YAMAHA

YZF-R1 '98

4XV1-AE1

SERVICE MANUAL

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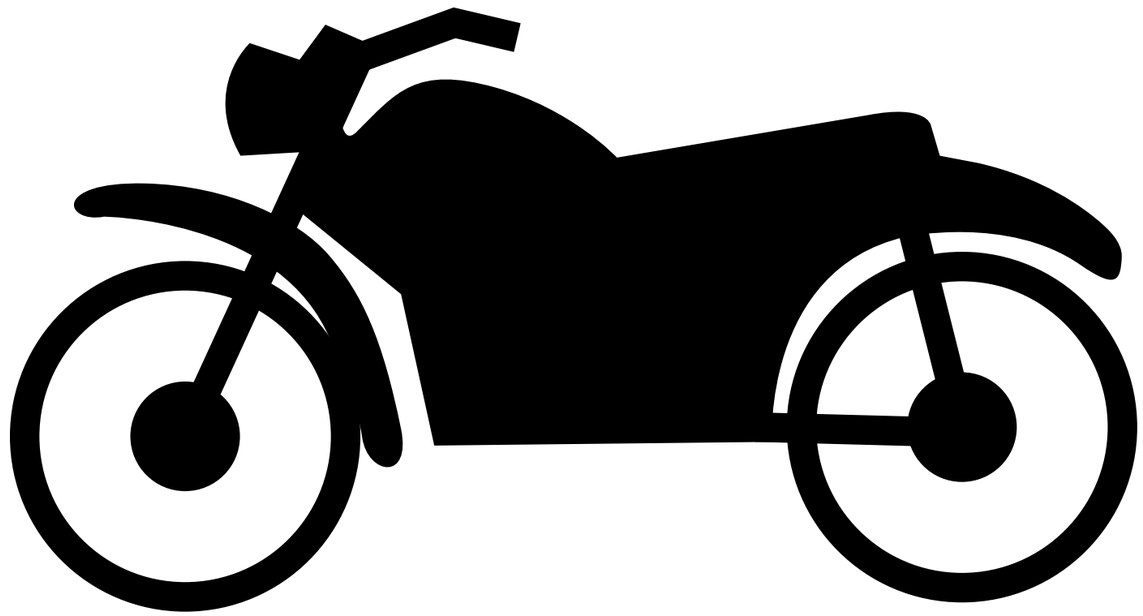

GEN INFO

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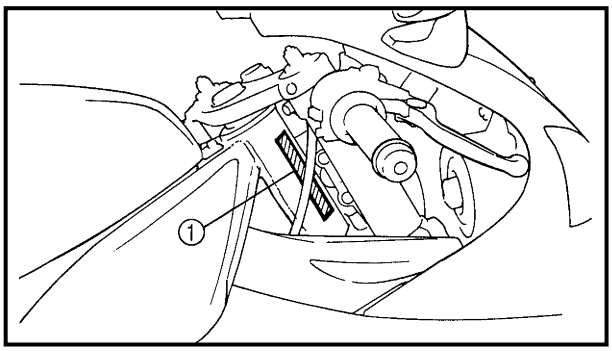
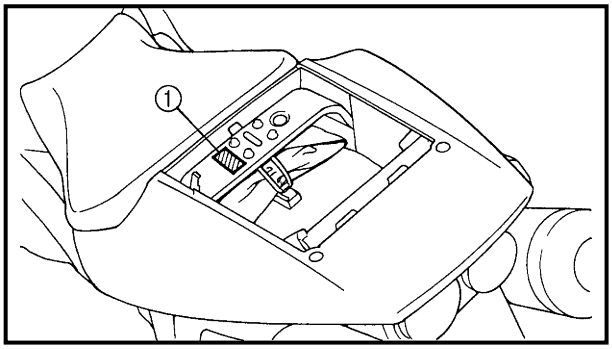
CHAPTER 1.
GENERAL INFORMATION





EB100000

GENERAL INFORMATION

MOTORCYCLE IDENTIFICATION

EB100010

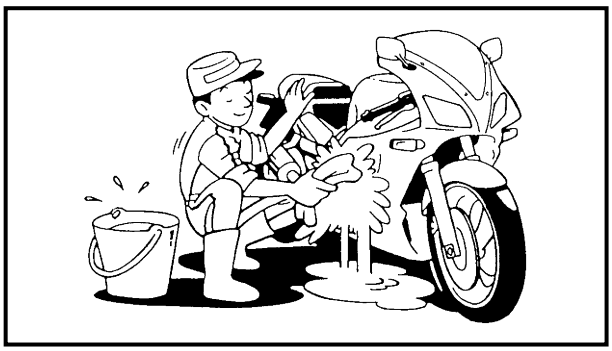
VEHICLE IDENTIFICATION NUMBER

The vehicle identification number ① is stamped into the right side of the steering head pipe.

EB100020

MODEL CODE

The model code label ① is affixed to the frame. This information will be needed to order spare parts.

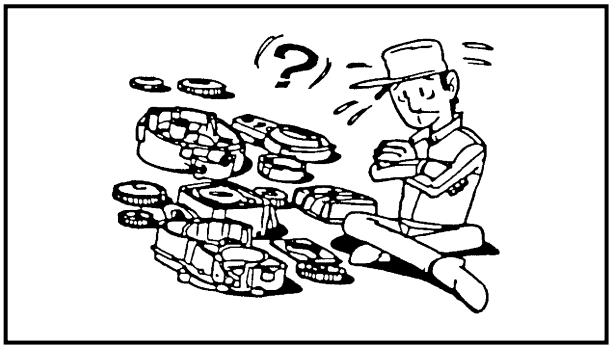


EB102000

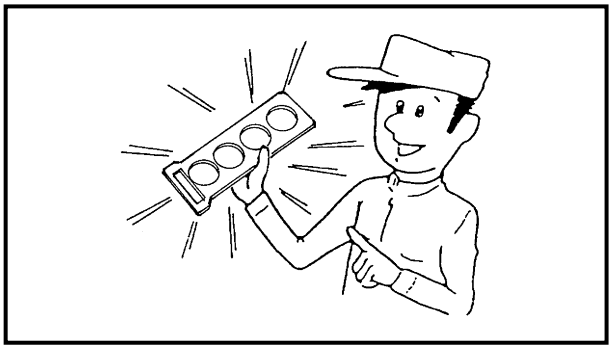
IMPORTANT INFORMATION

PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before removal and disassembly, remove all dirt, mud, dust, and foreign material.



2. Use only the proper tools and cleaning equipment.
   Refer to "SPECIAL TOOLS".
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been "mated" through normal wear. Mated parts must always be reused or replaced as an assembly.
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.



EB102010

REPLACEMENT PARTS

Use only genuine Yamaha parts for all replacements. Use oil and grease recommended by Yamaha for all lubrication jobs. Other brands may be similar in function and appearance, but inferior in quality.

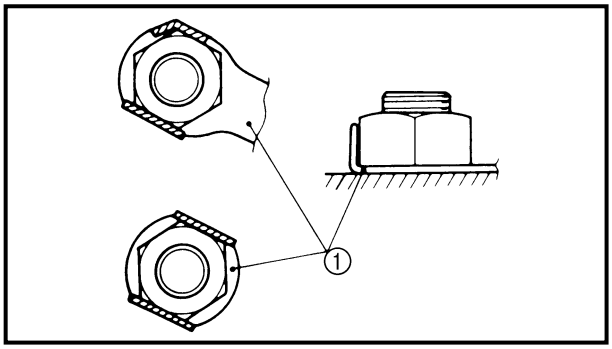
EB102020

GASKETS, OIL SEALS AND O-RINGS

1. When overhauling the engine, replace all gaskets, seals, and O-rings. All gasket surfaces, oil seal lips, and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.

USING A DYNAMOMETER

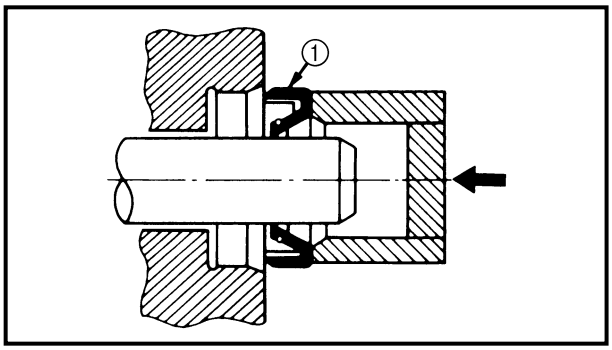
The YZF-R1 has a carbon muffler that may change color when exposed to high temperatures. Therefore, when using a dynamometer always use a fan to cool the muffler.



EB102030

LOCK WASHERS/PLATES AND COTTER PINS

After removal, replace all lock washers/plates ① and cotter pins. After the bolt or nut has been tightened to specification, bend the lock washer tabs and the cotter pin ends along a flat of the bolt or nut.



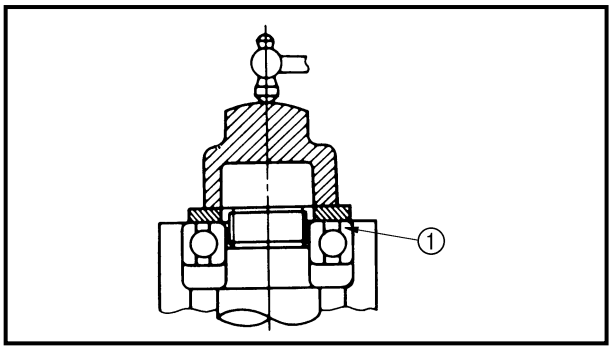
EB102040

BEARINGS AND OIL SEALS

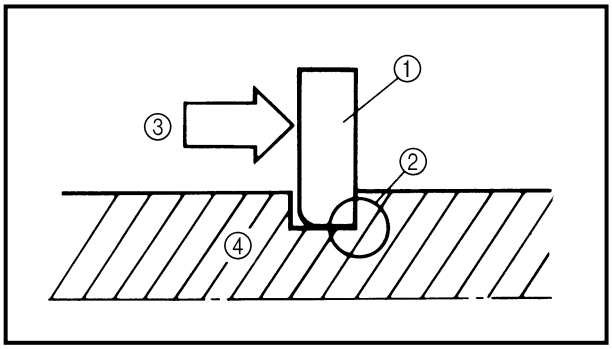
1. Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium soap base grease. Oil bearings liberally when installing, if appropriate.
   ① Oil seal

CAUTION:

Do not spin the bearing with compressed air because this will damage the bearing surfaces.



① Bearing



EB102050

CIRCLIPS

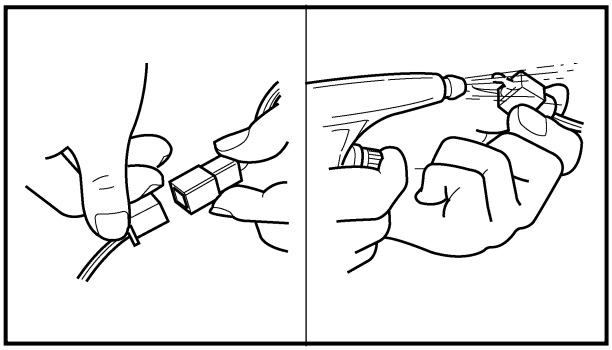
Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip ①, make sure that the sharp-edged corner ② is positioned opposite the thrust ③ that the circlip receives.

④ Shaft

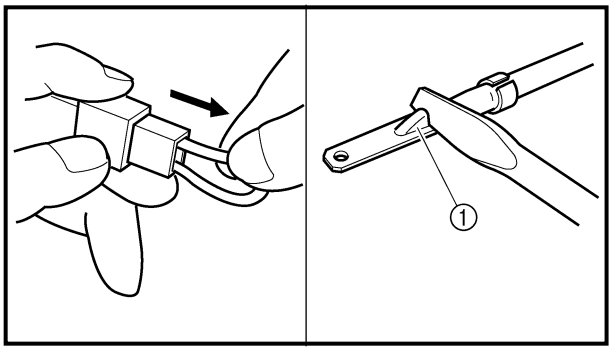
EB103000
CHECKING THE CONNECTIONS

Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
   • lead
   • coupler
   • connector

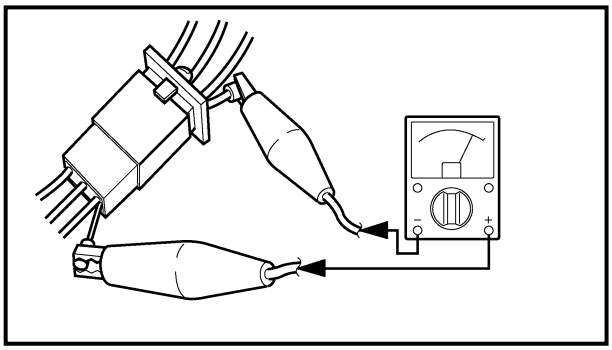


2. Check:
   • lead
   • coupler
   • connector
   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.



3. Check:
   • all connections
   Loose connection → Connect properly.

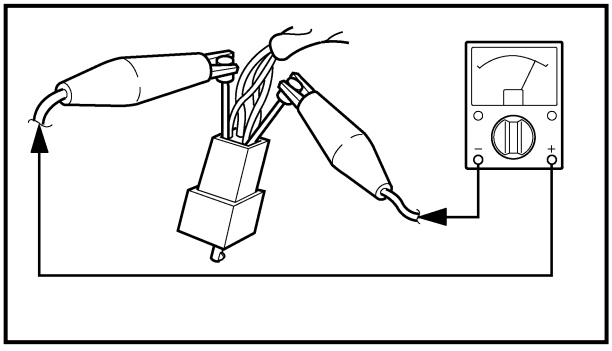
NOTE:
If the pin ① on the terminal is flattened, bend it up.



4. Connect:
   • lead
   • coupler
   • connector

NOTE:
Make sure that all connections are tight.

