brake*	• Check operation/fluid leakage. (See NOTE page 35.) • Correct if necessary.	○	○	○	○	○
Rear brake	• Check operation. • Adjust if necessary.	○	○	○	○	○
V-belt*	• Check operation. • Check for cracks or damage.	○		○	○	○
Wheels*	• Check balance/damage/runout. • Repair if necessary.	○		○	○	○
Wheel bearing*	• Check bearing assemblies for looseness/damage. • Replace if damaged.	○		○	○	○
Front and rear suspension*	• Check operation. • Correct if necessary.			○		○
Steering system*	• Check operation./Replace if damaged. • Check toe-in./Adjust if necessary.	○	○	○	○	○
Drive shaft universal joint*	• Lubricate.			○	○	○
Axle boots*	• Check operation. • Replace if damaged.	○	○	○	○	○

CHK ADJ

ITEM	ROUTINE	INITIAL			EVERY	
		1 month	3 months	6 months	6 months	1 year
Fittings and fasteners*	• Check all chassis fittings and fasteners. • Correct if necessary.	○	○	○	○	○
Lights and switches*	• Check operation. • Adjust headlight beams.	○	○	○	○	○

* Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

NOTE:

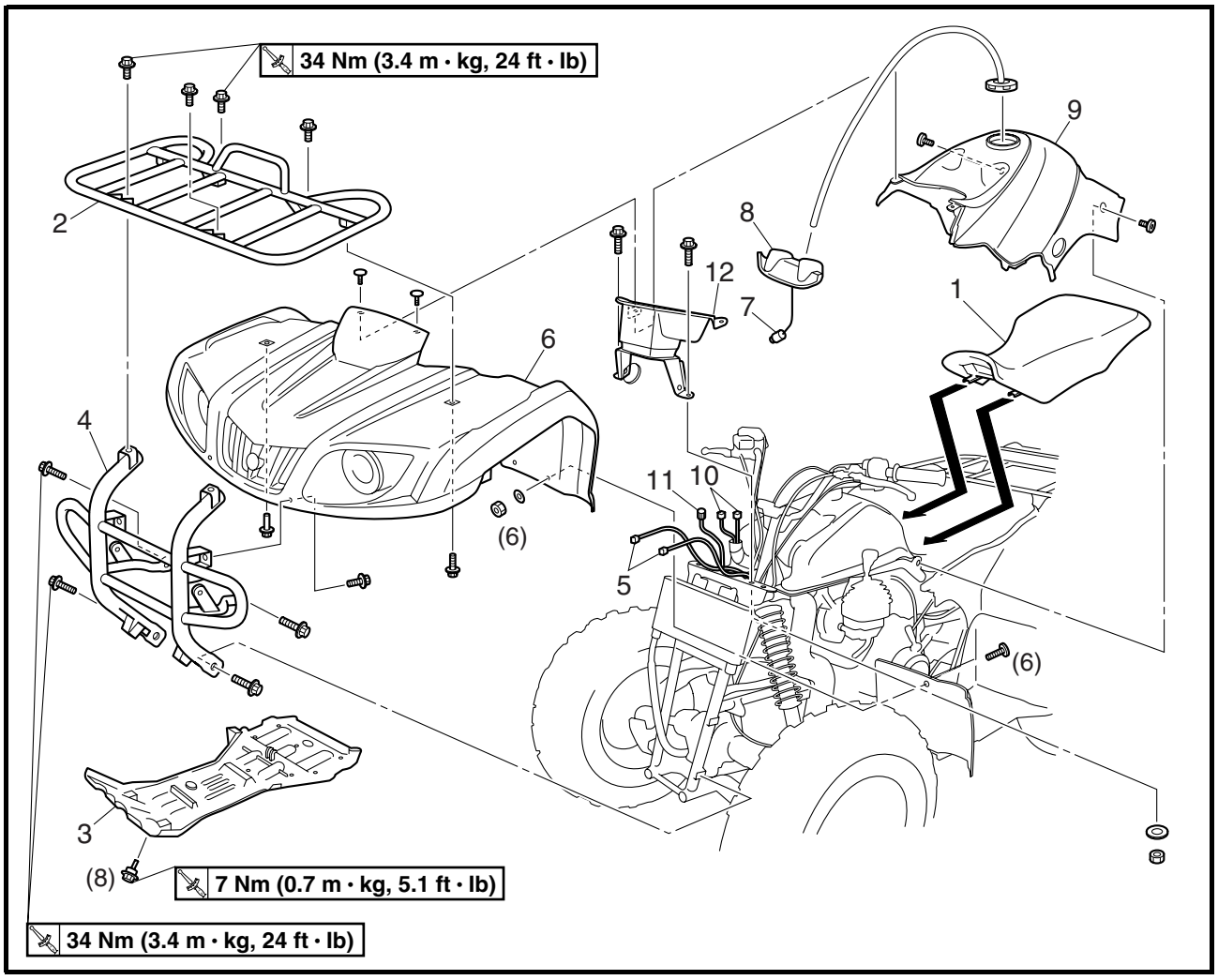
- Recommended brake fluid: DOT 4
- Brake fluid replacement:
  - When disassembling the master cylinder or caliper, replace the brake fluid. Normally check the brake fluid level and add fluid as required.
  - On the inner parts of the master cylinder and caliper, replace the oil seals every two years.
  - Replace the brake hoses every four years, or if cracked or damaged.

⚠ WARNING

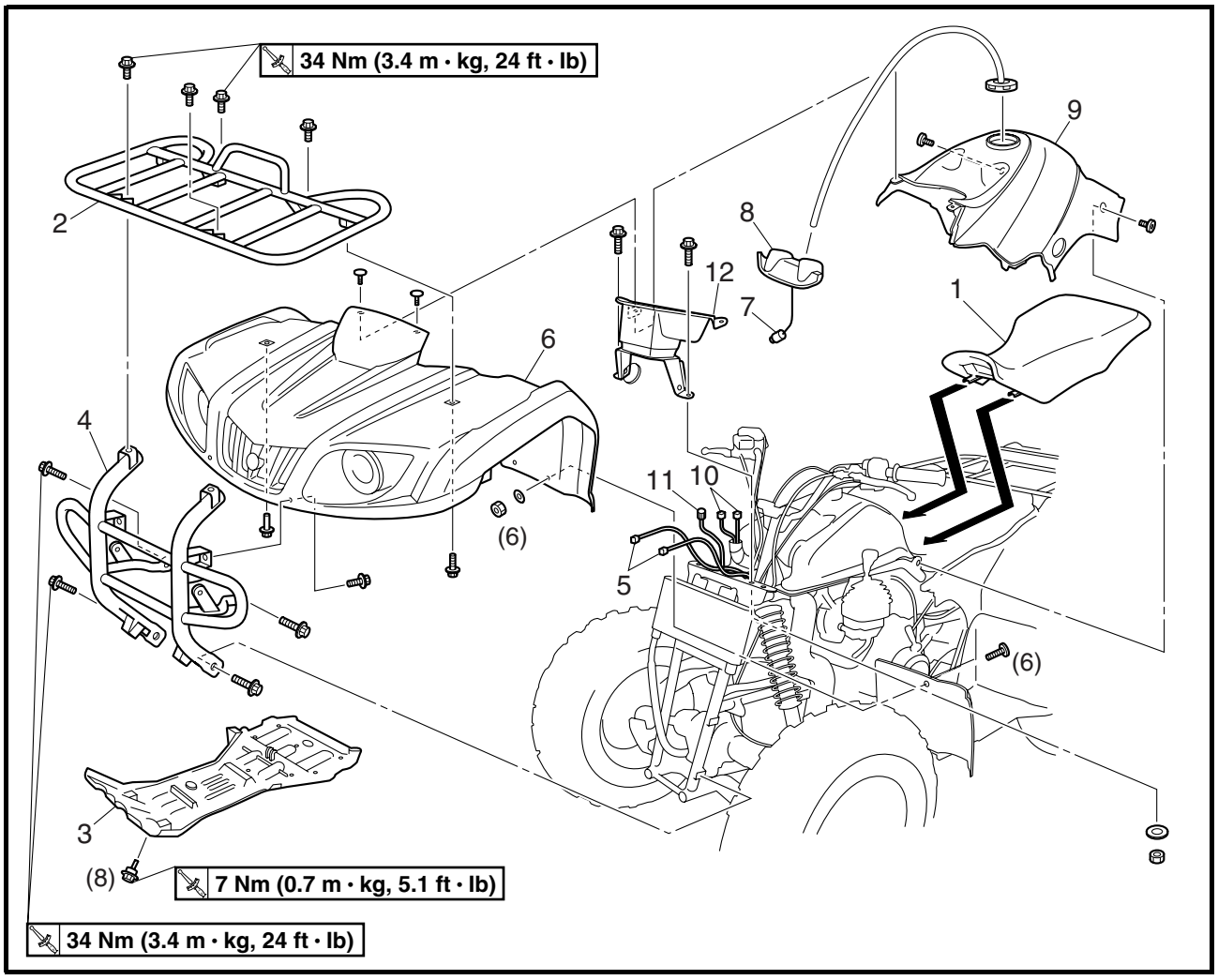
Indicates a potential hazard that could result in serious injury or death.

SEAT, CARRIERS, FENDERS AND FUEL TANK

SEAT, FRONT CARRIER, FRONT BUMPER AND FRONT FENDER

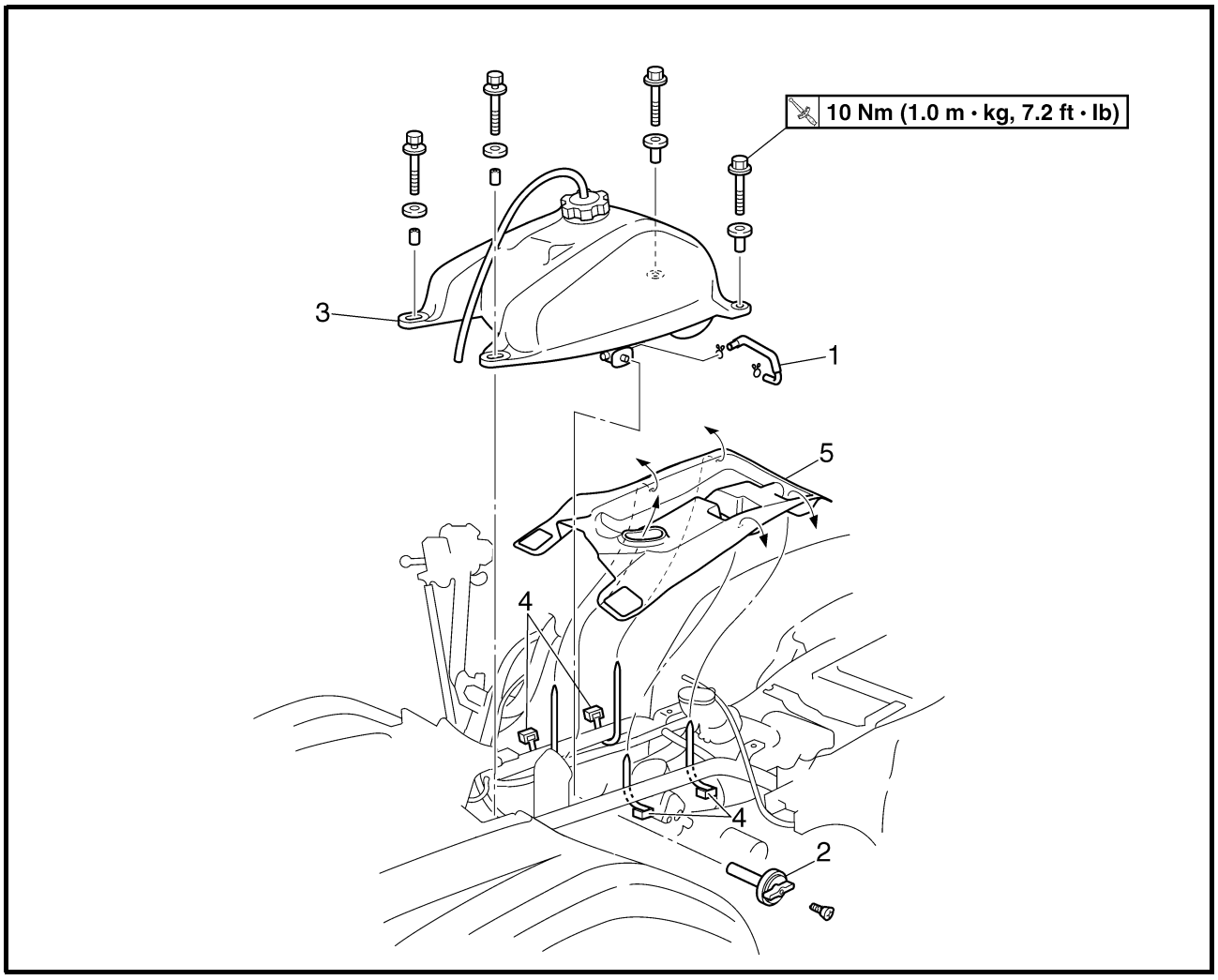


Order	Job name/Part name	Q'ty	Remarks
	Removing the seat, front carrier, front bumper and front fender		Remove the parts in the order below.
1	Seat	1	**NOTE:** Pull up the seat lock lever, then pull up on the rear of the seat.
2	Front carrier	1	
3	Engine skid plate	1	
4	Front bumper	1	
5	Headlight coupler	2	Disconnect.
6	Front fender	1	
7	Main switch coupler	1	Disconnect.
8	Handlebar cover	1	
9	Fuel tank cover	1	

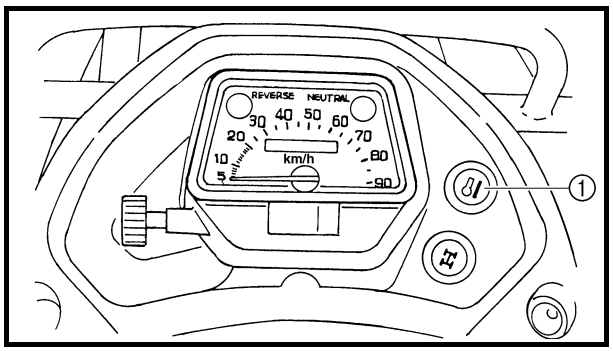


Order	Job name/Part name	Q'ty	Remarks
10	Indicator lights assembly coupler	2	Disconnect.
11	Speedometer cable	1	
12	Meter assembly	1	
			For installation, reverse the removal procedure.

FUEL TANK



Order	Job name/Part name	Q'ty	Remarks
	Removing the fuel tank Seat and fuel tank cover		Remove the parts in the order below. Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
1	Fuel hose	1	**NOTE:** Before disconnecting the fuel hose, turn the fuel cock to "OFF".
2	Fuel cock lever	1	
3	Fuel tank	1	**NOTE:** When installing the fuel tank, pass the fuel tank breather hose through the hole of the handlebar protector.
4	Plastic band	4	
5	Rubber cover	1	For installation, reverse the removal procedure.

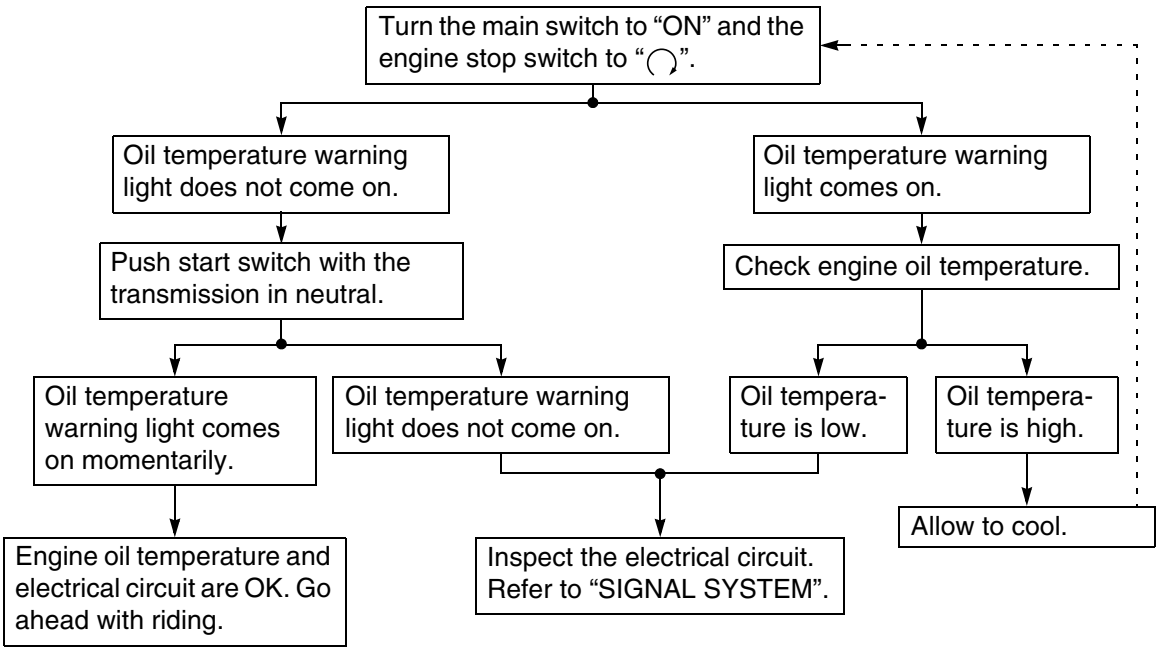


ENGINE

CHECKING THE OIL TEMPERATURE WARNING LIGHT

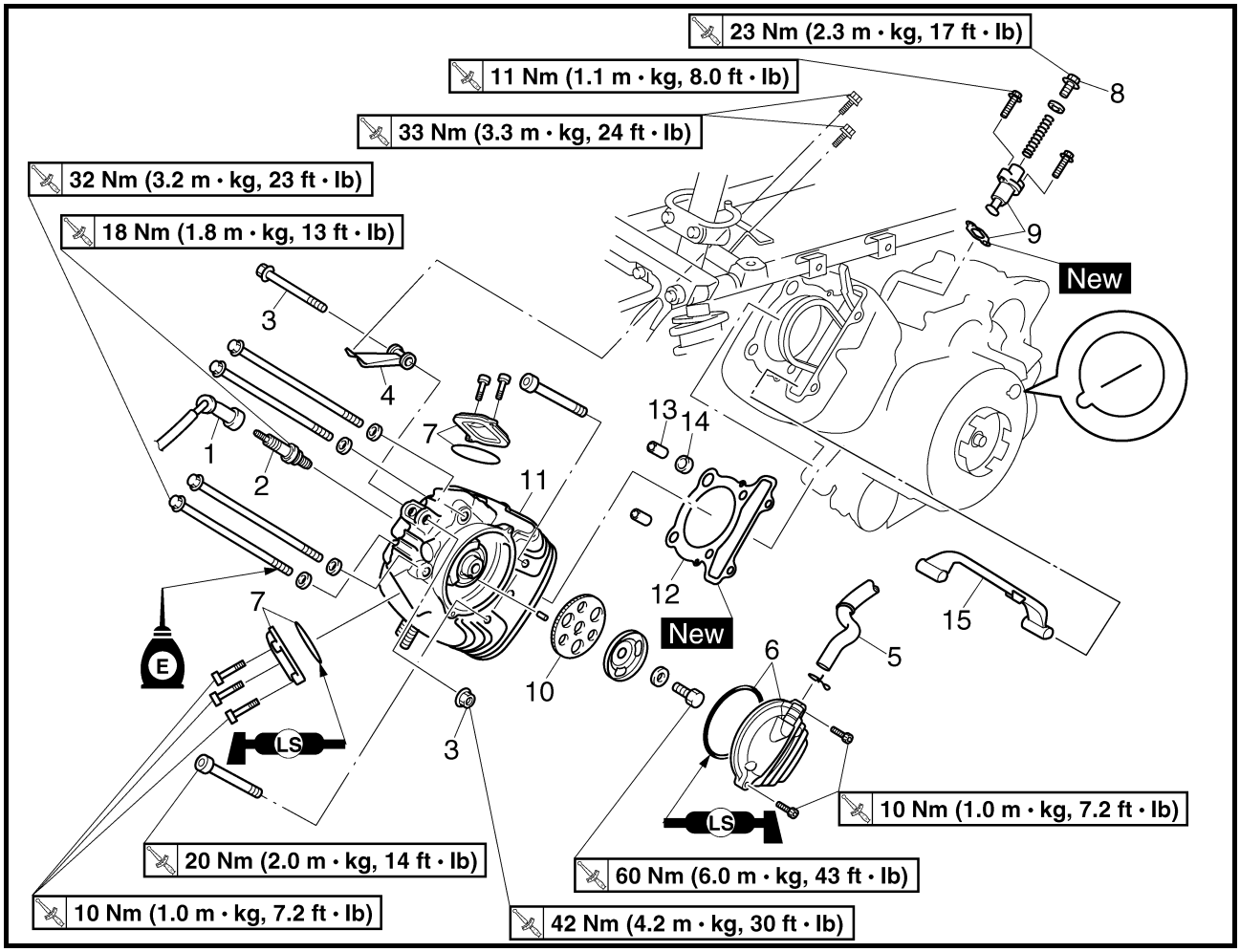
① Oil temperature warning light

Oil temperature warning light checking method

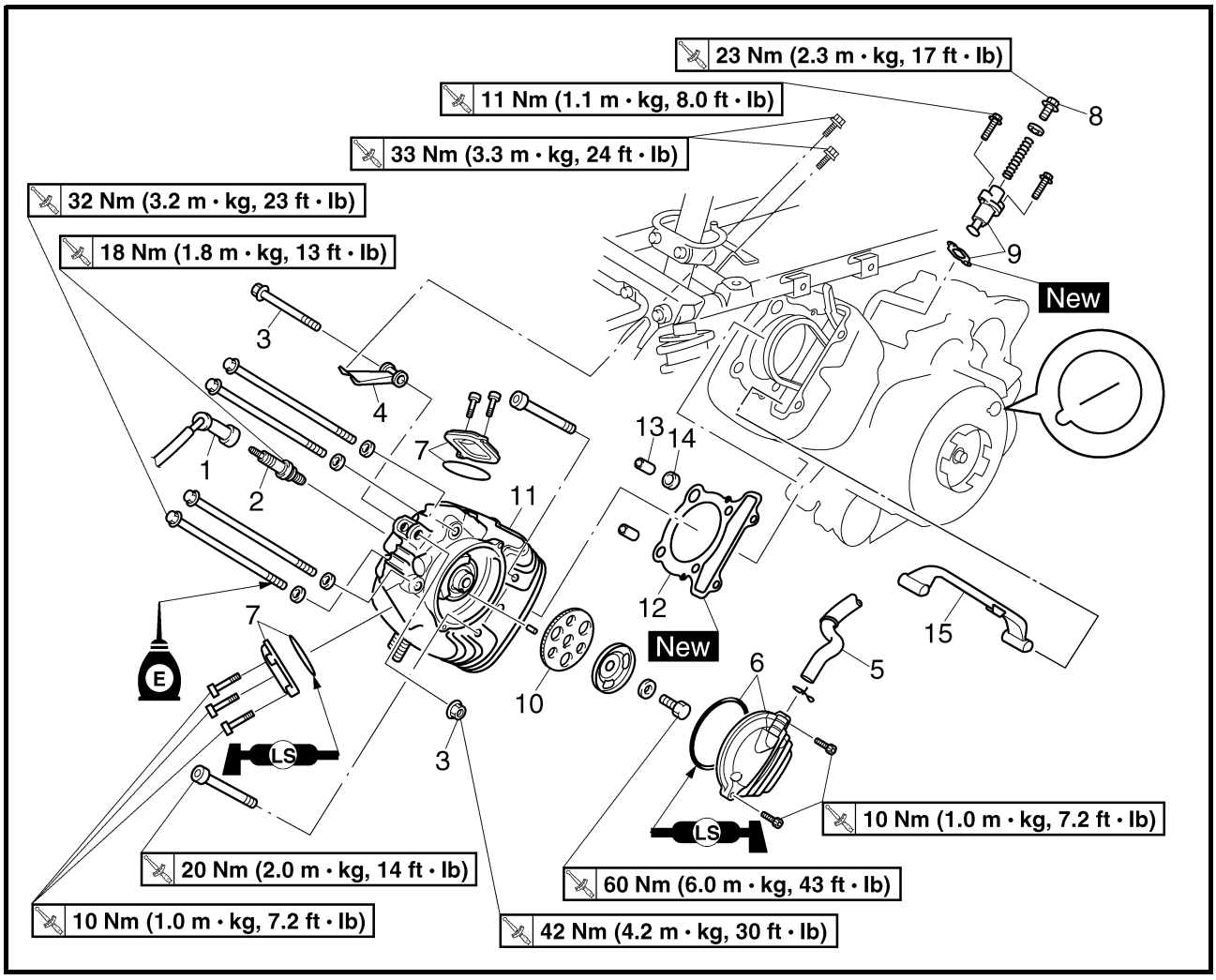


ENGINE

CYLINDER HEAD

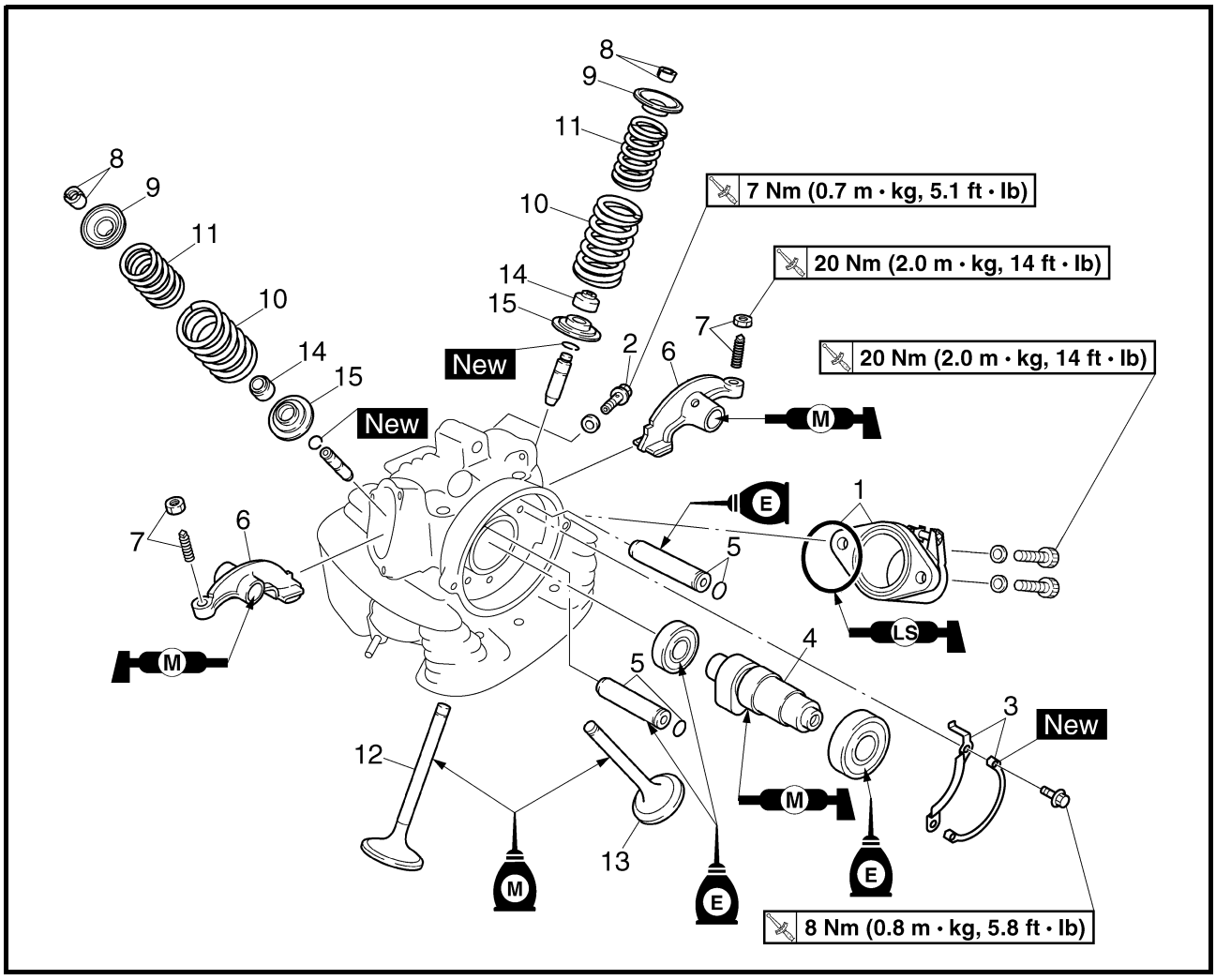


Order	Job name/Part name	Q'ty	Remarks
	Removing the cylinder head		Remove the parts in the order below.
	Fuel tank/rubber cover Front fender		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
	Air duct assembly 1/air filter case Exhaust pipe/muffler		Refer to "ENGINE REMOVAL" in CHAPTER 4. (Manual No.: 5TE2-AE1)
	Carburetor assembly		Refer to "CARBURETOR" in CHAPTER 6. (Manual No.: 5TE2-AE1)
	Recoil starter/timing plug		Refer to "ADJUSTING THE VALVE CLEARANCE" in CHAPTER 3. (Manual No.: 5TE2-AE1)
1	Spark plug lead	1	
2	Spark plug	1	
3	Engine mounting bolt (upper)/nut	1/1	
4	Engine bracket (upper)	1	

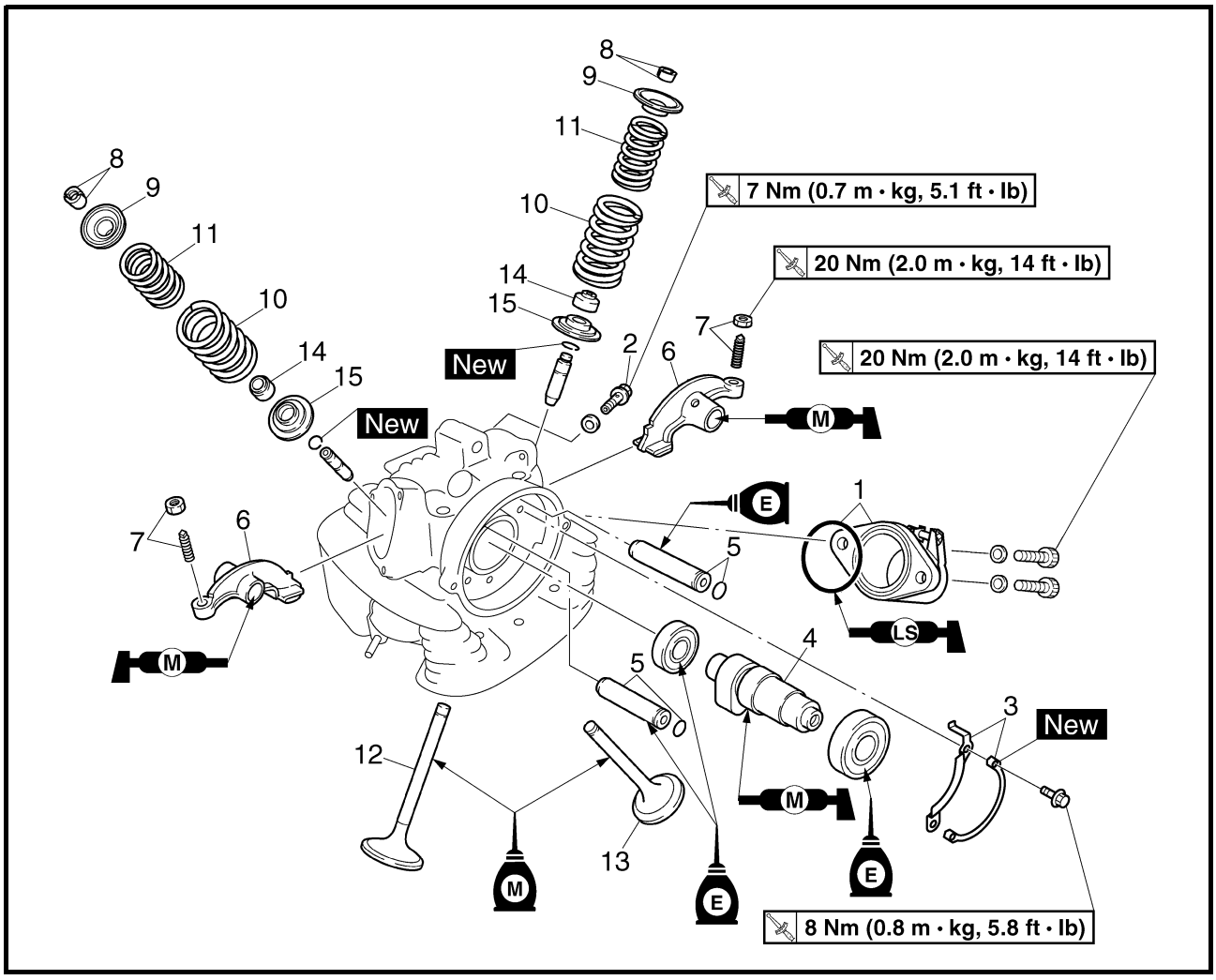


Order	Job name/Part name	Q'ty	Remarks
5	Cylinder head breather hose	1	
6	Camshaft sprocket cover/O-ring	1/1	
7	Tappet cover/O-ring	2/2	
8	Timing chain tensioner cap bolt	1	Refer to "REMOVING THE CYLINDER HEAD" and "INSTALLING THE CYLINDER HEAD" in CHAPTER 4. (Manual No.: 5TE2-AE1)
9	Timing chain tensioner/gasket	1/1	
10	Camshaft sprocket	1	
11	Cylinder head	1	
12	Cylinder head gasket	1	
13	Dowel pin	2	
14	Gasket	1	
15	Timing chain guide (exhaust)	1	
			For installation, reverse the removal procedure.

