



# **YZF-R1 (M) 2000**

**4XV1-AE2**

# **SUPPLEMENTARY SERVICE MANUAL**



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## **FOREWORD**

This Supplementary Service Manual has been prepared to introduce new service and data for the YZF-R1 2000. For complete service information procedures it is necessary to use this Supplementary Service Manual together with the following manual.

**YZF-R1 SERVICE MANUAL: 4XV1-AE1**

**YZF-R1 2000  
SUPPLEMENTARY  
SERVICE MANUAL**

- **1999 by Yamaha Motor Co., Ltd.  
First Edition, December 1999**

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## NOTICE

This manual was produced by the Yamaha Motor Company, Ltd. 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. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.

Yamaha Motor Company, Ltd. is continually striving to improve all of 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.

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**NOTE:**

Designs and specifications are subject to change without notice.

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## IMPORTANT MANUAL INFORMATION

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



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



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

**CAUTION:**

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

**NOTE:**

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

## HOW TO USE THIS MANUAL

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check procedures are laid out with the individual steps in sequential order.

- ① The manual is divided into chapters. An abbreviation and symbol in the upper right corner of each page indicate the current chapter. Refer to "SYMBOLS".
- ② Each chapter is divided into sections. The current section title is shown at the top of each page, except in Chapter 3 ("PERIODIC CHECKS AND ADJUSTMENTS"), where the sub-section title(-s) appears.
- ③ Sub-section titles appear in smaller print than the section title.
- ④ To help identify parts and clarify procedure steps, there are exploded diagrams at the start of each removal and disassembly section.
- ⑤ Numbers are given in the order of the jobs in the exploded diagram. A circled number indicates a disassembly step.
- ⑥ Symbols indicate parts to be lubricated or replaced. Refer to "SYMBOLS".
- ⑦ A job instruction chart accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc.
- ⑧ Jobs requiring more information (such as special tools and technical data) are described sequentially.

⑥ ② ①

CLUTCH ENG

CLUTCH ENG

**REMOVING THE CLUTCH**

1. Remove:  
• clutch cover ①

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

2. Straighten the lock washer tab.  
3. Loosen:  
• clutch boss nut ①

**NOTE:**  
While holding the clutch boss ② with the clutch holding tool ③, loosen the clutch boss nut.

**Clutch holding tool**  
90890-04066

4. Remove:  
• clutch boss nut ①  
• lock washer ②  
• clutch boss assembly ③

**NOTE:**  
There is a built-in damper between the clutch boss and the friction plate. It is not necessary to remove the wire circlip ④ and disassemble the built-in damper unless there is serious clutch chattering.

**CHECKING THE FRICTION PLATES**  
The following procedure applies to all of the friction plates.

1. Check:  
• friction plate  
Damage/wear → Replace the friction plates as a set.

2. Measure:  
• friction plate thickness  
Out of specification → Replace the friction plates as a set.

**NOTE:**  
Measure the friction plate at four places.

**Friction plate thickness**  
2.9 – 3.1 mm  
<Limit>: 2.8 mm

④

























⑤

⑦

Order	Job/Part	Q'ty	Remarks
<b>Removing the clutch cover</b>			
	Bottom cowling and right side cowling		Remove the parts in the order listed. Refer to "COWLINGS" in chapter 3.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" in chapter 3.
1	Clutch cable	1	
2	Clutch cover	1	
3	Clutch cover gasket	1	
4	Dowel pin	2	
For installation, reverse the removal procedure.			

4-39

4-43

① GEN INFO 	② SPEC 	
③ CHK ADJ 	④ ENG 	
⑤ COOL 	⑥ CARB 	
⑦ CHAS 	⑧ ELEC 	
⑨ TRBL SHTG 	⑩ 	
⑪ 	⑫ 	
⑬ 	⑭ 	
⑮ 	⑯ 	⑰ 
⑱ 	⑲ 	⑳ 
㉑ 	㉒ 	㉓ 
㉔ 	㉕ <b>New</b>	

## SYMBOLS

The following symbols are not relevant to every vehicle.

Symbols ① to ⑨ indicate the subject of each chapter.

- ① General information
- ② Specifications
- ③ Periodic checks and adjustments
- ④ Engine
- ⑤ Cooling system
- ⑥ Carburetor(-s)
- ⑦ Chassis
- ⑧ Electrical system
- ⑨ Troubleshooting

Symbols ⑩ to ⑰ indicate the following.

- ⑩ Serviceable with engine mounted
- ⑪ Filling fluid
- ⑫ Lubricant
- ⑬ Special tool
- ⑭ Tightening torque
- ⑮ Wear limit, clearance
- ⑯ Engine speed
- ⑰ Electrical data

Symbols ⑱ to ㉓ in the exploded diagrams indicate the types of lubricants and lubrication points.

- ⑱ Engine oil
- ⑲ Gear oil
- ⑳ Molybdenum disulfide oil
- ㉑ Wheel bearing grease
- ㉒ Lithium soap base grease
- ㉓ Molybdenum disulfide grease

Symbols ㉔ to ㉕ in the exploded diagrams indicate the following.

- ㉔ Apply locking agent (LOCTITE®)
- ㉕ Replace the part

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**YZF-R1 WIRING DIAGRAM (For EUR)**

**YZF-R1 WIRING DIAGRAM (For OCE)**





**SPECIFICATIONS**

**GENERAL SPECIFICATIONS**

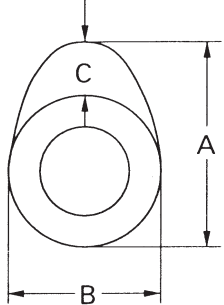
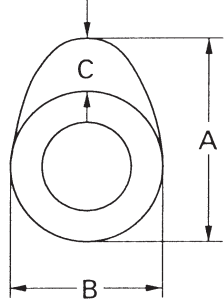
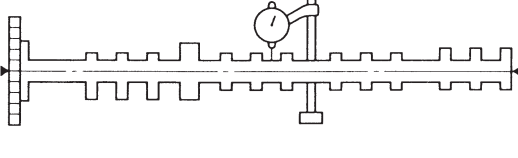
Item	Standard	Limit
<b>Dimensions</b>		
Overall length	2,035 mm	...
	2,095 mm (for AUS)	...
Overall width	695 mm	...
Overall height	1,105 mm	...
Seat height	815 mm	...
Wheelbase	1,395 mm	...
Minimum ground clearance	140 mm	...
Minimum turning radius	3,400 mm	...
<b>Weight</b>		
Wet (with oil and a full fuel tank)	194 kg	...
Dry (without oil and fuel)	175 kg	...
Maximum load (total of cargo, rider, passenger, and accessories)	201 kg	...



## ENGINE SPECIFICATIONS

Item	Standard	Limit
<b>Engine</b>		
Engine type	Liquid-cooled, 4-stroke, DOHC	...
Displacement	998 cm <sup>3</sup>	...
Cylinder arrangement	Forward-inclined parallel 4-cylinder	...
Bore / stroke	74 / 58 mm	...
Compression ratio	11.8 : 1	...
Engine idling speed	1,000 ~ 1,100 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 <sup>2</sup> ) at 400 r/min	...
<b>Fuel</b>		
Recommended fuel	Regular unleaded gasoline Unleaded fuel (for AUS)	...
Fuel tank capacity		
Total (including reserve)	18 L	...
Reserve only	3.8 L	...
<b>Engine oil</b>		
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 <sup>2</sup> at 1,100 r/min)	...
Relief valve opening pressure	490 ~ 570 kPa (4.9 ~ 5.7 kgf/cm <sup>2</sup> )	...