5. Check:
   • continuity
   (with the pocket tester)

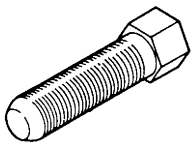
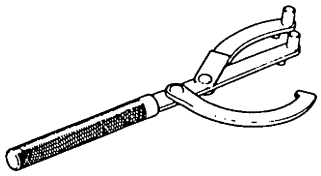
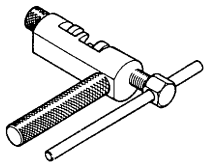
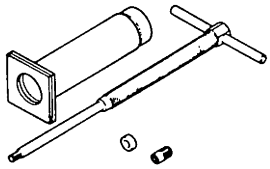
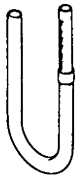
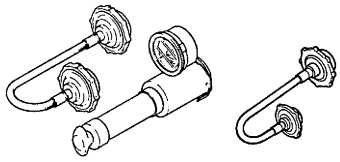
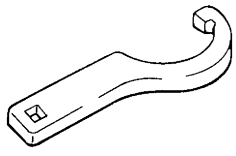
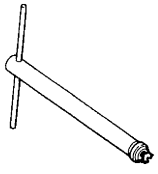


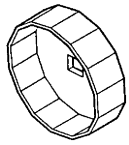
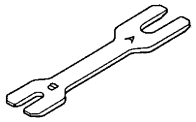
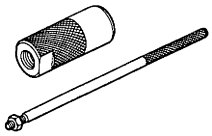
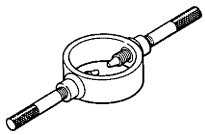
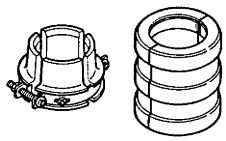
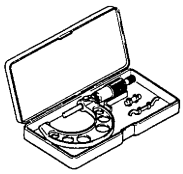
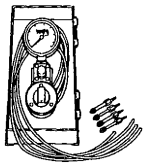
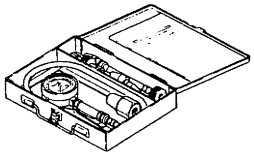
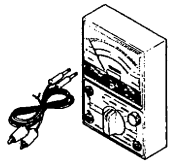
	**Pocket tester** **90890-03112**

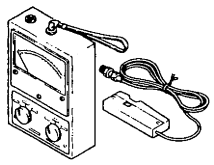
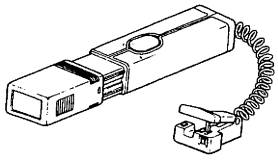
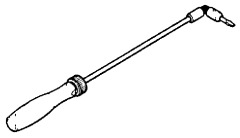
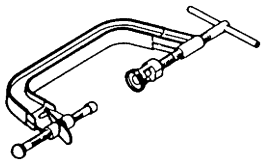
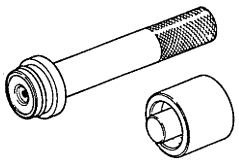
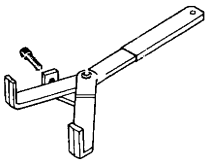
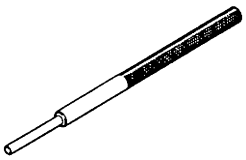
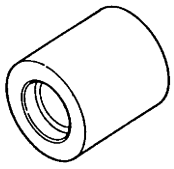
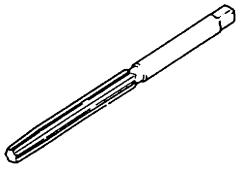
NOTE:
- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.

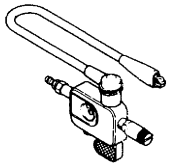
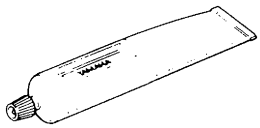
EB104000
SPECIAL TOOLS

The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques.
When placing an order, refer to the list provided below to avoid any mistakes.

Tool No.	Tool name/Function	Illustration
90890-01080	Flywheel puller This tool is used to remove the generator rotor.	
90890-01235	Rotor holding tool This tool is used to hold the generator rotor when removing or installing the generator rotor bolt or pickup coil rotor bolt.	
90890-01286	Drive chain cutter This tool is used to remove the drive chain.	
90890-01304	Piston pin puller This tool is used to remove the piston pins.	
90890-01312	Fuel level gauge This tool is used to measure the fuel level in the float chamber.	
Radiator cap tester 90890-01325 Adapter 90890-01352	Radiator cap tester Adapter These tools are used to check the cooling system.	
90890-01403	Steering nut wrench This tool is used to loosen or tighten the steering stem ring nuts.	
90890-01423	Damper rod holder This tool is used to hold the damper rod assembly when loosening or tightening the damper rod assembly bolt.	

Tool No.	Tool name/Function	Illustration
90890-01426	Oil filter wrench This tool is needed to loosen or tighten the oil filter cartridge.	
90890-01434	Rod holder This tool is used to support the damper adjusting rod.	
Rod puller 90890-01437 Rod puller attachment 90890-01436	Rod puller Rod puller attachment These tools are used to pull up the front fork damper rod.	
90890-01441	Fork spring compressor This tool is used to disassemble or assemble the front fork legs.	
90890-01442	Fork seal driver This tool is used to install the front fork's oil seal and dust seal.	
90890-03008	Micrometer This tool is used to measure the piston skirt diameter.	
Vacuum gauge 90890-03094 Vacuum gauge attachment 90890-03060	Vacuum gauge Vacuum gauge attachment This gauge is used to synchronize the carburetors.	
Compression gauge 90890-03081 Adapter 90890-04136	Compression gauge Adapter These tools are used to measure engine compression.	
90890-03112	Pocket tester This tool is used to check the electrical system.	

Tool No.	Tool name/Function	Illustration
90890-03113	Engine tachometer This tool is used to check engine speed.	
90890-03141	Timing light This tool is used to check the ignition timing.	
90890-03158	Carburetor angle driver This tool is used to turn the pilot screw when adjusting the engine idling speed.	
Valve spring compressor 90890-04019 Attachment 90890-04108 90890-04114	Valve spring compressor Attachment These tools are used to remove or install the valve assemblies.	
Middle driven shaft bearing driver 90890-04058 Mechanical seal installer 90890-04078	Middle driven shaft bearing driver Mechanical seal installer These tools are used to install the water pump seal.	
90890-04086	Clutch holding tool This tool is used to hold the clutch boss when removing or installing the clutch boss nut.	
90890-04111 90890-04116	Valve guide remover This tool is used to remove or install the valve guides.	
90890-04112 90890-04117	Valve guide installer This tool is used to install the valve guides.	
90890-04113 90890-04118	Valve guide reamer This tool is used to rebore the new valve guides.	

Tool No.	Tool name/Function	Illustration
90890-06754	Ignition checker This tool is used to check the ignition system components.	
90890-85505	Yamaha bond No. 1215 This bond is used to seal two mating surfaces (e.g., crankcase mating surfaces).	

SPEC 2

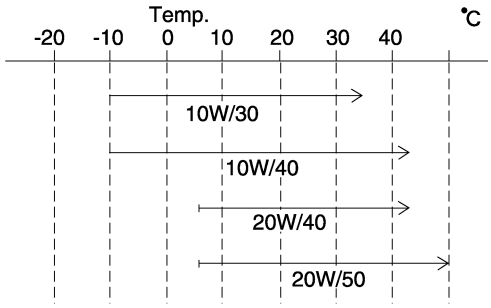
CHAPTER 2.
SPECIFICATIONS

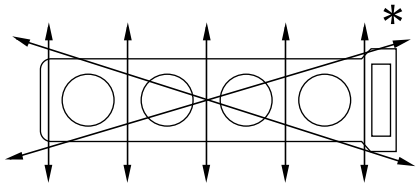
SPECIFICATIONS

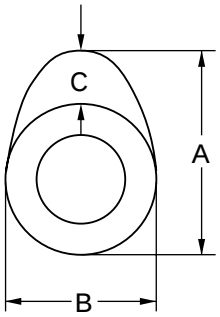
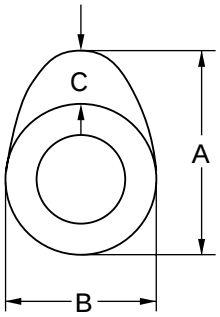
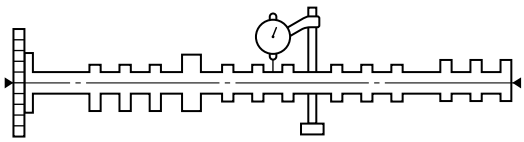
GENERAL SPECIFICATIONS

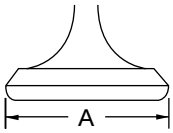
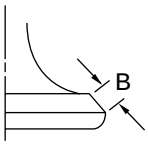
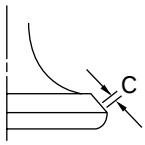
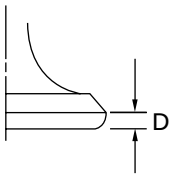
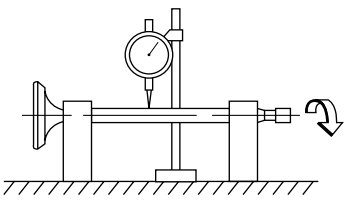
Item	Standard	Limit
Dimensions		
Overall length	2,035 mm (except for N, S, SF)	----
	2,095 mm (for N, S, SF)	----
Overall width	695 mm	----
Overall height	1,095 mm	----
Seat height	815 mm	----
Wheelbase	1,395 mm	----
Minimum ground clearance	140 mm	----
Minimum turning radius	3,400 mm	----
Weight		
Wet (with oil and a full fuel tank)	198 kg	----
Dry (without oil and fuel)	177 kg	----
Maximum load (total of cargo, rider, passenger, and accessories)	197 kg	----

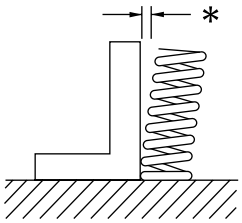
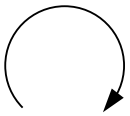
ENGINE SPECIFICATIONS

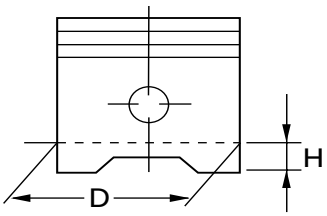
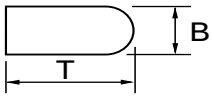
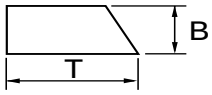
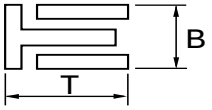
Item	Standard	Limit
Engine		
Engine type	Liquid-cooled, 4-stroke, DOHC	----
Displacement	998 cm^3	----
Cylinder arrangement	Forward-inclined parallel 4-cylinder	----
Bore × stroke	74 × 58 mm	----
Compression ratio	11.8:1	----
Engine idling speed	1,050 ~ 1,150 r/min	----
Vacuum pressure at engine idling speed	29.3 kPa (220 mm Hg)	----
Standard compression pressure (at sea level)	1,450 kPa (14.5 kgf/cm^2) at 400 r/min	----
Fuel		
Recommended fuel	Regular gasoline	----
Fuel tank capacity		
Total (including reserve)	18 L	----
Reserve only	5.5 L	----
Engine oil		
Lubrication system	Wet sump	----
Recommended oil		----
	SAE20W40SE or SAE10W30SE	
Quantity		
Total amount	3.6 L	----
Without oil filter cartridge replacement	2.7 L	----
With oil filter cartridge replacement	2.9 L	----
Oil pressure (hot)	45 kPa at 1,100 r/min (0.45 kgf/cm^2 at 1,100 r/min)	----
Relief valve opening pressure	490 ~ 570 kPa (4.9 ~ 5.7 kgf/cm^2)	----

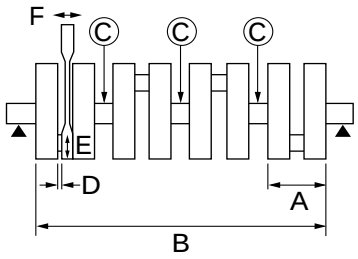
Item	Standard	Limit
Oil filter		
Oil filter type	Cartridge (paper)	----
Bypass valve opening pressure	180 ~ 220 kPa (1.8 ~ 2.2 kgf/cm^2)	----
Oil pump		
Oil pump type	Trochoidal	----
Inner-rotor-to-outer-rotor-tip clearance	0.09 ~ 0.15 mm	----
Outer-rotor-to-oil-pump-housing clearance	0.03 ~ 0.08 mm	----
Cooling system		
Radiator capacity	2.55 L	
Radiator cap opening pressure	95 ~ 125 kPa (0.95 ~ 1.25 kgf/cm^2)	----
Radiator core		
Width	340 mm	----
Height	298 mm	----
Depth	24 mm	----
Coolant reservoir		
Capacity	0.45 L	----
Water pump		
Water pump type	Single-suction centrifugal pump	----
Reduction ratio	68/43 × 28/28 (1.581)	----
Max. impeller shaft tilt	----	0.15 mm
Starting system type	Electric starter	
Spark plugs		
Model (manufacturer) × quantity	CR9E/U27ESR-N (NGK/DENSO) × 4	----
Spark plug gap	0.7 ~ 0.8 mm	----
Cylinder head		
Max. warpage	----	0.1 mm
		

Item	Standard	Limit
Camshafts		
Drive system	Chain drive (right)	----
Camshaft cap inside diameter	24.500 ~ 24.521 mm	----
Camshaft journal diameter	24.437 ~ 24.450 mm	----
Camshaft-journal-to-camshaft-cap clearance	0.050 ~ 0.084 mm	----
Intake camshaft lobe dimensions		
		
Measurement A	32.5 ~ 32.6 mm	32.4 mm
Measurement B	24.95 ~ 25.05 mm	24.85 mm
Measurement C	7.45 ~ 7.65 mm	----
Exhaust camshaft lobe dimensions		
		
Measurement A	32.95 ~ 33.05 mm	32.85 mm
Measurement B	24.95 ~ 25.05 mm	24.85 mm
Measurement C	7.75 ~ 7.95 mm	----
Max. camshaft runout	----	0.03 mm
		