CAMSHAFT, ROCKER ARMS AND VALVES

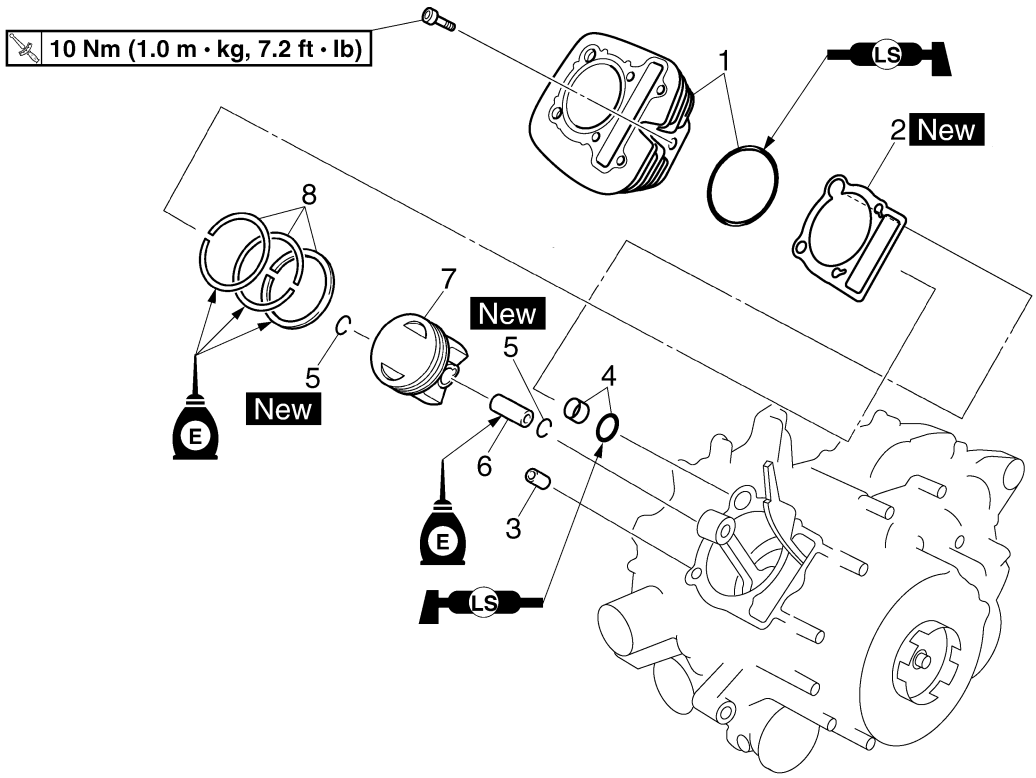


Order	Job name/Part name	Q'ty	Remarks
	Removing the camshaft, rocker arms and valves		Remove the parts in the order below.
1	Intake manifold/O-ring	1/1	
2	Oil gallery bolt	1	
3	Lock washer/bearing retainer	1/1	
4	Camshaft	1	Refer to "REMOVING THE CAMSHAFT AND ROCKER ARMS" and "INSTALLING THE CAMSHAFT AND ROCKER ARMS" in CHAPTER 4. (Manual No.: 5TE2-AE1)
5	Rocker arm shaft/O-ring	2/2	
6	Rocker arm	2	
7	Locknut/valve adjuster	2/2	



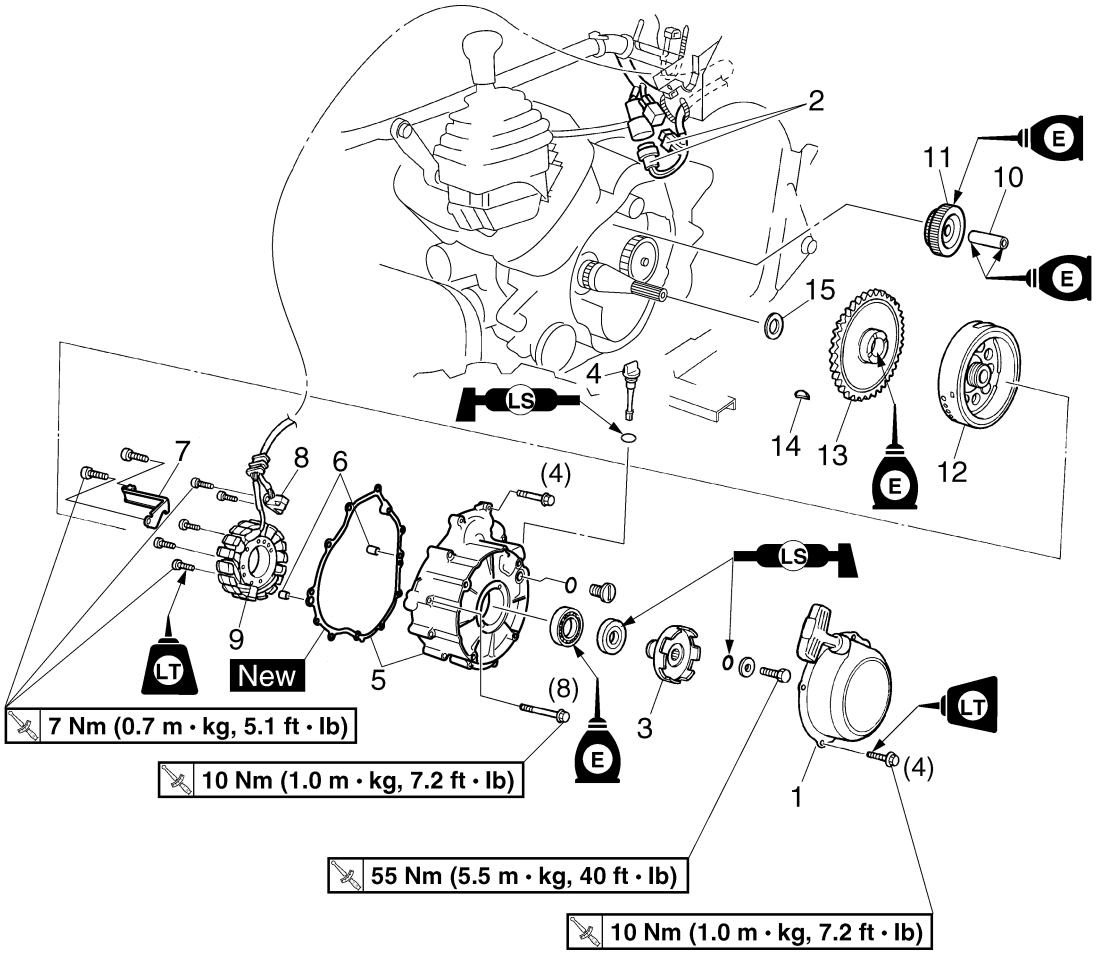
Order	Job name/Part name	Q'ty	Remarks
8	Valve cotter	4	Refer to "REMOVING THE VALVES AND VALVE SPRINGS" and "INSTALLING THE VALVES AND VALVE SPRINGS" in CHAPTER 4. (Manual No.: 5TE2-AE1)
9	Valve spring retainer	2	
10	Valve spring (outer)	2	
11	Valve spring (inner)	2	
12	Valve (intake)	1	
13	Valve (exhaust)	1	
14	Valve stem seal	2	
15	Valve spring seat	2	
			For installation, reverse the removal procedure.

CYLINDER AND PISTON

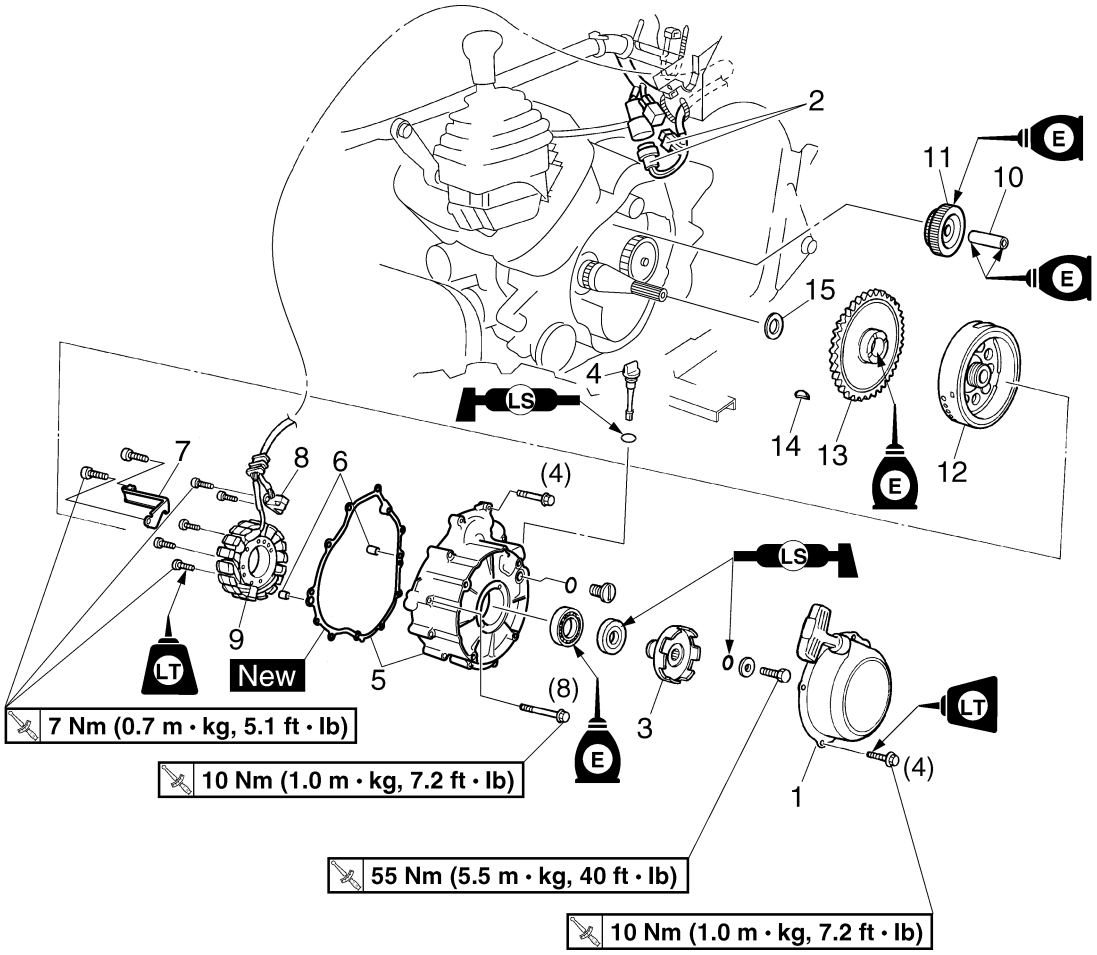


Order	Job name/Part name	Q'ty	Remarks
	Removing the cylinder and piston		Remove the parts in the order below.
	Cylinder head		Refer to "CYLINDER HEAD".
1	Cylinder/O-ring	1/1	Refer to "INSTALLING THE CYLINDER" in CHAPTER 4. (Manual No.: 5TE2-AE1)
2	Cylinder gasket	1	
3	Dowel pin	1	
4	Dowel pin/O-ring	1/1	
5	Piston pin clip	2	Refer to "REMOVING THE PISTON" and "INSTALLING THE PISTON" in CHAPTER 4. (Manual No.: 5TE2-AE1)
6	Piston pin	1	
7	Piston	1	
8	Piston ring set	1	
			For installation, reverse the removal procedure.

RECOIL STARTER AND A.C. MAGNETO

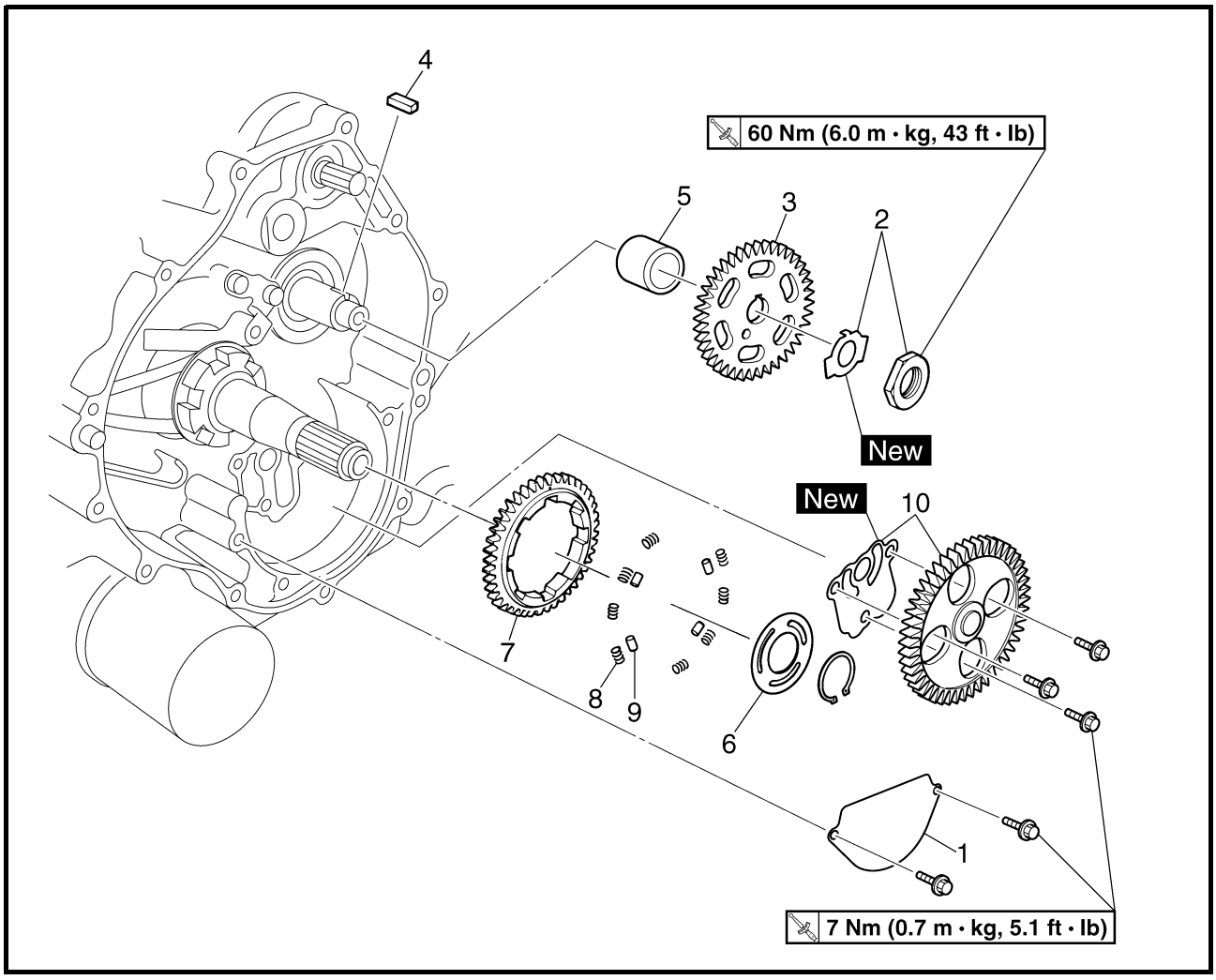


Order	Job name/Part name	Q'ty	Remarks
	Removing the A.C. magneto		Remove the parts in the order below.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in CHAPTER 3. (Manual No.: 5TE2-AE1)
	Seat and fuel tank cover		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
	Left footrest board		Refer to "FOOTREST BOARDS" in CHAPTER 3. (Manual No.: 5TE2-AE1)
1	Recoil starter assembly	1	
2	A.C. magneto coupler	2	Disconnect.
3	Starter pulley	1	Refer to "REMOVING THE A.C. MAGNETO" and "INSTALLING THE A.C. MAGNETO" in CHAPTER 4. (Manual No.: 5TE2-AE1)
4	Oil filler cap	1	
5	Crankcase cover/gasket	1/1	
6	Dowel pin	2	

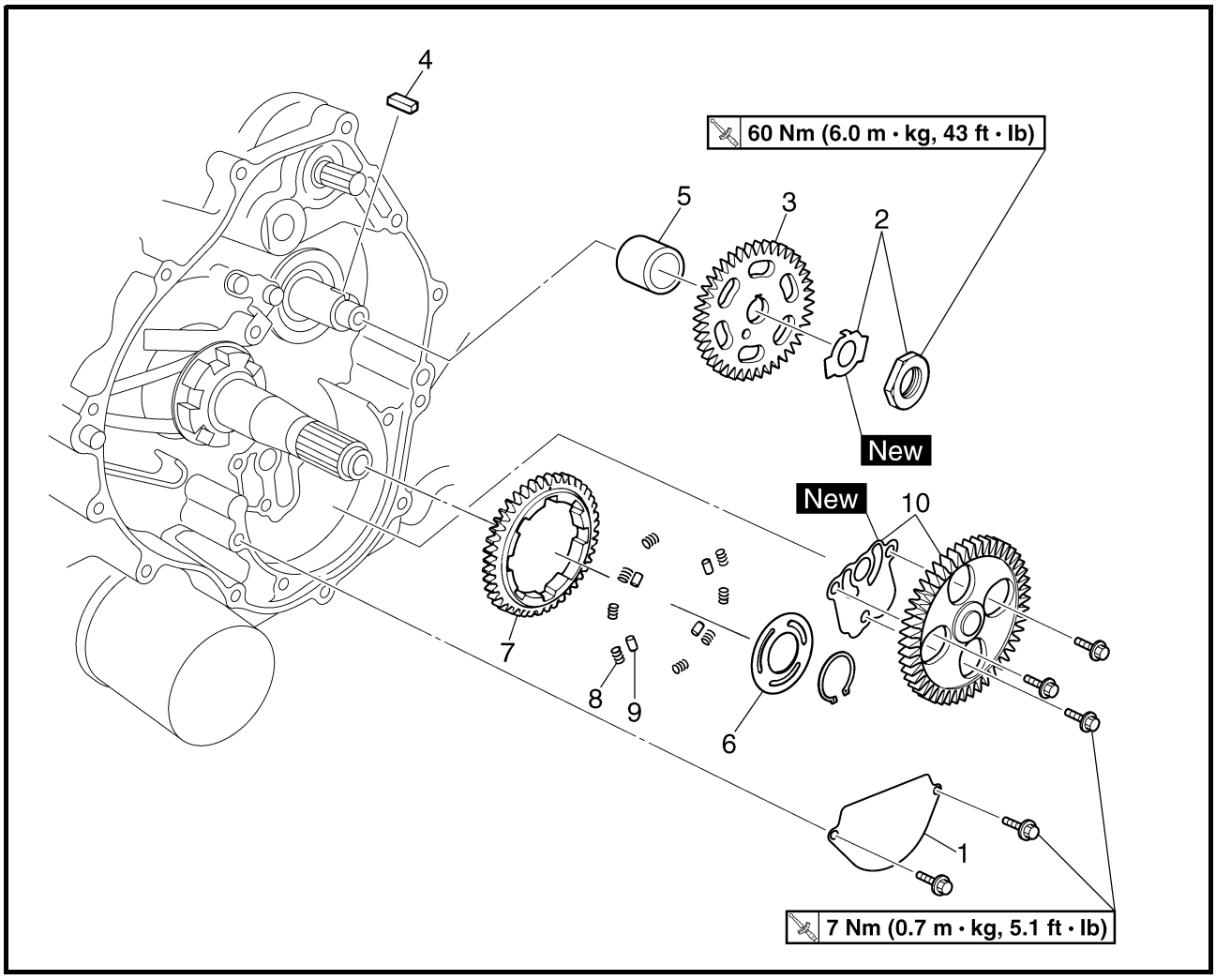


Order	Job name/Part name	Q'ty	Remarks
7	Lead holder	1	
8	Pickup coil	1	
9	Stator assembly	1	
10	Starter idle gear shaft	1	
11	Starter idle gear	1	
12	Rotor	1	Refer to "REMOVING THE A.C. MAGNETO" and "INSTALLING THE A.C. MAGNETO" in CHAPTER 4. (Manual No.: 5TE2-AE1).
13	Starter wheel gear	1	
14	Woodruff key	1	
15	Washer	1	
			For installation, reverse the removal procedure.

BALANCER GEARS AND OIL PUMP

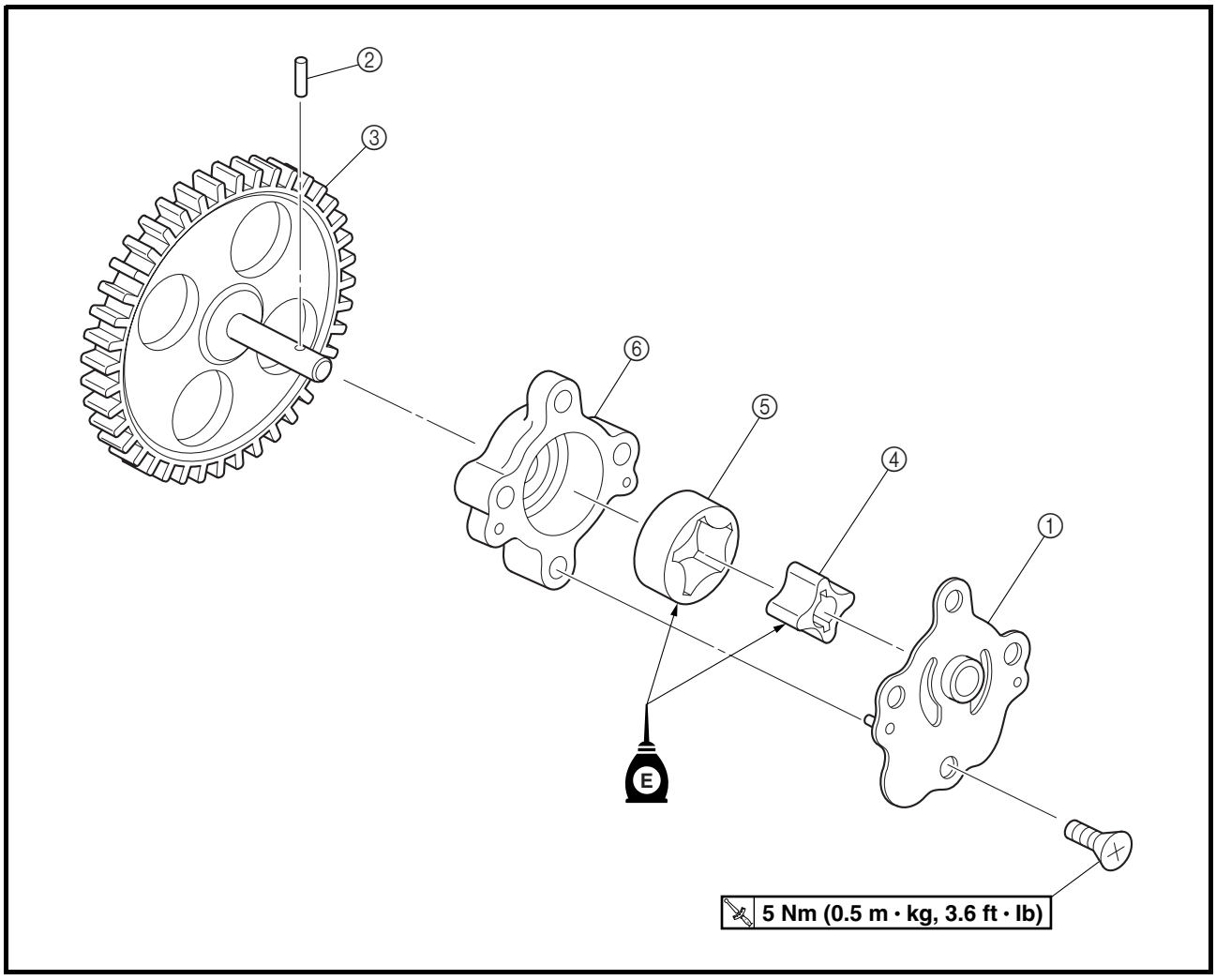


Order	Job name/Part name	Q'ty	Remarks
	Removing the balancer gears and oil pump		Remove the parts in the order below.
	Starter wheel gear		Refer to "RECOIL STARTER AND A.C. MAGNETO".
1	Plate	1	
2	Nut/lock washer	1/1	
3	Balancer driven gear	1	Refer to "REMOVING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR" and "INSTALLING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR".
4	Straight key	1	
5	Spacer	1	
6	Plate	1	

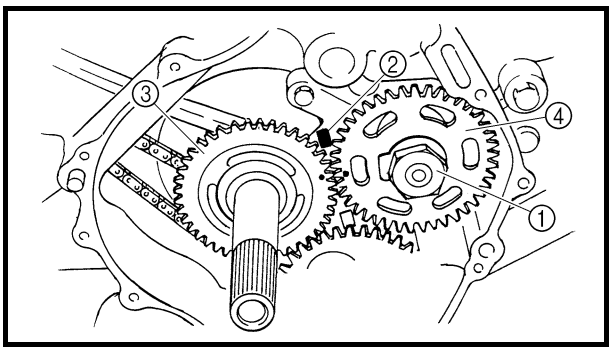


Order	Job name/Part name	Q'ty	Remarks
7	Balancer drive gear	1	
8	Spring	8	
9	Pin	4	
10	Oil pump assembly/gasket	1/1	
			For installation, reverse the removal procedure.

OIL PUMP



Order	Job name/Part name	Q'ty	Remarks
	Disassembling the oil pump		Remove the parts in the order below.
①	Rotor cover	1	
②	Pin	1	
③	Oil pump driven gear	1	
④	Inner rotor	1	
⑤	Outer rotor	1	
⑥	Oil pump housing	1	
			For assembly, reverse the disassembly procedure.

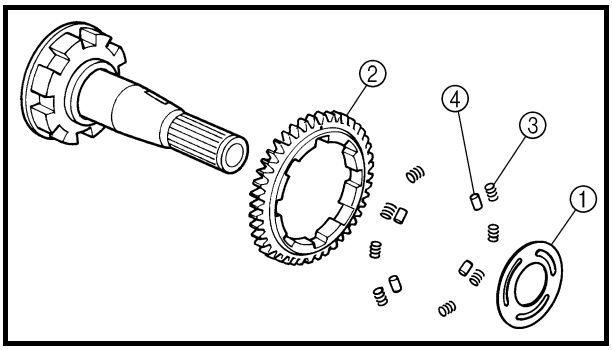


REMOVING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

1.Straighten the lock washer tabs.
2.Loosen:
- Balancer driven gear nut ①

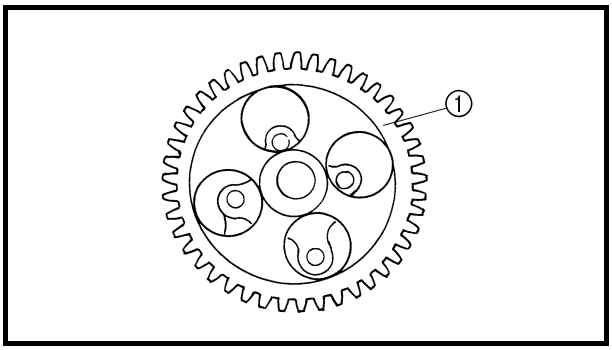
NOTE:

Place an aluminum plate ② between the teeth of the balancer drive gear ③ and balancer driven gear ④.