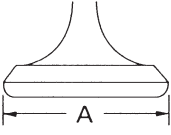
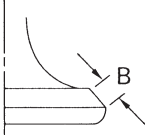
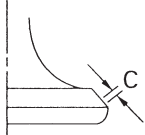
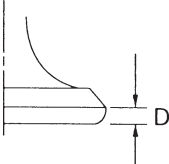
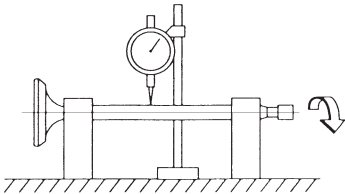


Item	Standard	Limit
<p><b>Camshafts</b>                      Drive system                      Camshaft cap inside diameter                      Camshaft journal diameter                      Camshaft-journal-to-camshaft-cap clearance                      Intake camshaft lobe dimensions</p>	<p>Chain drive (right)                      24.500 ~ 24.521 mm                      24.459 ~ 24.472 mm                      0.028 ~ 0.062 mm</p>	<p>•••                      •••                      •••                      •••</p>
		
<p>Measurement A                      Measurement B                      Measurement C                      Exhaust camshaft lobe dimensions</p>	<p>32.5 ~ 32.6 mm                      24.95 ~ 25.05 mm                      7.45 ~ 7.65 mm</p>	<p>32.4 mm                      24.85 mm                      •••</p>
		
<p>Measurement A                      Measurement B                      Measurement C                      Max. camshaft runout</p>	<p>32.95 ~ 33.05 mm                      24.95 ~ 25.05 mm                      7.75 ~ 7.95 mm                      •••</p>	<p>32.85 mm                      24.85 mm                      •••                      0.03 mm</p>
		

# ENGINE SPECIFICATIONS

**SPEC**



Item	Standard	Limit	
<b>Valves, valve seats, valve guides</b>			
Valve clearance (cold)			
Intake	0.11 ~ 0.20 mm	•••	
Exhaust	0.21 ~ 0.25 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 ~ 3.990 mm		3.945 mm
Exhaust	4.465 ~ 4.480 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	0.020 ~ 0.047 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		•••
<b>Connecting rods</b>			
Crankshaft-pin-to-big-end-bearing clearance	0.031 ~ 0.055 mm	•••	
Bearing color code	-1 = Violet 0 = White 1 = Blue 2 = Black	•••	

# ENGINE SPECIFICATIONS


**SPEC**



Item	Standard	Limit
<b>Transmission</b>		
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	•••
<b>Gear ratios</b>		
1st gear	35/14 (2.500)	•••
2nd gear	35/19 (1.842)	•••
3rd gear	30/20 (1.500)	•••
4nd 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
<b>Carburetors</b>		
Model (manufacturer) √ quantity	BDSR40 (MIKUNI) √ 4	•••
Throttle cable free play (at the flange of the throttle grip)	3 ~ 5 mm	•••
ID mark	5JJ1 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-OM	•••
Pilot air jet	#120	•••
Pilot outlet	1.0	•••
Pilot jet	#15	•••
Bypass 1	0.8	•••
Bypass 2	0.9	•••
Bypass 3	0.8	•••
Pilot screw turns out	3.125	•••
Valve seat size	1.5	•••



## CHASSIS SPECIFICATIONS

Item	Standard	Limit
<b>Front tire</b> Tire type Size Model (manufacturer)  Tire pressure (cold) 0 ~ 90 kg 90 ~ 197 kg High-speed riding Min. tire tread depth	Tubeless 120/70 ZR17 (58W) MEZ3Y FRONT (METZELER) D207FQ (DUNLOP)  250 kPa (2.5 kg/cm <sup>2</sup> , 2.5 bar) 250 kPa (2.5 kg/cm <sup>2</sup> , 2.5 bar) 250 kPa (2.5 kg/cm <sup>2</sup> , 2.5 bar) ●●●	●●● ●●● ●●●  ●●● ●●● ●●● 1.6 mm
<b>Rear tire</b> Tire type Size Model (manufacturer) Tire pressure (cold) 0 ~ 90 kg 90 ~ 197 kg High-speed riding Min. tire tread depth	Tubeless 190/50 ZR17 (73W) MEZ3Y (METZELER)/D207N (DUNLOP)  250 kPa (2.5 kg/cm <sup>2</sup> , 2.5 bar) 290 kPa (2.9 kg/cm <sup>2</sup> , 2.9 bar) 250 kPa (2.5 kg/cm <sup>2</sup> , 2.5 bar) ●●●	●●● ●●● ●●●  ●●● ●●● ●●● 1.6 mm
<b>Rear brake</b> Brake type Operation Brake pedal position (from the top of the brake pedal to the bottom of the rider footrest bracket) Recommended fluid Brake discs Diameter √ thickness Min. thickness Max. deflection Brake pad lining thickness    Master cylinder inside diameter Caliper cylinder inside diameter	Single-disc brake Right-foot operation 35 ~ 40 mm  DOT 4  245 √ 5 mm ●●● ●●● 5.5 mm  12.7 mm 38.2 mm	●●● ●●● ●●●  ●●●  ●●● 4.5 mm 0.1 mm 0.5 mm  ●●● ●●●

## CHASSIS SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Front suspension</b>		
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)	482 cm <sup>3</sup>	...
Level (from the top of the inner tube, with the inner tube fully compressed, and without the fork spring)	74 mm	...
Damper adjusting rod locknut distance	11 mm	...
Spring preload adjusting positions		
Minimum	8	...
Standard	6	...
Maximum	1	...
Rebound damping adjusting positions		
Minimum*	11	...
Standard*	5	...
Maximum*	1	...
Compression damping adjusting positions		
Minimum*	9	...
Standard*	5	...
Maximum*	1	...
*with the adjusting screw fully turned in position		

## CHASSIS SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<b>Rear suspension</b>		
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)	78.4 N/mm (7.84 kgf/mm)	...
Spring stroke (K1)	0 ~ 65 mm	...
Optional spring available	No	...
Standard spring preload gas/air pressure	1,200 kPa (12 kgf/cm <sup>2</sup> )	...
Spring preload adjusting positions		
Minimum	1	...
Standard	4	...
Maximum	9	...
Rebound damping adjusting positions		
Minimum*	11	...
Standard*	7	...
Maximum*	1	...
Compression damping adjusting positions		
Minimum*	11	...
Standard*	9	...
Maximum*	1	...
*with the adjusting screw fully turned in position		





## ELECTRICAL SPECIFICATIONS

Item	Standard	Limit
<b>System voltage</b>	12 V	...
<b>Ignition system</b>		
Ignition system type	Transistorized coil ignition	...
Ignition timing	5° BTDC at 1,050 r/min	...
Advanced timing	55° BTDC at 5,000 r/min	...
Advancer type	Throttle position sensor and electrical	...
Pickup coil resistance/color	248 ~ 372 W/Gy-B	...
Transistorized coil ignition unit model (manufacturer)	TNDF54 (DENSO)	...
<b>Voltage regulator</b>		
Regulator type	Semiconductor short circuit	...
Model	SH650A-12	...
No-load regulated voltage	14.1 ~ 14.9 V	...
<b>Bulbs (voltage/wattage √ quantity)</b>		
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	LED	...
<b>Electric starting system</b>		
System type	Constant mesh	...
Starter motor		
Model (manufacturer)	5JJ (YAMAHA)	...
Power output	0.75 kW	...
Brushes		
Overall length	9.8 mm	3.65 mm
Spring force	4.88 ~ 7.32 N (488 ~ 732 gf)	...
Commutator resistance	0.009 ~ 0.011 Ω	...
Commutator diameter	24.5 mm	23.5 mm
Mica undercut	1.5 mm	...
<b>Turn signal relay</b>		
Relay type	Full-transistor	...
Model (manufacturer)	FE246BH (DENSO)	...
Self-cancelling device built-in	No	...
Turn signal blinking frequency	75 ~ 95 cycles/min.	...
Wattage	21 W √ 2	...
<b>Oil level switch model (manufacturer)</b>	4XV (DENSO)	...
<b>Fuel pump relay model (manufacturer)</b>	G8R-30Y-M (OMRON)	...