Item	Standard	Limit
Timing chain		
Model/number of links	RH2015 / 130	----
Tensioning system	Automatic	----
Valves, valve seats, valve guides		
Valve clearance (cold)		
Intake	0.11 ~ 0.20 mm	----
Exhaust	0.21 ~ 0.30 mm	----
Valve dimensions		
 Head Diameter	 Face Width	 Seat Width	 Margin Thickness
Valve head diameter A		
Intake	22.9 ~ 23.1 mm	----
Exhaust	24.4 ~ 24.6 mm	----
Valve face width B		
Intake	1.76 ~ 2.90 mm	----
Exhaust	1.76 ~ 2.90 mm	----
Valve seat width C		
Intake	0.9 ~ 1.1 mm	----
Exhaust	0.9 ~ 1.1 mm	----
Valve margin thickness D		
Intake	0.5 ~ 0.9 mm	----
Exhaust	0.5 ~ 0.9 mm	----
Valve stem diameter		
Intake	3.975 ~ 3.900 mm	3.945 mm
Exhaust	4.460 ~ 4.475 mm	4.43 mm
Valve guide inside diameter		
Intake	4.000 ~ 4.012 mm	4.05 mm
Exhaust	4.500 ~ 4.512 mm	4.55 mm
Valve-stem-to-valve-guide clearance		
Intake	0.010 ~ 0.037 mm	0.08 mm
Exhaust	0.025 ~ 0.052 mm	0.1 mm
Valve stem runout	----	0.01 mm
		
Valve seat width		
Intake	0.9 ~ 1.1 mm	----
Exhaust	0.9 ~ 1.1 mm	----

Item	Standard	Limit
Valve springs		
Free length		
Intake	38.9 mm	----
Exhaust	40.67 mm	----
Installed length (valve closed)		
Intake	34.5 mm	----
Exhaust	35 mm	----
Compressed spring force (installed)		
Intake	82 ~ 96 N (8.36 ~ 9.79 kgf)	----
Exhaust	110 ~ 126 N (11.22 ~ 12.85 kgf)	----
Spring tilt		
		
Intake	----	2.5° / 1.7 mm
Exhaust	----	2.5° / 1.8 mm
Winding direction (top view)		
Intake	Clockwise	----
Exhaust	Clockwise	----
		
Cylinders		
Cylinder arrangement	Forward-inclined, parallel 4-cylinder	----
Bore × stroke	74 × 58 mm	----
Compression ratio	11.8:1	----
Bore	74.00 ~ 74.010 mm	----
Max. taper	----	0.05 mm
Max. out-of-round	----	0.05 mm

Item	Standard	Limit
Pistons		
Piston-to-cylinder clearance	0.03 ~ 0.055 mm	0.12 mm
Diameter D	73.955 ~ 73.970 mm	----
		
Height H	5 mm	----
Piston pin bore (in the piston)		
Diameter	17.002 ~ 17.013 mm	----
Offset	0.5 mm	----
Offset direction	Intake side	----
Piston pins		
Outside diameter	16.991 ~ 17.000 mm	----
Piston-pin-to-piston-pin-bore clearance	0.002 ~ 0.022 mm	0.072 mm
Piston rings		
Top ring		
		
Ring type	Barrel	----
Dimensions (B × T)	0.90 × 2.75 mm	----
End gap (installed)	0.19 ~ 0.31 mm	----
Ring side clearance	0.030 ~ 0.065 mm	----
2nd ring		
		
Ring type	Taper	----
Dimensions (B × T)	0.8 × 2.8 mm	----
End gap (installed)	0.30 ~ 0.45 mm	----
Ring side clearance	0.020 ~ 0.055 mm	----
Oil ring		
		
Dimensions (B × T)	1.5 × 2.6 mm	----
End gap (installed)	0.10 ~ 0.35 mm	----

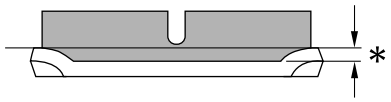
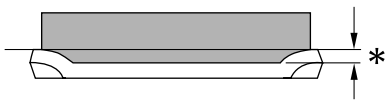
Item	Standard	Limit
Connecting rods		
Crankshaft-pin-to-big-end-bearing clearance	0.016 ~ 0.040 mm	----
Bearing color code	–1 = Violet 0 = White 1 = Blue 2 = Black	----
Crankshaft		
		
Width A	52.40 ~ 57.25 mm	----
Width B	300.75 ~ 302.65 mm	----
Max. runout C		0.03 mm
Big end side clearance D	0.160 ~ 0.262 mm	----
Crankshaft-journal-to-crankshaft-journal-bearing clearance	0.004 ~ 0.028 mm	----
Bearing color code	–1 = Pink/violet 0 = Pink/white 1 = Pink/blue 2 = Pink/black 3 = Pink/brown	----
Clutch		
Clutch type	Wet, multiple disc	----
Clutch release method	Rack and pinion (pull rod type)	----
Clutch release method operation	Cable operation	----
Operation	Right-foot operation	----
Clutch cable free play (at the end of the clutch lever)	10 ~ 15 mm	----
Friction plates		
Thickness	2.9 ~ 3.1 mm	2.8 mm
Plate quantity	8	----
Clutch plates		
Thickness	1.9 ~ 2.1 mm	----
Plate quantity	7	----
Max. warpage	----	0.1 mm
Clutch springs		
Free length	6.5 mm	----
Spring quantity	1 spring per valve	----

Item	Standard	Limit
Transmission		
Transmission type	Constant mesh, 6-speed	----
Primary reduction system	Spur gear	----
Primary reduction ratio	68/43 (1.581)	----
Secondary reduction system	Chain drive	----
Secondary reduction ratio	43/16 (2.688)	----
Operation	Left-foot operation	----
Gear ratios		
1st gear	39/15 (2.600)	----
2nd gear	35/19 (1.842)	----
3rd gear	30/20 (1.500)	----
4th gear	28/21 (1.333)	----
5th gear	30/25 (1.200)	----
6th gear	29/26 (1.115)	----
Max. main axle runout	----	0.08 mm
Max. drive axle runout	----	0.08 mm
Shifting mechanism		
Shift mechanism type	Shift drum	----
Max. shift fork guide bar bending	----	0.1 mm
Installed shift rod length	305 mm	----
Air filter type	Dry element	----
Fuel pump		
Pump type	Electrical	----
Model (manufacturer)	4SV (MITSUBISHI)	----
Output pressure	20 kPa (0.2 kgf/cm^2)	----
Carburetors		
Model (manufacturer) × quantity	BDSR40 (MIKUNI) × 4	----
Throttle cable free play (at the flange of the throttle grip)	3 ~ 5 mm	----
ID mark	4XV1 00	----
Main jet	#130	----
Main air jet	Carburetors 1 and 4: #60 Carburetors 2 and 3: #65	----
Jet needle	6DEY5-53-3	----
Needle jet	P-0	----
Pilot air jet	#120	----
Pilot outlet	1.0	----
Pilot jet	#17.5	----
Bypass 1	0.8	----
Bypass 2	0.9	----
Bypass 3	0.8	----
Pilot screw turns out	2.5	----
Valve seat size	1.5	----

Item	Standard	Limit
Starter jet 1	#35	----
Starter jet 2	0.7	----
Butterfly valve size	#100	----
Fuel level (below the line on the float chamber)	4.1 ~ 5.1 mm	----
Max. EXUP cable free play (at the EXUP valve pulley)	1.5 mm	----

CHASSIS SPECIFICATIONS

Item	Standard	Limit
Frame		
Frame type	Diamond	----
Caster angle	24°	----
Trail	92 mm	----
Front wheel		
Wheel type	Cast wheel	----
Rim		
Size	17 × MT3.50	----
Material	Aluminum	----
Wheel travel	135 mm	----
Wheel runout		
Max. radial wheel runout	----	1 mm
Max. lateral wheel runout	----	0.5 mm
Rear wheel		
Wheel type	Cast wheel	----
Rim		
Size	17 × MT6.00	----
Material	Aluminum	----
Wheel travel	130 mm	----
Wheel runout		
Max. radial wheel runout	----	1 mm
Max. lateral wheel runout	----	0.5 mm
Front tire		
Tire type	Tubeless	----
Size	120/70 ZR17 (58W)	----
Model (manufacturer)	MEZ3 FRONT (METZELER) (for GB) TX15 (MICHELIN) (for N, D, NL, B, E, P, I, GR)	----
Tire pressure (cold)		
0 ~ 90 kg	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
90 ~ 197 kg	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
High-speed riding	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
Min. tire tread depth	----	1.6 mm

Item	Standard	Limit
Rear tire		
Tire type	Tubeless	----
Size	190/50 ZR17 (73W)	----
Model (manufacturer)	MEZ3 (METZELER) (for GB) TX25 (MICHELIN) (for N, D, NL, B, E, P, I, GR)	----
Tire pressure (cold)		
0 ~ 90 kg	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
90 ~ 197 kg	290 kPa (2.9 kg/cm^2, 2.9 bar)	----
High-speed riding	250 kPa (2.5 kg/cm^2, 2.5 bar)	----
Min. tire tread depth	----	1.6 mm
Front brakes		
Brake type	Dual-disc brake	----
Operation	Right-hand operation	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	298 × 5 mm	----
Min. thickness	----	4.5 mm
Max. deflection	----	0.1 mm
Brake pad lining thickness	5.5 mm	0.5 mm
		
Master cylinder inside diameter	14 mm	----
Caliper cylinder inside diameter	30.2 mm and 27 mm	----
Rear brake		
Brake type	Single-disc brake	----
Operation	Right-foot operation	----
Brake pedal position (from the top of the brake pedal to the bottom of the rider footrest bracket)	35 ~ 40 mm	----
Recommended fluid	DOT 4	----
Brake discs		
Diameter × thickness	245 × 5 mm	----
Min. thickness	----	4.5 mm
Max. deflection	----	0.1 mm
Brake pad lining thickness	5 mm	0.5 mm
		
Master cylinder inside diameter	12.7 mm	----
Caliper cylinder inside diameter	38.2 mm	----

Item	Standard	Limit
Front suspension		
Suspension type	Telescopic fork	----
Front fork type	Coil spring/oil damper	----
Front fork travel	135 mm	----
Spring		
Free length	255 mm	----
Spacer length	85 mm	----
Installed length	242.4 mm	----
Spring rate (K1)	7.35 N/mm (0.75 kgf/mm)	
Spring stroke (K1)	0 ~ 135 mm	----
Optional spring available	No	----
Fork oil		
Recommended oil	Suspension oil “01” or equivalent	----
Quantity (each front fork leg)	477 cm^3	----
Level (from the top of the inner tube, with the inner tube fully compressed, and without the fork spring)	78 mm	----
Damper adjusting rod locknut distance	11 mm	----
Spring preload adjusting positions		
Minimum	8	----
Standard	6	----
Maximum	1	----
Rebound damping adjusting positions		
Minimum*	13	----
Standard*	5	----
Maximum*	1	----
Compression damping adjusting positions		
Minimum*	11	----
Standard*	5	----
Maximum*	1	----
* from the fully turned-in position		

Item	Standard	Limit
Steering		
Steering bearing type	Angular ball bearings	----
Rear suspension		
Suspension type	Swingarm (link suspension)	----
Rear shock absorber assembly type	Coil spring/gas-oil damper	----
Rear shock absorber assembly travel	65 mm	----
Spring		
Free length	176 mm	----
Installed length	162.5 mm	----
Spring rate (K1)	7.84 N/mm (0.8 kgf/mm)	----
Spring stroke (K1)	0 ~ 65 mm	----
Optional spring available	No	----
Standard spring preload gas/air pressure	1,200 kPa (12 kgf/cm^2)	----
Spring preload adjusting positions		
Minimum	1	----
Standard	4	----
Maximum	9	----
Rebound damping adjusting positions		
Minimum*	12	----
Standard*	6	----
Maximum*	1	----
Compression damping adjusting positions		
Minimum*	12	----
Standard*	8	----
Maximum*	1	----
* from the fully turned-in position		
Swingarm		
Free play (at the end of the swingarm)		
Radial	----	1 mm
Axial	----	1 mm
Drive chain		
Model (manufacturer)	50ZVM (DAIDO)	----
Link quantity	114	----
Drive chain slack	40 ~ 50 mm	----
Maximum ten-link section	150.1 mm	----

ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
System voltage	12 V	----
Ignition system		
Ignition system type	Transistorized coil ignition	----
Ignition timing	5° BTDC at 1,100 r/min	----
Advanced timing	55° BTDC at 5,000 r/min	----
Advancer type	Throttle position sensor and electrical	----
Pickup coil resistance/color	248 ~ 372 Ω / Gy–B	----
Transistorized coil ignition unit model (manufacturer)	TNDF41 (DENSO)	----
Ignition coils		
Model (manufacturer)	JO313 (DENSO)	----
Minimum ignition spark gap	6 mm	----
Primary coil resistance	1.87 ~ 2.53 Ω	----
Secondary coil resistance	12 ~ 18 kΩ	----
Spark plug caps		
Material	Resin	----
Resistance	10 kΩ	----
Throttle position sensor standard resistance	4 ~ 6 kΩ	----
Charging system		
System type	AC magneto	----
Model (manufacturer)	F4T361 (MITSUBISHI)	----
Nominal output	14 V / 26 A at 5,000 r/min	----
Stator coil resistance	0.45 ~ 0.55 Ω at 20°C	----
Voltage regulator		
Regulator type	Semiconductor, field control	----
Model	SH650A-12	----
No-load regulated voltage	14.1 ~ 14.9 V	----
Rectifier		
Model	SH650A-12	----
Rectifier capacity	18 A	----
Withstand voltage	200 V	----
Battery		
Battery type	GT12B-4	----
Battery voltage/capacity	12V / 10AH	----
Headlight type	Halogen bulb	
Indicator light type × quantity	LED × 5	
Bulbs (voltage/wattage × quantity)		
Headlight	12 V 60 W / 55 W × 2	----
Auxiliary light	12 V 5 W × 2	----
Tail/brake light	12 V 5 W / 21 W × 2	----
Turn signal light	12 V 21 W × 4	----
Meter light	12 V 1.4 W × 4	----