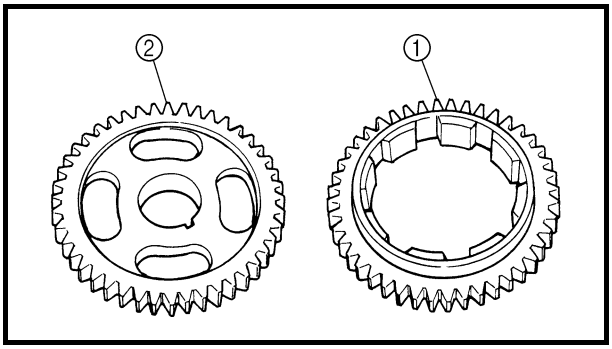
REMOVING THE BALANCER DRIVE GEAR AND BUFFER BOSS

1.Remove:
- Plate ①
- Balancer drive gear ②
- Springs ③
- Pins ④



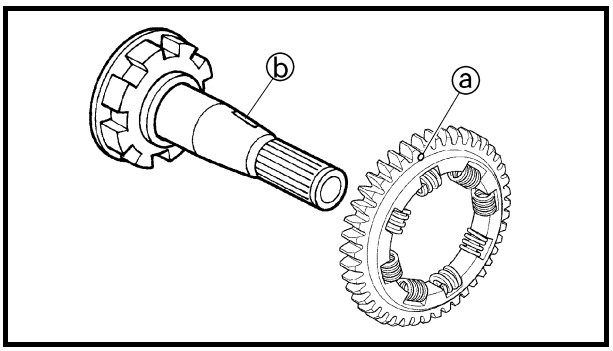
CHECKING THE OIL PUMP DRIVEN GEAR

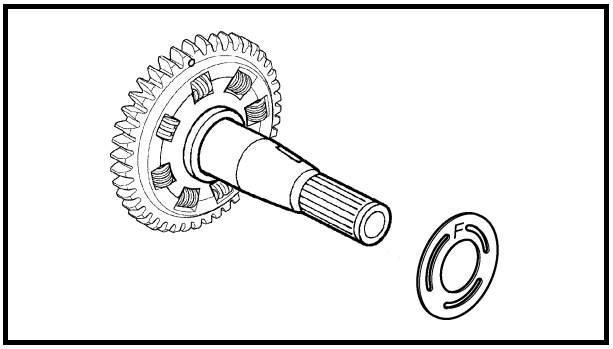
1.Check:
- Oil pump driven gear ①
  Cracks/wear/damage → Replace.



CHECKING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

1.Check:
- Balancer drive gear ①
- Balancer driven gear ②
  Damage/wear → Replace the balancer drive gear and balancer driven gear as a set.
  Excessive noise during operation → Replace the balancer drive gear and balancer driven gear as a set.





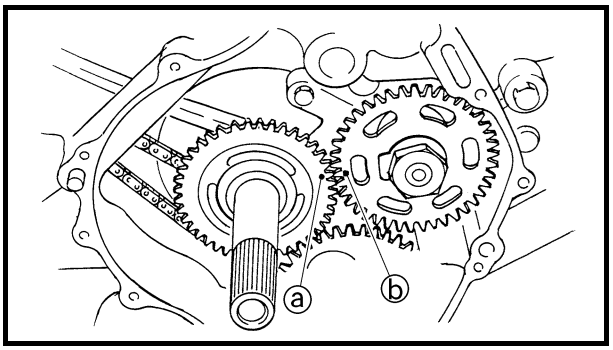
INSTALLING THE BALANCER DRIVE GEAR AND BALANCER DRIVEN GEAR

1.Install:
- Pin
- Spring
- Balancer drive gear (onto the buffer boss)

NOTE:
Align the punch mark ⓐ on the balancer drive gear with the keyway ⓑ on the crankshaft.

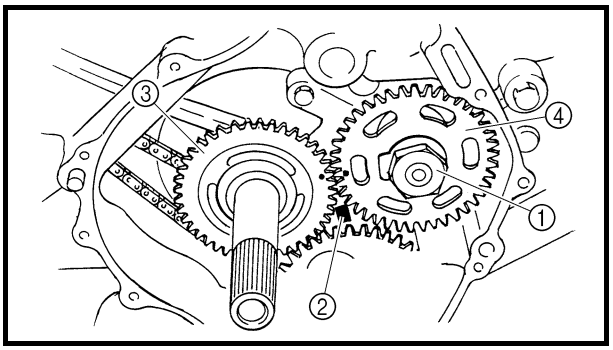
2.Install:
- Plate

NOTE:
Install the plate with the identification mark "F" facing away from the balancer drive gear.



3.Install:
- Balancer driven gear

NOTE:
Align the punch mark ⓐ on the balancer drive gear with the punch mark ⓑ on the balancer driven gear.



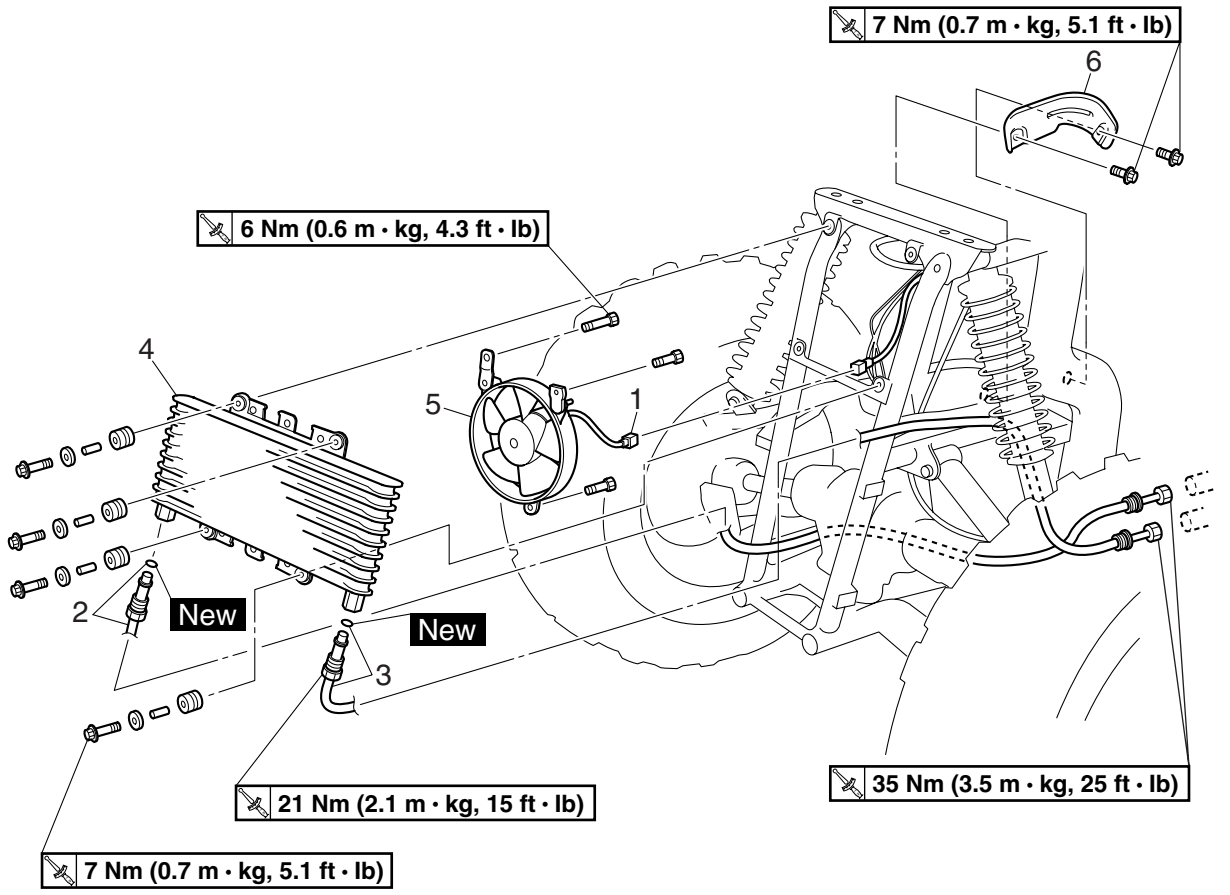
4.Install:
- Lock washer New
- Balancer driven gear nut ①

	60 Nm (6.0 m • kg, 43 ft • lb)

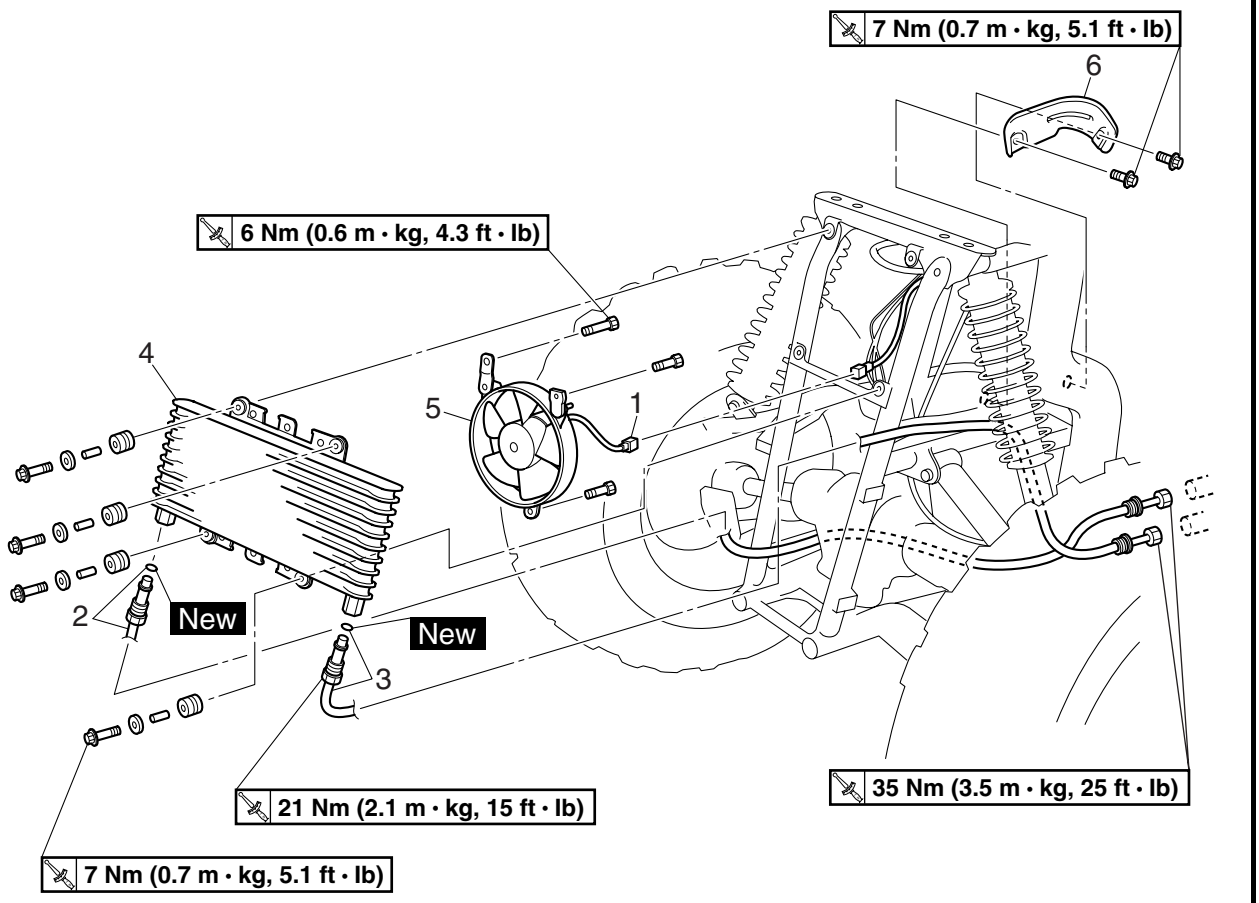
NOTE:
- Place an aluminum plate ② between the teeth of the balancer drive gear ③ and balancer driven gear ④.
- Apply the molybdenum disulfide grease to the thread of axles and nuts.

5.Bend the lock washer tabs along the balancer driven gear nut.

OIL COOLER

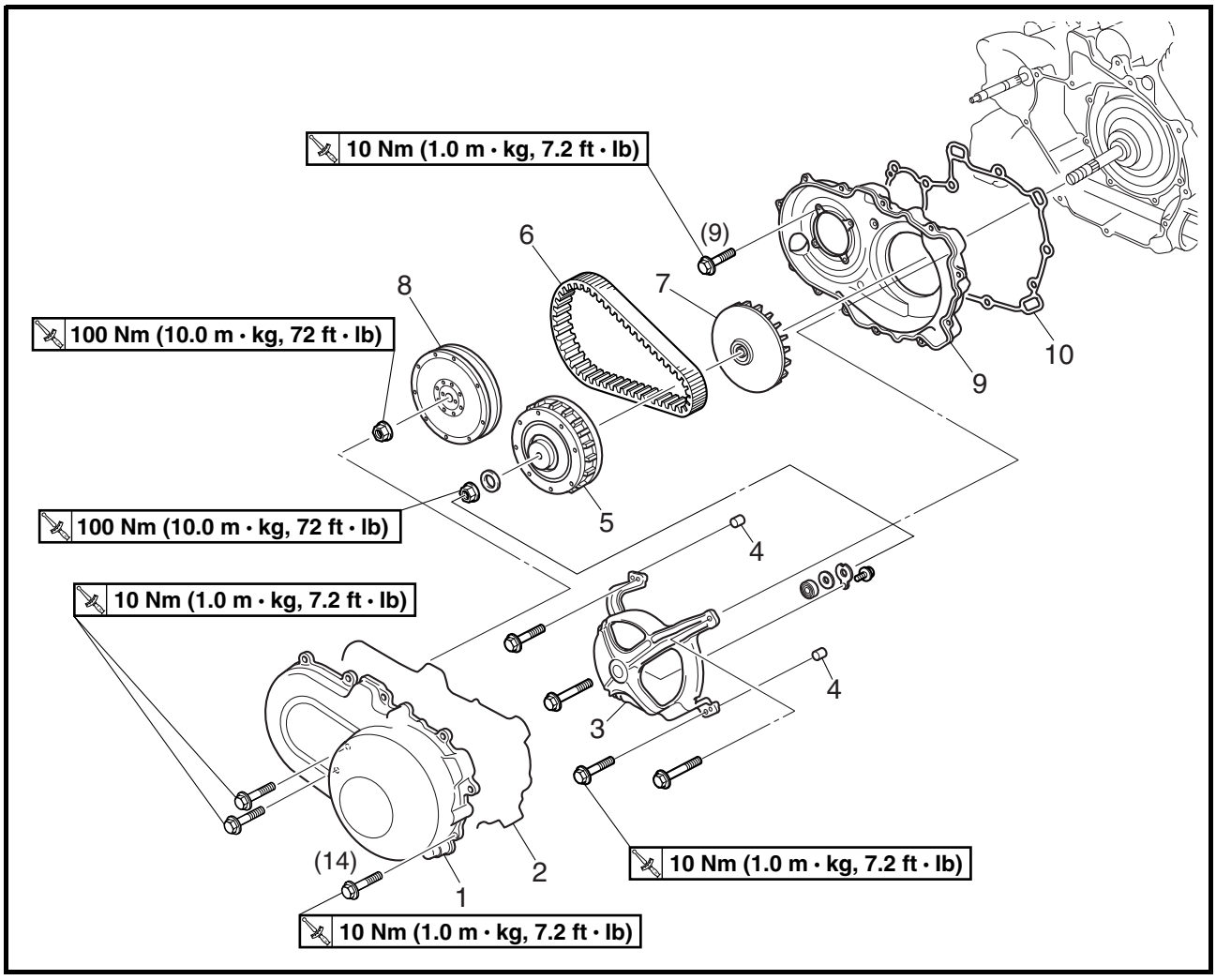


Order	Job name/Part name	Q'ty	Remarks
	Removing the oil cooler		Remove the parts in the order below.
	Seat, fuel tank cover, front carrier, front bumper and front fender		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
	Left footrest board		Refer to "FOOTREST BOARDS" in CHAPTER 3. (Manual No.: 5TE2-AE1)
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in CHAPTER 3. (Manual No.: 5TE2-AE1)
1	Oil cooler fan coupler	1	Disconnect.
2	Oil inlet hose/O-ring	1/1	Disconnect.

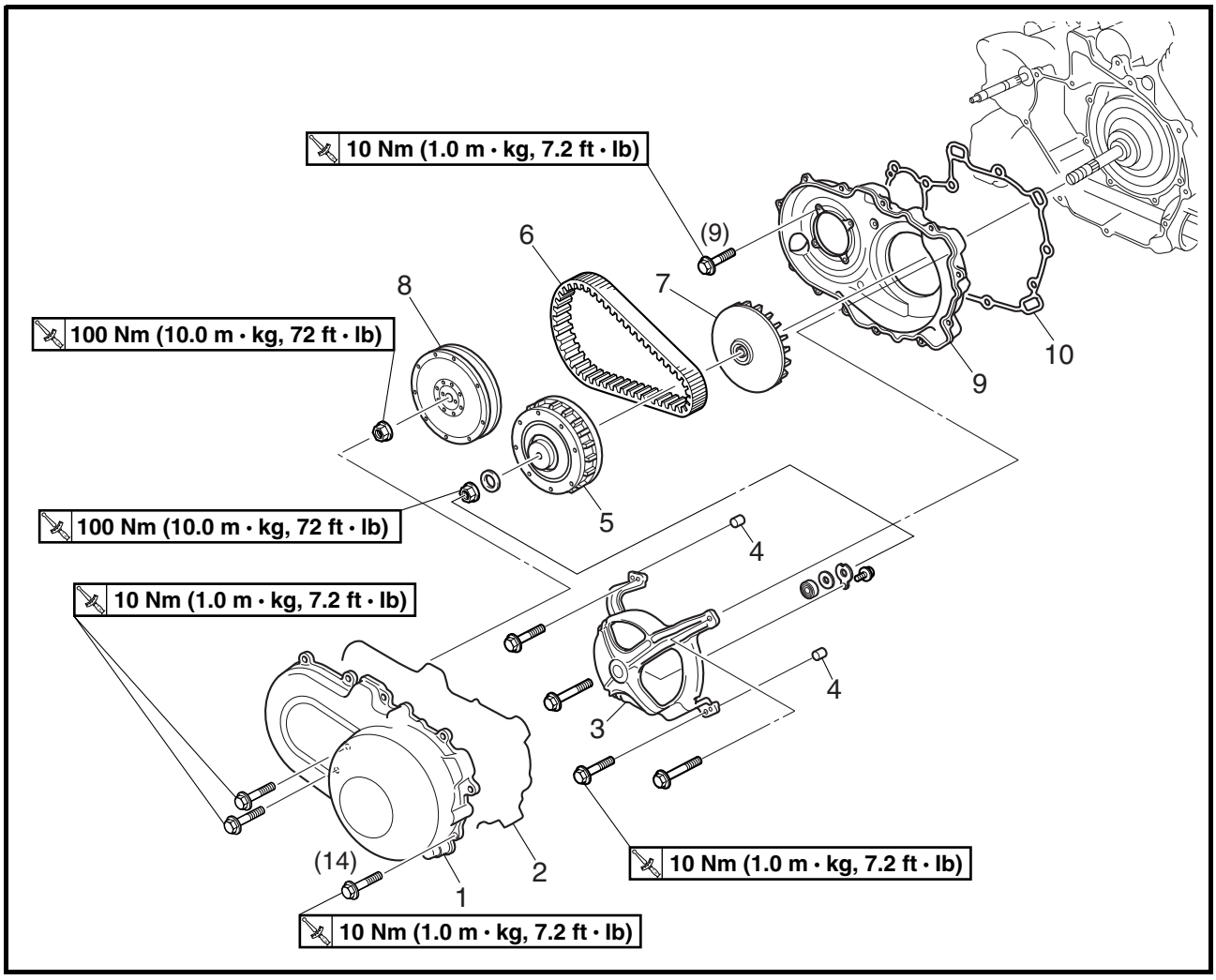


Order	Job name/Part name	Q'ty	Remarks
3	Oil outlet hose/O-ring	1/1	Disconnect.
4	Oil cooler	1	
5	Oil cooler fan	1	
6	Oil hose protector	1	
			For installation, reverse the removal procedure.

PRIMARY AND SECONDARY SHEAVES

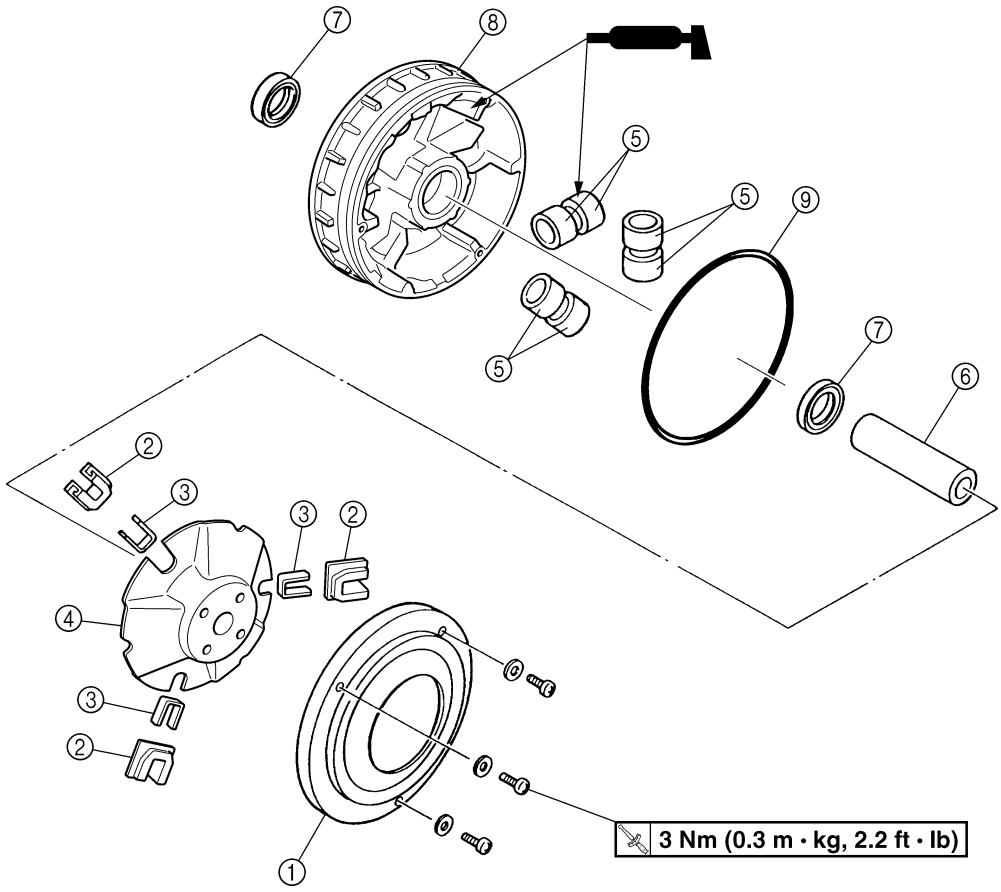


Order	Job name/Part name	Q'ty	Remarks
	Removing the primary and secondary sheaves		Remove the parts in the order below.
	Front fender		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
	Rear fender		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK" in CHAPTER 3. (Manual No.: 5TE2-AE1)
	Right footrest board		Refer to "FOOTREST BOARDS" in CHAPTER 3. (Manual No.: 5TE2-AE1)
1	Drive belt case cover	1	
2	Rubber gasket	1	
3	Bearing housing	1	
4	Dowel pin	2	



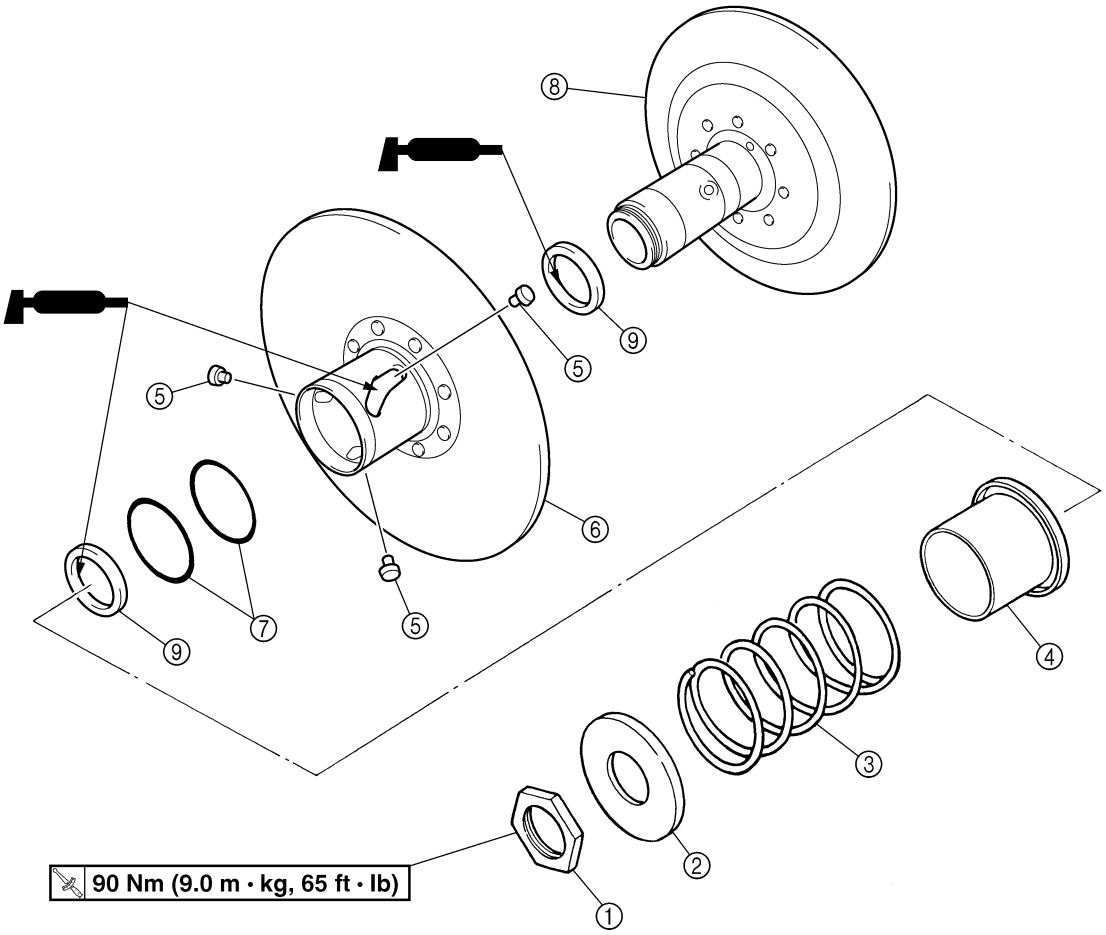
Order	Job name/Part name	Q'ty	Remarks
5	Primary sliding sheave assembly	1	Refer to "REMOVING THE PRIMARY AND SECONDARY SHEAVES" and "INSTALLING THE PRIMARY AND SECONDARY SHEAVES" in CHAPTER 4. (Manual No.: 5TE2-AE1)
6	V-belt	1	
7	Primary fixed sheave	1	
8	Secondary sheave assembly	1	
9	Drive belt case	1	
10	Rubber gasket	1	For installation, reverse the removal procedure.

PRIMARY SLIDING SHEAVE

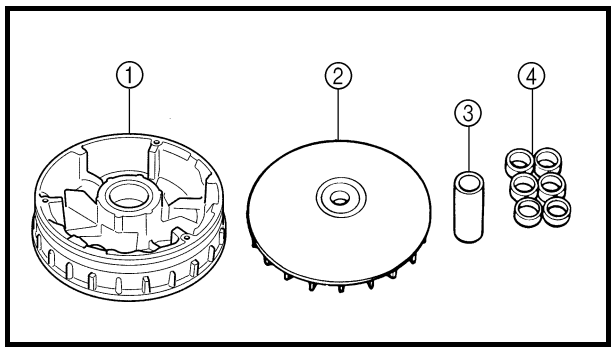


Order	Job name/Part name	Q'ty	Remarks
	Disassembling the primary sliding sheave		Remove the parts in the order below.
①	Primary sliding sheave cap	1	
②	Primary pulley slider	3	
③	Spacer	3	
④	Primary pulley cam	1	
⑤	Primary pulley weight	6	Refer to "ASSEMBLING THE PRIMARY SHEAVE".
⑥	Collar	1	
⑦	Oil seal	2	
⑧	Primary sliding sheave	1	
⑨	O-ring	1	
			For assembly, reverse the disassembly procedure.

SECONDARY SHEAVE



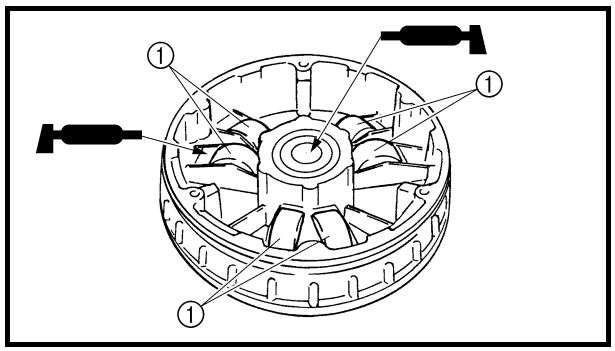
Order	Job name/Part name	Q'ty	Remarks
	Disassembling the secondary sheave		Remove the parts in the order below.
①	Nut	1	
②	Spring seat	1	
③	Compression spring	1	Refer to "DISASSEMBLING THE SECONDARY SHEAVE" in CHAPTER 4. (Manual No.: 5TE2-AE1)
④	Spring seat	1	
⑤	Guide pin	3	
⑥	Secondary sliding sheave	1	Refer to "ASSEMBLING THE SECONDARY SHEAVE".
⑦	O-ring	2	
⑧	Secondary fixed sheave	1	
⑨	Oil seal	2	
			For assembly, reverse the disassembly procedure.



ASSEMBLING THE PRIMARY SHEAVE

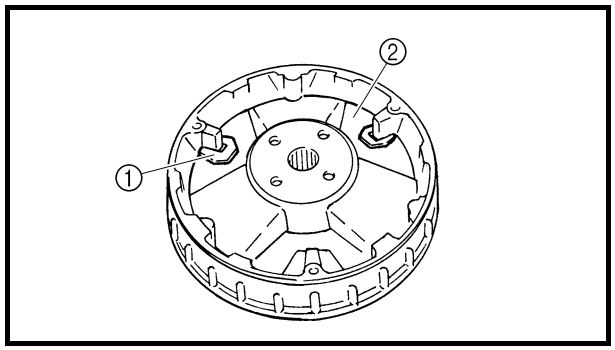
1.Clean:
- Primary sliding sheave face ①
- Primary fixed sheave face ②
- Collar ③
- Weights ④
- Primary pulley cam face

NOTE:
Remove any excess grease.



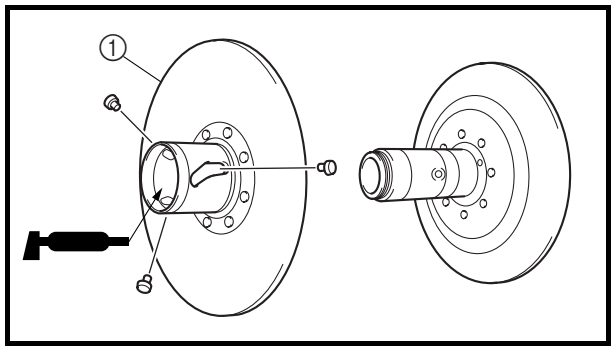
2.Install:
- Weights ①

NOTE:
- Apply Yamaha Grizzly grease (90 g) to the whole outer surface of the weights and install.
- Apply Yamaha Grizzly grease to the inner surface of the collar.
- Apply Yamaha Grizzly grease to the inner surface of the primary sliding sheave.