# ELECTRICAL SPECIFICATIONS



Item	Standard	Limit
<b>Thermo unit</b>		
Model (manufacturer)	5JJ (NIPPON THERMOSTAT)	...
<b>Fuses (amperage √ quantity)</b>		
Main fuse	30 A √ 1	...
Headlight fuse	20 A √ 1	...
Signaling system fuse	20 A √ 1	...
Ignition fuse	15 A √ 1	...
Radiator fan fuse	10 A √ 1	...
Backup fuse (odometer)	10 A √ 1	...
Reserve fuse	30 A √ 1	...
	20 A √ 1	...
	15 A √ 1	...
	10 A √ 1	...

# TIGHTENING TORQUES

**SPEC**



## TIGHTENING TORQUES ENGINE TIGHTENING TORQUES

Item	Fastener	Thread size	Q'ty	Tightening torque		Remarks
				Nm	m•kgf	
Cylinder head	Nut	M10	8	50	5.0	
Cylinder head	Cap nut	M10	2	65	6.5	
Generator rotor	Bolt	M10	1	65	6.5	
Oil/water pump assembly driven sprocket cover	Bolt	M6	1	12	1.2	
Air induction system hose	Clamp	M7	4	4	0.4	
Crankcase	Bolt	M9	10	See NOTE		
Crankcase	Bolt	M6	2	14	1.4	
Crankcase	Bolt	M6	14	12	1.2	
Crankcase	Bolt	M8	2	24	2.4	
Ignitor unit	Screw	M5	2	7	0.7	

**NOTE:**

After tightening to 15 Nm (1.5 m•kgf), tighten another 45° ~ 50°

## TIGHTENING TORQUES

**SPEC**

### CHASSIS TIGHTENING TORQUES

Item	Thread size	Tightening		Remarks
		Nm	m•kgf	
Lower ring nut	M30	9	0.9	See NOTE.
Engine mounting				
Front mounting bolts	M10	40	4.0	
Rear upper mounting bolt	M10	55	5.5	
Rear under mounting bolts	M10	55	5.5	
Pinch bolts	M8	24	2.4	
Exhaust pipe bracket	M8	24	2.4	
Rear master cylinder	M8	18	1.8	

**NOTE:**


1. First, tighten the ring nut to approximately 18 Nm (1.8 m•kg) with a torque wrench, then loosen the ring nut completely.
2. Retighten the ring nut to specification.

# LUBRICATION POINTS AND LUBRICANT TYPES



E202000

## LUBRICATION POINTS AND LUBRICANT TYPES ENGINE LUBRICATION POINTS AND LUBRICANT TYPES

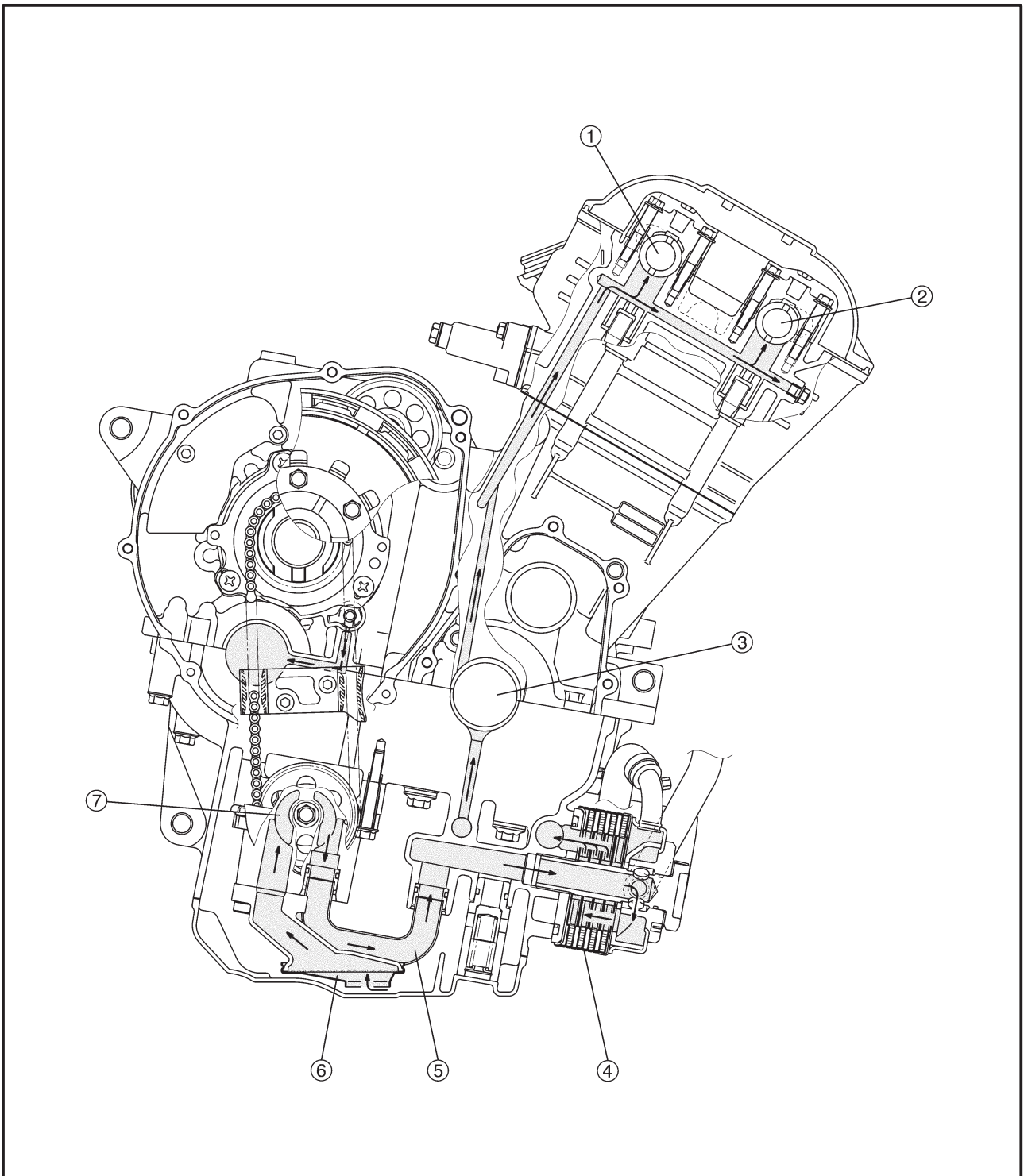
Lubrication point	Lubricant
Connecting rod bolts and nuts	