Item	Standard	Limit
Electric starting system		
System type	Constant mesh	----
Starter motor		
Model (manufacturer)	SM-13 (MITSUBA)	----
Power output	0.8 kW	----
Brushes		
Overall length	10 mm	5 mm
Spring force	7.03 ~ 10.63 N (717 ~ 1,084 gf)	----
Commutator resistance	0.025 ~ 0.035 Ω	----
Commutator diameter	28 mm	27 mm
Mica undercut	0.7 mm	----
Starter relay		
Model (manufacturer)	MS5F-631 (JIDECO)	----
Amperage	100 A	----
Coil resistance	4.18 ~ 4.62 Ω	----
Horn		
Horn type	Plain	----
Model (manufacturer) × quantity	YF-12 (NIKKO) × 1	----
Max. amperage	3 A	----
Turn signal relay		
Relay type	Full-transistor	----
Model (manufacturer)	FE246BH (DENSO)	----
Self-cancelling device built-in	No	----
Turn signal blinking frequency	60 ~ 120 cycles/min.	----
Wattage	21 W × 2	----
Oil level switch model (manufacturer)	3GM (DENSO)	----
Fuel sender		
Model (manufacturer)	3GM (DENSO)	----
Resistance	899.7 ~ 900.3 kΩ at 25 ˚C	----
Sidestand relay		
Model	3EN-00	----
Coil resistance	225 Ω	----
Fuel pump maximum amperage	1.2 A	----
Fuel pump relay model (manufacturer)	3EN-00 (OMRON)	----
Radiator fan model (manufacturer)	4XV (TOYO RADIATOR)	----
Thermo switch model (manufacturer)	3LN (NIPPON THERMOSTAT)	----

Item	Standard	Limit
Temperature sender		
Model (manufacturer)	2YK (NIPPON SEIKI)	----
Resistance	47.5 ~ 56.8 Ω at 80 ˚C 16.5 ~ 20.5 Ω at 115 ˚C	----
Fuses (amperage × quantity)		
Main fuse	30 A × 1	----
Headlight fuse	20 A × 1	----
Signaling system fuse	20 A × 1	----
Ignition fuse	15 A × 1	----
Radiator fan fuse	7.5 A × 1	----
Backup fuse (odometer)	7.5 A × 1	----

EB201000
CONVERSION TABLE

All specification data in this manual are listed in SI and METRIC UNITS.
Use this table to convert METRIC unit data to IMPERIAL unit data.

Ex.

METRIC		MULTIPLIER		IMPERIAL
** mm	×	0.03937	=	** in
2 mm	×	0.03937	=	0.08 in

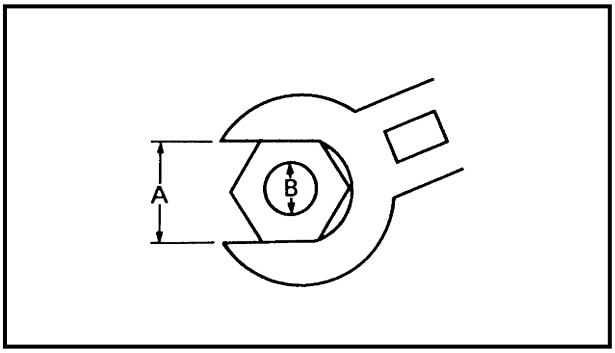
CONVERSION TABLE

METRIC TO IMPERIAL			
	Metric unit	Multiplier	Imperial unit
Tightening torque	m·kg m·kg cm·kg cm·kg	7.233 86.794 0.0723 0.8679	ft·lb in·lb ft·lb in·lb
Weight	kg g	2.205 0.03527	lb oz
Speed	km/hr	0.6214	mph
Distance	km m m cm mm	0.6214 3.281 1.094 0.3937 0.03937	mi ft yd in in
Volume/ Capacity	cc (cm^3) cc (cm^3) lt (liter) lt (liter)	0.03527 0.06102 0.8799 0.2199	oz (IMP liq.) cu·in qt (IMP liq.) gal (IMP liq.)
Misc.	kg/mm kg/cm^2 Centigrade (°C)	55.997 14.2234 9/5+32	lb/in psi (lb/in^2) Fahrenheit (°F)

EB202001
TIGHTENING TORQUES

GENERAL TIGHTENING TORQUES

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



A: Width across flats
B: Thread diameter

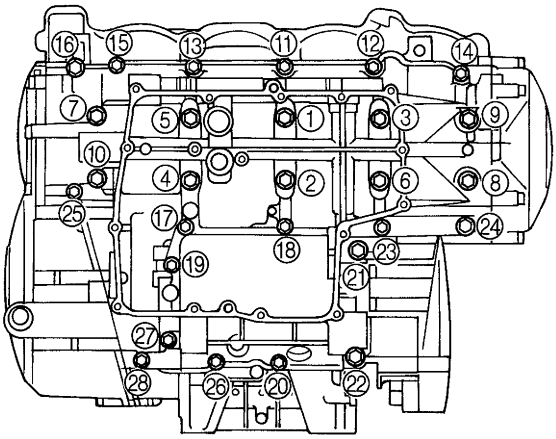
A (nut)	B (bolt)	General tightening torques		
		Nm	m•kg	ft•lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

ENGINE TIGHTENING TORQUES

Item	Fastener	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m·kgf	
Spark plugs	–	M10	4	13	1.3	
Cylinder head	Nut	M10	8	50	5.0	E
Cylinder head	Cap nut	M10	2	50	5.0	E
Cylinder head	Bolt	M6	2	12	1.2	
Camshaft caps	Bolt	M6	28	10	1.0	E
Cylinder head cover	Bolt	M6	6	12	1.2	
Oil passage check bolt	Bolt	M8	1	20	2.0	
Cylinder head (exhaust pipe)	Stud bolt	M8	8	15	1.5	E
Connecting rod caps	Nut	M8	8	36	3.6	M
Generator rotor	Bolt	M10	1	95	9.5	E
Crankshaft sprocket	Bolt	M10	1	60	6.0	E
Cap bolt (timing chain tensioner)	Bolt	M6	1	10	1.0	
Camshaft sprocket	Bolt	M7	4	24	2.4	
Water pump inlet pipe	Bolt	M6	1	10	1.0	LT
Water pump outlet pipe	Bolt	M6	1	10	1.0	LT
Oil/water pump assembly driven sprocket	Bolt	M6	1	15	1.5	LT
Oil pump	Bolt	M6	1	10	1.0	
Oil cooler	Bolt	M20	1	35	3.5	E
Engine oil drain bolt	–	M14	1	43	4.3	
Oil strainer housing	Bolt	M6	2	10	1.0	LT
Oil/water pump assembly driven sprocket cover	Bolt	M6	1	10	1.0	LT
Oil pipe	Bolt	M6	1	10	1.0	LT
Oil filter bolt	Bolt	M20	1	70	7.0	
Oil filter cartridge	–	M20	1	17	1.7	E
Exhaust pipes	Nut	M8	8	20	2.0	
Muffler clamp	Bolt	M8	3	20	2.0	
Exhaust pipe emission check bolts	Bolt	M6	4	10	1.0	
EXUP valve pulley cover	Bolt	M6	3	10	1.0	LT
EXUP cable holder	Bolt	M8	2	10	1.0	
Exhaust pipe bracket	Bolt	M8	1	20	2.0	
Crankcase (cylinder head)	Stud bolt	M10	10	10	1.0	E
Crankcase	Bolt	M9	10	32	3.2	E
Crankcase	Bolt	M6	2	14	1.4	E
Crankcase	Bolt	M6	18	12	1.2	E
Crankcase	Bolt	M8	4	24	2.4	E
Generator rotor cover	Bolt	M6	9	12	1.2	
Drive sprocket cover	Bolt	M6	5	10	1.0	

Item	Fastener	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m·kgf	
Clutch cover	Bolt	M6	8	12	1.2	
Pickup coil rotor cover	Bolt	M6	8	12	1.2	
Shift shaft cover	Bolt	M6	5	12	1.2	
Oil baffle plate	Bolt	M6	5	10	1.0	LT
Timing mark accessing screw	–	M8	1	15	1.5	
Starter clutch idle gear shaft	Bolt	M6	1	10	1.0	
Starter clutch	Bolt	M6	3	12	1.2	LT
Clutch boss	Nut	M20	1	70	7.0	Use a lock washer.
Clutch springs	Bolt	M6	6	8	0.8	
Drive sprocket	Nut	M22	1	85	8.5	Use a lock washer.
Main axle bearing housing	Screw	M6	3	12	1.2	LT
Shift drum retainer	Bolt	M6	2	10	1.0	LT
Shift shaft spring stopper	Bolt	M8	1	22	2.2	LT
Shift rod locknut	Nut	M6	2	7	0.7	
Shift arm	Bolt	M6	1	10	1.0	
Stator coil	Bolt	M6	3	10	1.0	LT
Ignitor unit	Bolt	M6	1	10	1.0	
Neutral switch	–	M10	1	20	2.0	
Pickup coil	Bolt	M6	2	10	1.0	LT
Temperature sender	–	–	1	15	1.5	
Thermo switch	–	M16	1	23	2.3	

Crankcase tightening sequence:



CHASSIS TIGHTENING TORQUES

Item	Thread size	Tightening torque		Remarks
		Nm	m·kgf	
Upper bracket pinch bolts	M8	23	2.3	
Steering stem nut	M28	115	11.5	
Handlebar pinch bolts	M8	17	1.7	
Lower ring nut	M30	9	0.9	See NOTE.
Lower bracket pinch bolts	M8	23	2.3	
Brake fluid reservoir cap stopper	M4	12	1.2	
Front brake hose union bolts	M10	30	3.0	
Front brake master cylinder	M6	13	1.3	
Engine mounting				
Left front mounting bolts	M10	40	4.0	
Right front mounting bolt	M12	55	5.5	
Rear mounting bolts	M10	55	5.5	
Pinch bolts	M8	24	2.4	
Exhaust pipe bracket	M8	24	2.4	
Pivot shaft nut	M18	125	12.5	
Connecting arms	M10	40	4.0	
Relay arm and connecting arms	M10	40	4.0	
Relay arm	M10	40	4.0	
Rear shock absorber and relay arm	M10	40	4.0	
Rear shock absorber assembly	M10	40	4.0	
Fuel cock	M6	7	0.7	
Fuel sender and fuel tank	M6	7	0.7	
Coolant reservoir and radiator	M6	5	0.5	
Rider footrest bracket	M8	28	2.8	
Passenger footrest bracket	M8	28	2.8	
Rear master cylinder	M8	23	2.3	
Rear brake hose union bolts	M10	30	3.0	
Sidestand	M10	63	6.3	
Front wheel axle	M18	72	7.2	
Rear wheel axle nut	M24	150	15.0	
Front brake caliper and front fork	M10	40	4.0	
Rear brake caliper and bracket	M10	40	4.0	
Brake disc and wheel	M6	18	1.8	
Rear wheel sprocket and rear wheel drive hub	M10	69	6.9	
Brake caliper and bleed screw	M8	6	0.6	
Pinch bolt (front wheel axle)	M8	23	2.3	

NOTE:

1.First, tighten the ring nut to approximately 28 Nm (2.8 m • kg) with a torque wrench, then loosen the ring nut completely.
2.Retighten the ring nut to specification.

EB202000

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE LUBRICATION POINTS AND LUBRICANT TYPES

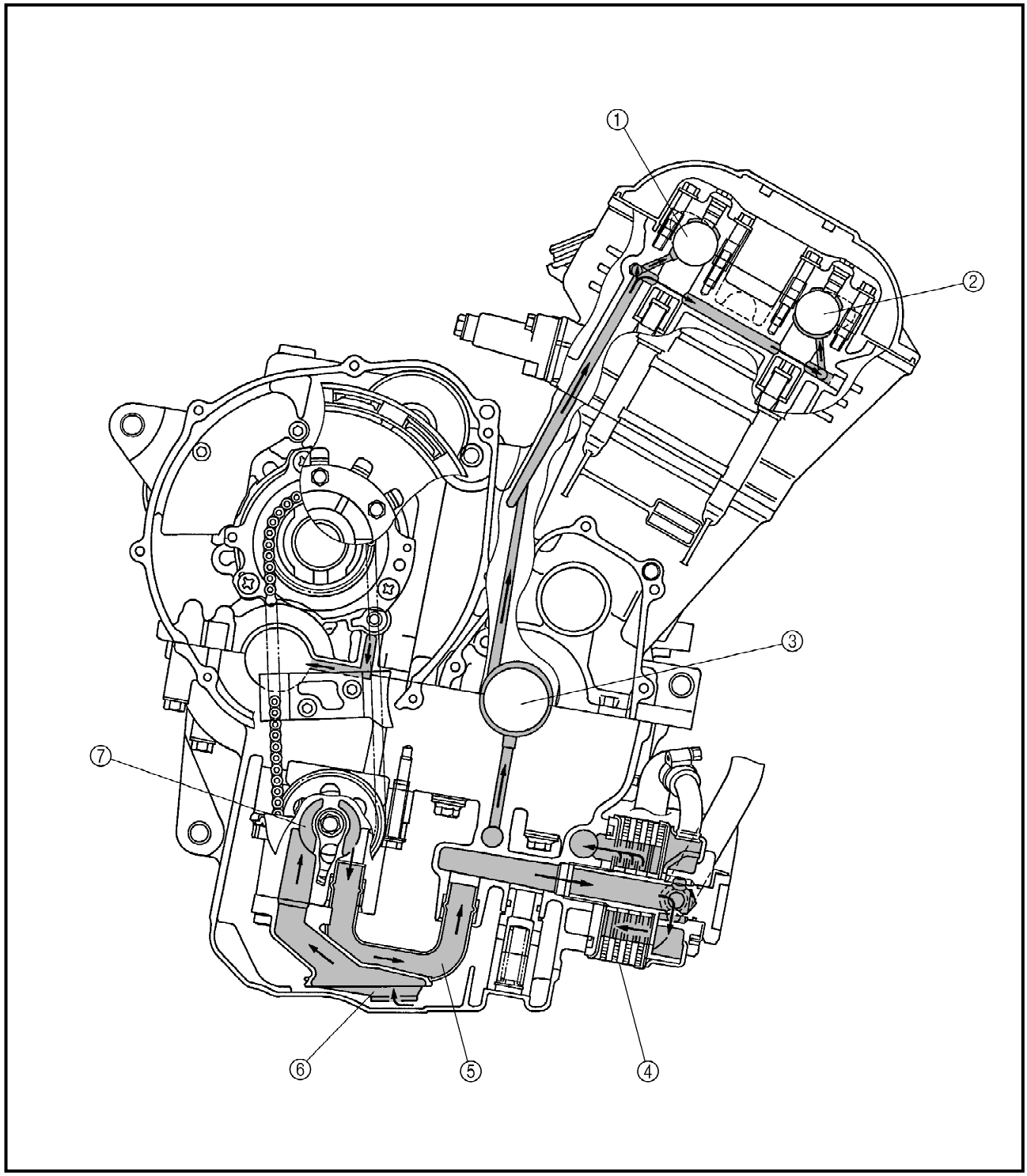
Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Bearings	E
Crankshaft pins	E
Piston surfaces	E
Piston pins	E
Connecting rod bolts and nuts	M
Crankshaft journals	E
Camshaft lobes	M
Camshaft journals	M
Valve stems (intake and exhaust)	M
Valve stem ends (intake and exhaust)	E
Water pump impeller shaft	E
Oil pump rotors (inner and outer)	E
Oil pump housing	E
Oil strainer	E
Starter clutch idle gear inner surface	E
Starter clutch assembly	E
Primary driven gear	E
Transmission gears (wheel and pinion)	M
Main axle and drive axle	M
Shift drum	E
Shift forks and shift fork guide bars	E
Shift shaft	E
Shift shaft boss	LS
Engine mounting bolts (rear)	LS
Cylinder head cover mating surface	Yamaha bond No.1215
Crankcase mating surface	Yamaha bond No.1215
Clutch cover (crankcase mating surface)	Yamaha bond No.1215
Generator rotor cover (crankcase mating surface)	Yamaha bond No.1215
Cylinder head cover	Yamaha bond No.1215