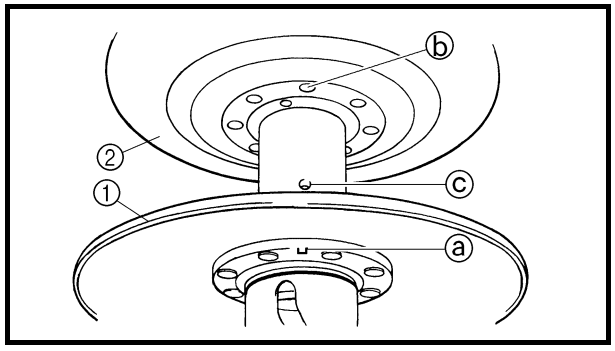
3.Install:
- Spacer
- Sliders ①
- Primary pulley cam ②
- Primary sliding sheave cap

	3 Nm (0.3 m • kg, 2.2 ft • lb)



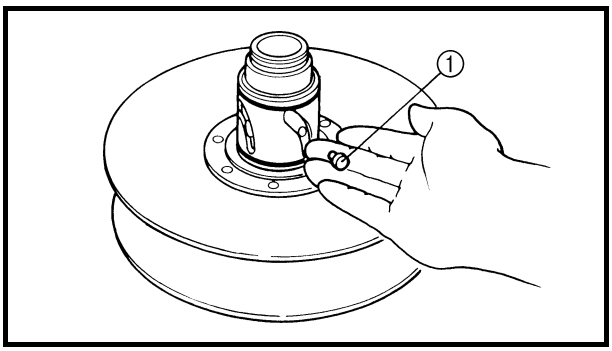
ASSEMBLING THE SECONDARY SHEAVE

1.Apply:
- BEL-RAY assembly lube®
  (to the secondary sliding sheave ① inner surface and oil seals)

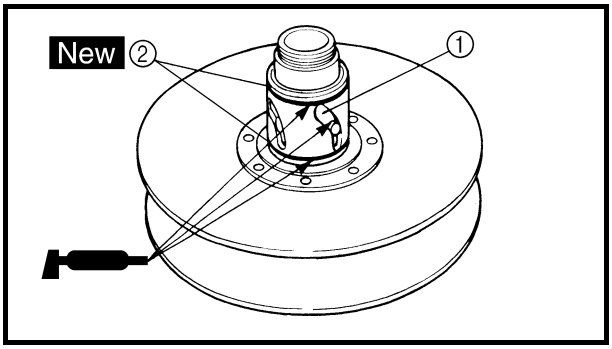


2.Install:
- Secondary sliding sheave ①
- Secondary fixed sheave ②

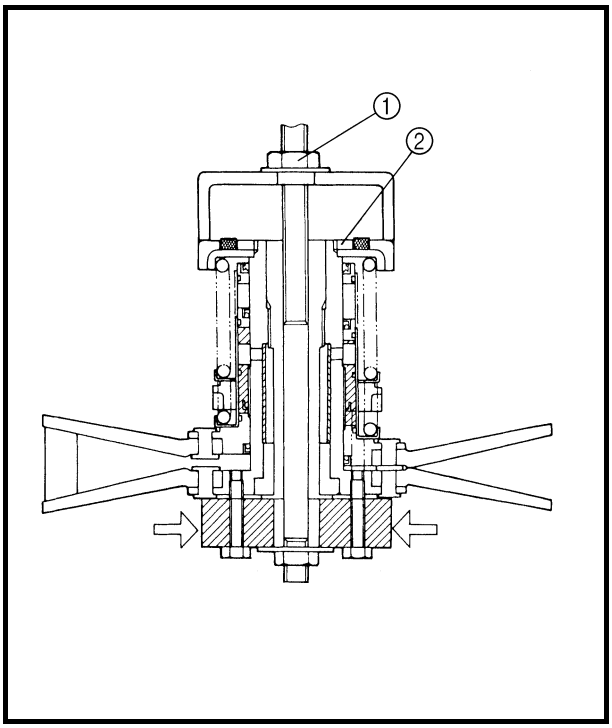
NOTE:
Align the alignment mark ⓐ on the secondary sliding sheave with the hole ⓑ in the guide pin that is aligned with the rivet ⓒ on the secondary fixed sheave.



3.Install:
- Guide pins ①



4.Apply:
- BEL-RAY assembly lube®
  (to all guide pin sliding grooves ①, and O-rings ② New)



5.Install:
- Spring seat
- Compression spring
- Spring seat
- Nut

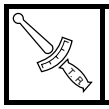
****

Installing steps:

- Attach the sheave fixed block, locknut wrench and sheave spring compressor to the secondary sheave assembly.

Sheave fixed block:
P/N. YM-04135, 90890-04135
Locknut wrench:
P/N. YM-01348, 90890-01348
Sheave spring compressor:
P/N. YM-04134, 90890-04134

- Place the sheave fixed block in a vise and secure it.
- Tighten the sheave spring compressor nut ① and compress the spring.
- Install the nut ② and tighten it to the specified torque using the locknut wrench.

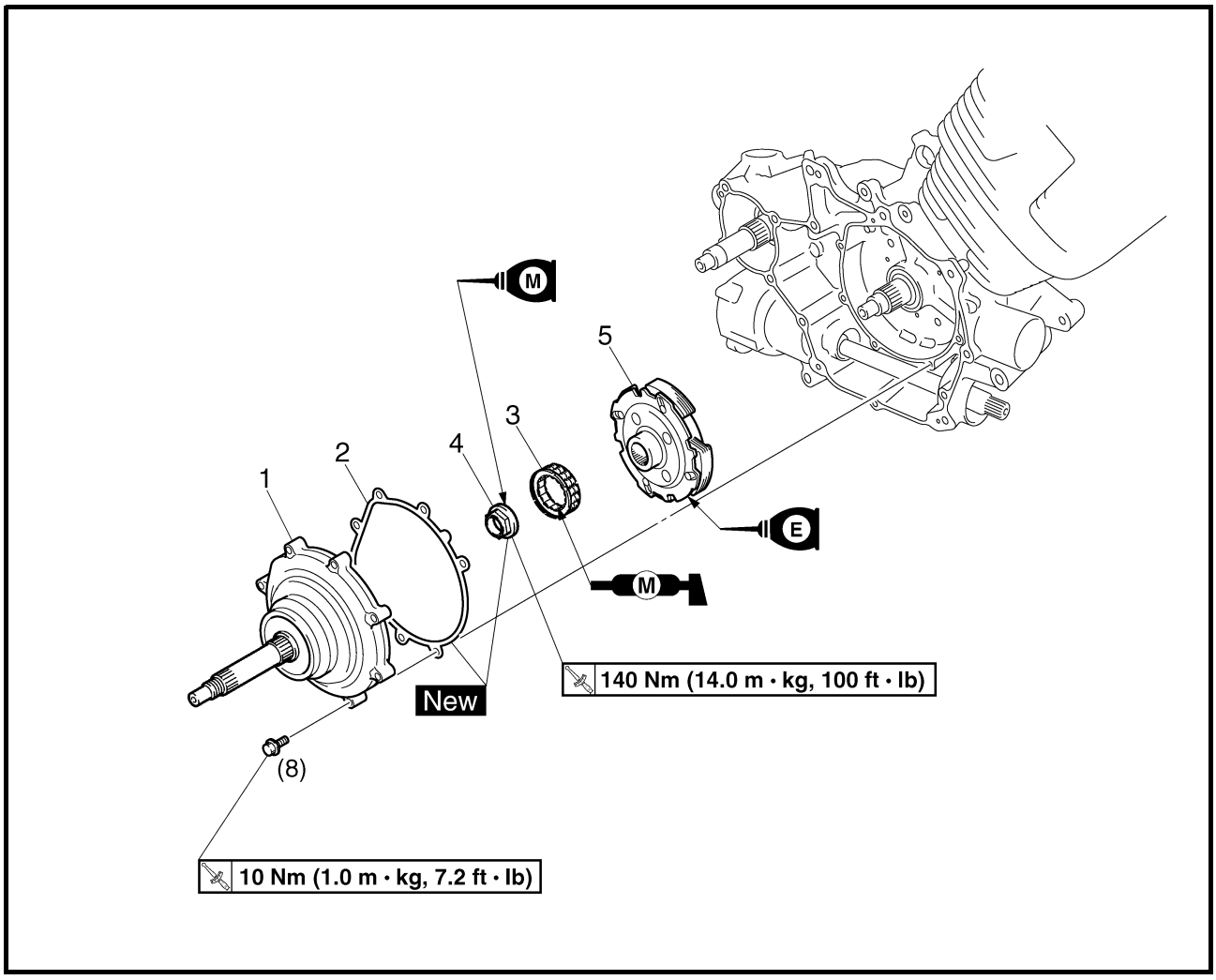


Nut:
90 Nm (9.0 m • kg, 65 ft • lb)

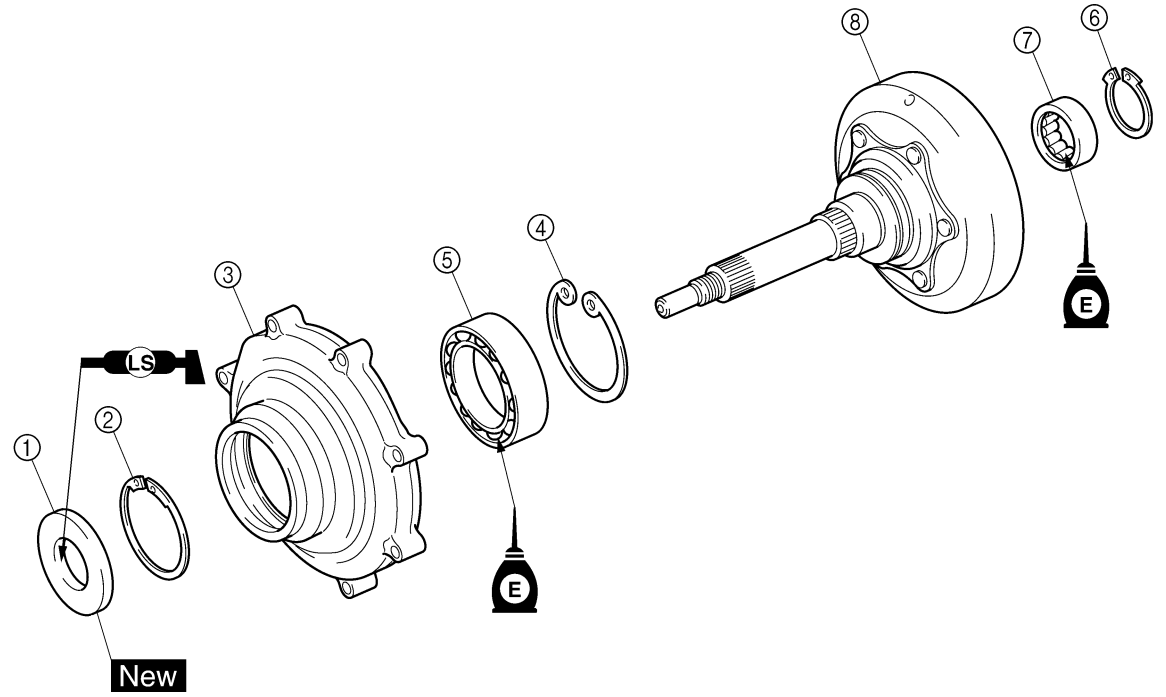
- Remove the sheave spring compressor, locknut wrench, and sheave fixed block.

****

CLUTCH



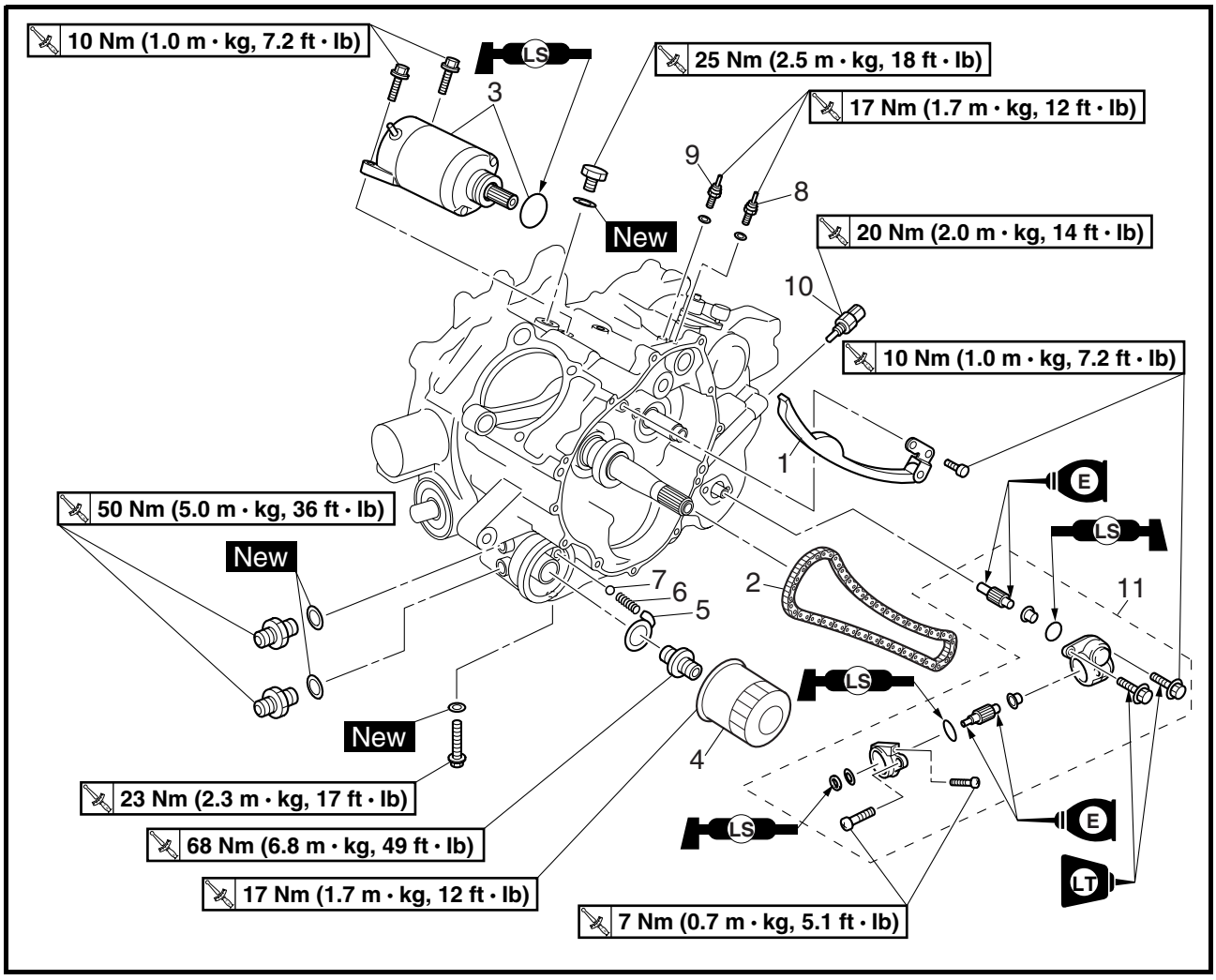
Order	Job name/Part name	Q'ty	Remarks
	Removing the clutch		Remove the parts in the order below.
	Primary and secondary sheaves		Refer to "PRIMARY AND SECONDARY SHEAVES".
1	Clutch housing assembly	1	Refer to "REMOVING THE CLUTCH" and "INSTALLING THE CLUTCH" in CHAPTER 4. (Manual No.: 5TE2-AE1)
2	Gasket	1	
3	One-way clutch bearing	1	
4	Nut	1	
5	Clutch carrier assembly	1	
			For installation, reverse the removal procedure.



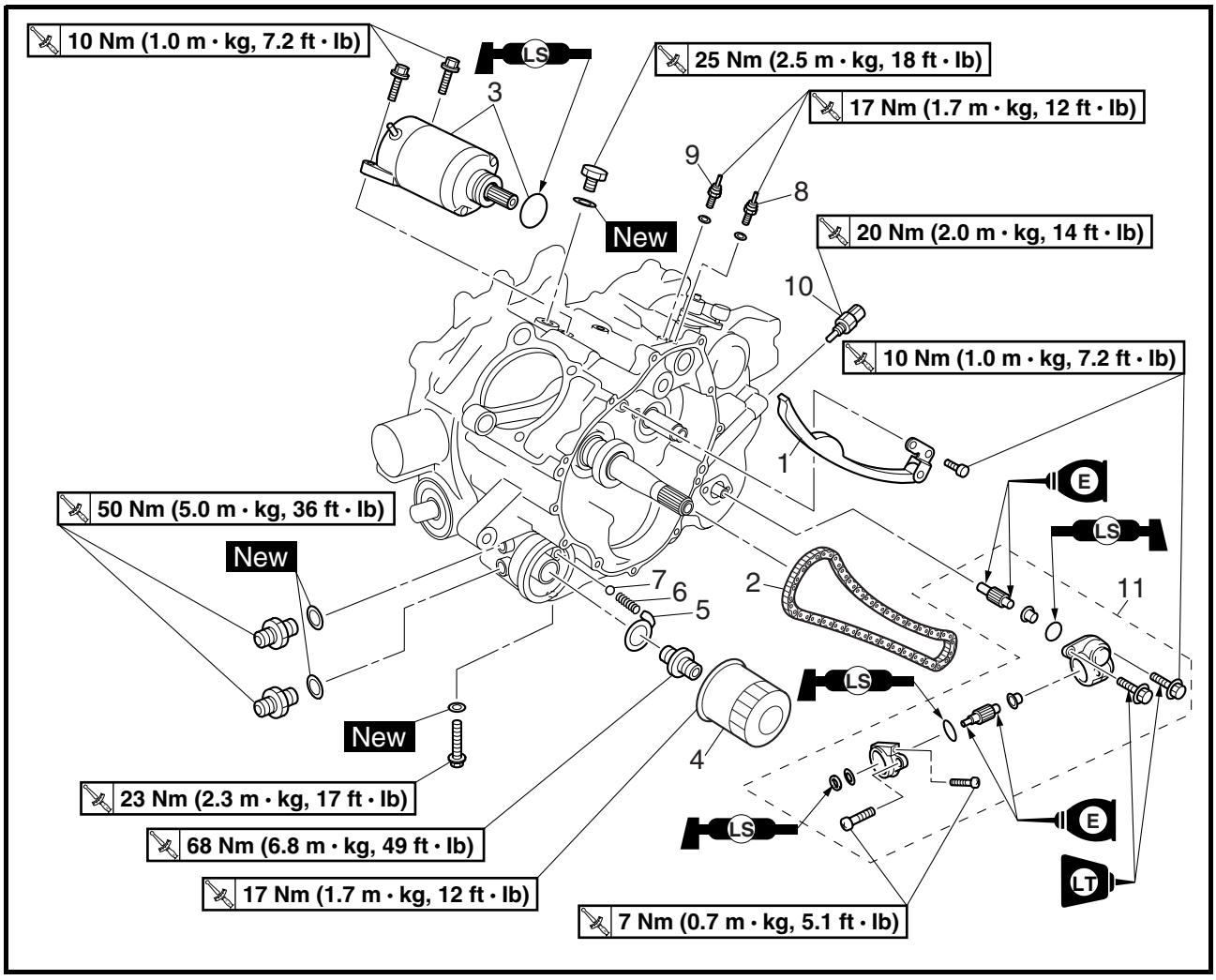
Order	Job name/Part name	Q'ty	Remarks
	Disassembling the clutch housing		Remove the parts in the order below.
①	Oil seal	1	
②	Circlip	1	
③	Bearing housing	1	
④	Circlip	1	
⑤	Bearing	1	
⑥	Circlip	1	
⑦	Bearing	1	
⑧	Clutch housing	1	
			For assembly, reverse the disassembly procedure.

CRANKCASE

STARTER MOTOR, TIMING CHAIN AND OIL FILTER

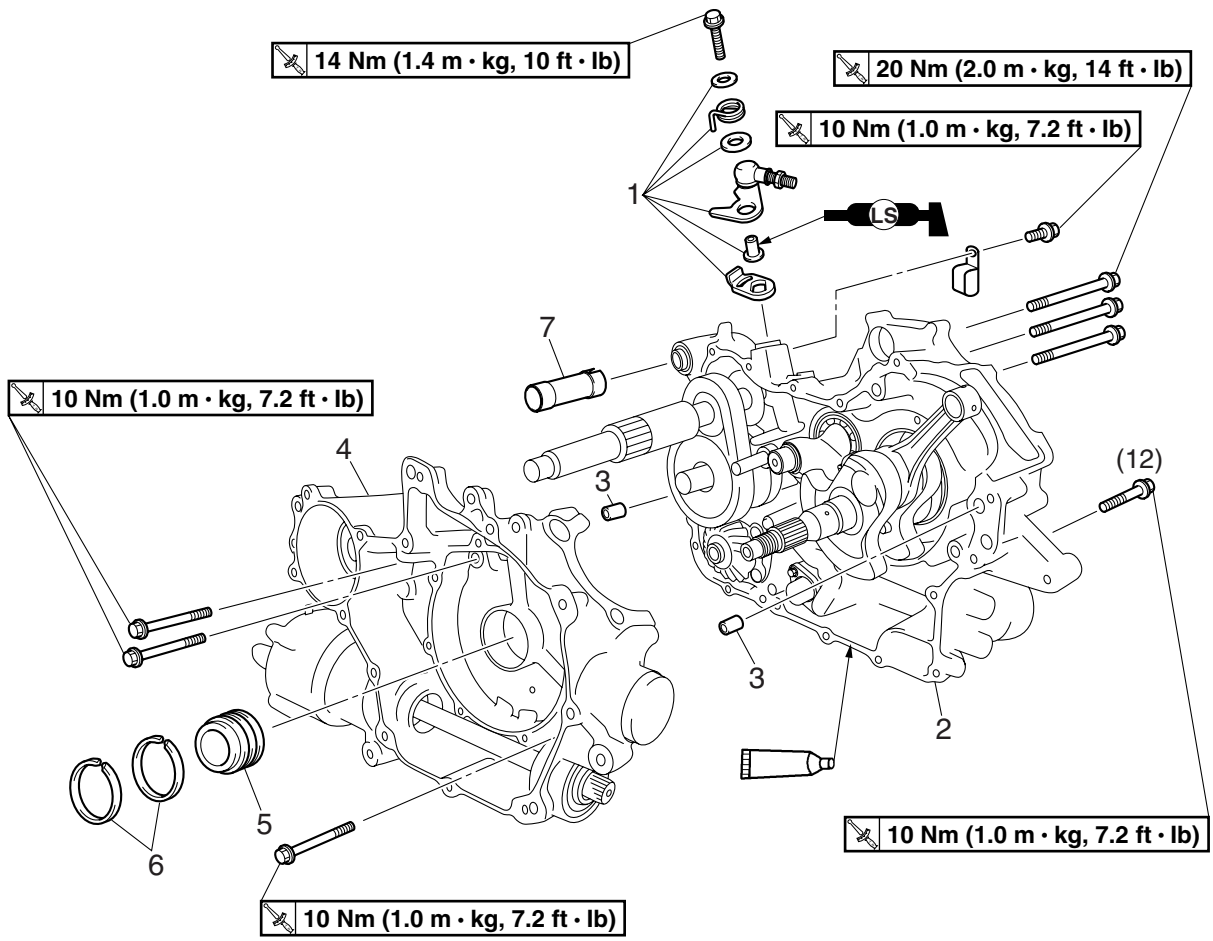


Order	Job name/Part name	Q'ty	Remarks
	Removing the starter motor, timing chain and oil filter		Remove the parts in the order below.
	Engine assembly		Refer to "ENGINE REMOVAL" in CHAPTER 4. (Manual No.: 5TE2-AE1)
	Cylinder head		Refer to "CYLINDER HEAD".
	Cylinder and piston		Refer to "CYLINDER AND PISTON".
	Recoil starter and rotor		Refer to "RECOIL STARTER AND A.C. MAGNETO".
	Balancer gears and oil pump		Refer to "BALANCER GEARS AND OIL PUMP".
	Primary and secondary sheaves		Refer to "PRIMARY AND SECONDARY SHEAVES".
	Clutch carrier assembly		Refer to "CLUTCH".
1	Timing chain guide (intake)	1	
2	Timing chain	1	



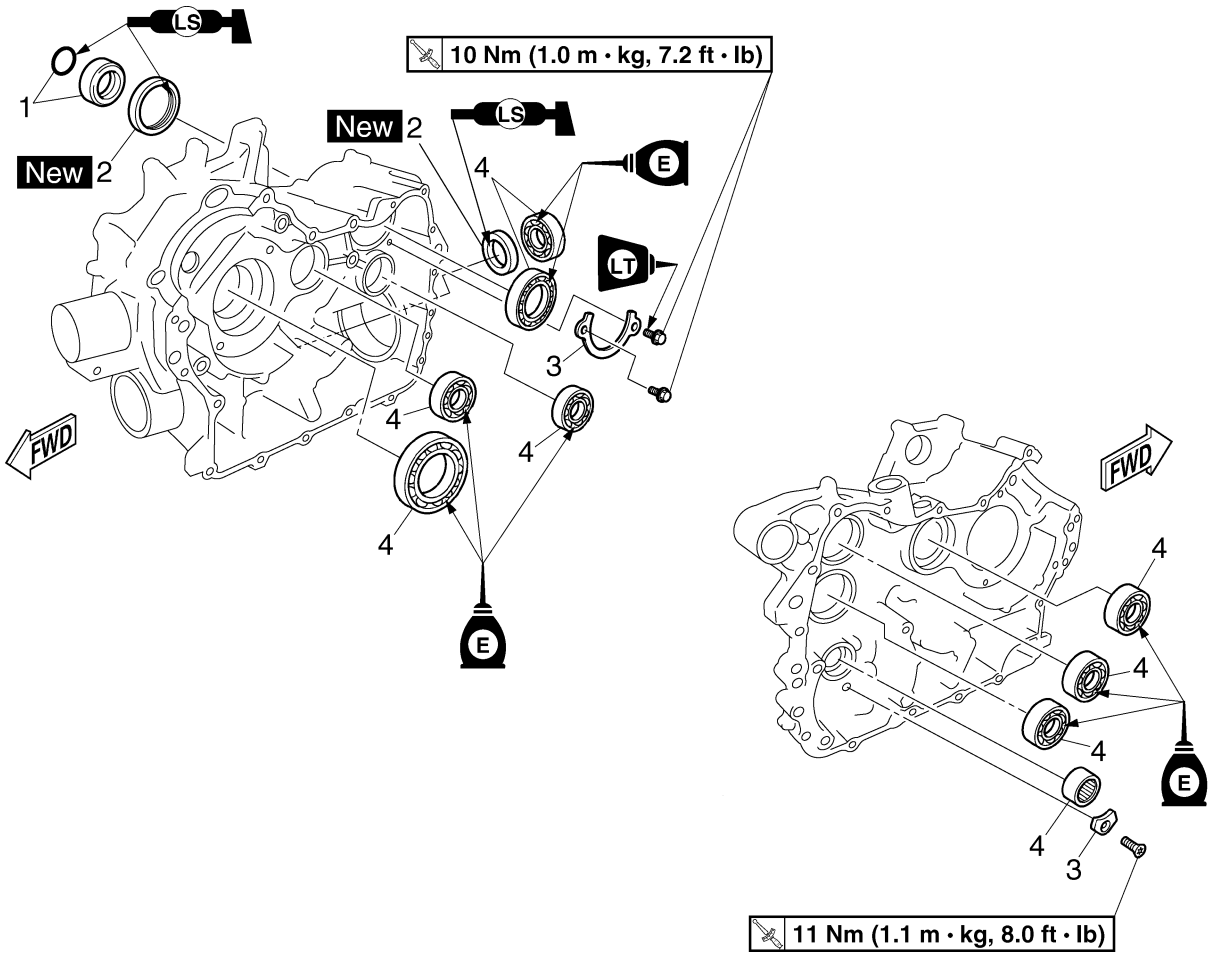
Order	Job name/Part name	Q'ty	Remarks
3	Starter motor/O-ring	1/1	
4	Oil filter cartridge	1	
5	Plate	1	
6	Spring	1	
7	Check ball	1	
8	Neutral switch	1	
9	Reverse switch	1	
10	Thermo unit	1	
11	Speedometer gear unit	1	
			For installation, reverse the removal procedure.

CRANKCASE

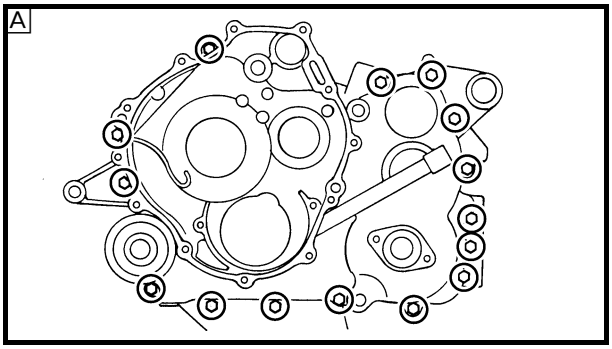


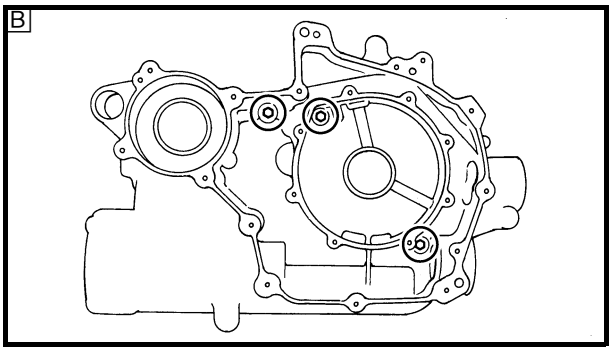
Order	Job name/Part name	Q'ty	Remarks
	Separating the crankcase		Remove the parts in the order below.
1	Shift lever assembly	1	
2	Crankcase (left)	1	Refer to "SEPARATING THE CRANKCASE" and "ASSEMBLING THE CRANKCASE".
3	Dowel pin	2	
4	Crankcase (right)	1	
5	Spacer	1	
6	Crankshaft seal	2	
7	Spacer	1	
			For installation, reverse the removal procedure.