EB203000

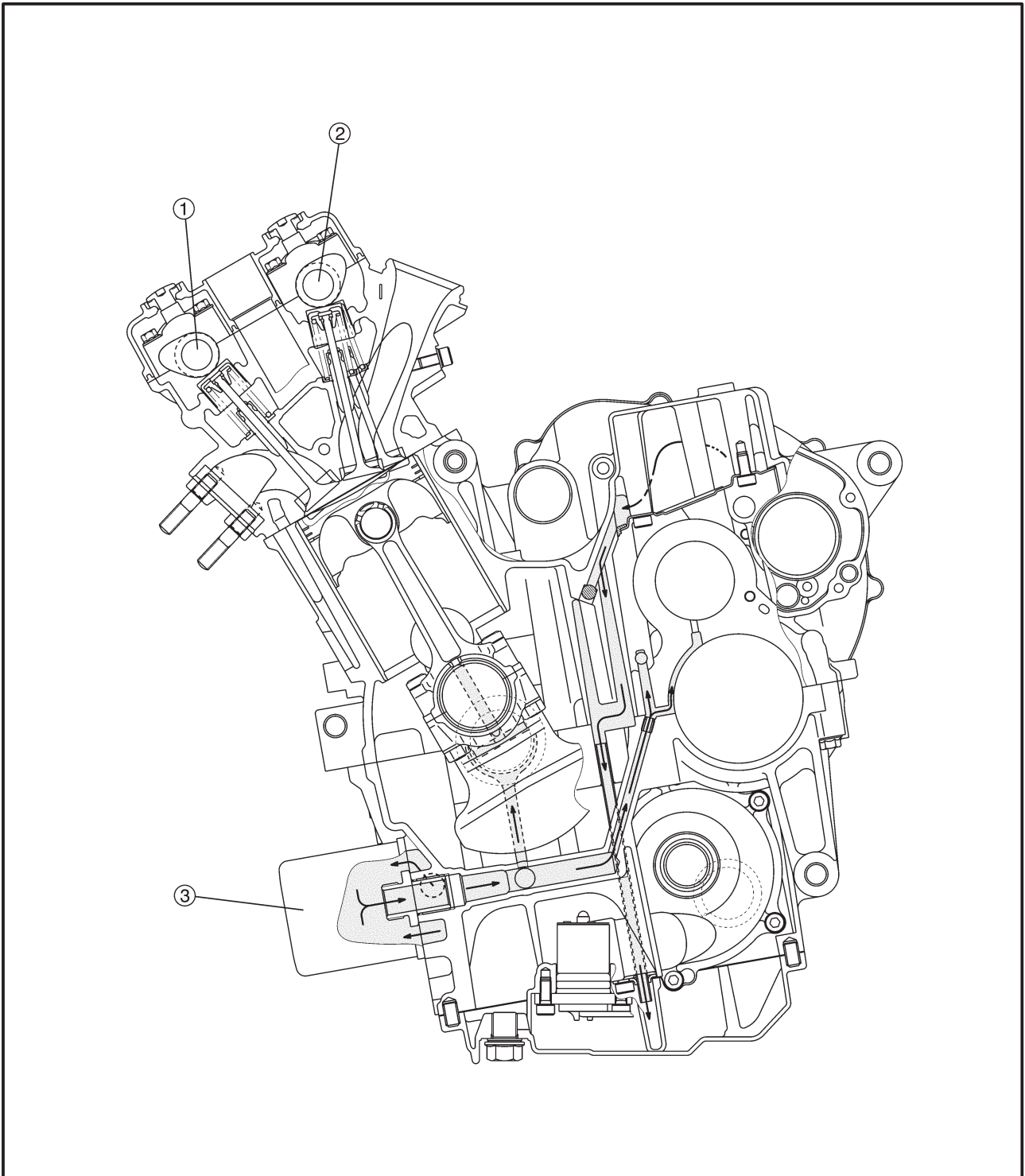
**OIL FLOW DIAGRAMS**

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



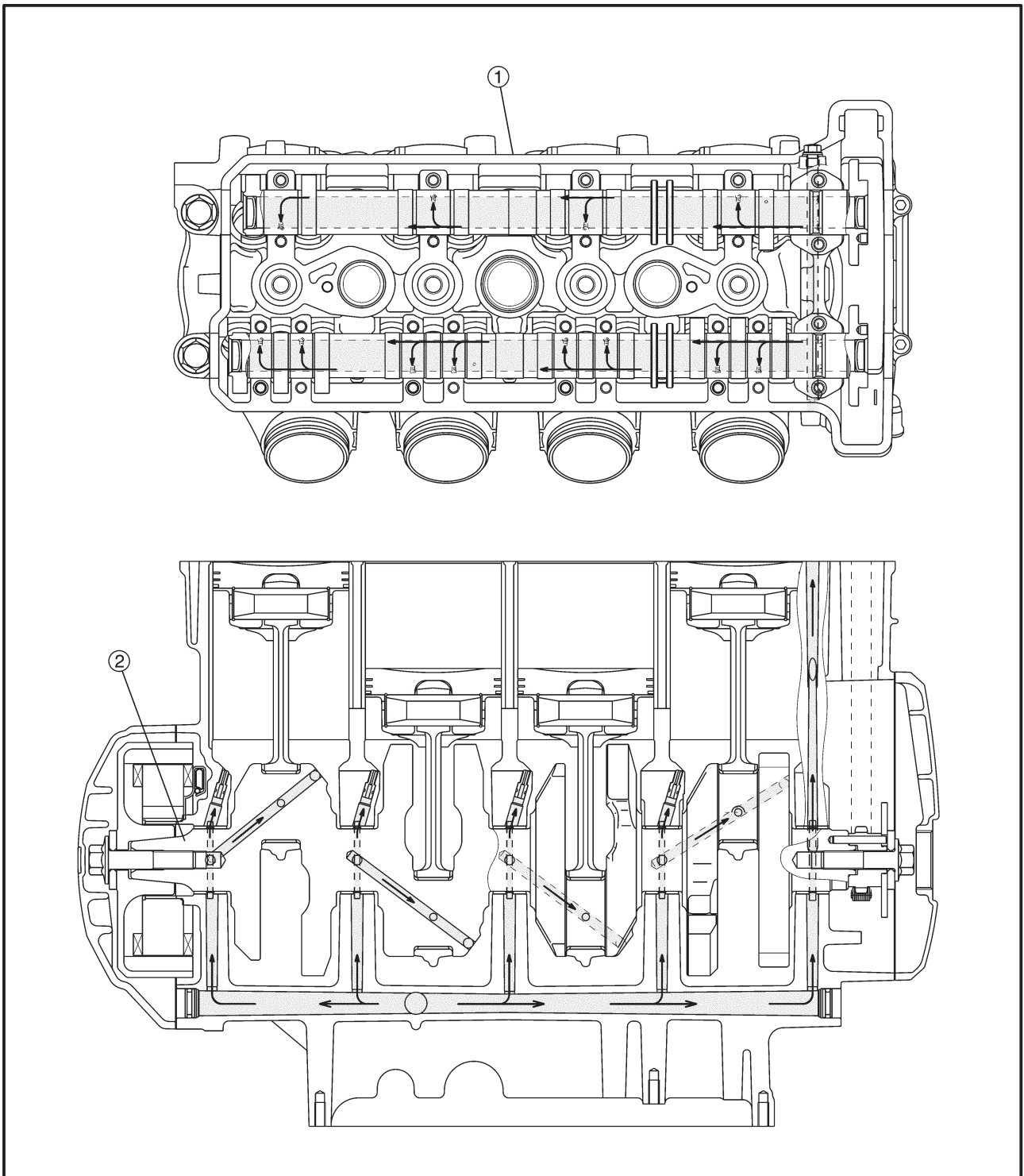


- ① Exhaust camshaft
- ② Intake camshaft
- ③ Oil filter





- ① Cylinder head
- ② Crankshaft



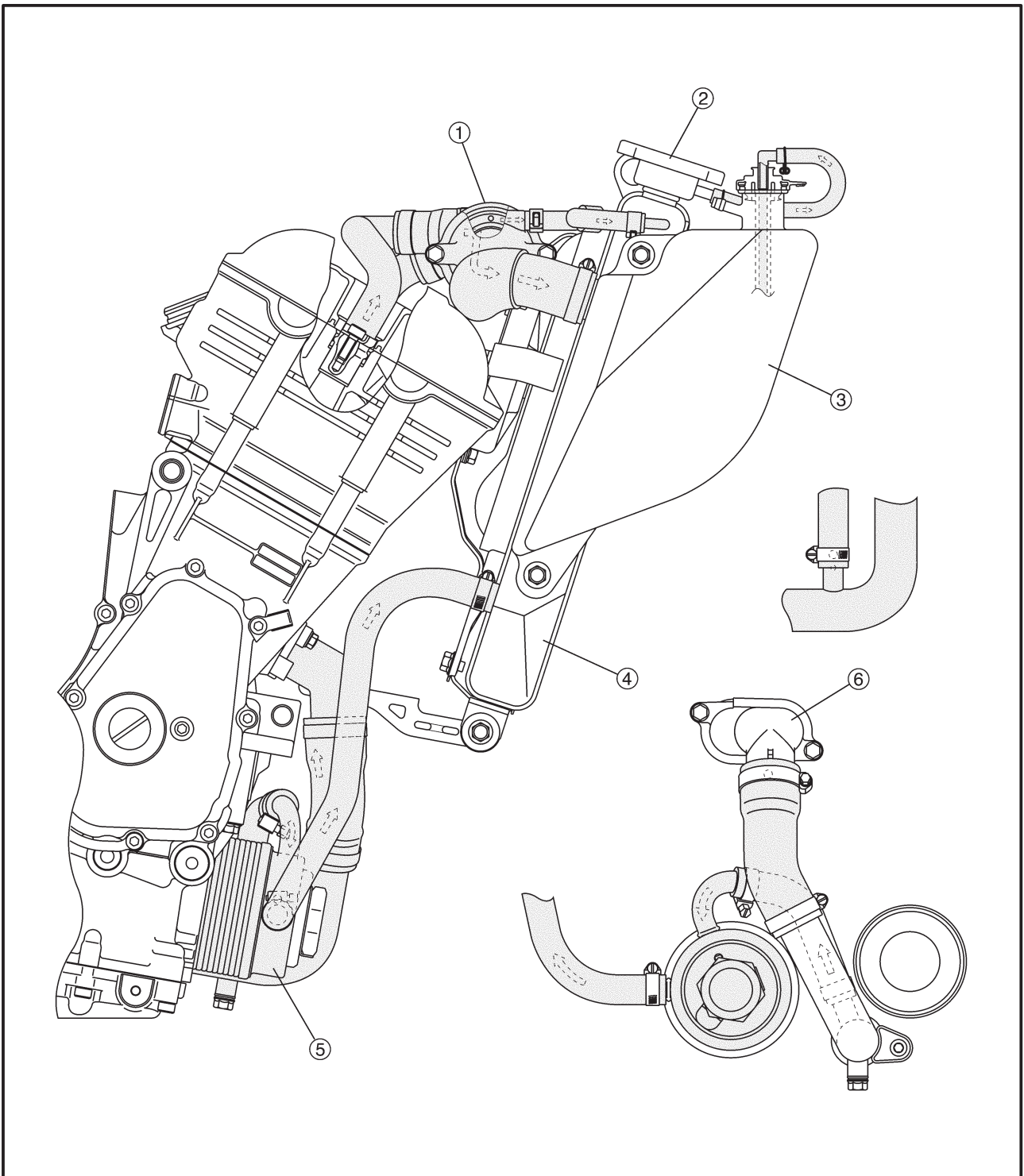




EB203000

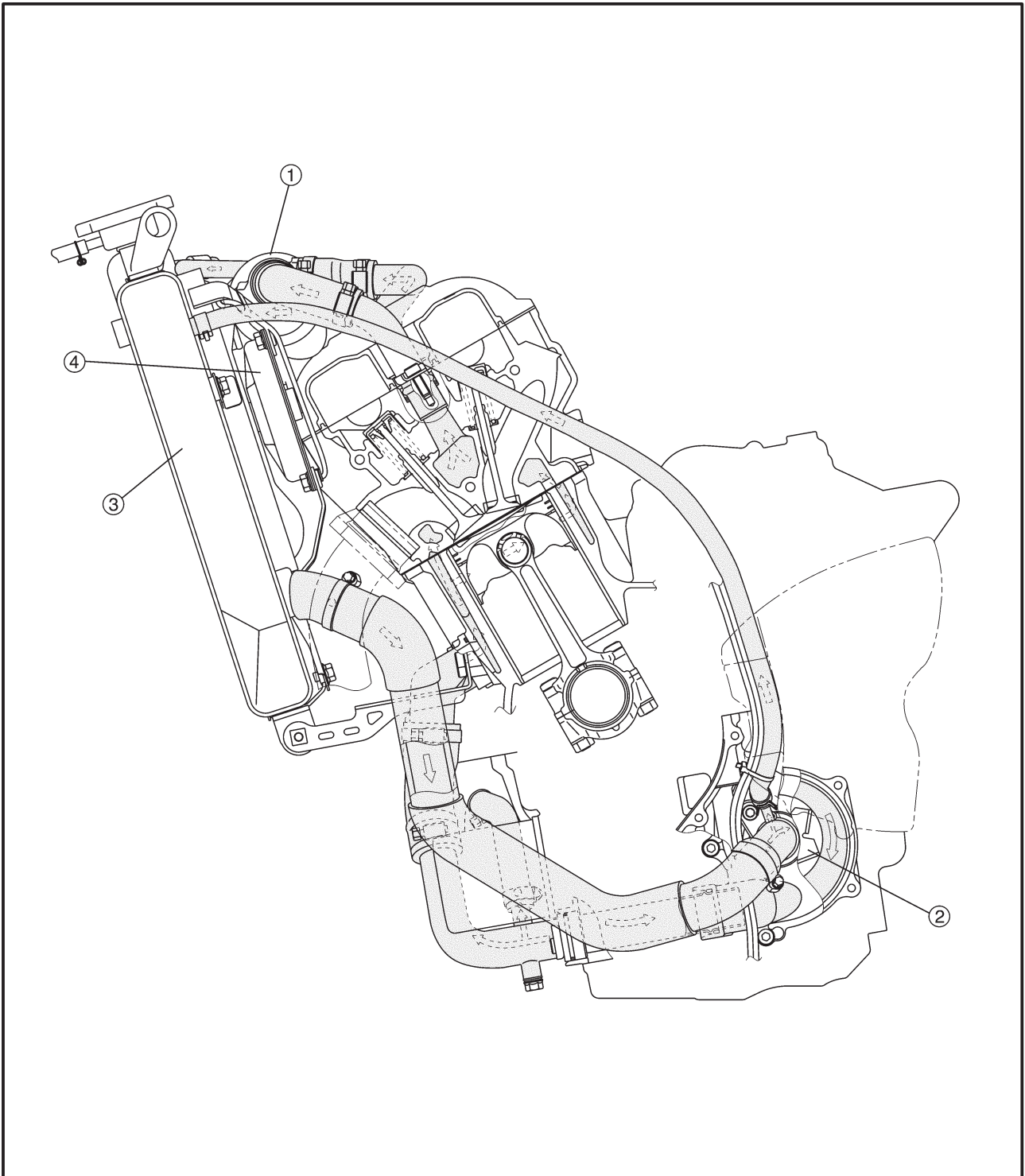
COOLANT FLOW DIAGRAMS

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



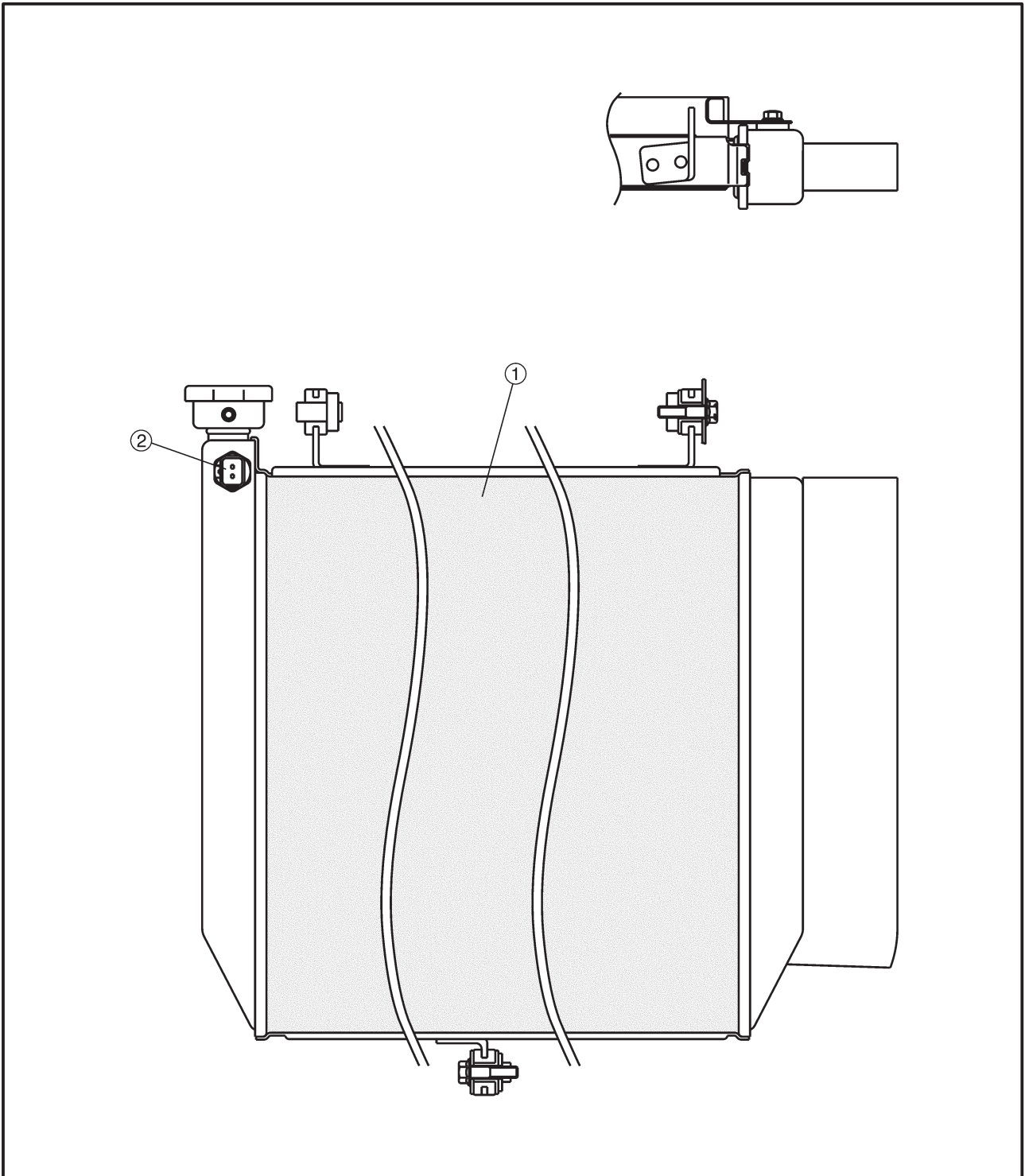