EB202010
CHASSIS LUBRICATION POINTS AND LUBRICANT TYPES

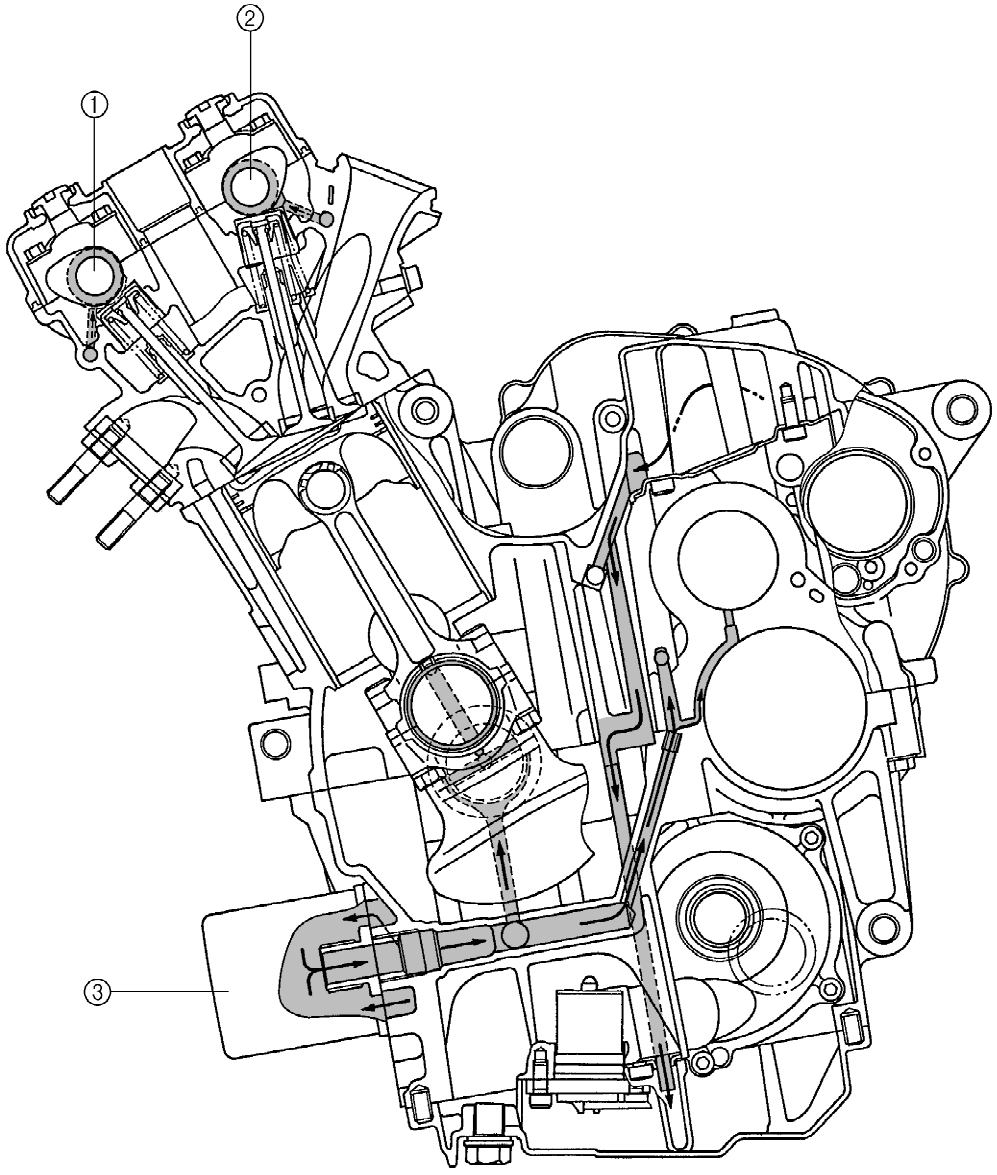
Lubrication point	Lubricant
Steering bearings and bearing races (upper and lower)	LS
Front wheel oil seal (right and left)	LS
Rear wheel oil seal	LS
Rear wheel drive hub oil seal	LS
Rear wheel drive hub mating surface	LS
Rear brake pedal	LS
Sidestand pivoting point and metal-to-metal moving parts	LS
Throttle grip inner surface	LS
Brake lever pivoting point and metal-to-metal moving parts	LS
Clutch lever pivoting point and metal-to-metal moving parts	LS
Rear shock absorber assembly oil seal	LS
Rear shock absorber assembly bearing	LS
Rear shock absorber assembly spacer	LS
Pivot shaft	LS
Connecting arm bearing (left and right)	LS
Spacer (relay arm and connecting arm)	LS
Oil seal (relay arm and connecting arm)	LS

EB203000
OIL FLOW DIAGRAMS

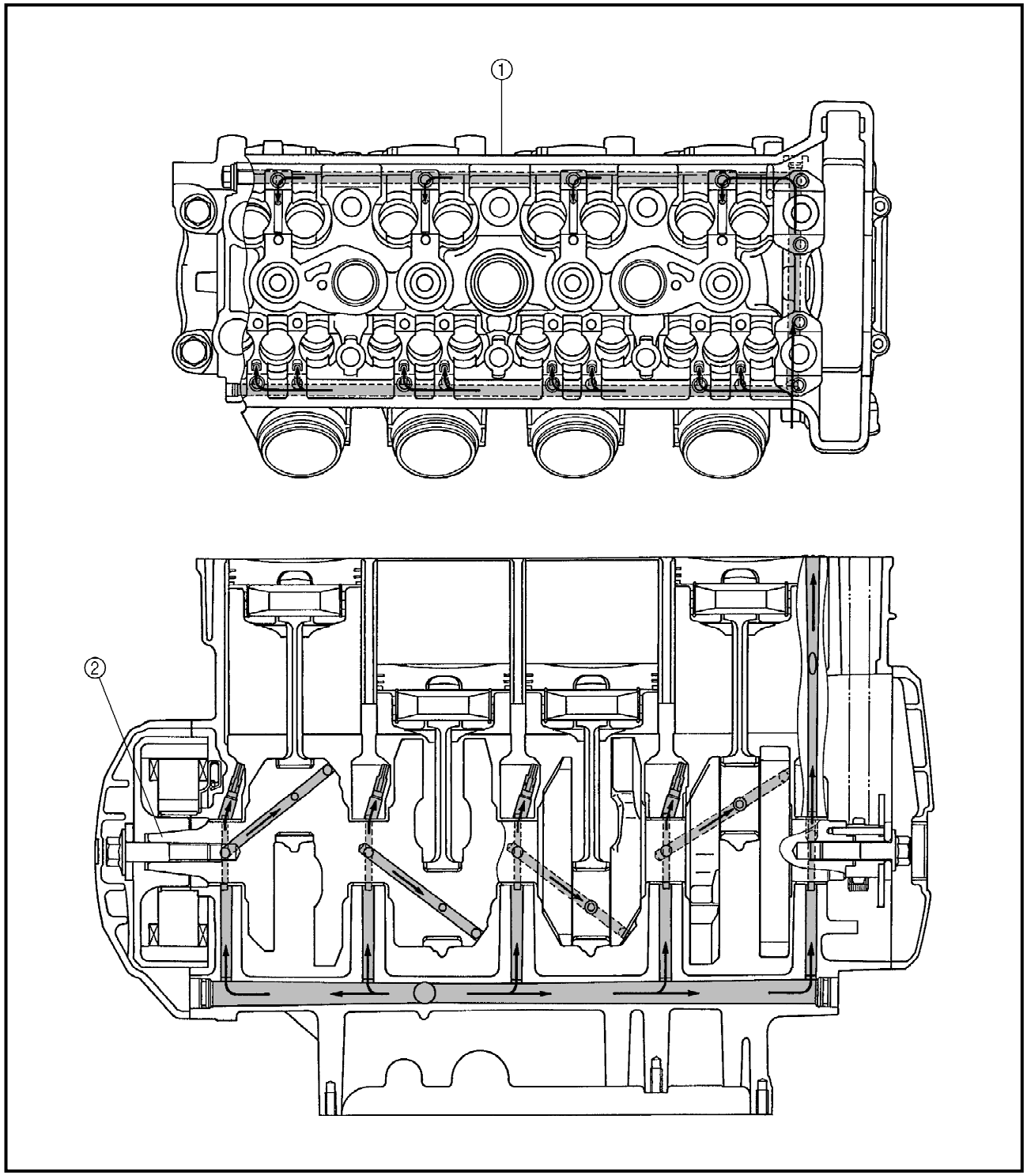
① Intake camshaft
② Exhaust camshaft
③ Crankshaft
④ Oil cooler
⑤ Oil pipe
⑥ Oil strainer
⑦ Oil pump



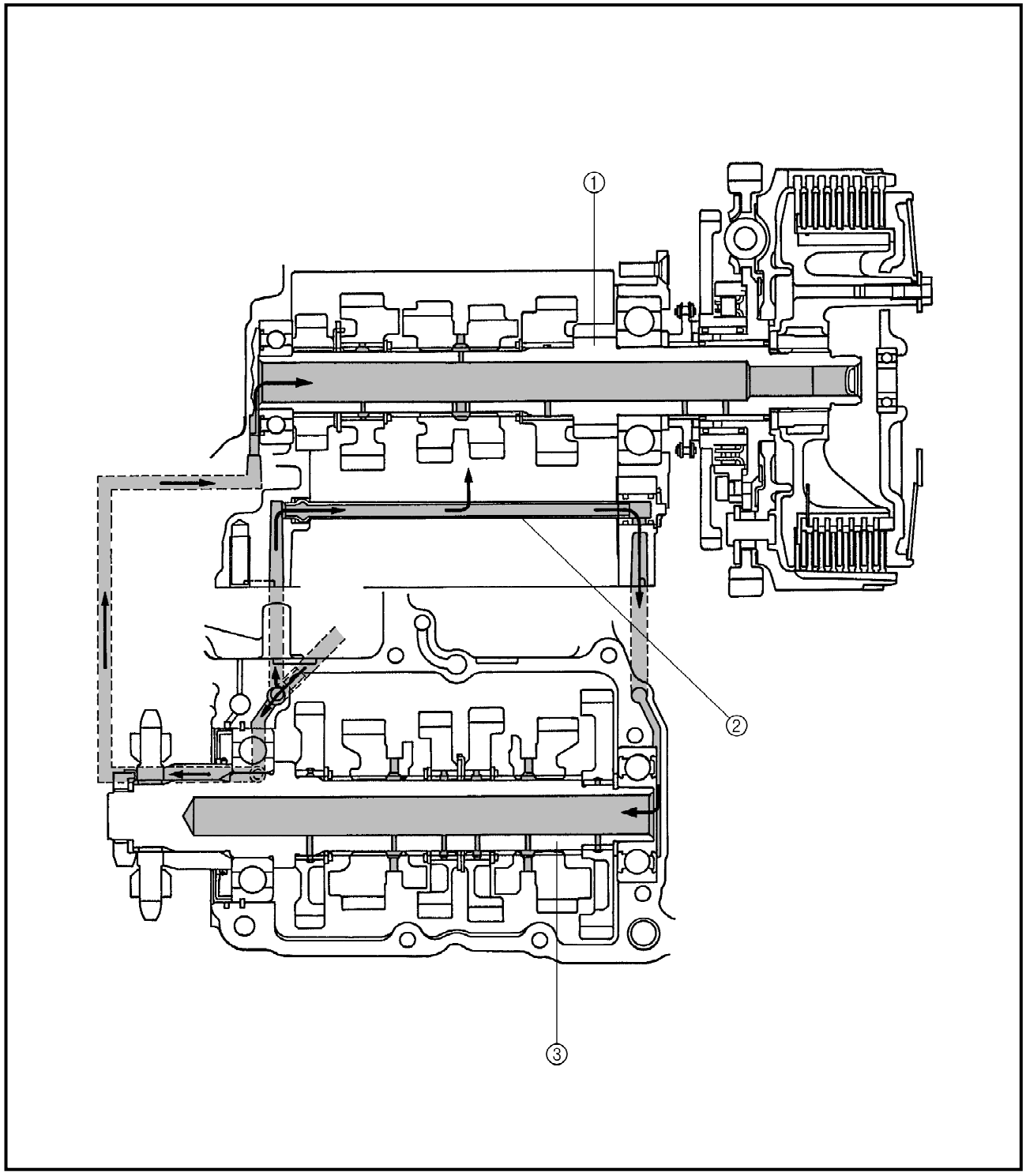
① Exhaust camshaft
② Intake camshaft
③ Oil filter