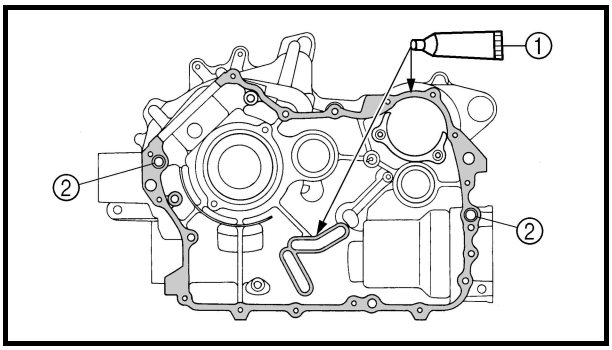
CRANKCASE BEARINGS



Order	Job name/Part name	Q'ty	Remarks
	Removing the crankcase bearings		Remove the parts in the order below.
	Crankshaft and balancer		Refer to "CRANKSHAFT".
	Transmission		Refer to "TRANSMISSION".
	Middle drive/driven shaft		Refer to "MIDDLE GEAR".
1	O-ring/collar	1/1	
2	Oil seal	2	
3	Bearing retainer	2	
4	Bearing	9	
			For installation, reverse the removal procedure.







SEPARATING THE CRANKCASE

1.Separate:
- Left crankcase
- Right crankcase

****

Separation steps:

● Remove the crankcase bolts.

NOTE:
- Loosen each bolt 1/4 of a turn at a time and after all the bolts are loosened, remove them.
- Loosen the bolts in stages, using a crisscross pattern.

Ⓐ Left crankcase
Ⓑ Right crankcase

****

ASSEMBLING THE CRANKCASE

1.Apply:
- Sealant (Quick Gasket®) ①
  (to the mating surfaces of both case halves)

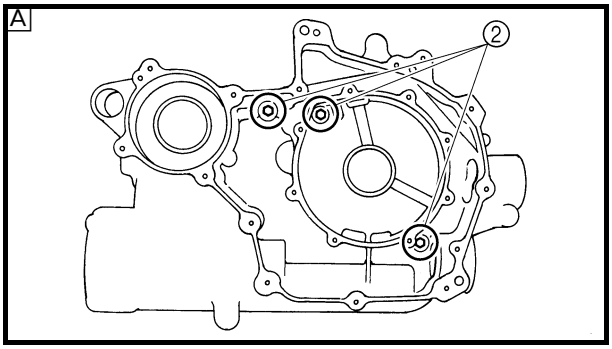
Sealant (Quick Gasket®):
P/N. ACC-11001-05-01
Yamaha bond No. 1215:
P/N. 90890-85505

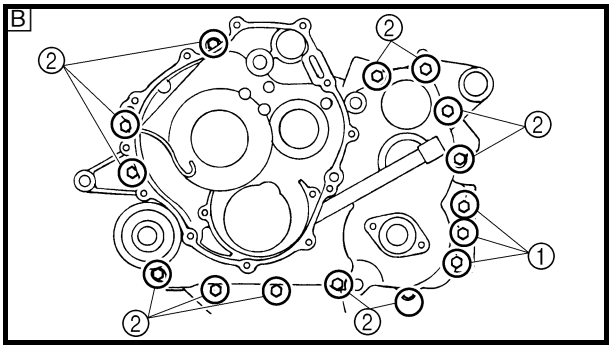
2.Install:
- Dowel pins ②

3.Fit the right crankcase onto the left case. Tap lightly on the case with a soft hammer.

CAUTION:

Before installing and torquing the crankcase holding bolts, be sure to check whether the transmission is functioning properly by manually rotating the shift shaft in both directions.





4.Tighten:
- Crankcase bolts ①

  20 Nm (2.0 m • kg, 14 ft • lb)

  (follow the proper tightening sequence)
- Crankcase bolts ②

  10 Nm (1.0 m • kg, 7.2 ft • lb)

  (follow the proper tightening sequence)

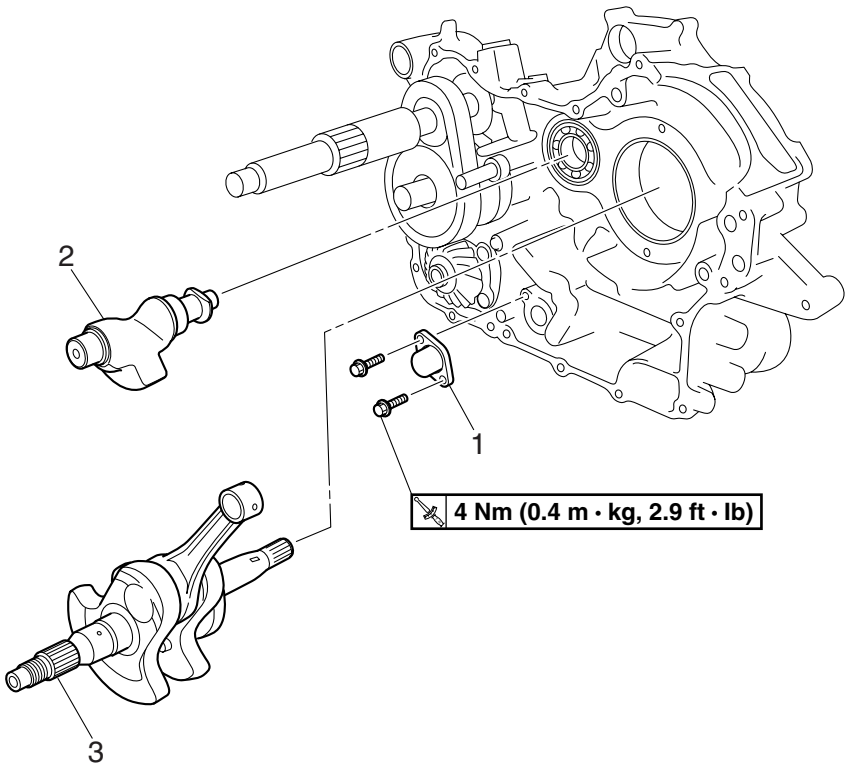
A Right crankcase
B Left crankcase

NOTE:
Tighten the bolts in stages, using a crisscross pattern.

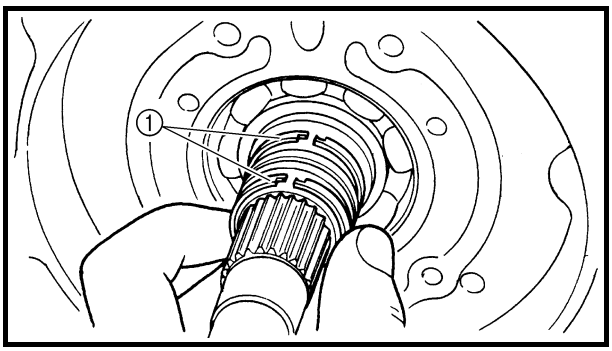
5.Apply:
- 4-stroke engine oil
  (to the crank pin, bearings and oil delivery hole)

6.Check:
- Crankshaft and transmission operation
  Unsmooth operation → Repair.

CRANKSHAFT



Order	Job name/Part name	Q'ty	Remarks
	Removing the crankshaft		Remove the parts in the order below.
	Crankcase separation		Refer to "CRANKCASE".
1	Oil strainer	1	
2	Balancer	1	Refer to "REMOVING THE CRANKSHAFT" and "INSTALLING THE CRANKSHAFT".
3	Crankshaft	1	
			For installation, reverse the removal procedure.



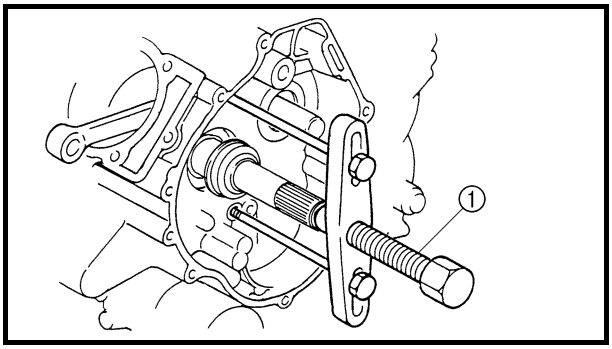
REMOVING THE CRANKSHAFT

1.Remove:

- Crankshaft seal ①

NOTE:

Mark a note of the position of each crankshaft seal so that they can be installed in the correct place and in the correct direction.

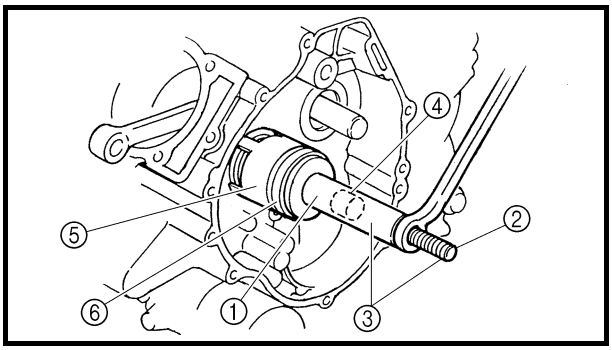


2.Remove:

- Crankshaft

  Use a crankcase separating tool ①.

Crankcase separating tool:
P/N. YU-01135-A, 90890-01135



INSTALLING THE CRANKSHAFT

1.Install:

- Crankshaft

Crankshaft installer pot ①:
P/N. 90890-01274
Crankshaft installer bolt ②:
P/N. 90890-01275
Crankshaft installer set ③:
P/N. YU-90050
Adapter ④:
P/N. YM-1383, 90890-01383
Spacer (crankshaft installer) ⑤:
P/N. YM-91044, 90890-04081
Spacer ⑥:
P/N. 90890-01309

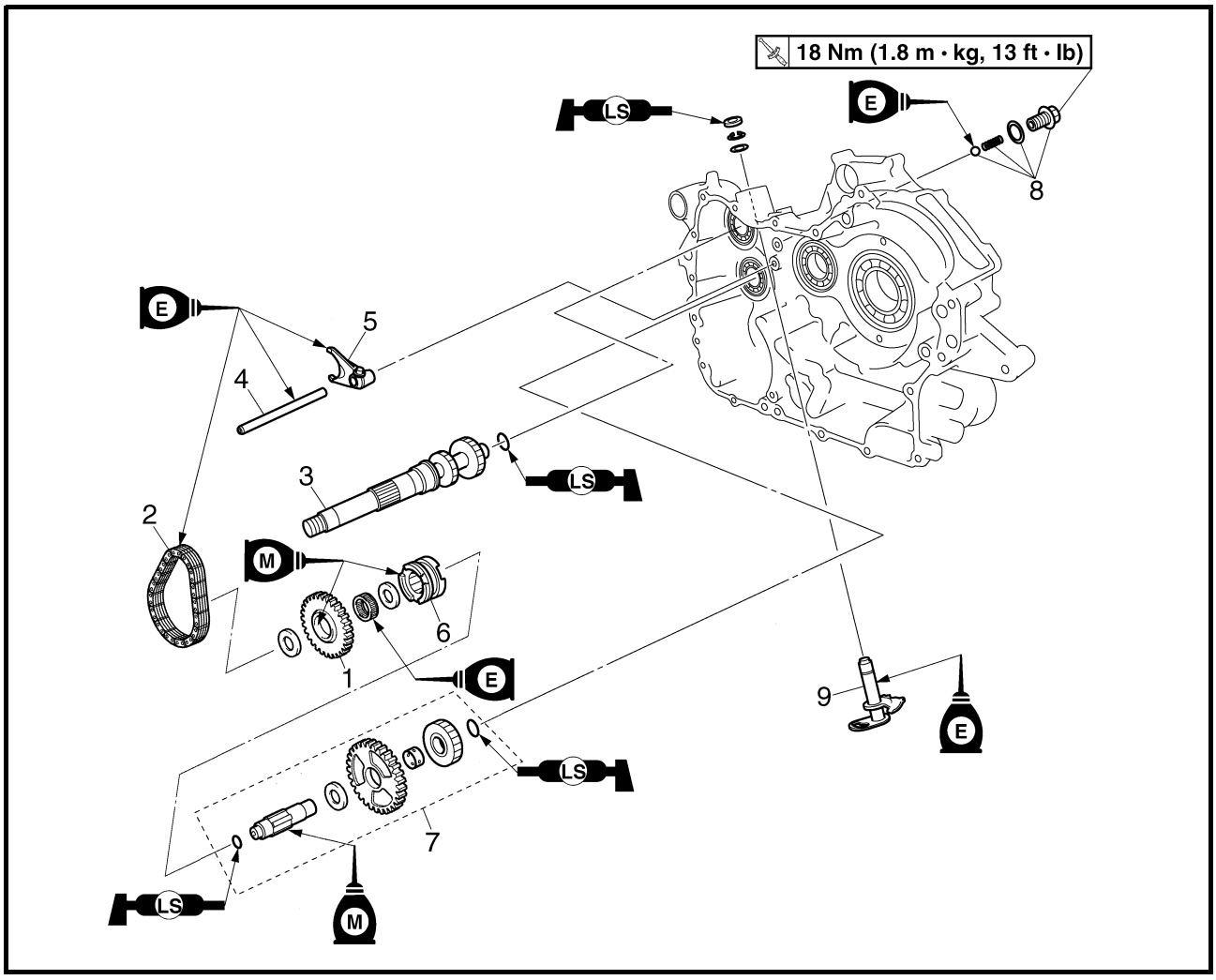
NOTE:

Hold the connecting rod at the Top Dead Center (T.D.C.) with one hand while turning the nut of the installing tool with the other. Operate the installing tool until the crankshaft bottoms against the bearing.

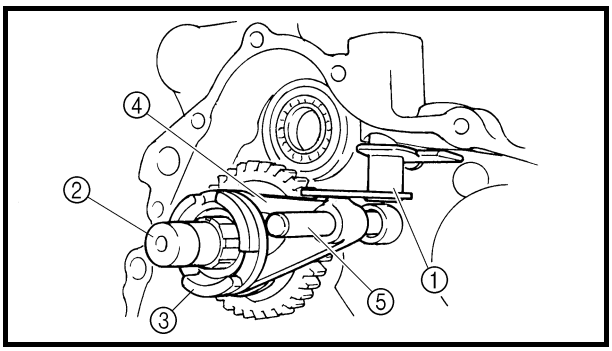
CAUTION:

Apply engine oil to each bearing to protect the crankshaft against scratches and to make installation easier.

TRANSMISSION



Order	Job name/Part name	Q'ty	Remarks
	Removing the transmission		Remove the parts in the order below.
	Crankcase separation		Refer to "CRANKCASE".
1	Driven sprocket	1	
2	Chain	1	
3	Secondary shaft	1	
4	Guide bar	1	
5	Shift fork	1	
6	Clutch dog	1	
7	Drive axle assembly	1	
8	Shift shaft stopper	1	
9	Shift shaft	1	
			For installation, reverse the removal procedure.

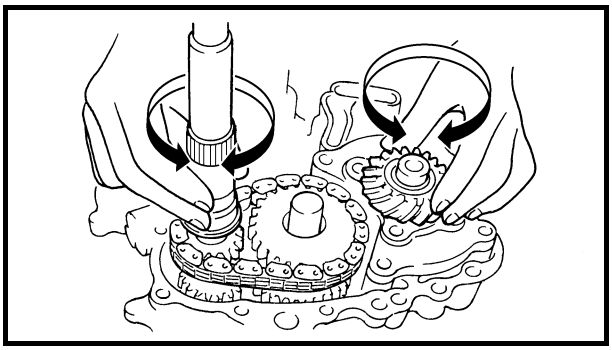


INSTALLING THE TRANSMISSION

1.Install:
- Shift shaft ①
- Drive axle assembly ②
- Clutch dog ③
- Shift fork ④
- Guide bar ⑤

NOTE:

Install the shift fork with the "L" mark facing towards the left side of the crankcase. Be sure that the shift fork guide pin is properly seated in the shift shaft groove.

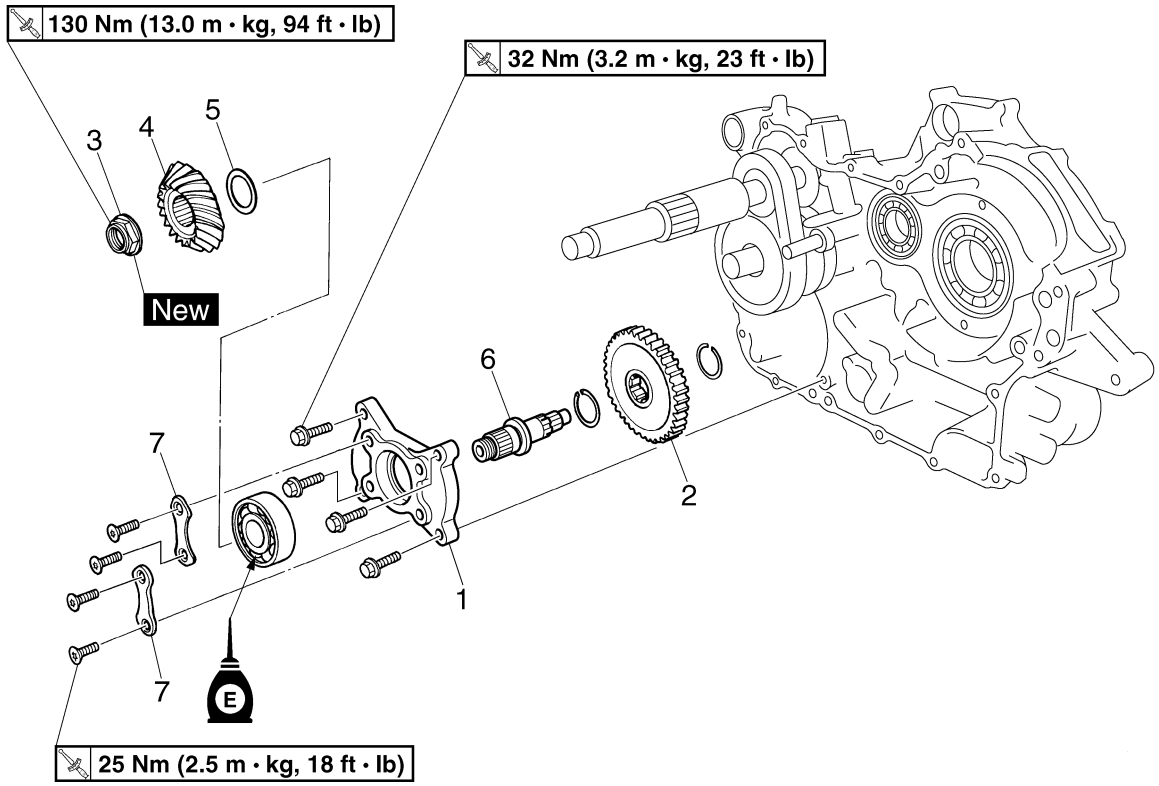


2.Check:
- Shift operation
  Unsmooth operation → Repair.

NOTE:
- Oil each gear and bearing thoroughly.
- Before assembling the crankcase, be sure that the transmission is in neutral and that the gears turn freely.

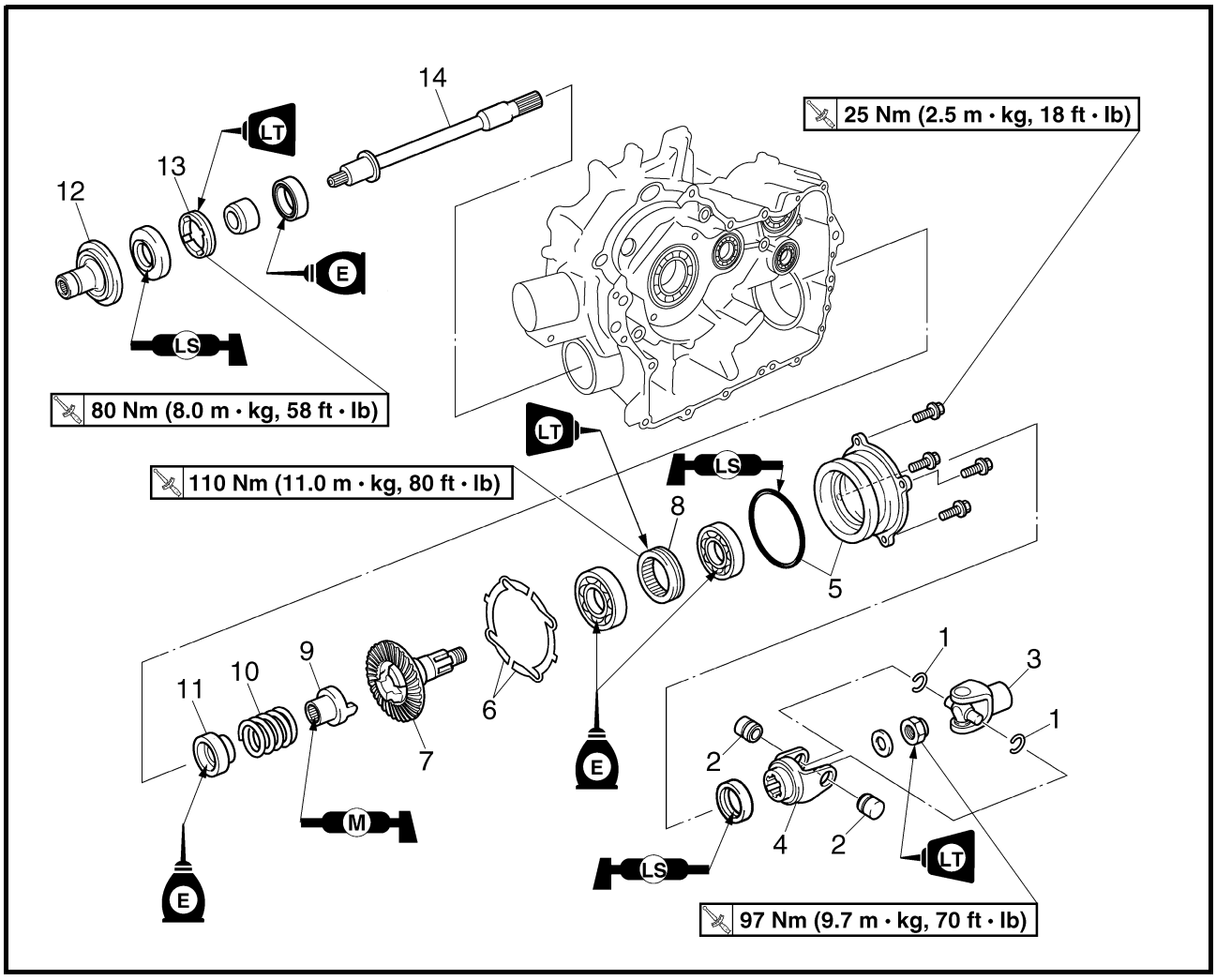
MIDDLE GEAR

MIDDLE DRIVE SHAFT

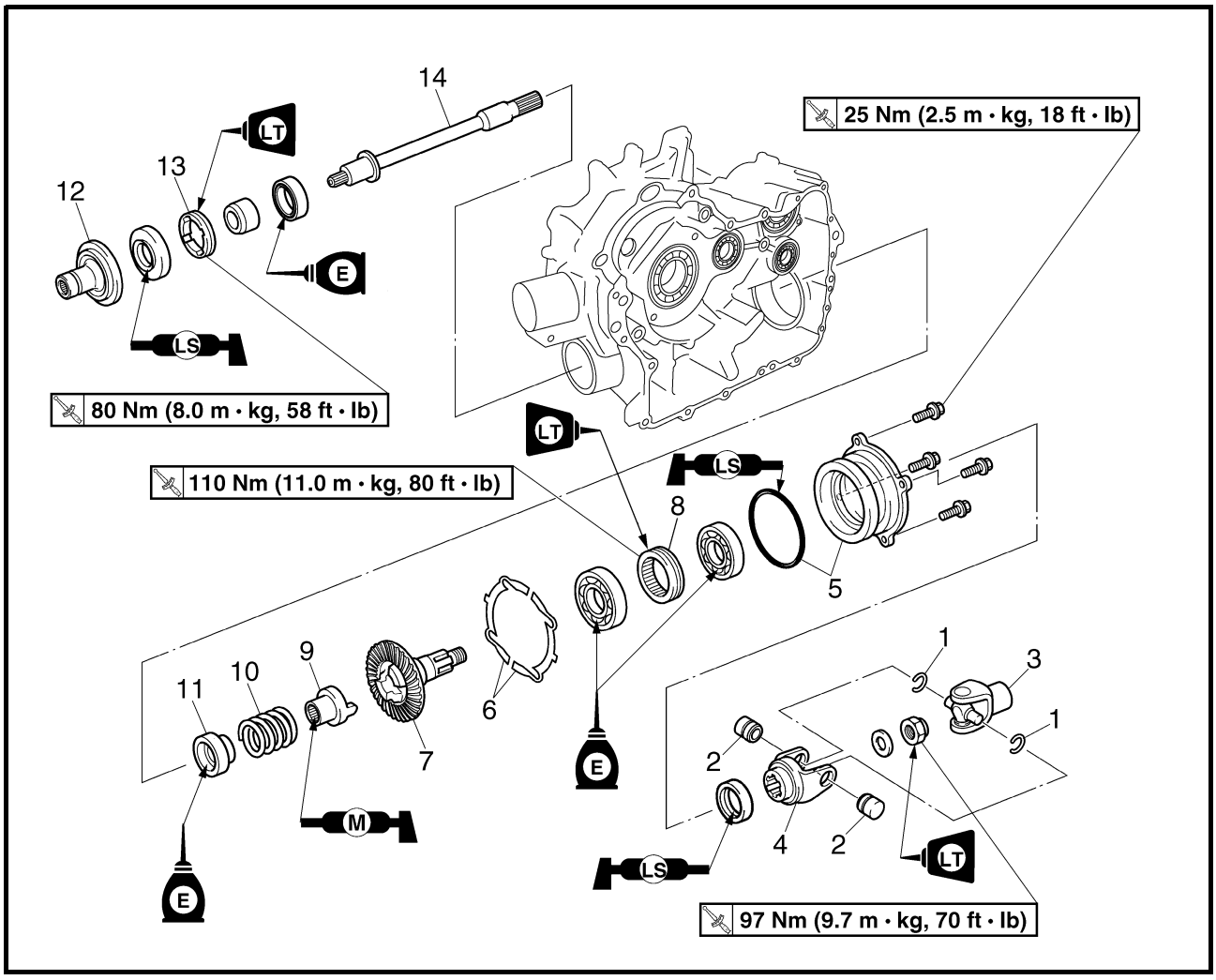


Order	Job name/Part name	Q'ty	Remarks
	Removing the middle drive shaft		Remove the parts in the order below.
	Crankcase separation		Refer to "CRANKCASE".
1	Bearing housing assembly	1	
2	Middle driven gear	1	
3	Nut	1	Refer to "REMOVING THE MIDDLE DRIVE SHAFT" and "INSTALLING THE MIDDLE DRIVE SHAFT" in CHAPTER 4. (Manual No.: 5TE2-AE1)
4	Middle drive pinion gear	1	
5	Shim		Refer to "SELECTING THE MIDDLE DRIVE AND DRIVEN GEAR SHIMS".
6	Middle drive shaft	1	
7	Bearing retainer	2	
			For installation, reverse the removal procedure.

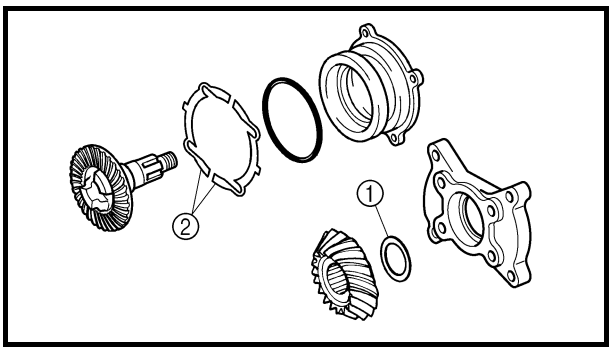
MIDDLE DRIVEN SHAFT

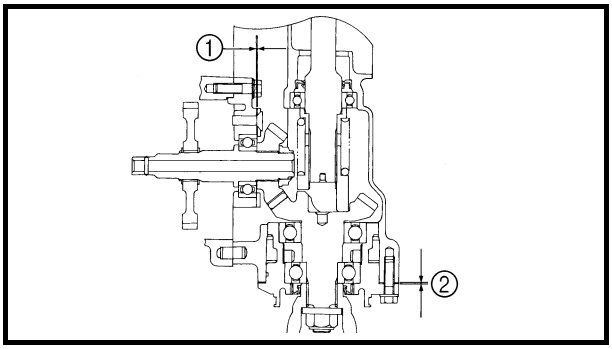


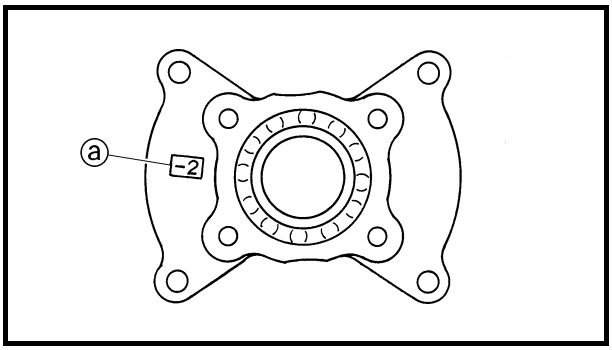
Order	Job name/Part name	Q'ty	Remarks
	Removing the middle driven shaft		Remove the parts in the order below.
	Crankcase separation		Refer to "CRANKCASE".
1	Circlip	2	
2	Bearing	2	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT" and "INSTALLING THE MIDDLE DRIVEN SHAFT" in CHAPTER 4. (Manual No.: 5TE2-AE1)
3	Universal joint	1	
4	Universal joint yoke	1	
5	Bearing housing/O-ring	1/1	
6	Shim		Refer to "SELECTING THE MIDDLE DRIVE AND DRIVEN GEAR SHIMS".
7	Middle driven pinion gear	1	Refer to "REMOVING THE MIDDLE DRIVEN SHAFT" and "INSTALLING THE MIDDLE DRIVEN SHAFT" in CHAPTER 4. (Manual No.: 5TE2-AE1)
8	Bearing retainer	1	
9	Damper cam	1	
10	Spring	1	
11	Gear coupling	1	

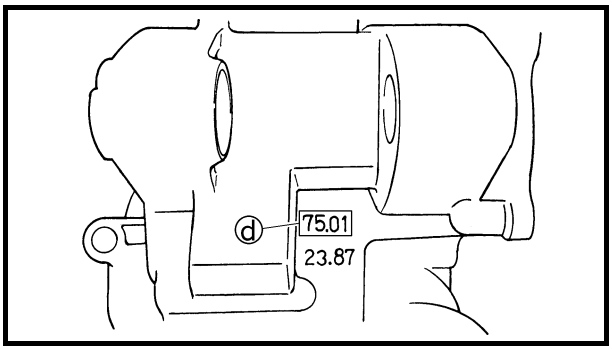


Order	Job name/Part name	Q'ty	Remarks
12	Front drive shaft coupling	1	
13	Bearing retainer	1	
14	Middle driven shaft	1	
			For installation, reverse the removal procedure.









SELECTING THE MIDDLE DRIVE AND DRIVEN GEAR SHIMS

When the drive and driven gear, bearing housing assembly and/or crankcase are replaced, be sure to adjust the gear shims.

1.Select:
- Middle drive gear shim ①
- Middle driven gear shim ②

****

Selection steps:

- Position middle drive and driven gear by using shims ① and ② with their respective thickness calculated from information marked on crankcase, bearing housing and drive gear end.