- ① Thermostat housing
- ② Water pump
- ③ Radiator
- ④ Radiator fan





- ① Radiator
- ② Thermo unit



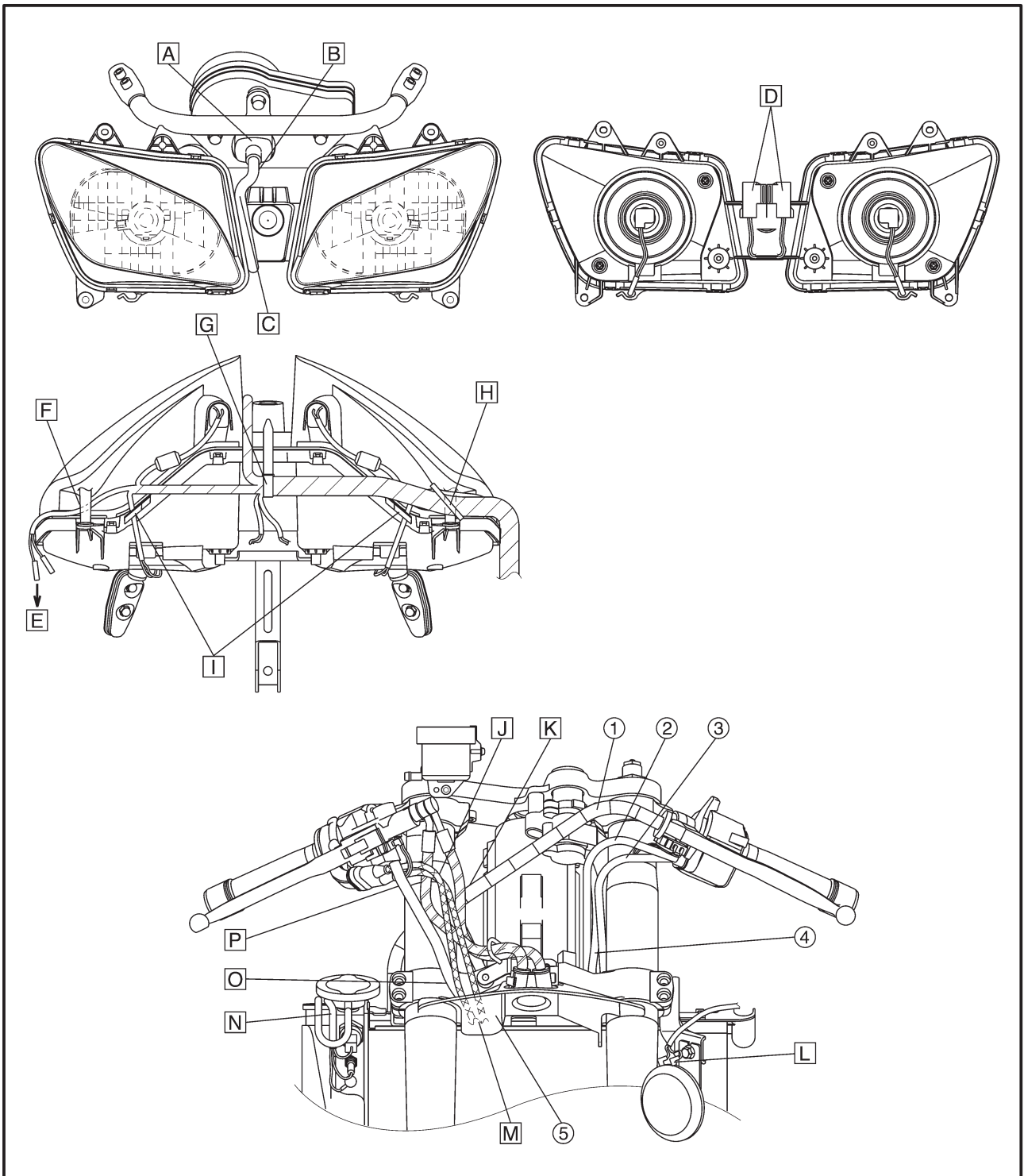


EB206000

**CABLE ROUTING**

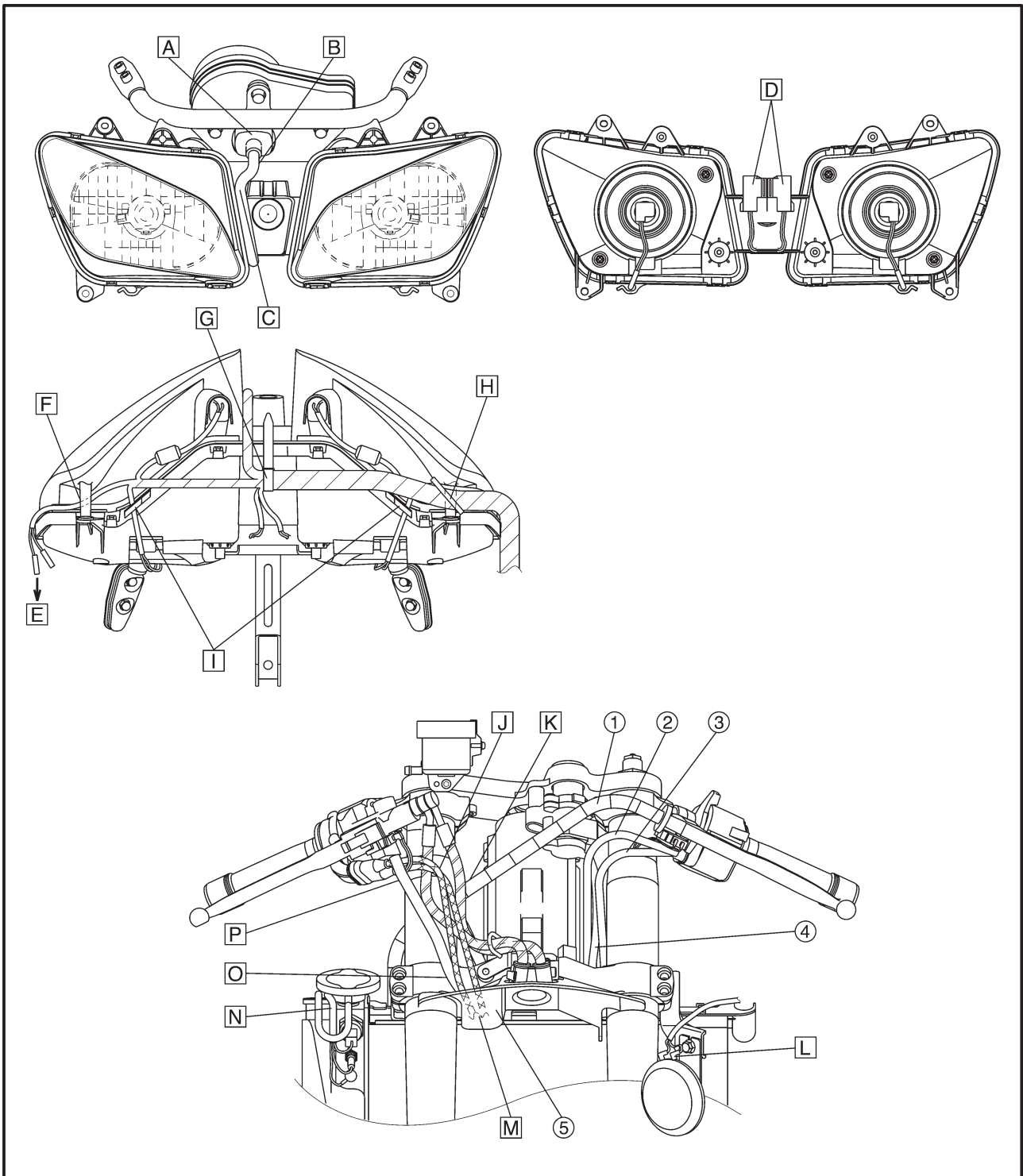
- ① Clutch cable
- ② Left handlebar switch lead
- ③ Starter cable
- ④ Main switch lead
- ⑤ Steering cover

- 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 The speedometer lead with not be tighten.
- D Install the headlight relays onto the headlight housing bridge.
- E Connect to the right front turn signal connectors.
- F Route the turn signal leads upper the headlight housing boss.





- G** Fasten the headlight lead with a plastic clamp at white tape mark.
- H** Fasten the wire harness to the headlight housing boss with a plastic locking tie.
- I** Route the headlight lead through the plastic guide.
- J** Route the throttle cable to the front side of the brake hose.
- K** Route the clutch cable behind the front fork leg.
- L** Make sure that the horn leads face out.
- M** Route the throttle cables and right handlebar switch lead between the lower bracket and steering cover.
- N** Route the thermo switch/temperature sender sub-wire harness to the outside of the radiator cap.
- O** Route the right handlebar switch lead behind the throttle cables. Do not cross the throttle cables and the right handlebar switch lead.
- P** Route the right handlebar switch lead in front of the throttle cables.