① Cylinder head
② Crankshaft

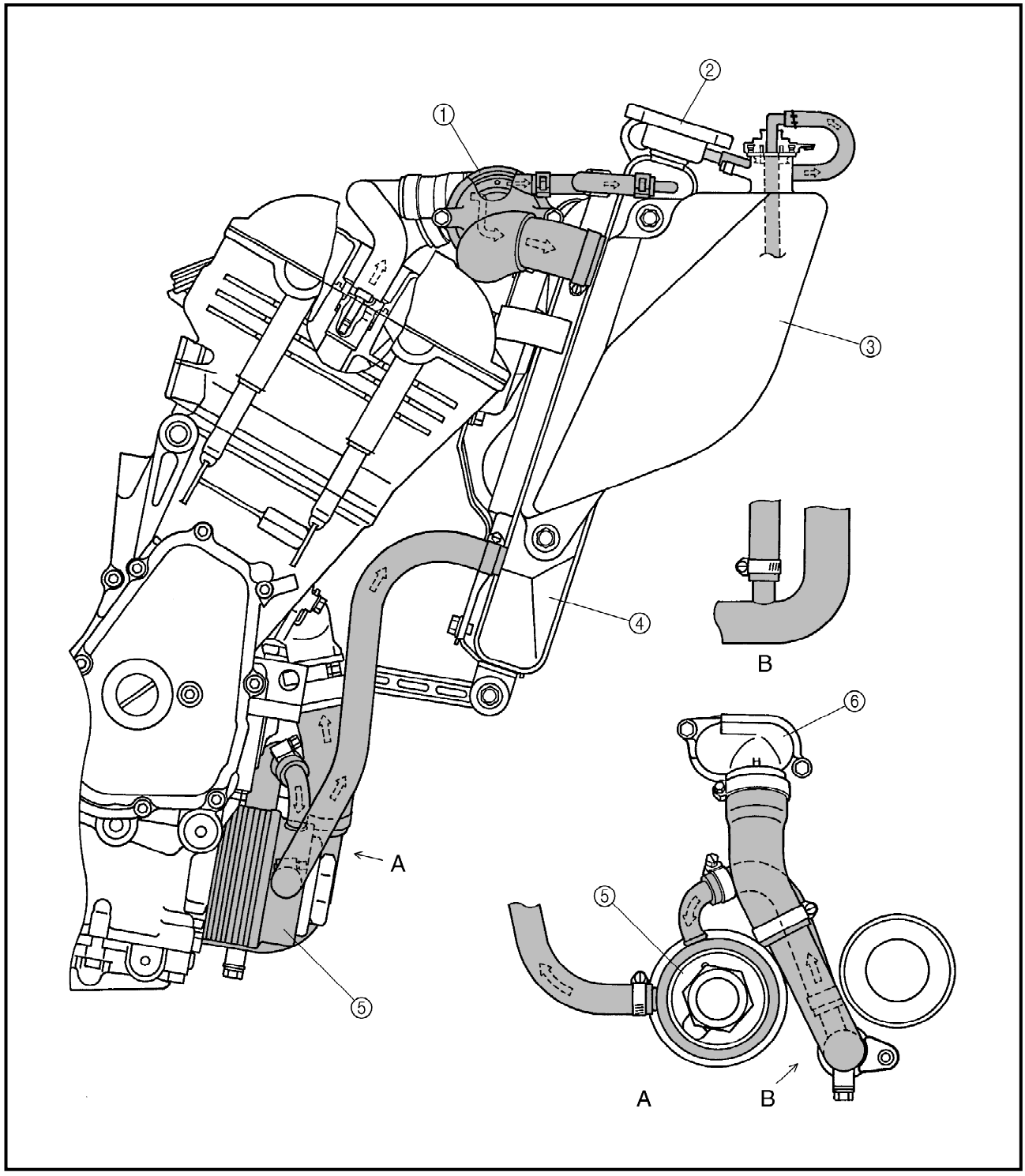


① Main axle
② Oil delivery pipe
③ Drive axle

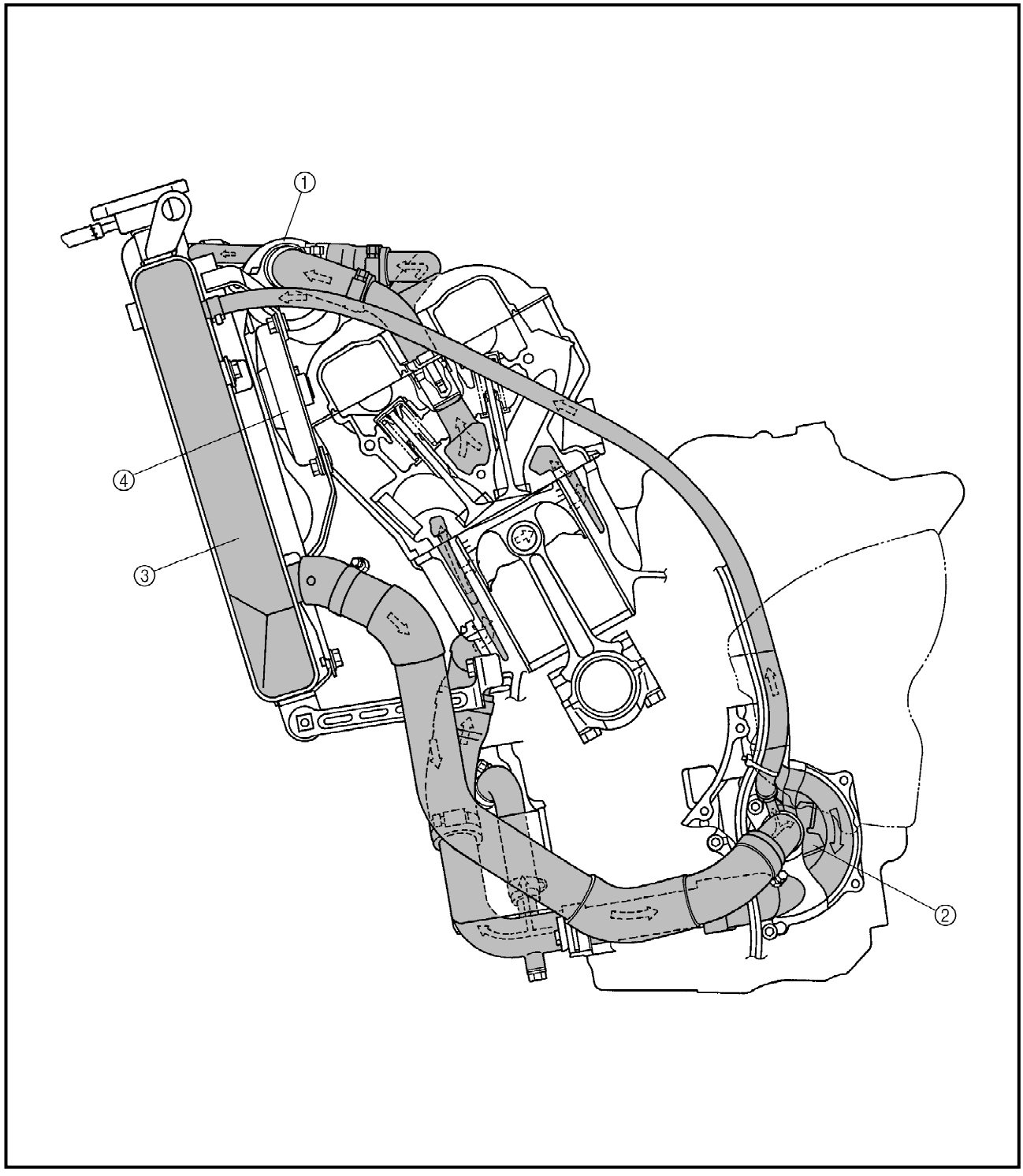


EB203000
COOLANT FLOW DIAGRAMS

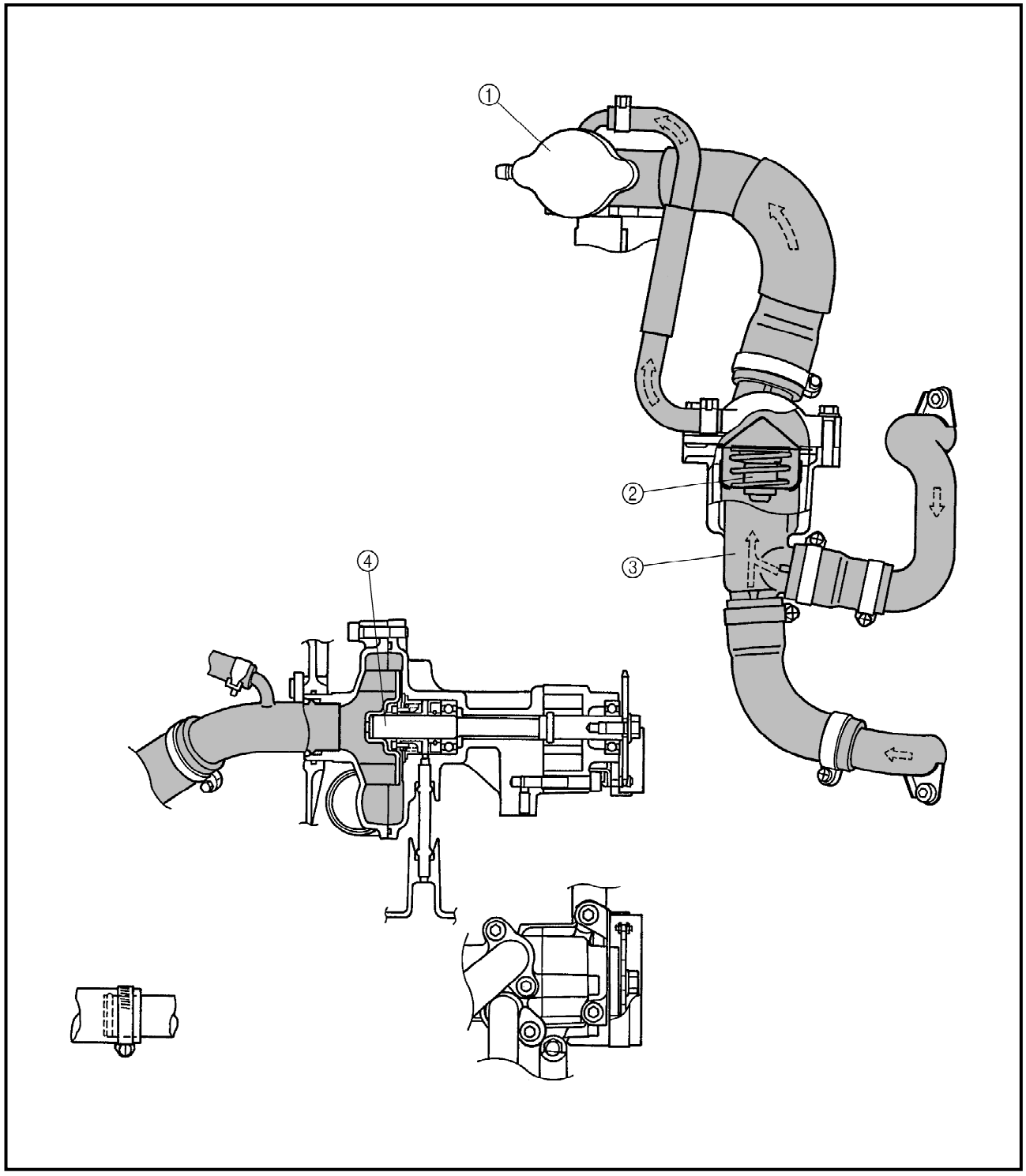
① Thermostat
② Radiator cap
③ Coolant reservoir
④ Radiator
⑤ Oil cooler
⑥ Water jacket joint