① Shim thickness “A”
② Shim thickness “B”

- To find shim thickness “A”, use following formula:

Middle drive pinion gear shim thickness:
“A” = ⓓ – ⓐ – ⓑ – ⓒ

Where:

ⓐ = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “4.5”.
ⓑ = 15.0
ⓒ = drive pinion gear to driven pinion gear center distance (considered constant “55”).
ⓓ = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “75”.

Example:

1) If the bearing housing is marked "–2",
   ..... ⓐ is 4.48.
2) ⓑ is 15.0
3) ⓒ is 55
4) If the crankcase (right) is marked "75.01",
   ..... ⓓ is 75.01.
5) Therefore, the shim thickness is 0.53 mm.

A = 75.01 – 4.48 – 15.0 – 55
= 0.53

6) Round off hundredths digit and select appropriate shim(s).
   In the example above, the calculated shim thickness is 0.53 mm. The chart instructs you, however, to round off 3 to 5.

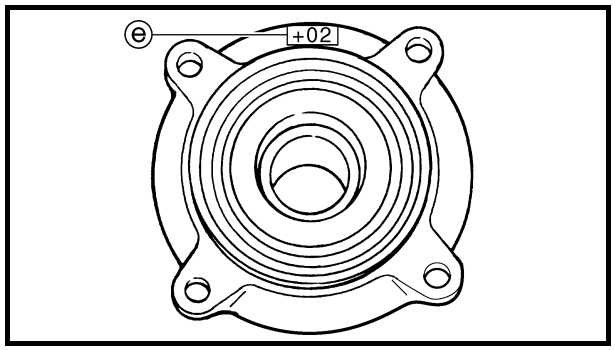
Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

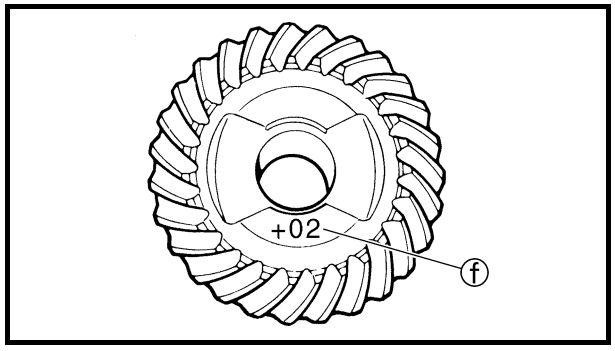
Shims are supplied in the following thicknesses.

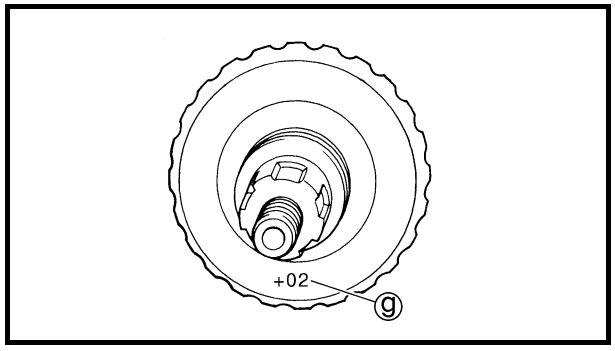
	Middle drive pinion gear shim	
Thickness (mm)	0.10 0.15 0.20	0.30 0.40 0.50

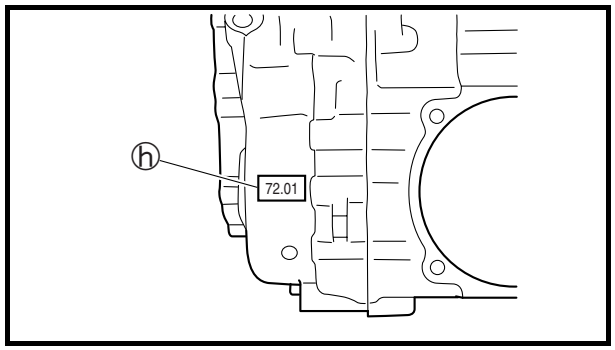
● To find shim thickness "B" use the following formula:

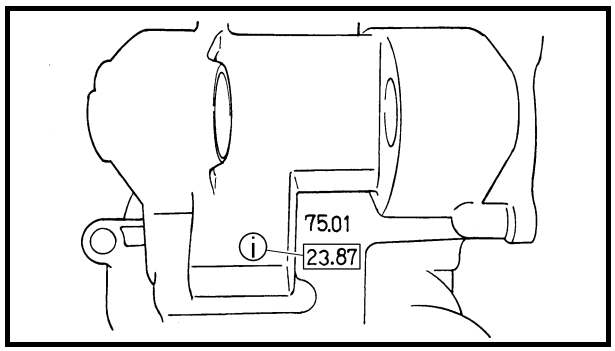
Middle driven pinion gear shim thickness:
"B" = ⓔ – ⓕ + ⓖ – ⓗ – ⓘ – 0.05











Where:

ⓔ = a numeral (usually a decimal number) on the bearing housing is either added to or subtracted from “76”.

ⓕ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “59”.

ⓖ = a numeral (usually a decimal number) on the middle driven pinion gear is either added to or subtracted from “79.5”.

ⓗ = a numeral (usually a decimal number) on the left crankcase specifies a thickness of “72.01”.

ⓘ = a numeral (usually a decimal number) on the right crankcase specifies a thickness of “23.87”.

Example:

1) If the bearing housing is marked “+02”, ... ⓔ is 76.02.
2) If the driven pinion gear is marked “+02”, ... ⓕ is 59.02.
3) If the driven pinion gear is marked “+02”, ... ⓖ is 79.52.
4) If the crankcase (left) is marked “72.01”, ... ⓗ is 72.01.
5) If the crankcase (left) is marked “23.87”, ... ⓘ is 23.87.
6) Therefore, the shim thickness is 0.64 mm.

B = 76.02 – 59.02 + 79.52 – 72.01 – 23.87 – 0.05 = 0.64

7) Round off hundredths digit and select appropriate shim(s).
In the example above, the calculated shim thickness is 0.64 mm. The chart instructs you, however, to round off 4 to 5.

Hundredths	Round value
0, 1, 2	0
3, 4, 5, 6, 7	5
8, 9	10

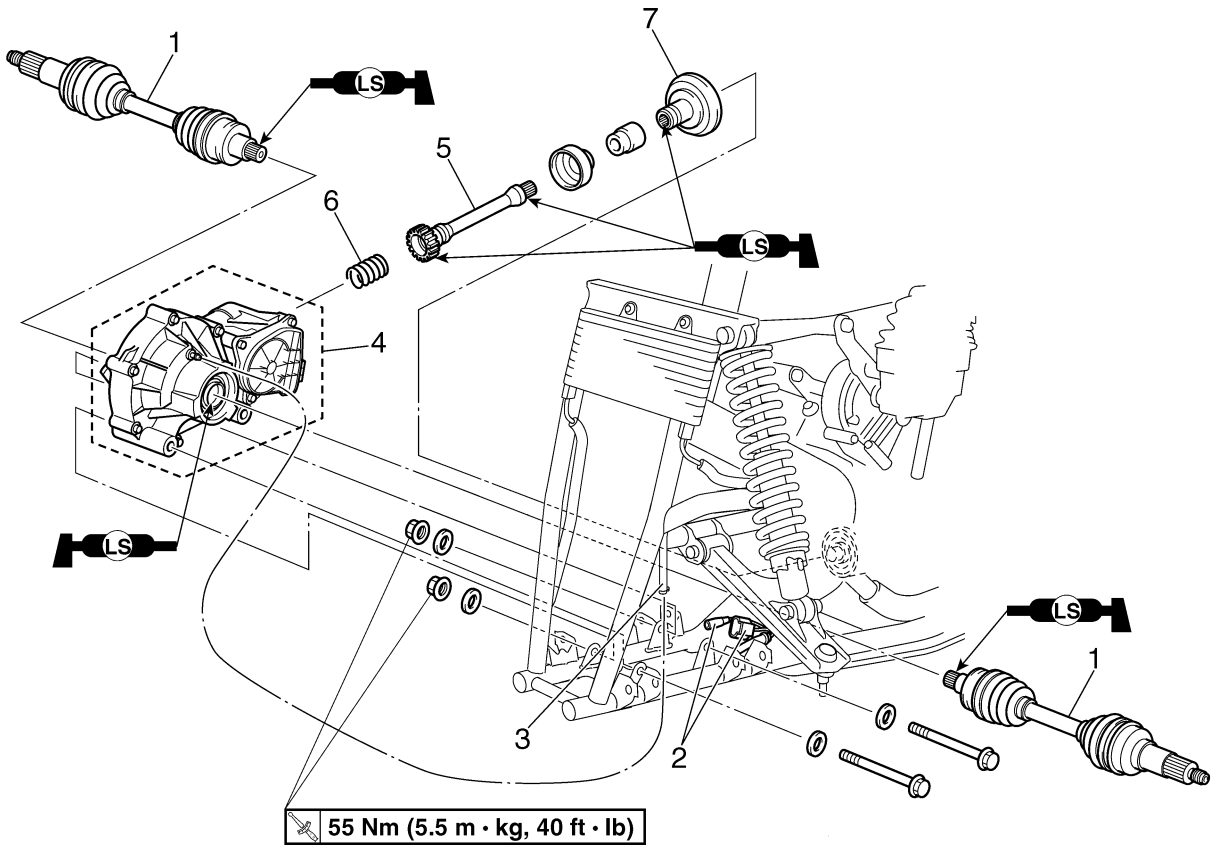
Shims are supplied in the following thickness.

	**Middle drive pinion gear shim**	
Thickness (mm)	**0.10** **0.15** **0.20** **0.30**	**0.40** **0.50** **0.60**

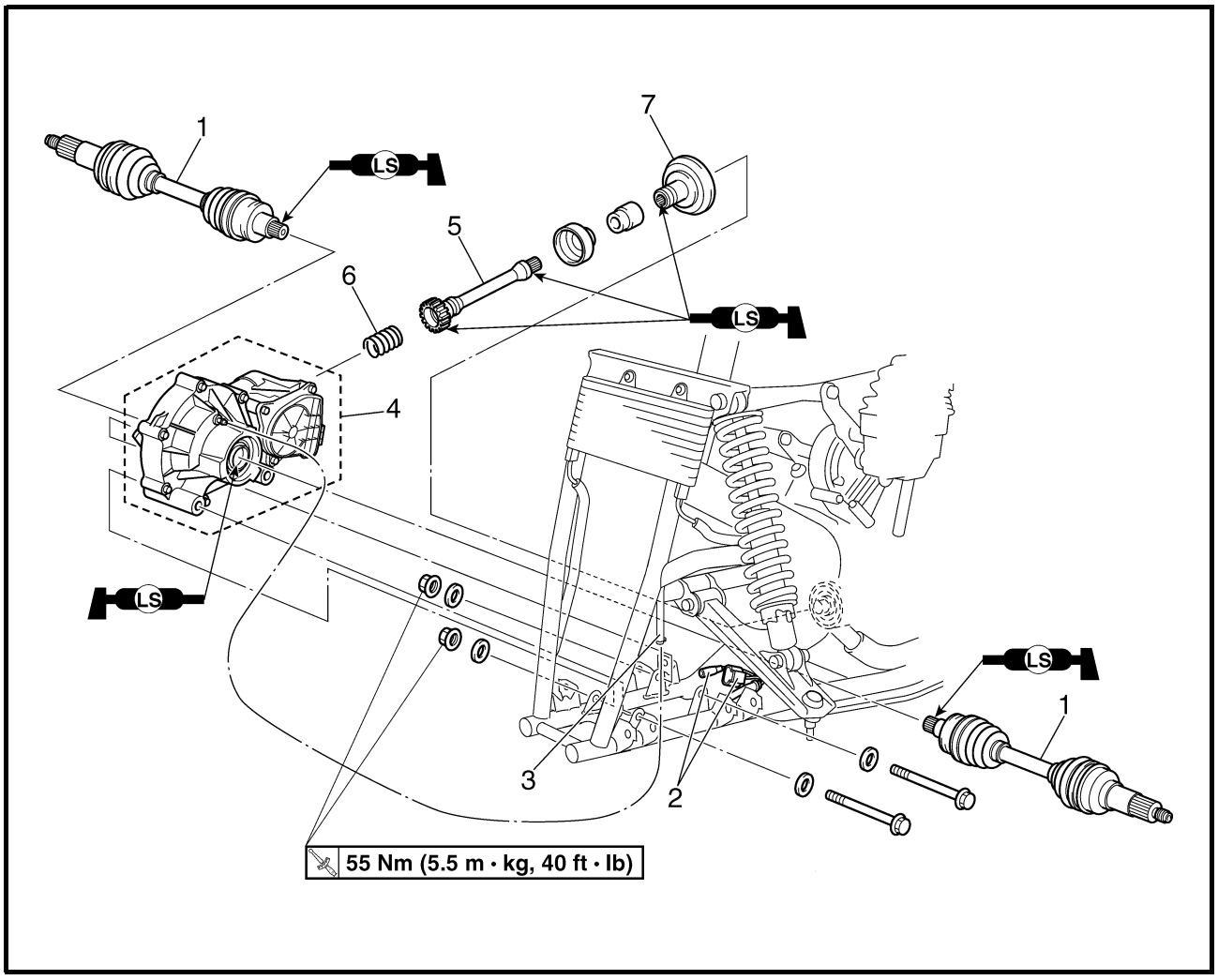
****

DRIVE TRAIN

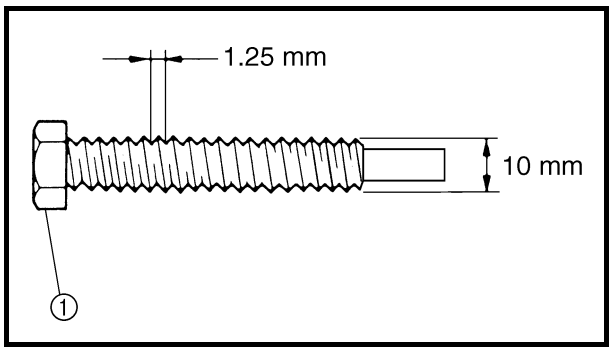
FRONT CONSTANT VELOCITY JOINTS AND DIFFERENTIAL GEAR

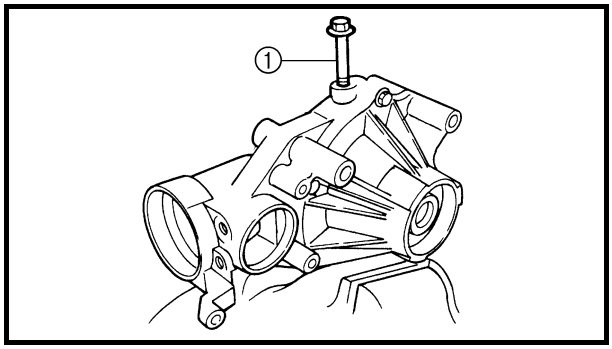


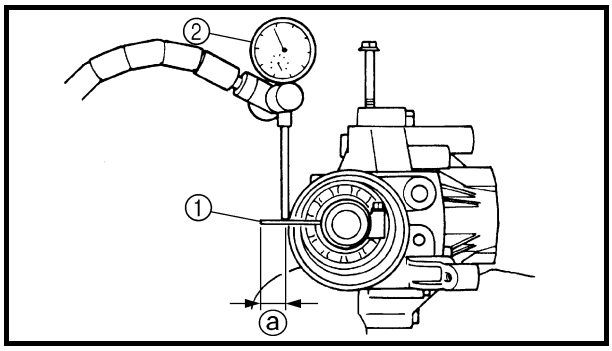
Order	Job name/Part name	Q'ty	Remarks
	Removing the front constant velocity joints and differential gear		Remove the parts in the order below.
	Engine skid plate (front) Front fender		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
	Brake light switch cover		Refer to "FRONT BRAKE" in CHAPTER 8. (Manual No.: 5TE2-AE1)
	Differential gear oil		Drain. Refer to "CHANGING THE DIFFERENTIAL GEAR OIL" in CHAPTER 3. (Manual No.: 5TE2-AE1)
	Steering knuckle		Refer to "STEERING SYSTEM" in CHAPTER 8. (Manual No.: 5TE2-AE1)
	Front arms (lower)		Refer to "FRONT ARMS AND FRONT SHOCK ABSORBERS".
1	Constant velocity joint	2	



Order	Job name/Part name	Q'ty	Remarks
2	Gear motor coupler/four-wheel drive switch connector	1/1	Disconnect.
3	Differential gear case breather hose	1	Disconnect.
4	Differential gear	1	
5	Drive shaft	1	
6	Compression spring	1	
7	Coupling gear	1	
			For installation, reverse the removal procedure.







MEASURING AND ADJUSTING THE DIFFERENTIAL GEAR LASH

Measuring the differential gear lash

1.Secure the gear case in a vise or another supporting device.

2.Remove:

- Drain plug
- Gasket

3.Install:

- A bolt of the specified size ①
  (into the drain plug hole)

CAUTION:

Finger tighten the bolt until it holds the ring gear. Otherwise, the ring gear will be damaged.

4.Attach:

- Gear lash measurement tool ①
- Dial gauge ②

Gear lash measurement tool:
P/N. YM-01475, 90890-01475

ⓐ Measuring point is 25 mm (0.98 in)

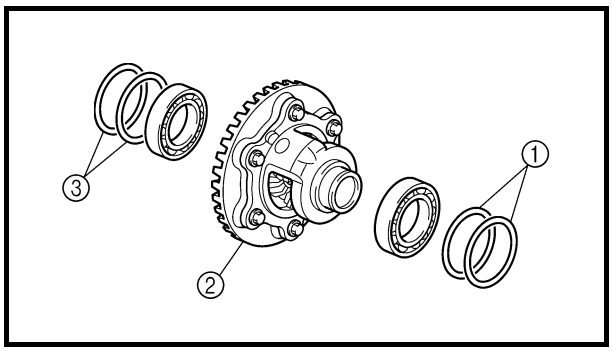
5.Measure:

- Gear lash
  Gently rotate the gear coupling from engagement to engagement.

Differential gear lash:
0.05 ~ 0.25 mm
(0.0020 ~ 0.0098 in)

NOTE:

Measure the gear lash at four positions. Rotate the shaft 90° each time.



Adjusting differential gear lash

1.Remove:
- Shim(s) (left) ①
- Differential gear assembly ②
- Shim(s) (right) ③

2.Adjust:
- Gear lash

****

Adjustment steps:

- Select the suitable shims using the following chart.

Too little gear lash	**Reduce shim thickness.**
Too large gear lash	**Increase shim thickness.**

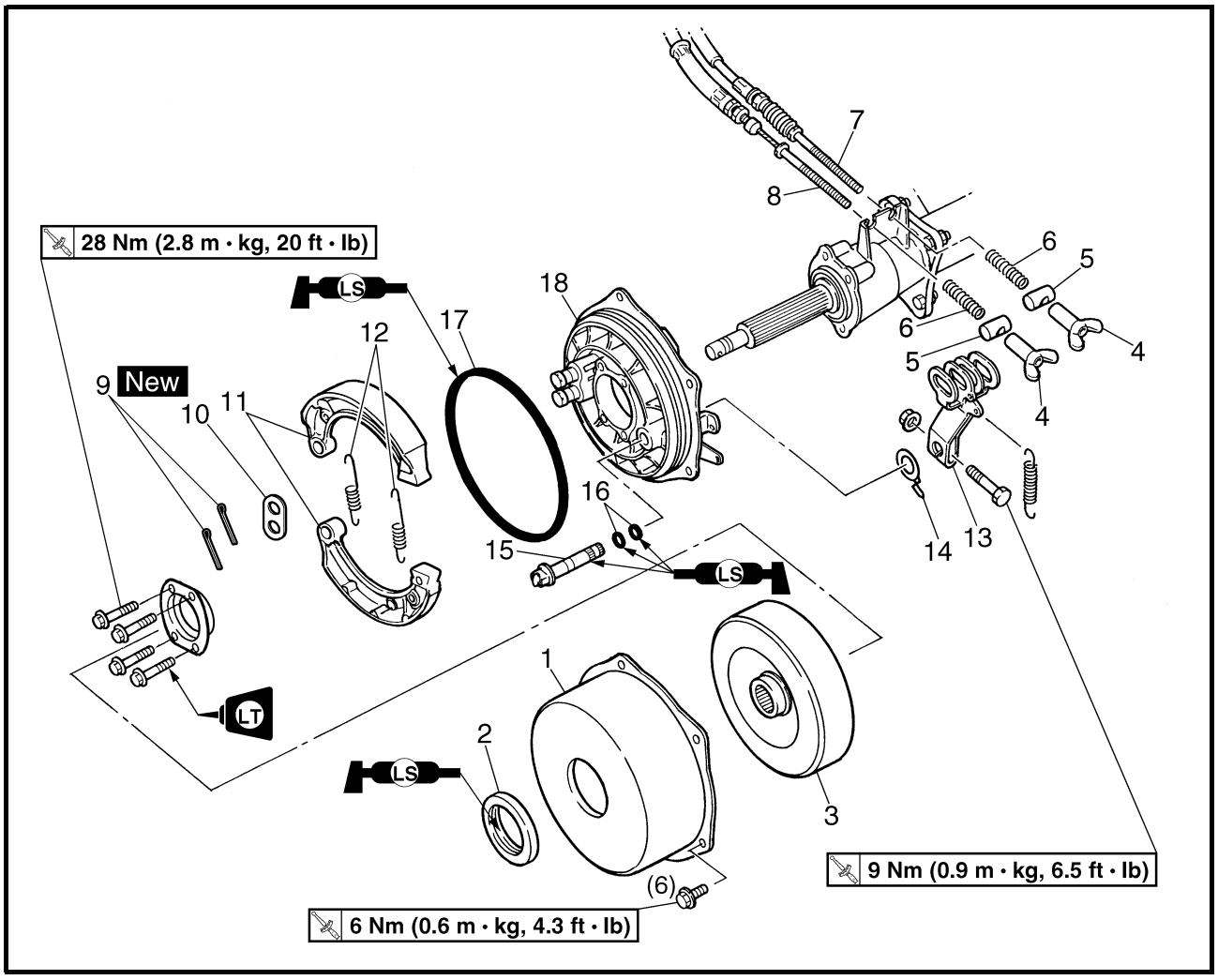
- If it is necessary to increase by more than 0.05 mm (0.002 in):
  Reduce right shim thickness by 0.1 mm (0.004 in) for every 0.1 mm (0.004 in) of left shim increase.
- If it is necessary to reduce by more than 0.1 mm (0.004 in):
  Increase right shim thickness by 0.1 mm (0.004 in) for every 0.1 mm of left shim decrease.

	Ring gear shim (left and right)		
Thickness (mm)	**0.1** **0.4**	**0.2** **0.5**	**0.3** **1.0**

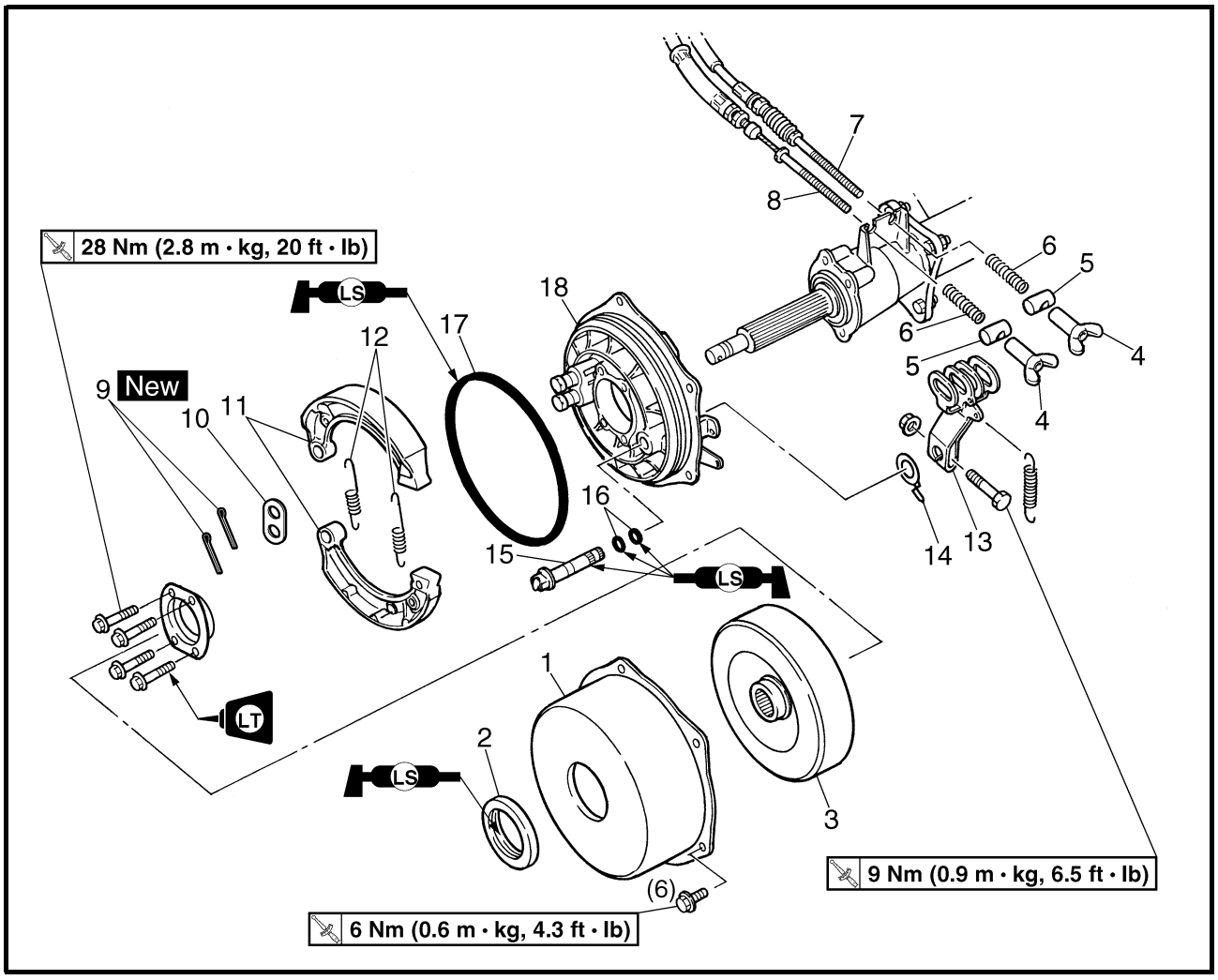
****

CHASSIS

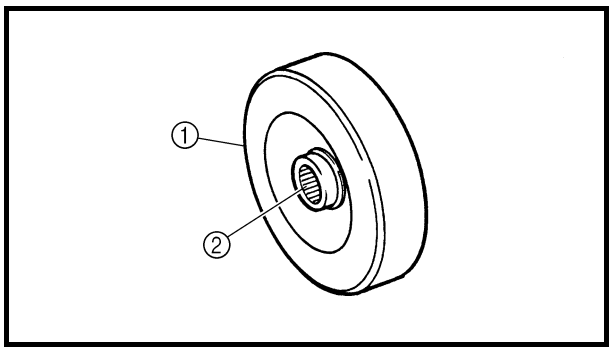
REAR BRAKE



Order	Job name/Part name	Q'ty	Remarks
	Removing the rear brake drum		Remove the parts in the order below.
	Rear wheel (left)		Refer to "FRONT AND REAR WHEELS" in CHAPTER 8. (Manual No.: 5TE2-AE1)
1	Brake drum cover	1	
2	Dust seal	1	
3	Brake drum	1	
4	Adjusting nut	2	
5	Pin	2	Refer to "REMOVING THE REAR BRAKE" in CHAPTER 8. (Manual No.: 5TE2-AE1)
6	Spring	2	
7	Rear brake lever cable	1	Refer to "INSTALLING THE REAR BRAKE".
8	Rear brake pedal cable	1	
9	Cotter pin	2	
10	Plate	1	
11	Brake shoe	2	
12	Brake shoe spring	2	

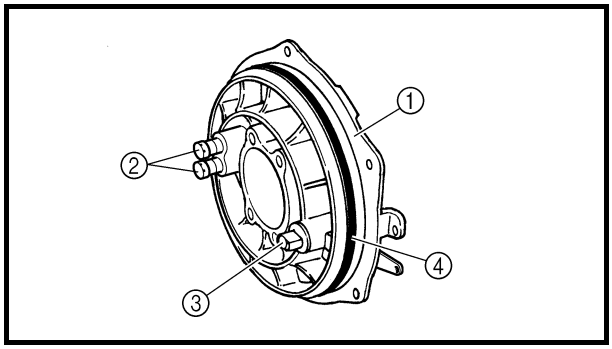


Order	Job name/Part name	Q'ty	Remarks
13	Brake camshaft lever	1	Refer to "REMOVING THE REAR BRAKE" in CHAPTER 8. (Manual No.: 5TE2-AE1)
14	Brake shoe wear indicator	1	
15	Brake camshaft	1	
16	O-ring	2	Refer to "INSTALLING THE REAR BRAKE".
17	Dust seal	1	
18	Brake shoe plate	1	
			For installation, reverse the removal procedure.

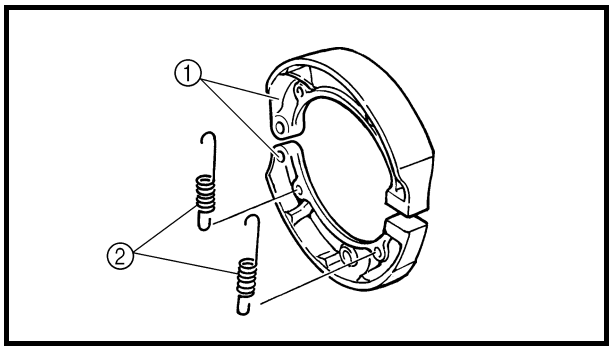


CHECKING THE REAR BRAKE

1.Check:
- Brake drum ①
  Cracks/damage → Replace.
- Splines ②
  Wear/damage → Replace.

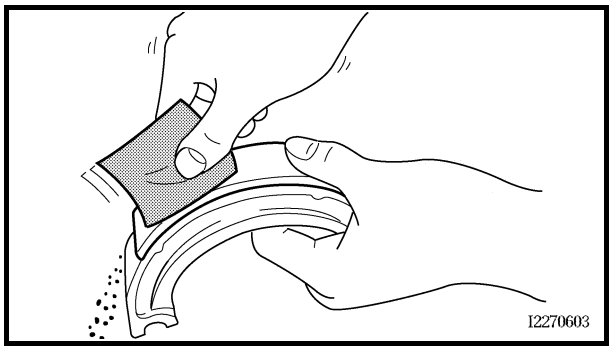


2.Check:
- Brake shoe plate ①
- Pivot pins ②
- Brake camshaft ③
  Bends/cracks/damage → Replace.
- Dust seal ④
  Wear/damage → Replace.



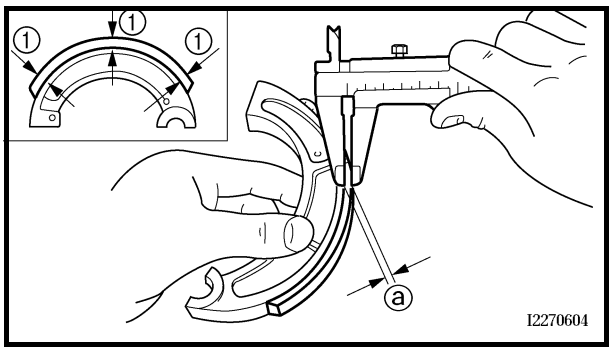
3.Check:
- Brake shoes ①
- Brake shoe springs ②
  Cracks/damage → Replace as a set.

NOTE:
When replacing the brake shoes, replace the brake shoe springs at the same time.



4.Check:
- Brake shoe lining
  Glazed areas → Repair.
  Sand the glazed areas with coarse sandpaper.

NOTE:
After sanding the glazed areas, clean the brake shoe with a cloth.

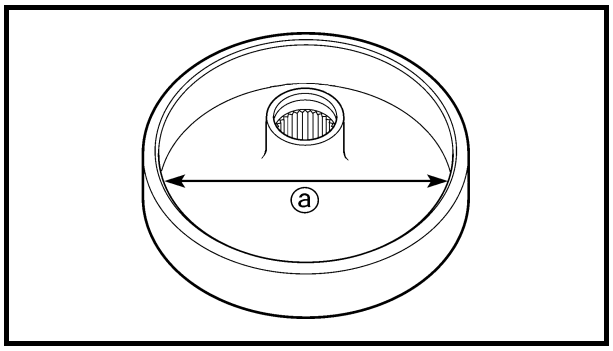


5.Measure:
- Brake shoe lining thickness ⓐ
  Out of specification → Replace.

① Measuring points

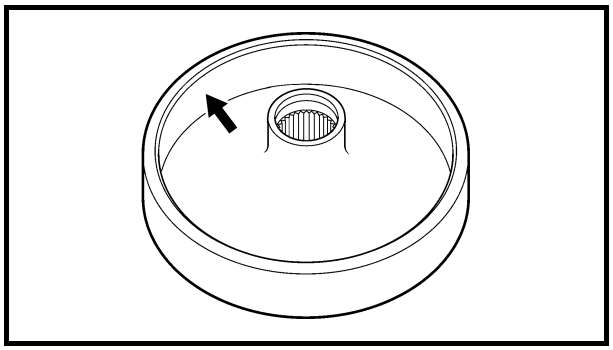
NOTE:
Replace the brake shoes as a set if either is worn to the wear limit.

Brake shoe lining thickness limit:
2.0 mm (0.08 in)

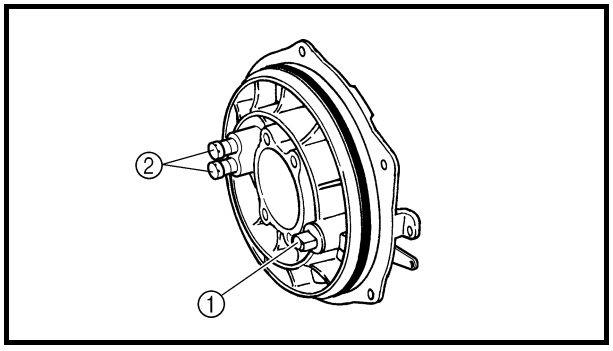


6.Measure:
- Brake drum inside diameter ⓐ
  Out of specification → Replace.

Brake drum inside diameter limit (maximum):
161 mm (6.34 in)



7.Check:
- Brake drum inner surface
  Oil deposits → Clean.
  Remove the oil with a rag soaked in lacquer thinner or solvent.
  Scratches → Repair.
  Lightly and evenly polish the scratches with an emery cloth.



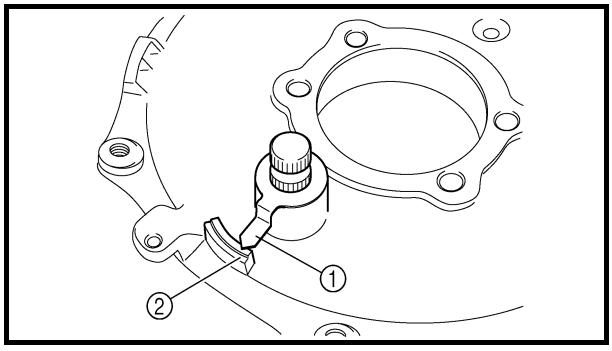
INSTALLING THE REAR BRAKE

1.Lubricate:
- Brake camshaft ①
- Pivot pins ②

Lithium-soap-based grease

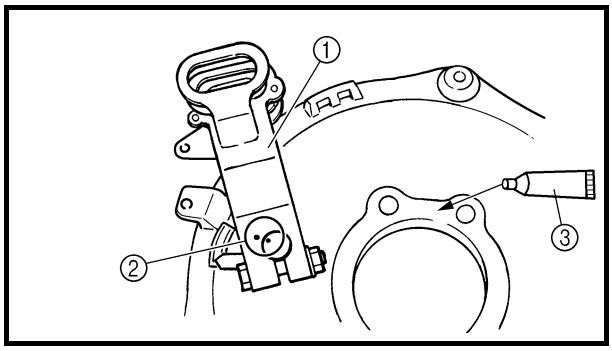
CAUTION:

During installation, lightly grease the brake camshaft and the pivot pin. Wipe off the excess grease.



2.Install:
- Brake shoe wear indicator ①

NOTE:
When installing the wear indicator pointer, fit the projection into a brake camshaft groove and align the pointer with the right end of the wear indicator scale ②.



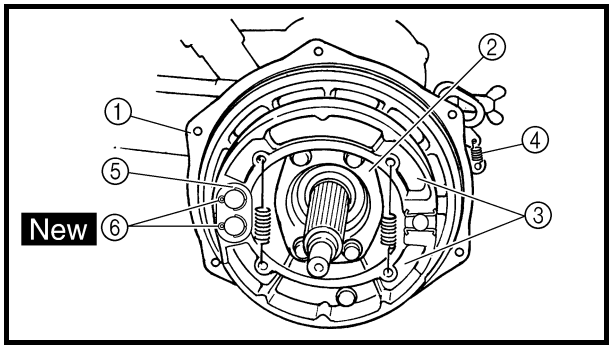
3.Install:
- Brake camshaft lever ①

Bolt (camshaft lever):
9 Nm (0.9 m • kg, 6.5 ft • lb)

NOTE:
When installing the brake camshaft lever, align the punch marks ② on the brake camshaft lever and brake camshaft.

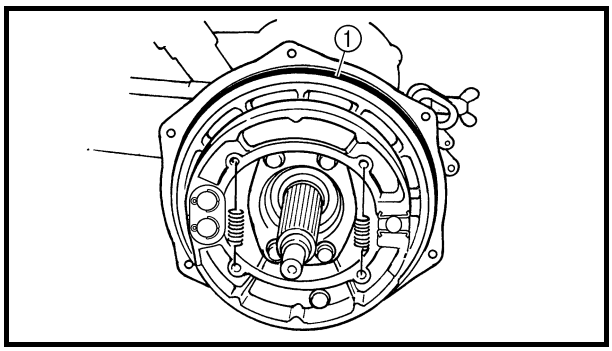
4.Apply:
- Sealant ③
  (onto the mating surfaces of swingarm)

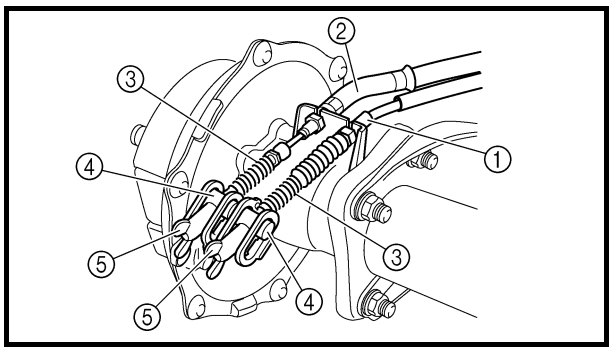
Sealant (Quick Gasket)®:
P/N. ACC-11001-05-01
Yamaha bond No. 1215:
P/N. 90890-85505



5.Install:
- Brake shoe plate ①
- Bearing retainer ②
- Brake shoes ③
- Spring ④
- Plate ⑤
- Cotter pins ⑥ New

Bolt (bearing retainer):
28 Nm (2.8 m • kg, 20 ft • lb)





6.Check:
- Brake camshaft operation
  Unsmooth operation → Repair.

7.Lubricate:
- Dust seal ①

	Lithium-soap-based grease

8.Connect:
- Rear brake lever cable ①
- Rear brake pedal cable ②

9.Install:
- Springs ③
- Pins ④
- Adjusting nuts ⑤
- Brake drum
- Brake drum cover

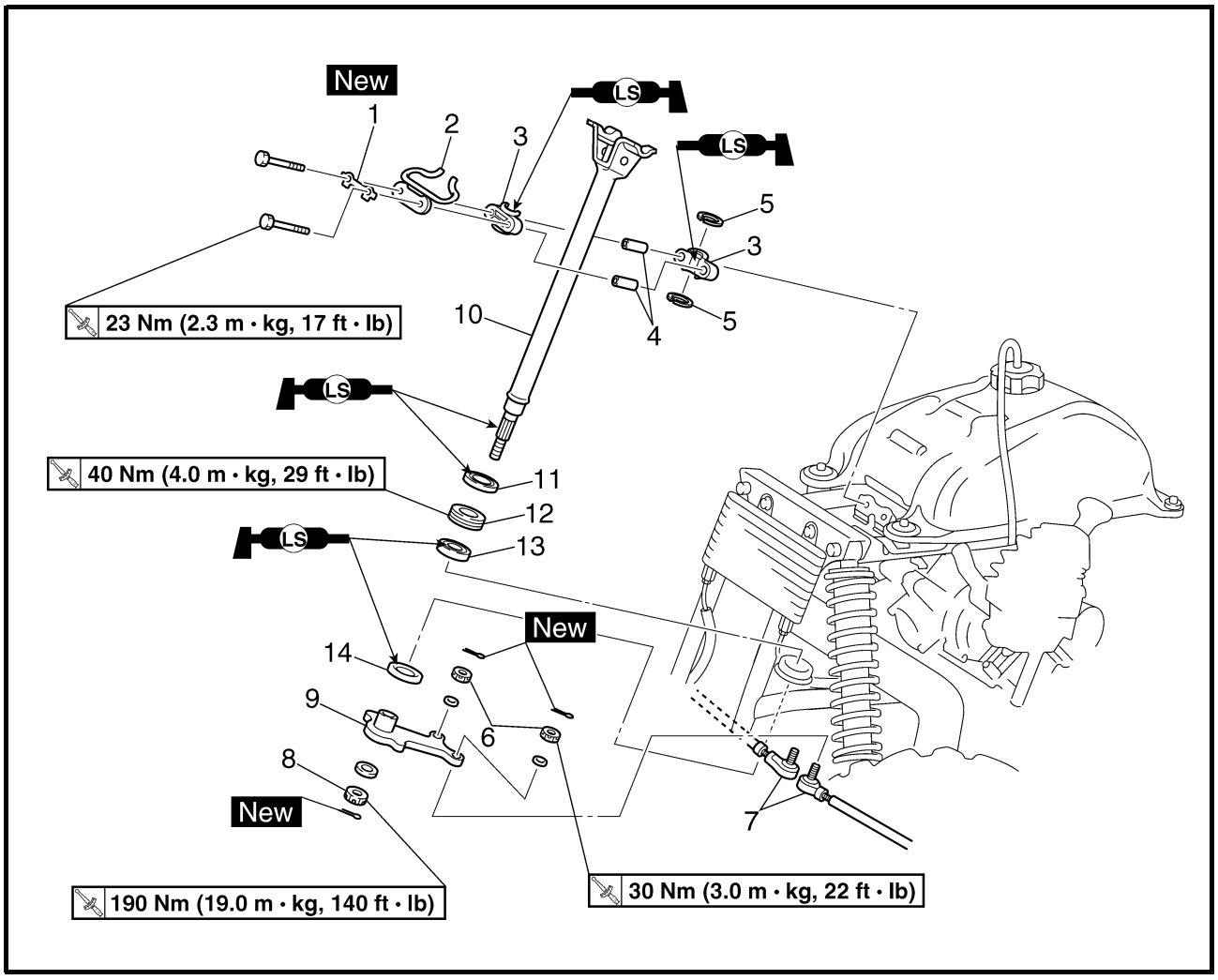
10.Install:
- Rear wheel hub (left)
- Rear wheel (left)
  Refer to “FRONT AND REAR WHEELS” in CHAPTER 8. (Manual No.: 5TE2-AE1)

	Axle nut: **150 Nm (15 m • kg, 110 ft • lb)** **Nut (rear wheel):** **55 Nm (5.5 m • kg, 40 ft • lb)**

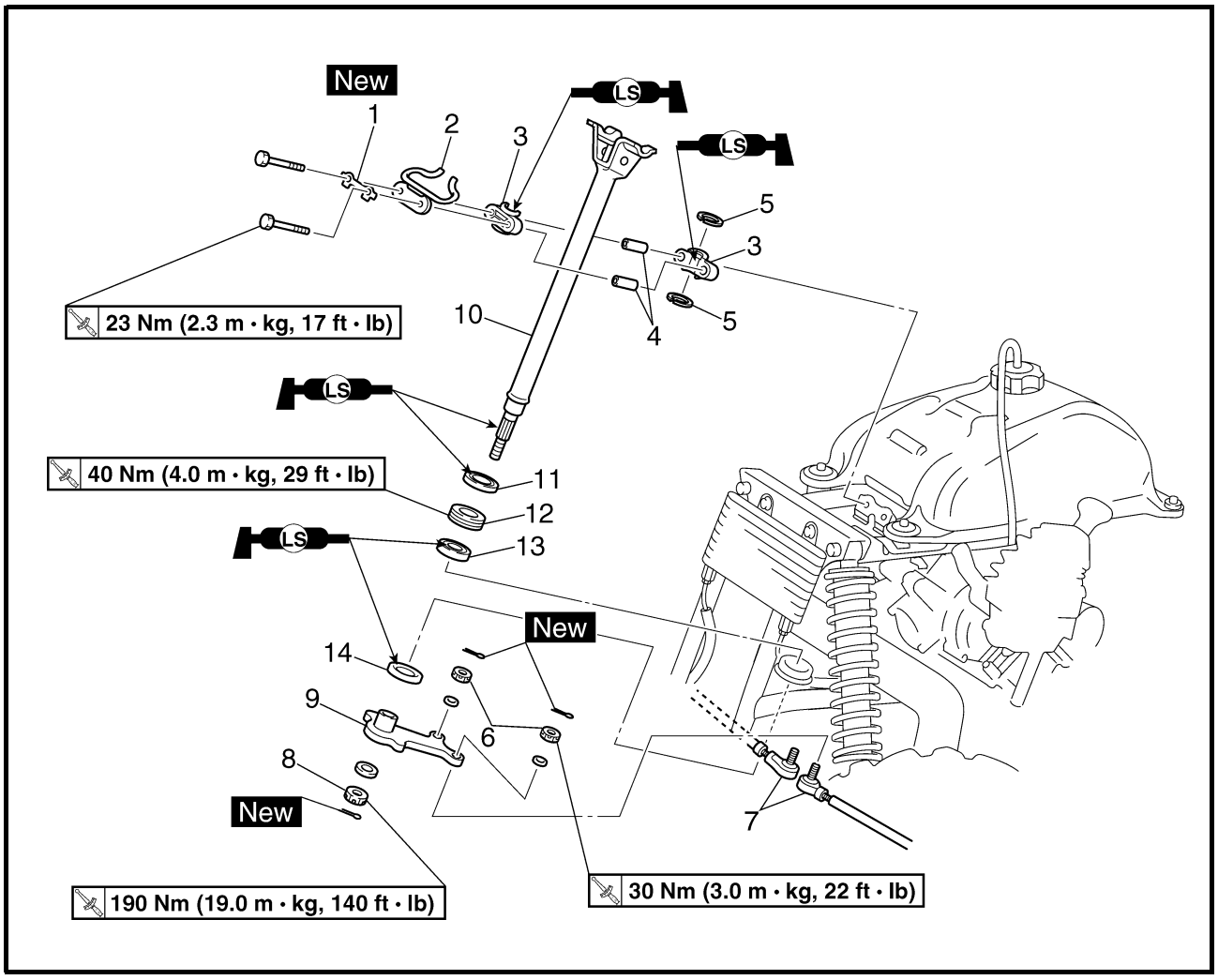
11.Adjust:
- Rear brake pedal free play
- Rear brake lever free play
  Refer to “ADJUSTING THE REAR BRAKE” in CHAPTER 3. (Manual No.: 5TE2-AE1)

STEERING SYSTEM

STEERING STEM

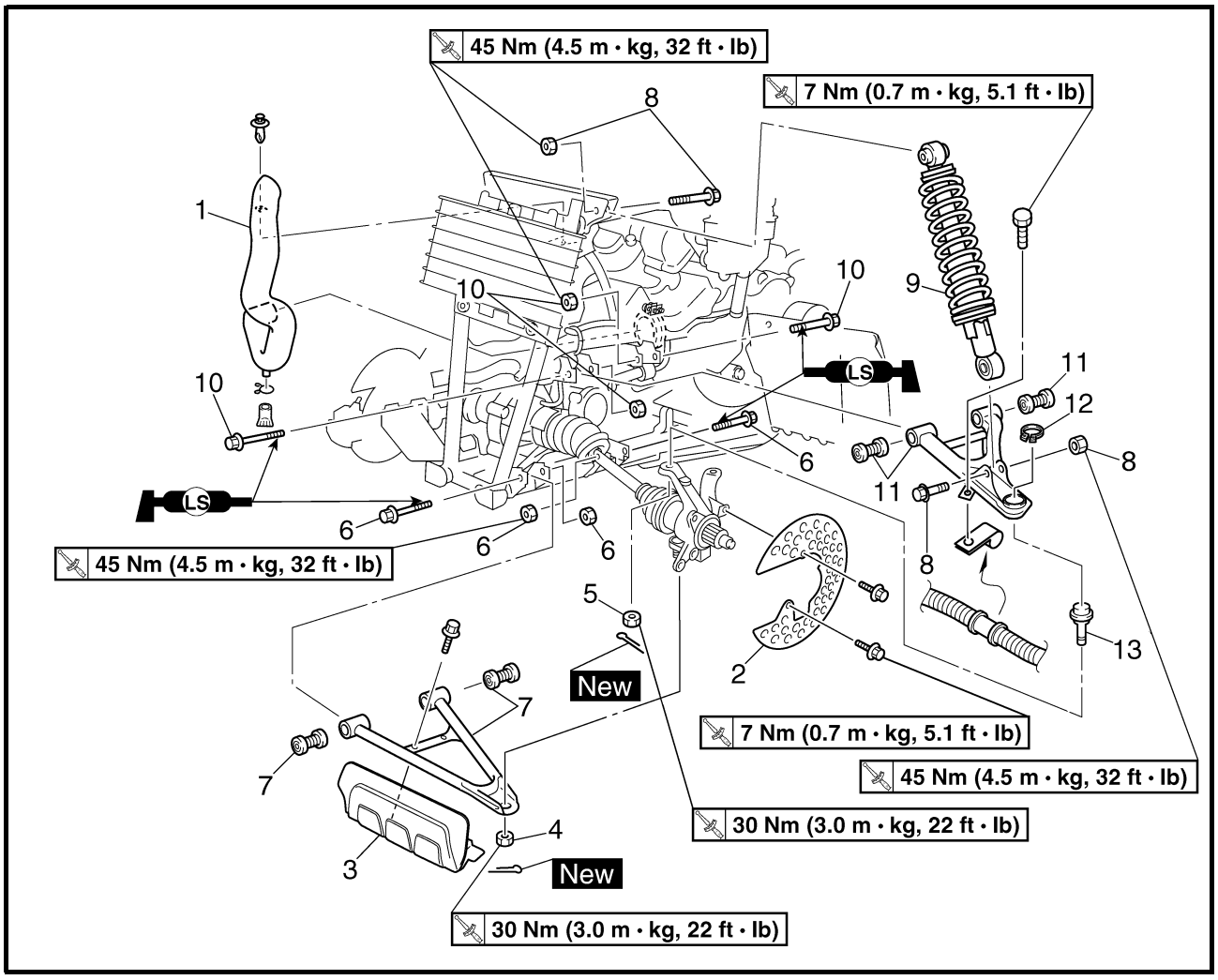


Order	Job name/Part name	Q'ty	Remarks
	Removing the steering stem		Remove the parts in the order below.
	Handlebar		Refer to "HANDLEBAR" in CHAPTER 8. (Manual No.: 5TE2-AE1)
	Seat		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
	Front fender		
1	Lock washer	1	Refer to "INSTALLING THE CABLE GUIDE" in CHAPTER 8. (Manual No.: 5TE2-AE1)
2	Cable guide	1	
3	Steering stem bushing	2	
4	Collar	2	
5	Oil seal	2	
6	Tie rod end nut	2	
7	Tie rod	2	Disconnect.
8	Steering stem nut	1	
9	Pitman arm	1	
10	Steering stem	1	

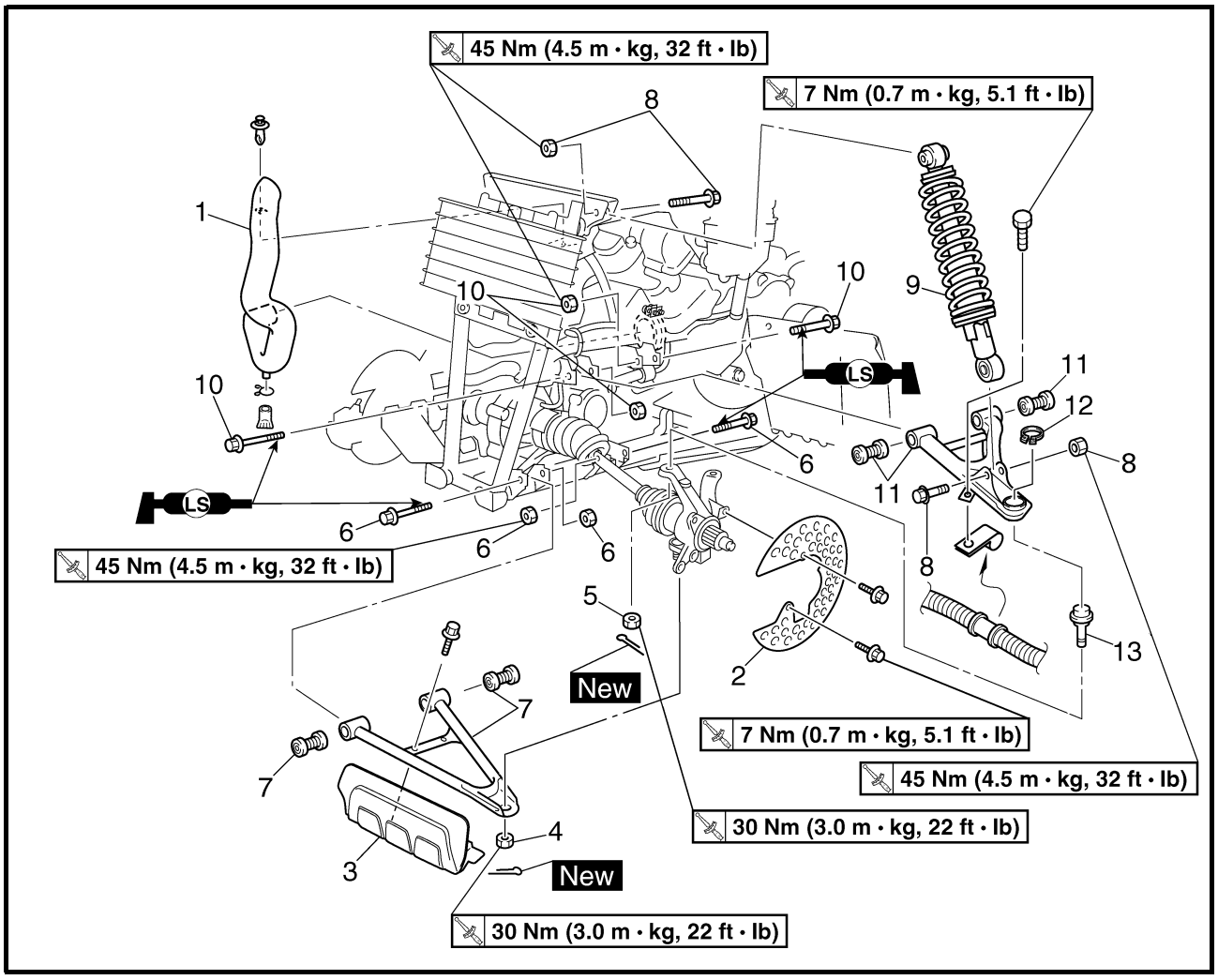


Order	Job name/Part name	Q'ty	Remarks
11	Oil seal	1	
12	Bearing retainer	1	Refer to "REMOVING THE BEARING RETAINER" and "INSTALLING THE BEARING RETAINER" in CHAPTER 8. (Manual No.: 5TE2-AE1)
13	Bearing	1	
14	Oil seal	1	
			For installation, reverse the removal procedure.

FRONT ARMS AND FRONT SHOCK ABSORBERS



Order	Job name/Part name	Q'ty	Remarks
	Removing the front arms and front shock absorbers		Remove the parts in the order below.
	Engine skid plate Front fender		Refer to "SEAT, CARRIERS, FENDERS AND FUEL TANK".
	Front wheel/brake disc		Refer to "FRONT AND REAR WHEELS" in CHAPTER 8. (Manual No.: 5TE2-AE1)
1	Air duct	1	
2	Brake disc guard	1	
3	Protector	1	

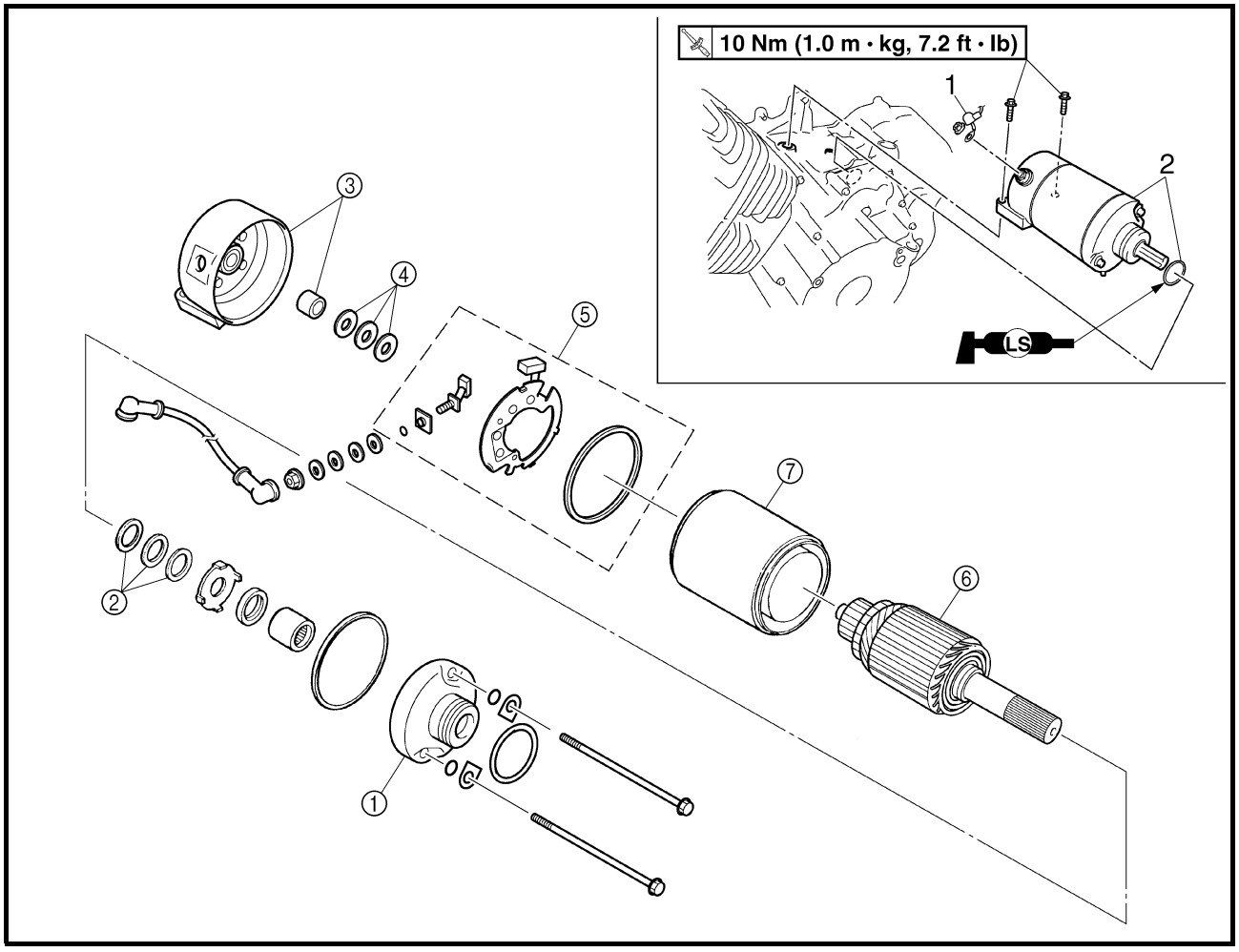


Order	Job name/Part name	Q'ty	Remarks
4	Nut	1	Refer to "REMOVING THE FRONT ARMS" and "INSTALLING THE FRONT ARMS AND FRONT SHOCK ABSORBER" in CHAPTER 8. (Manual No.: 5TE2-AE1)
5	Nut	1	
6	Bolt/nut	2/2	
7	Front lower arm/bushing	1/2	
8	Bolt/nut	2/2	
9	Front shock absorber	1	
10	Bolt/nut	2/2	
11	Front upper arm/bushing	1/2	
12	Circlip	1	
13	Ball joint	1	
			For installation, reverse the removal procedure.