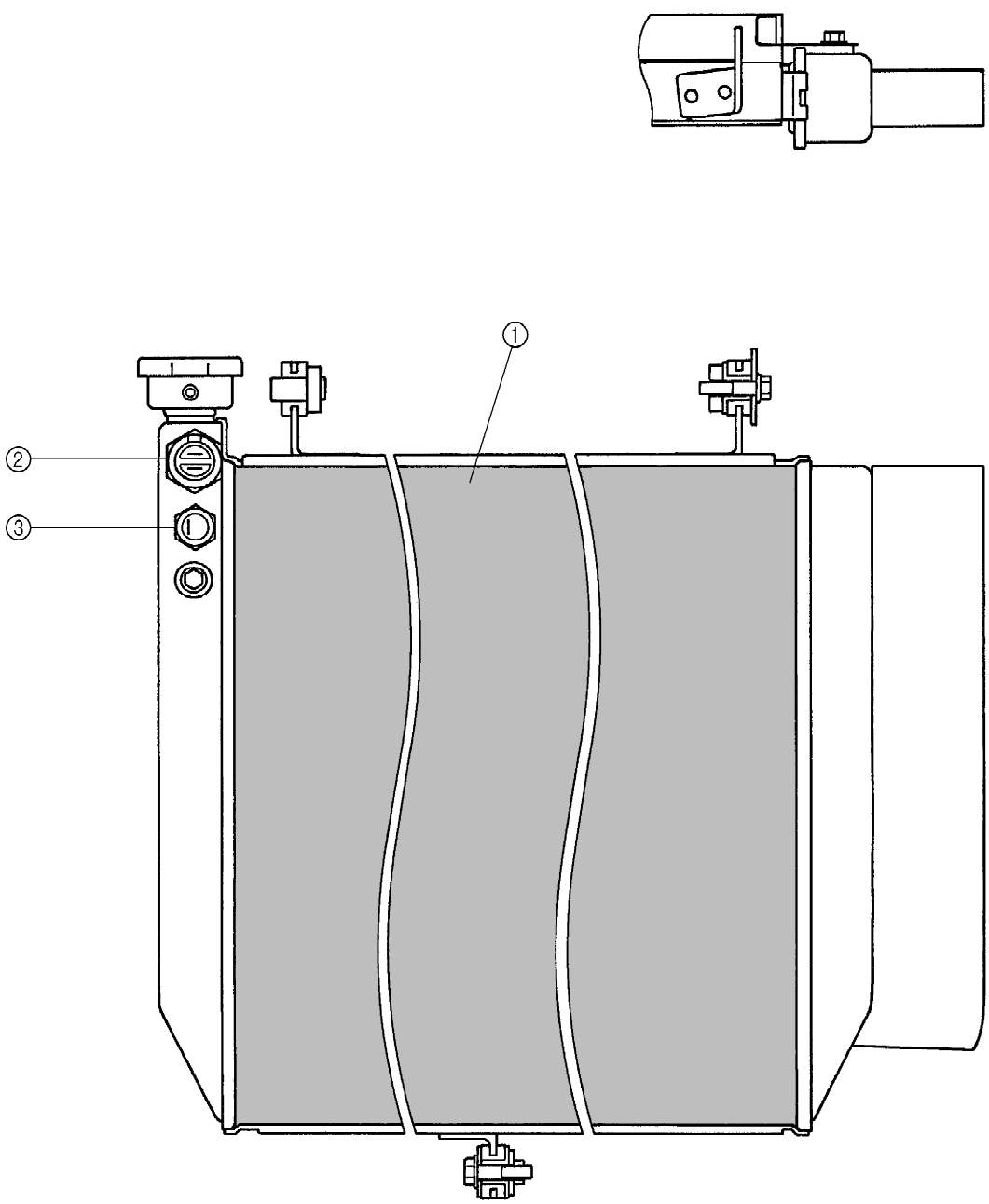
① Thermostat housing
② Water pump
③ Radiator
④ Radiator fan



① Radiator cap
② Thermostat
③ Thermostat housing
④ Water pump



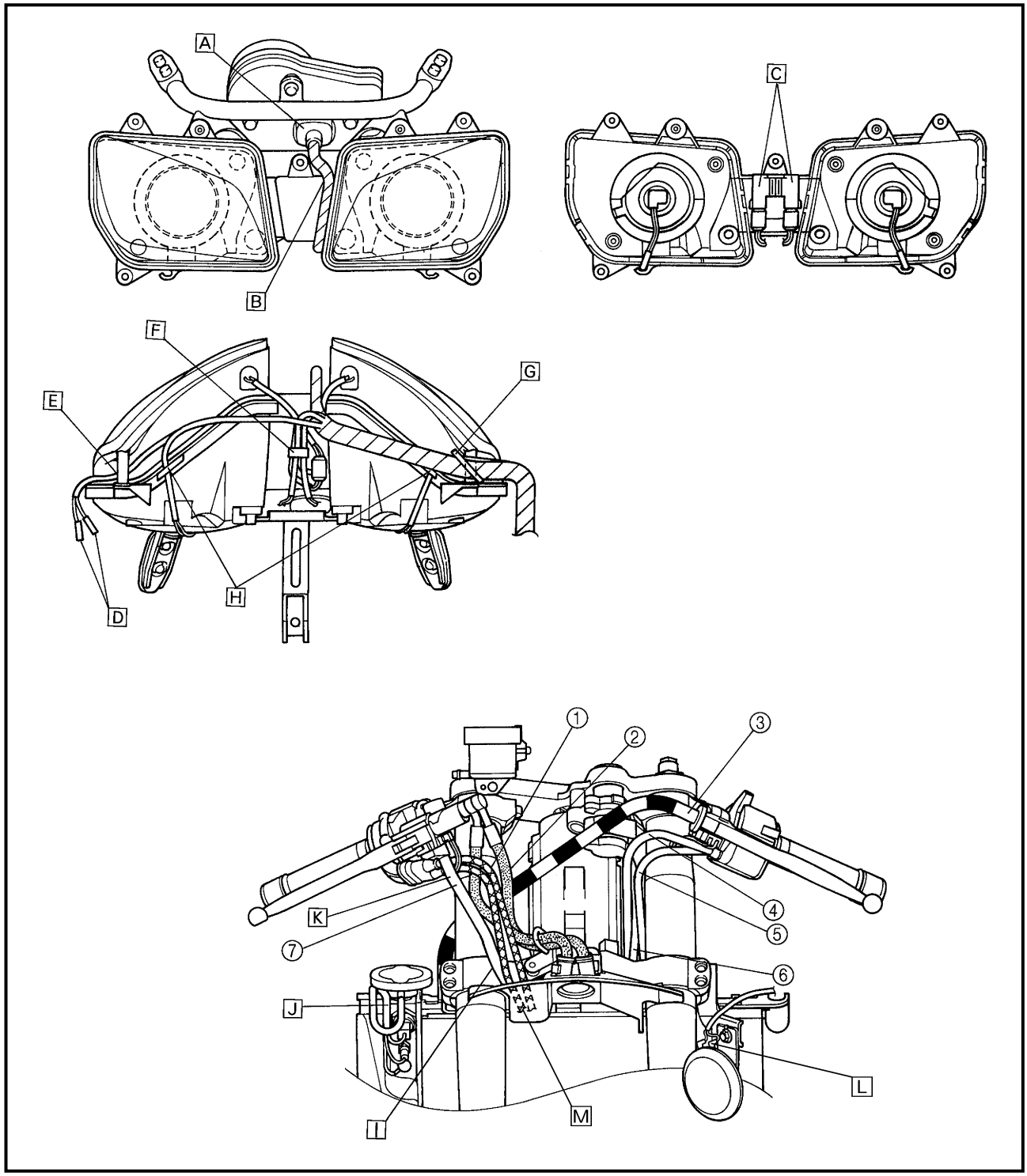
① Radiator
② Thermo switch
③ Temperature sender



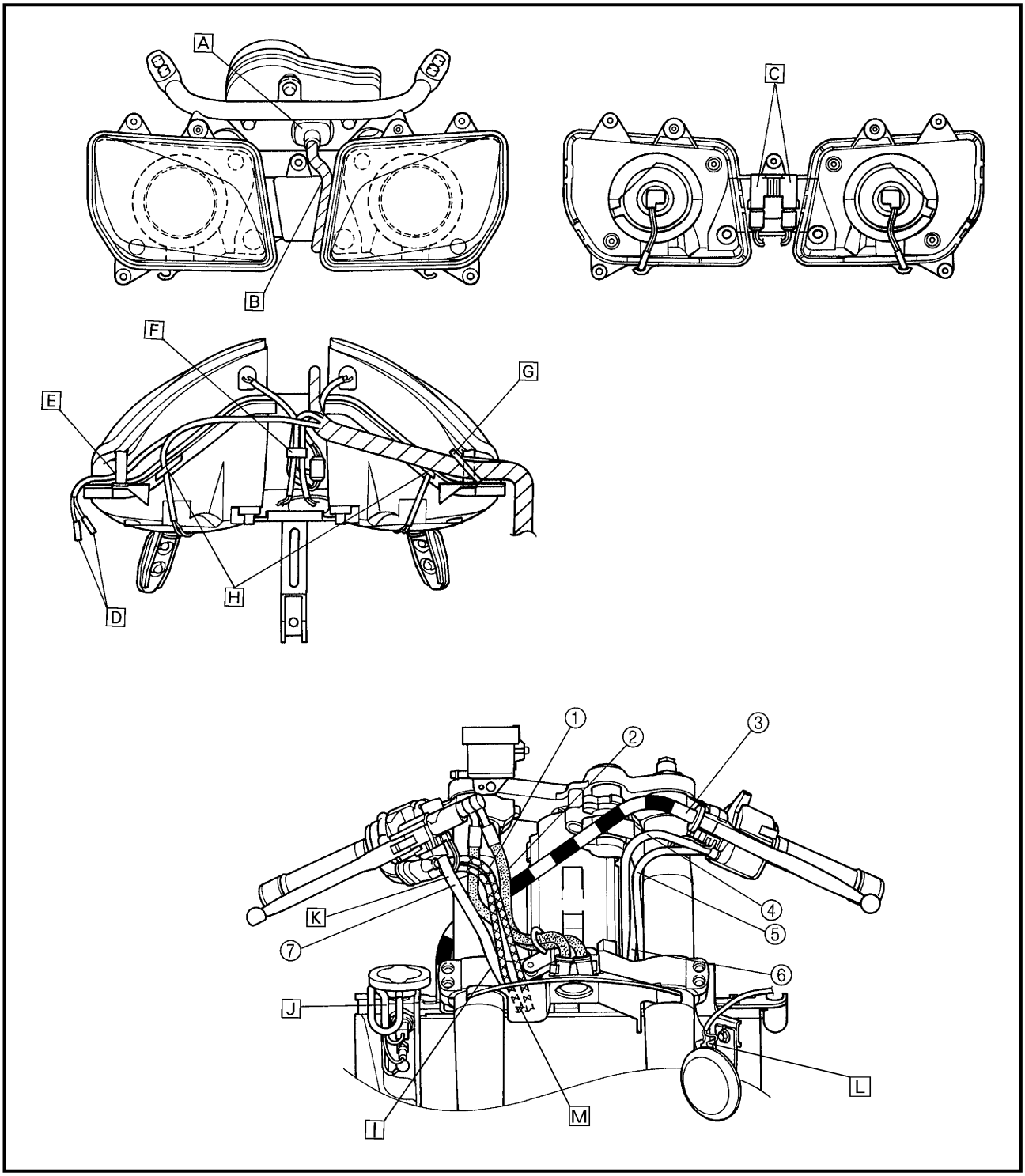
EB206000
CABLE ROUTING

① Throttle cables
② Front brake hose
③ Clutch cable
④ Starter cable
⑤ Left handlebar switch lead
⑥ Main switch lead
⑦ Right handlebar switch lead

A Properly insert the meter assembly coupler and rubber boot into the meter assembly.
B Route the meter assembly lead through the left side of the headlight housing.
C Install the headlight relays onto the headlight housing bridge.
D Connect to the right front turn signal connectors.
E Route the turn signal leads between the headlight housing and headlight housing boss.

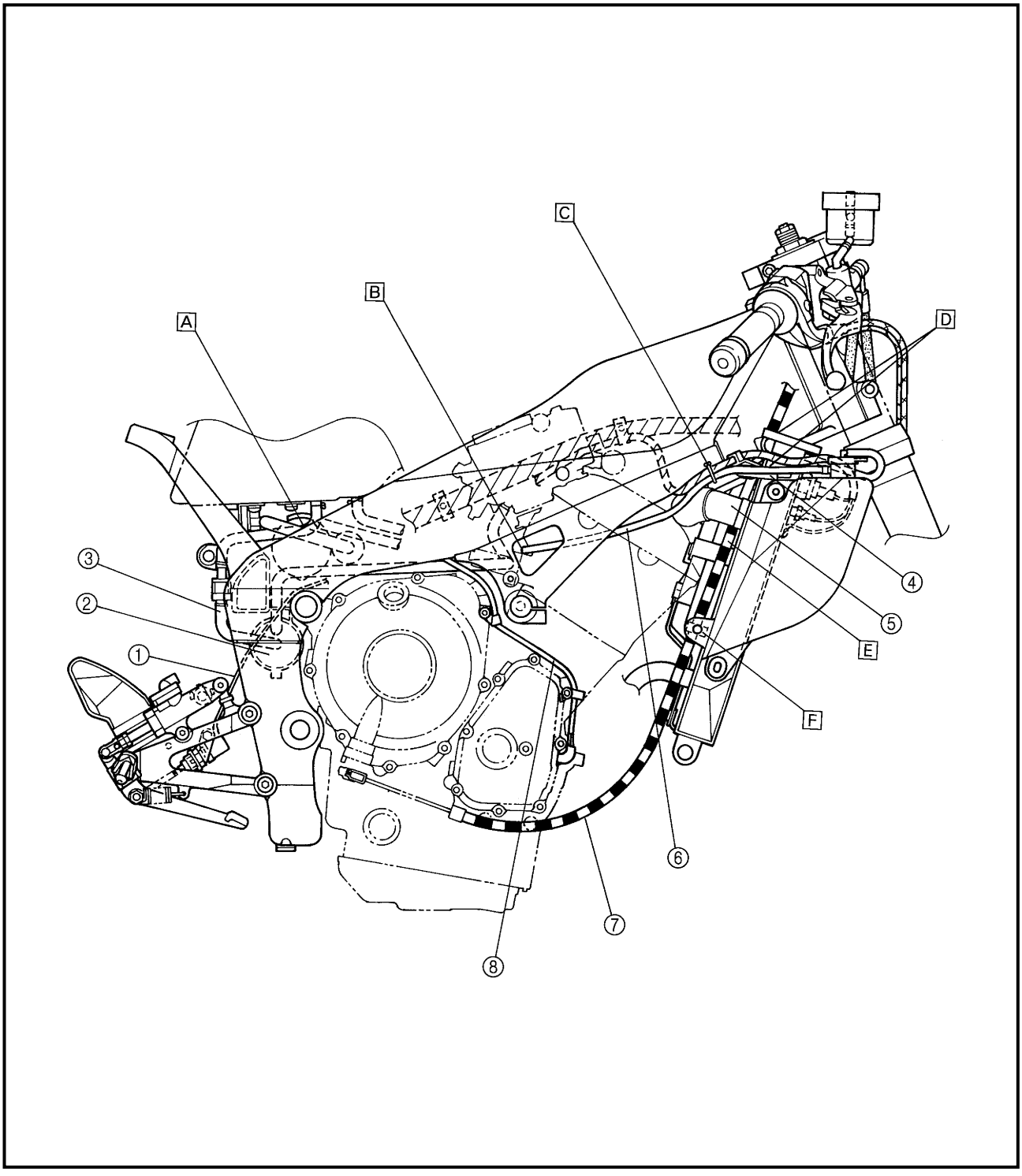


F Fasten the auxiliary light leads with a plastic locking tie.
G Fasten the wire harness to the headlight housing boss with a plastic locking tie.
H Route the headlight lead through the plastic guide.
I Route the right handlebar switch lead behind the throttle cables. Do not cross the throttle cables and the right handlebar switch lead.
J Route the thermo switch/temperature sender subwire harness to the outside of the radiator cap.
K Route the right handlebar switch lead in front of the throttle cables.
L Make sure that the horn leads face out.
M Route the throttle cables and right handlebar switch lead between the frame and plastic frame panel and then between the lower bracket and lower bracket panel. Make sure that the right handlebar switch lead is routed to the outside and the throttle cables are routed to the inside.