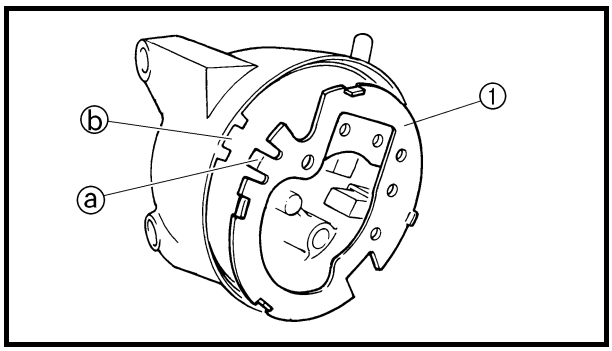
ELECTRICAL

ELECTRIC STARTING SYSTEM

STARTER MOTOR



Order	Job name/Part name	Q'ty	Remarks
	Removing the starter motor		Remove the parts in the order below.
1	Starter motor lead	1	
2	Starter motor/O-ring	1/1	
			For installation, reverse the removal procedure.
	Disassembling the starter motor		Remove the parts in the order below.
①	Bracket 1	1	
②	Washer kit		
③	Bracket 2/spacer	1	
④	Shims		Refer to "ASSEMBLING THE STARTER MOTOR".
⑤	Brush holder set	1	
⑥	Armature coil	1	
⑦	Yoke	1	
			For assembly, reverse the disassembly procedure.



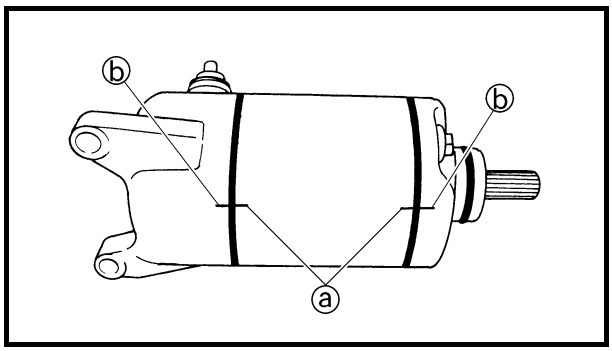
ASSEMBLING THE STARTER MOTOR

1.Install:

- Brush holder set ①

NOTE:

Align the projection ⓐ on the brush seat with the slot ⓑ on the bracket.



2.Install:

- Yoke
- Brackets

NOTE:

Align the match marks ⓐ on the yoke with the match marks ⓑ on the brackets.

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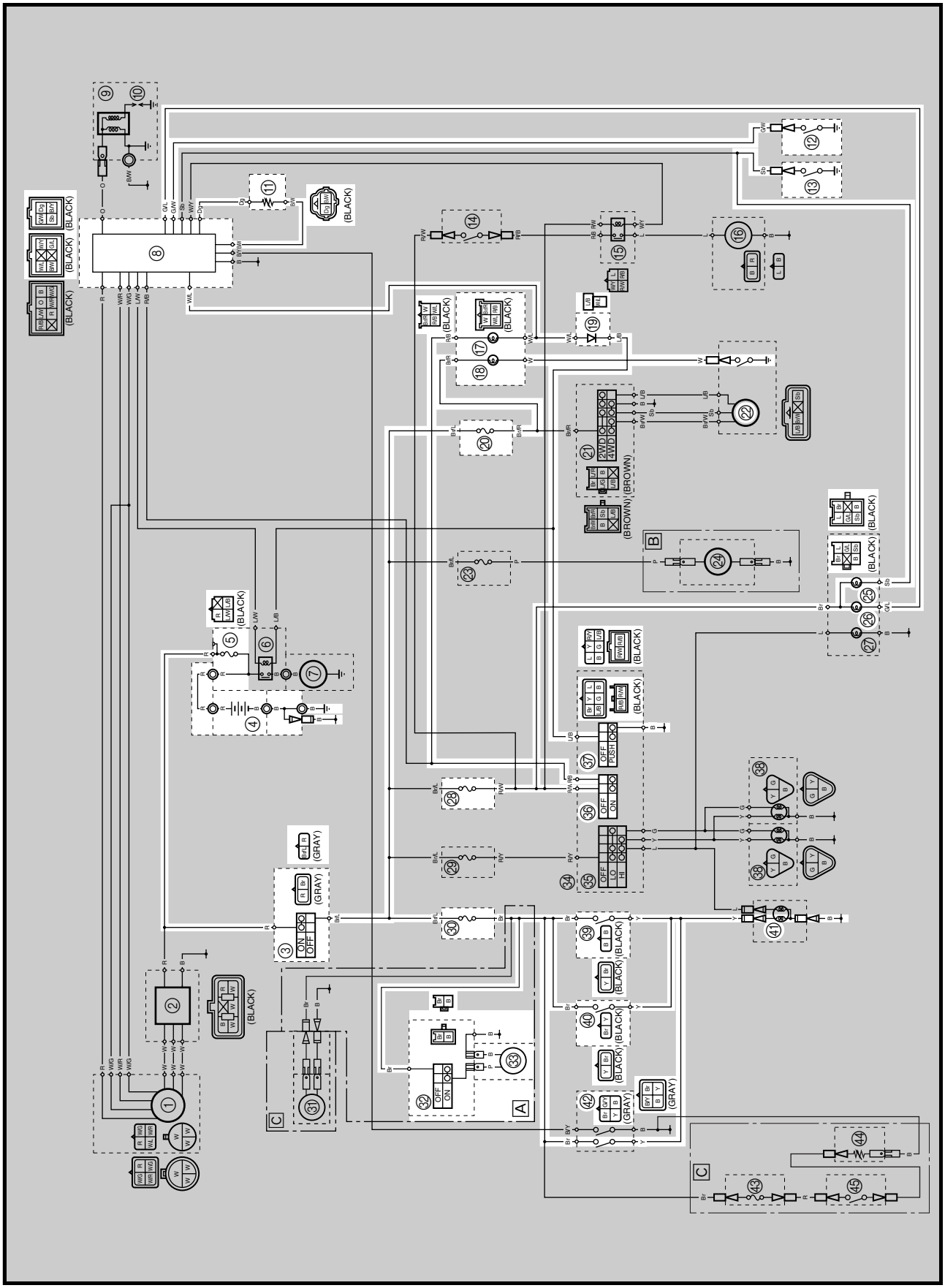
SIGNAL SYSTEM

CIRCUIT DIAGRAM



③ Main switch
④ Battery
⑤ Main fuse
⑧ CDI unit
⑪ Thermo unit
⑫ Reverse switch
⑬ Neutral switch
⑰ Oil temperature warning light
⑱ Four-wheel drive indicator light
⑲ Diode
⑳ Four-wheel drive fuse
㉒ Gear motor
㉕ Neutral indicator light
㉖ Reverse indicator light
㉘ Ignition fuse
㉚ Signaling system fuse
㉜ Horn switch
㉝ Horn
㊱ Engine stop switch
㊲ Start switch
㊴ Front brake light switch
㊵ Rear brake light switch
㊶ Tail/brake light
㊷ Rear brake switch

Ⓐ For Europe and Oceania

1.If the oil temperature warning light does not come on:
- Check that the light comes on when the start switch is pushed on.
- Check that the light comes on when the oil temperature is 145 °C (293 °F) or higher.

1.Bulb and bulb socket

Check the bulb and bulb socket for continuity.

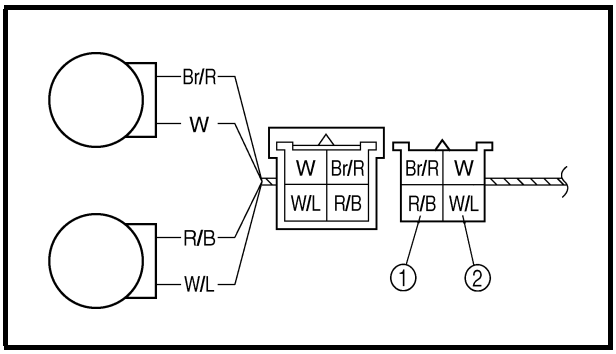
NO CONTINUITY → Replace the bulb and/or bulb socket.

CONTINUITY ↓

2.Voltage

- Connect the pocket tester (DC 20 V) to the bulb socket coupler (wire harness side).

Tester (+) lead → Red/Black terminal ①
Tester (–) lead → White/Blue terminal ②



- Turn the start switch to " ◯ " and the main switch to "ON".
- Check the voltage (12 V).

OUT OF SPECIFICATION → The wiring circuit from the main switch to the bulb socket connector is faulty, repair it.

MEETS SPECIFICATION ↓

3.Start switch

Refer to "CHECKING THE SWITCHES" in CHAPTER 9. (Manual No.: 5TE2-AE1)

INCORRECT → Replace the handlebar switch (left).

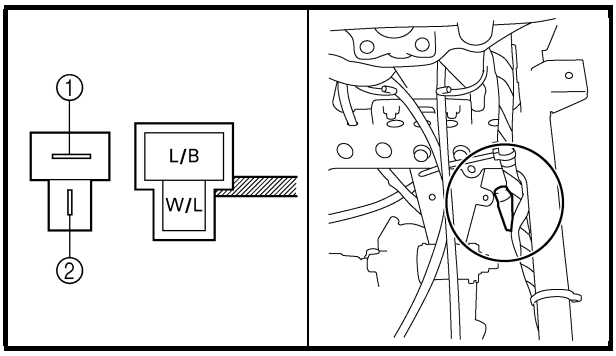
CORRECT ↓

*

*

4.Diode

- Remove the diode from the coupler.
- Connect the pocket tester (Ω × 1) to the diode terminals as shown.
- Check the diode for continuity as follows.



NOTE:
When you switch the tester's positive and negative probes, the readings in the left chart will be reversed.

Tester (+) lead → Blue/Black terminal ① Tester (–) lead → White/Blue terminal ②	**Continuity**
Tester (+) lead → White/Blue terminal ② Tester (–) lead → Blue/Black terminal ①	**No continuity**

INCORRECT

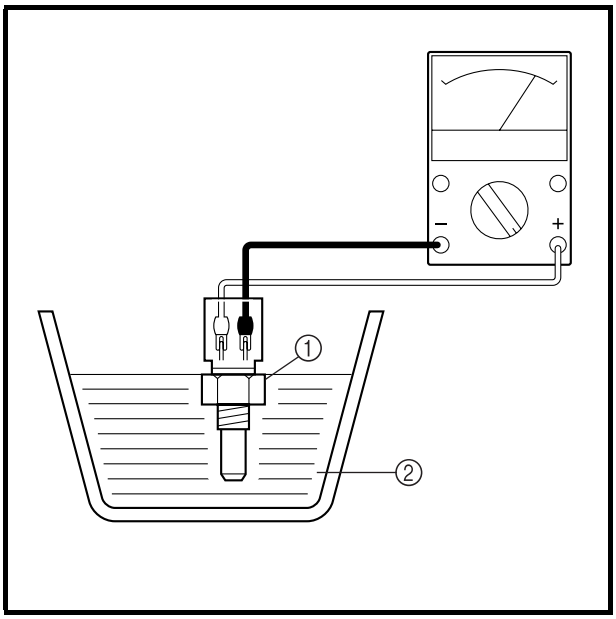
Replace the diode.

CORRECT

5.Thermo unit

- Remove the thermo unit from the crankcase.
- Connect the pocket tester (Ω × 100) to the thermo unit ①.
- Immerse the thermo unit in engine oil ②.
- Measure the resistance.

Thermo unit resistance:
150 °C (302 °F): 307 ~ 339 Ω
170 °C (338 °F): 209 ~ 231 Ω



⚠ WARNING

Handle the thermo unit with special care. Never subject it to a strong shock or allow it to be dropped. Should it be dropped, it must be replaced.

Thermo unit:
20 Nm (2.0 m • kg, 14 ft • lb)

BAD CONDITION

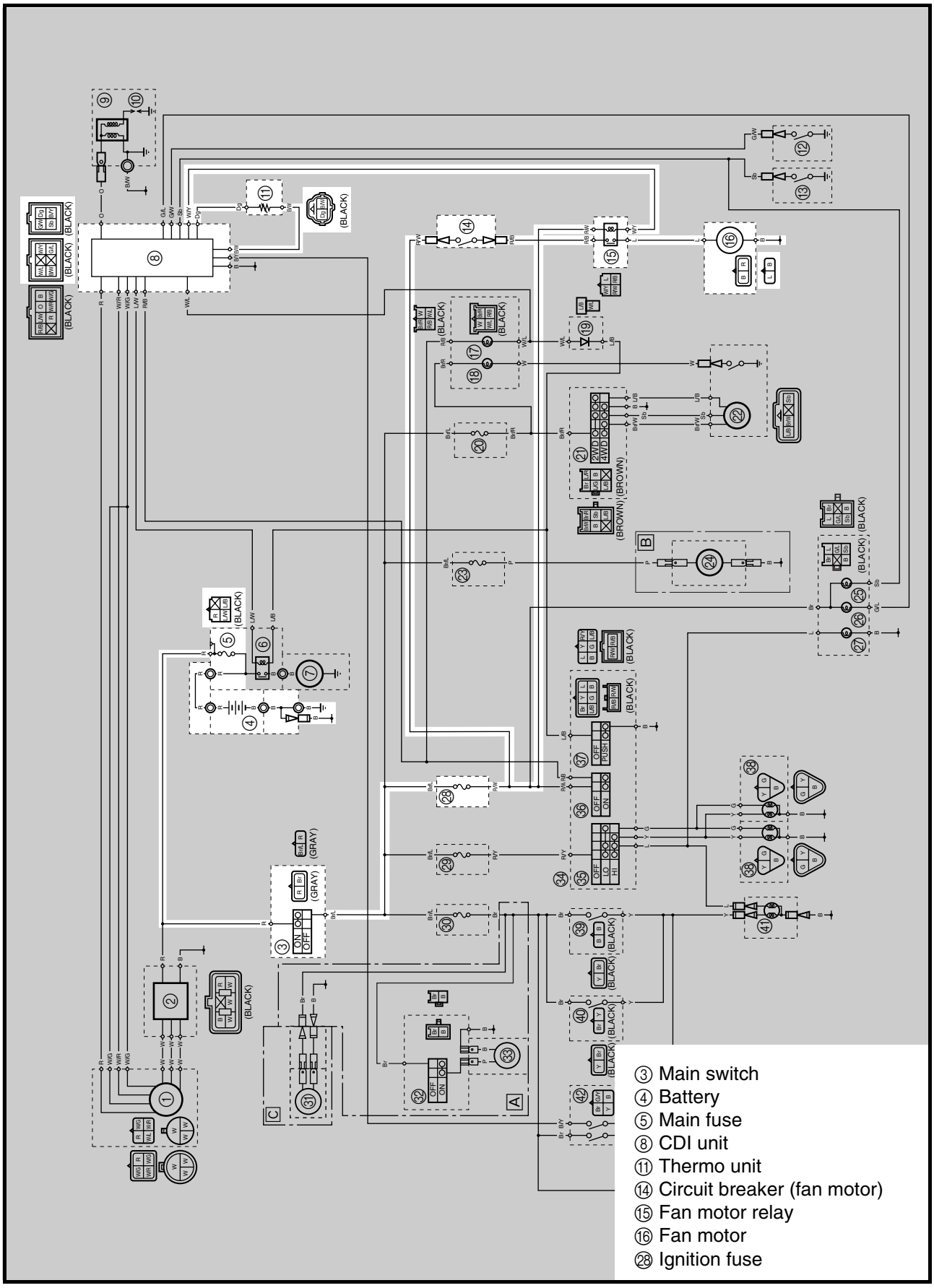
Replace the thermo unit.

GOOD CONDITION

Replace the CDI unit.

COOLING SYSTEM

CIRCUIT DIAGRAM



TROUBLESHOOTING

IF THE FAN MOTOR DOES NOT MOVE:

Procedure

Check:

1. Fuses (main, ignition)
2. Battery
3. Main switch
4. Fan motor
5. Circuit breaker (fan motor)
6. Fan motor relay
7. Thermo unit
8. Wiring connections (the entire cooling system)

NOTE:

- Remove the following part(s) before troubleshooting.

1) Seat
2) Front carrier
3) Front fender

- Use the following special tool(s) for troubleshooting.

Pocket tester:
P/N. YU-03112-C, 90890-03112

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1.Fuses (main, ignition)

Refer to "CHECKING THE SWITCHES" in CHAPTER 9. (Manual No.: 5TE2-AE1)

NO CONTINUITY → Replace the fuse.

CONTINUITY ↓

EB802012

2.Battery

- Check the battery condition. Refer to "CHECKING THE BATTERY" in CHAPTER 3. (Manual No.: 5TE2-AE1)

Open-circuit voltage:
12.8 V or more at 20 °C (68 °F)

INCORRECT → • Clean the battery terminals. • Recharge or replace the battery.

CORRECT ↓

3.Main switch

Refer to "CHECKING THE SWITCHES" in CHAPTER 9. (Manual No.: 5TE2-AE1)

INCORRECT → Replace the main switch.

CORRECT ↓

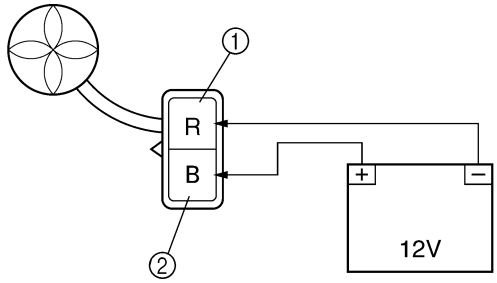
*

*

4.Fan motor

- Disconnect the fan motor coupler.
- Connect the battery (12 V) as shown.

Battery (+) lead → Red terminal ①
Battery (–) lead → Black terminal ②



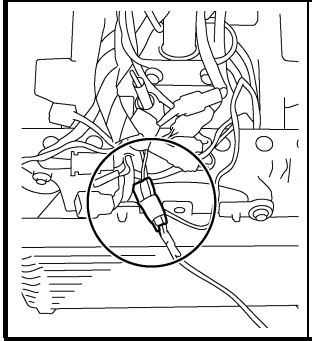
- Check the operation of the fan motor.

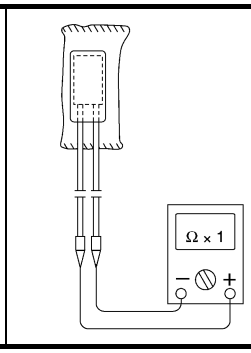
DOES NOT TURN → Replace the fan motor.

TURNS

5.Circuit breaker (fan motor)

- Remove the circuit breaker from the wire harness.
- Connect the pocket tester (Ω × 1) to the circuit breaker.





Circuit breaker resistance:
Zero Ω at 20 °C (68 °F)

OUT OF SPECIFICATION → Replace the circuit breaker.

MEETS SPECIFICATION

*

*

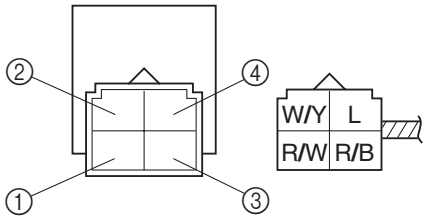
6.Fan motor relay

- Remove the fan motor relay from the wire harness.
- Connect the pocket tester (Ω × 1) and the battery (12 V) to the fan motor relay terminals.

Tester (+) lead → Red/Black terminal ①
Tester (–) lead → Blue terminal ②

Battery (+) terminal → Red/White terminal ③
Battery (–) terminal → White/Yellow terminal ④

- Check the fan motor relay for continuity.



NO CONTINUITY

Replace the fan motor relay.

CONTINUITY

7.Thermo unit

- Remove the thermo unit from the crankcase.
- Connect the pocket tester (Ω × 100) to the thermo unit ①.
- Immerse the thermo unit in engine oil ②.
- Measure the resistance.

Thermo unit resistance:
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⚠ WARNING

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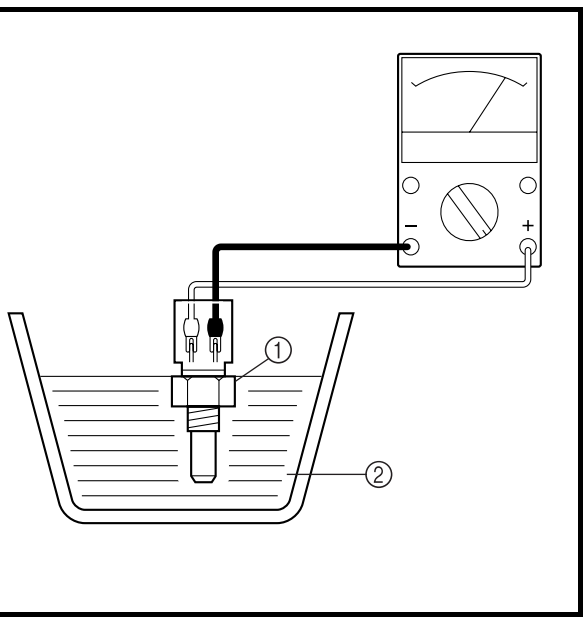
20 Nm (2.0 m • kg, 14 ft • lb)

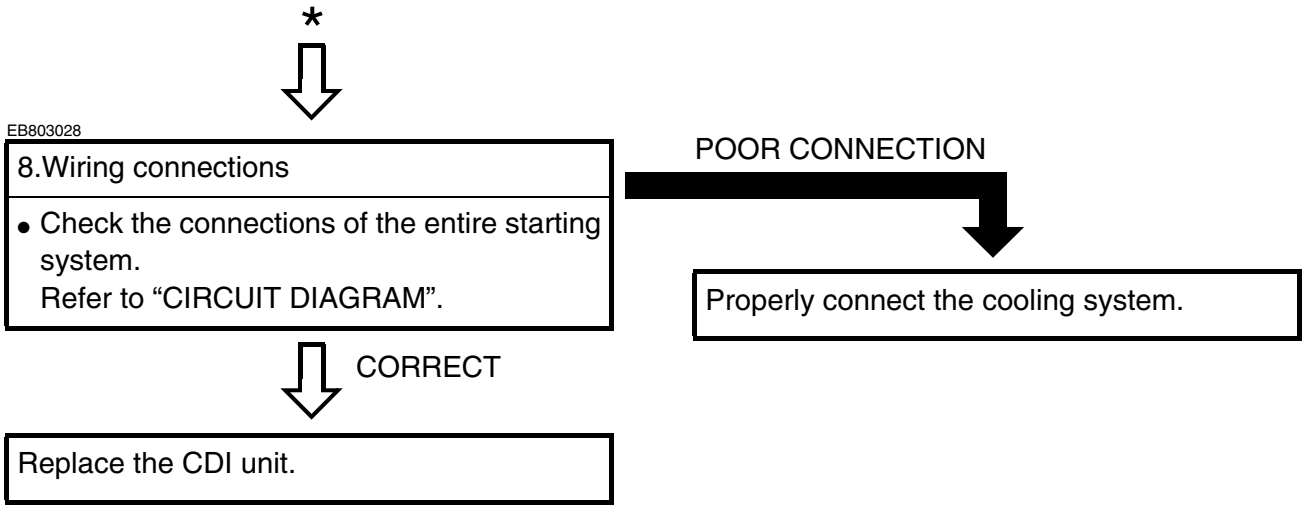


BAD CONDITION

Replace the thermo unit.

GOOD CONDITION

*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EB803028
8.Wiring connections
• Check the connections of the entire starting system.
Refer to “CIRCUIT DIAGRAM”.
POOR CONNECTION
Properly connect the cooling system.
CORRECT
Replace the CDI unit.

TROUBLESHOOTING

NOTE:
The following troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to troubleshooting. Refer to the relative procedure in this manual for checking, adjusting and replacing of parts.

FAULTY GEAR SHIFTING

HARD SHIFTING

Refer to “CLUTCH SLIPPING” in CHAPTER 10 (Manual No.: 5TE2-AE1).

SHIFT LEVER DOES NOT MOVE

Shift shaft
- Groove jammed with impurities
- Bent shift shaft

Shift fork
- Seized shift fork
- Bent shift fork guide bar

Transmission
- Seized transmission gear
- Jammed impurities
- Incorrectly assembled transmission

Shift guide
- Broken shift guide

JUMPS OUT OF GEAR

Shift shaft
- Improperly adjusted shift lever position
- Worn shift shaft lever
- Improperly returned stopper lever
- Improper thrust play
- Worn shift shaft groove

Shift fork
- Worn shift fork

Transmission
- Worn gear dog

OVERHEATING

OVERHEATING

Ignition system
- Improper spark plug gap
- Improper spark plug heat range
- Faulty CDI unit

Fuel system
- Improper carburetor main jet (improper setting)
- Improper fuel level
- Clogged air filter element

Compression system
- Heavy carbon build-up

Engine oil
- Improper oil level
- Improper oil viscosity
- Inferior oil quality

Brake
- Brake drag

Oil cooling system
- Faulty thermo unit
- Faulty CDI unit
- Faulty fan motor relay
- Faulty fan motor circuit breaker
- Clogged or damaged oil cooler
- Inoperative fan motor

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FAULTY BRAKE

POOR BRAKING EFFECT

Front disc brake

- Worn brake pads
- Worn disc
- Air in brake fluid
- Leaking brake fluid
- Faulty master cylinder kit cup
- Faulty caliper kit seal
- Loose union bolt
- Broken brake hose and pipe
- Oily or greasy disc/brake pads
- Improper brake fluid level

Rear drum brake

- Worn brake shoe lining
- Worn brake drum
- Oily or greasy brake shoe lining
- Oily or greasy brake drum
- Improperly adjusted brake lever free play
- Improper brake cam lever position
- Fatigued/damaged return spring

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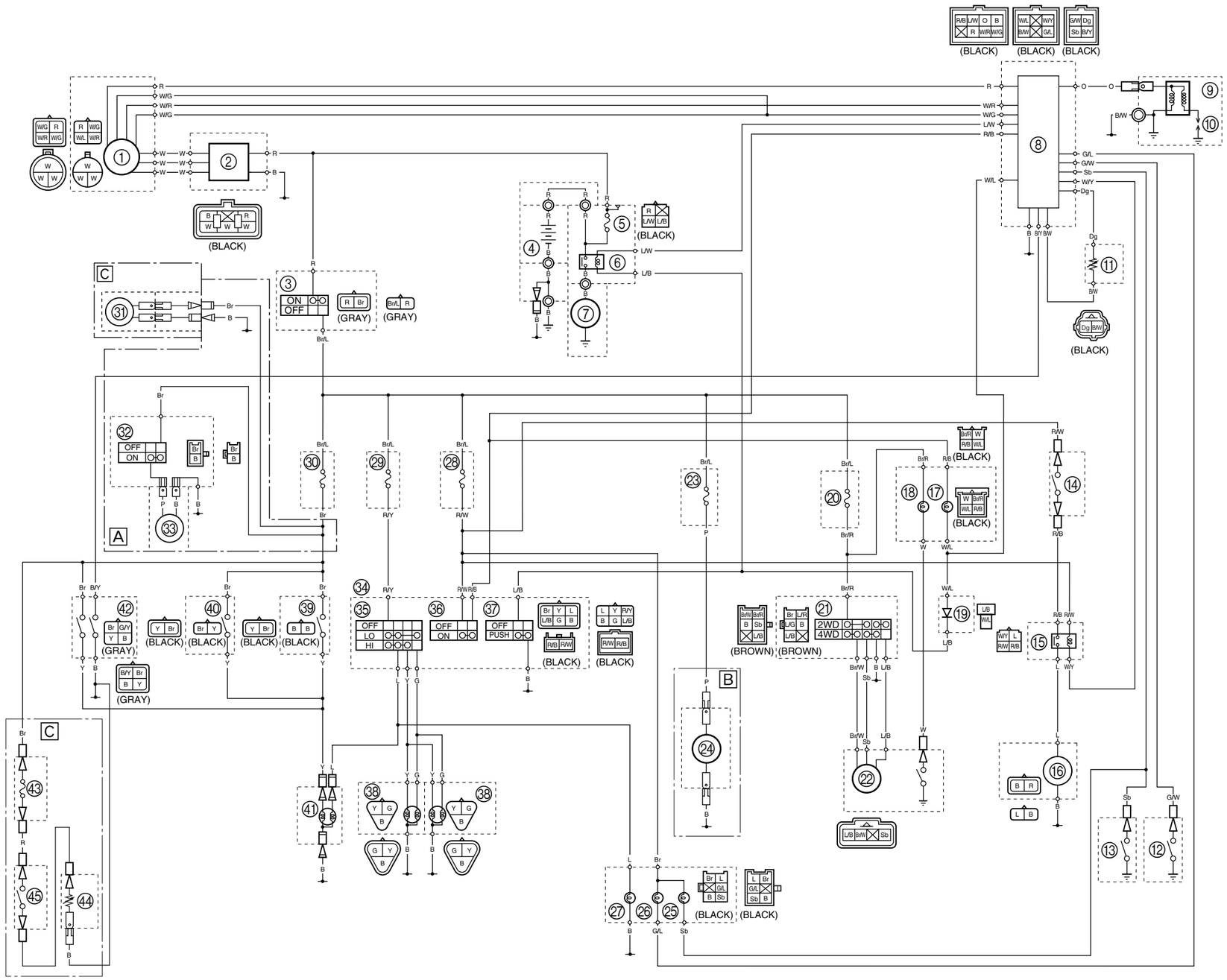
2500 SHINGAI IWATA SHIZUOKA JAPAN

YFM35FAS/YFM350FAS WIRING DIAGRAM



① A.C. magneto
② Rectifier/regulator
③ Main switch
④ Battery
⑤ Main fuse
⑥ Starter relay
⑦ Starter motor
⑧ CDI unit
⑨ Ignition coil
⑩ Spark plug
⑪ Thermo unit
⑫ Reverse switch
⑬ Neutral switch
⑭ Circuit breaker (fan motor)
⑮ Fan motor relay
⑯ Fan motor
⑰ Oil temperature warning light
⑱ Four-wheel drive indicator light
⑲ Diode
⑳ Four-wheel drive fuse
㉑ On-command four-wheel drive switch
㉒ Gear motor
㉓ Auxiliary DC jack fuse
㉔ Auxiliary DC jack
㉕ Neutral indicator light
㉖ Reverse indicator light
㉗ Speedometer light
㉘ Ignition fuse
㉙ Headlight fuse
㉚ Signaling system fuse
㉛ Hour meter
㉜ Horn switch
㉝ Horn
㉞ Handlebar switch (left)
㉟ Light switch
㊱ Engine stop switch
㊲ Start switch
㊳ Headlight
㊴ Front brake light switch
㊵ Rear brake light switch
㊶ Tail/brake light
㊷ Rear brake switch
㊸ Carburetor heater fuse
㊹ Carburetor heater
㊺ Thermo switch

[A] For Europe and Oceania
[B] Optional
[C] Optional (for Europe and Oceania)

COLOR CODE

B ..... Black	P ..... Pink	B/W ..... Black/White	G/Y ..... Green/Yellow	R/W ..... Red/White
Br ..... Brown	R ..... Red	Br/L ..... Brown/Blue	L/B ..... Blue/Black	R/Y ..... Red/Yellow
Dg ..... Dark green	Sb ..... Sky blue	Br/R ..... Brown/Red	L/G ..... Blue/Green	W/G ..... White/Green
G ..... Green	W ..... White	Br/W ..... Brown/White	L/R ..... Blue/Red	W/L ..... White/Blue
L ..... Blue	Y ..... Yellow	G/L ..... Green/Blue	L/W ..... Blue/White	W/R ..... White/Red
O ..... Orange	B/Y ..... Black/Yellow	G/W ..... Green/White	R/B ..... Red/Black	W/Y ..... White/Yellow