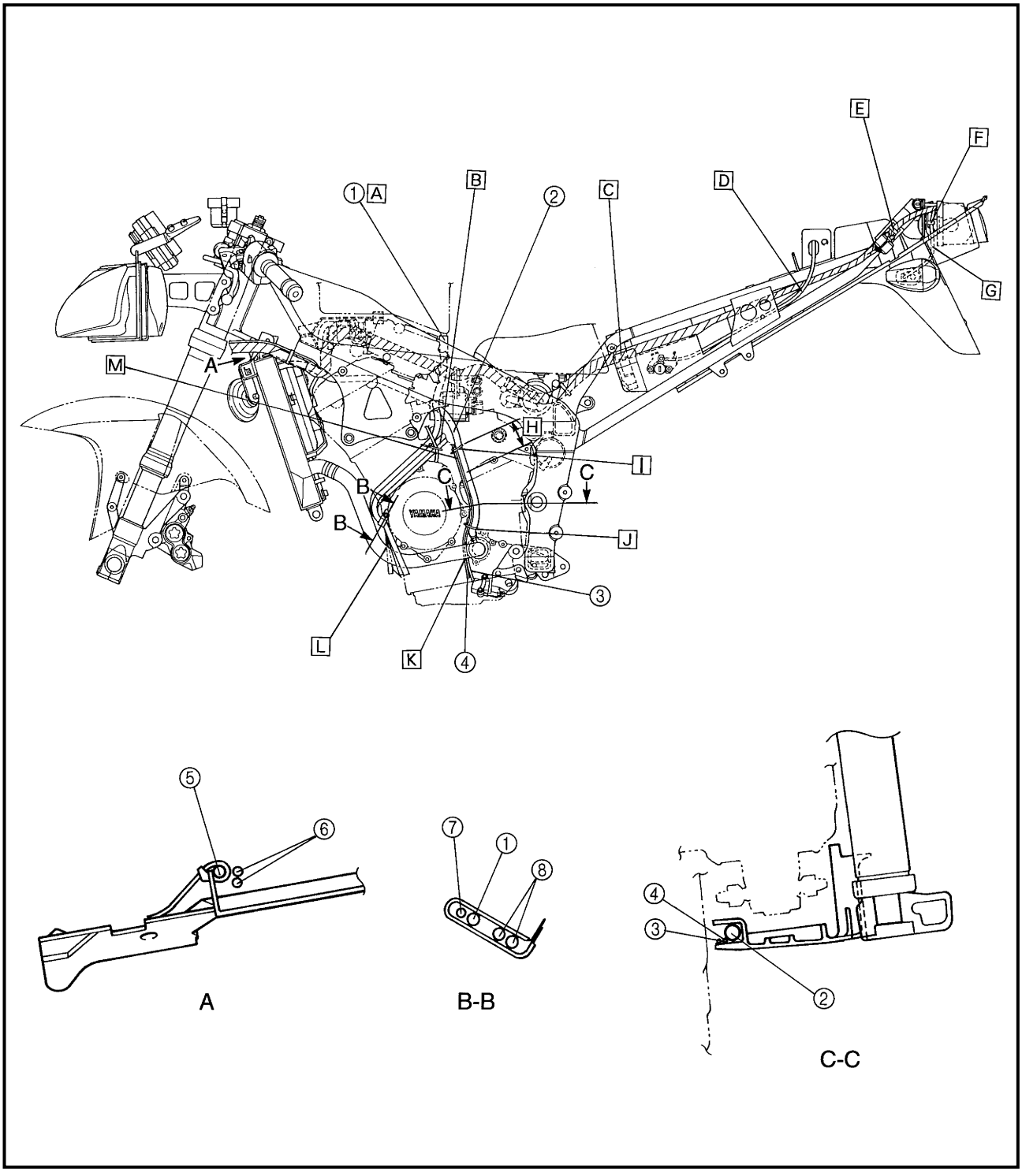
① Rear brake switch lead
② Charcoal canister (California only)
③ Rollover valve (California only)
④ Thermostat assembly breather hose
⑤ Radiator inlet hose
⑥ Coolant reservoir breather hose
⑦ Clutch cable
⑧ Pickup coil lead

[A] Route the rollover-valve-to-fuel-tank hose to the inside of the fuel hose (California only).
[B] Route the coolant reservoir breather hose over the timing chain tensioner.
[C] Insert the plastic clip through the hole in the plastic frame panel and then fasten the wire harness and coolant reservoir breather hose with it.
[D] Route the clutch cable between the radiator bracket and frame and in front of the thermostat assembly breather hose.
[E] Route the clutch cable to the inside of the radiator inlet hose.
[F] Insert the plastic clamp into the hole in the coolant reservoir's tab.

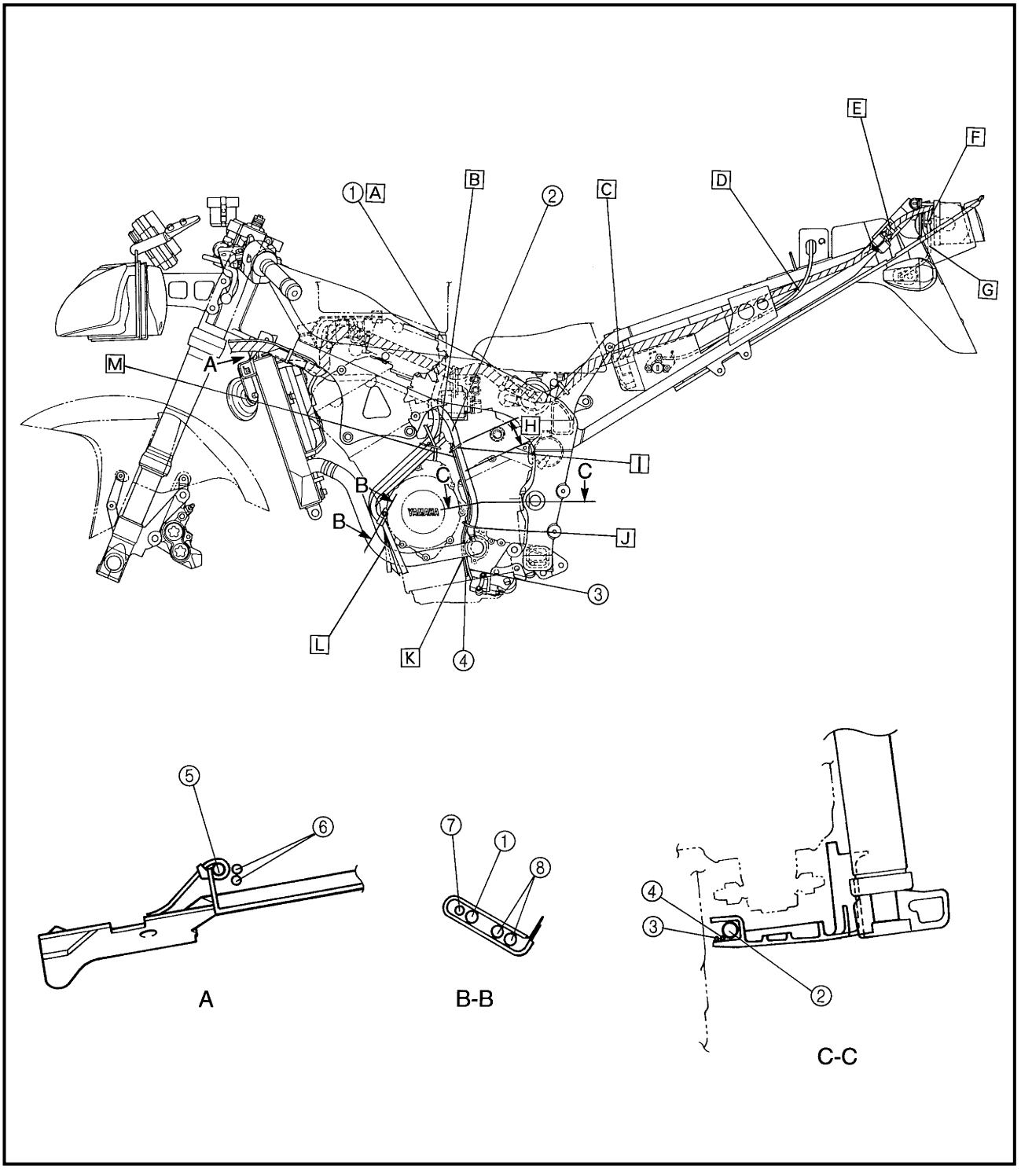


① Air filter case breather hose
② Water pump breather hose
③ Sidestand switch lead
④ Oil level switch lead
⑤ Right handlebar switch lead
⑥ Throttle cables
⑦ Coolant reservoir breather hose
⑧ Fuel tank overflow hose and fuel tank breather hose

Ⓐ Route the air filter case breather hose to the inside of the wire harness.
Ⓑ Route the stator coil lead over all of the hoses and leads and then fasten them with a plastic clip.
Ⓒ Align the wire harness with the indent in the upper rear fender.
Ⓓ Route the seat lock cable over the wire harness.
Ⓔ Fasten the wire harness with a plastic clamp.
Ⓕ Route the rear left turn signal lead through the plastic clamp.
Ⓖ Route the rear left turn signal lead through the hole in the upper rear fender.

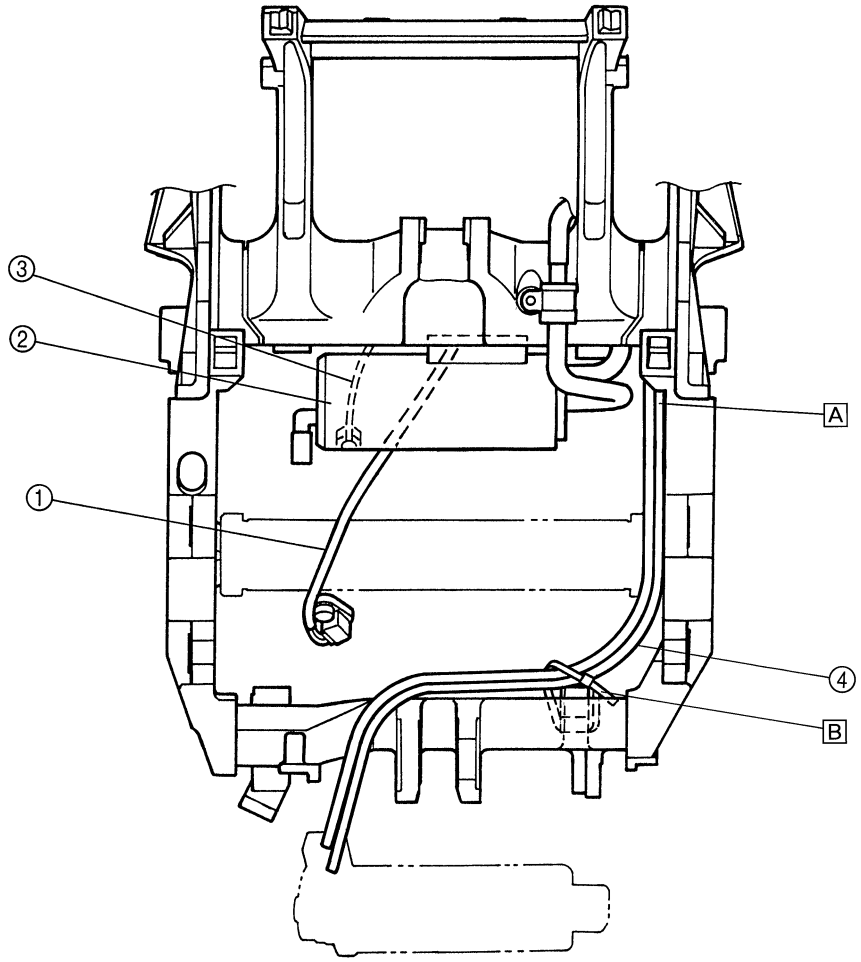


H 50 mm
I Fasten the sidestand switch lead, engine oil level switch lead, and water pump breather hose with a plastic clip.
J Do not crush the water pump breather hose and plastic clip.
K Route both of the leads (③ and ④) to the inside of the radiator outlet hose.
L Route the fuel tank overflow hose and fuel tank breather hose over the radiator outlet hose. Route the air filter case drain hose and coolant reservoir breather hose to the inside of the radiator outlet hose. Make sure that the ends of all of the hoses are below the radiator outlet hose and are not touching the bottom cowling.
M Route the sidestand switch lead and oil level switch lead to the inside of the drive sprocket cover.



① Speed sensor lead
② Charcoal canister (California only)
③ Neutral switch lead
④ EXUP cables

A Route the EXUP cables on the outside of the engine mount.
B Fasten the EXUP cables with a plastic locking tie.



① Headlight sub-wire harness
② Left handlebar switch lead
③ Main switch lead
④ Starter cable
⑤ Right handlebar switch coupler
⑥ Throttle cables
⑦ Ignition coil coupler
⑧ Pickup coil coupler
⑨ Rear brake switch coupler
⑩ Fuel pump coupler
⑪ Speed sensor coupler
⑫ Neutral switch connector
⑬ Fuel tank overflow hose
⑭ Fuel tank breather hose (except for California)
⑮ Starter motor lead
⑯ Battery positive lead
⑰ Battery negative lead
⑱ Crankcase breather hose
⑲ Fuel sender coupler
⑳ Sidestand switch coupler
㉑ Engine oil level switch lead
㉒ Generator coupler
㉓ EXUP servomotor coupler
㉔ Ignition coils