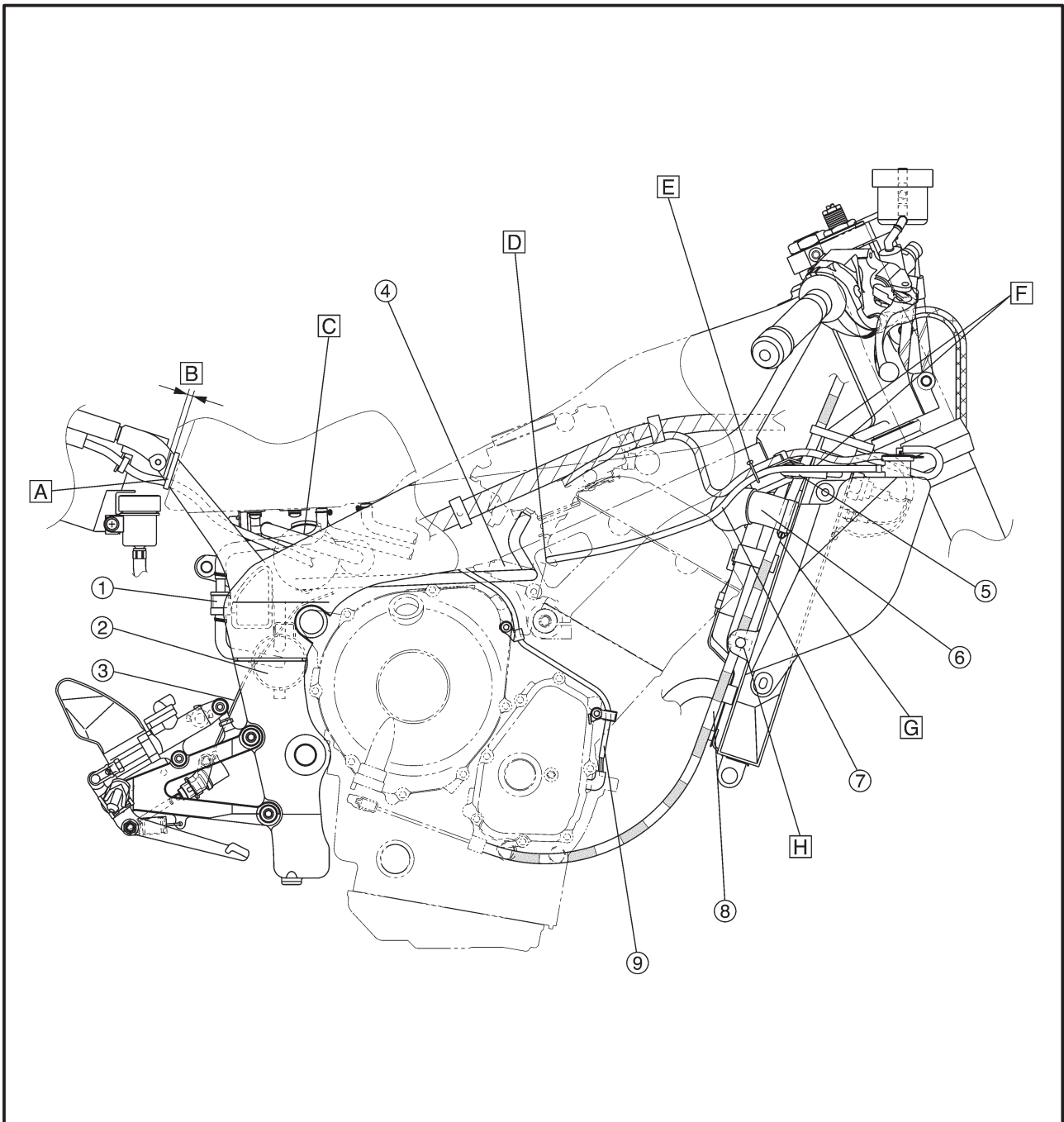
## CABLE ROUTING

SPEC



- ① Rollover valve (California only)
- ② Charcoal canister (California only)
- ③ Rear brake switch lead
- ④ Timing chain tensioner.
- ⑤ Thermostat assembly breather hose
- ⑥ Radiator inlet hose
- ⑦ Coolant reservoir breather hose
- ⑧ Clutch cable
- ⑨ Pickup coil lead
- A Fasten the starter motor lead to the frame which is just before the side cover stay (0 ~ 5 mm) with a plastic clamp.
- B 0 ~ 5 mm

- C Route the rollover-valve-to-fuel-tank hose to the inside of the fuel hose (California only).
- D Route the coolant reservoir breather hose over the timing chain tensioner.
- E 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.
- F Route the clutch cable between the radiator bracket and frame and in front of the thermostat assembly breather hose.
- G Route the clutch cable to the inside of the radiator inlet hose.
- H Insert the plastic clamp into the hole in the coolant reservoir's tab.



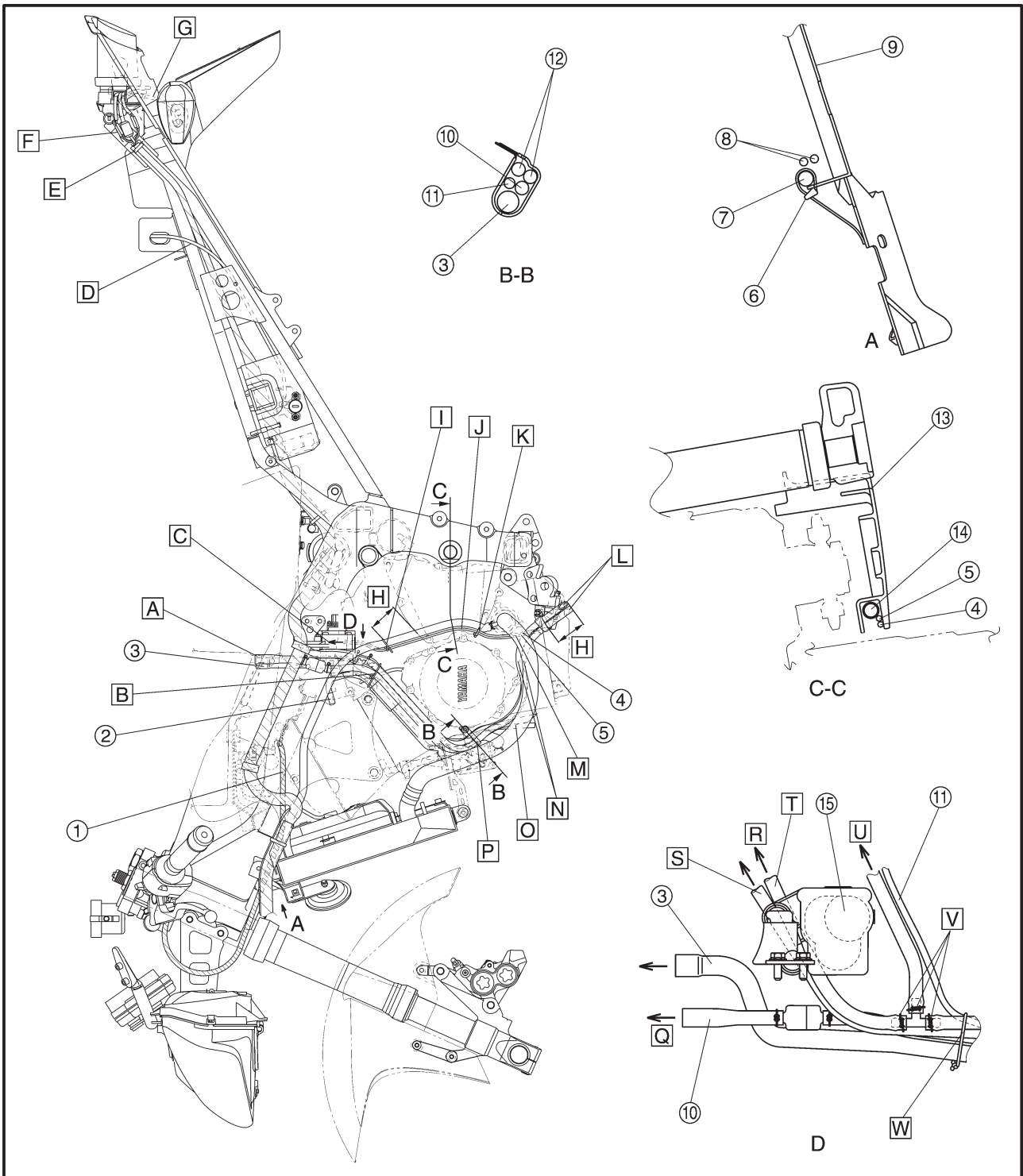


- ① Starter cable
- ② Air induction system vacuum hose
- ③ Air induction system hose
- ④ Sidestand switch lead
- ⑤ Oil level switch lead
- ⑥ Clamp
- ⑦ Right handlebar switch lead
- ⑧ Throttle cables
- ⑨ Air guide
- ⑩ Air filter case breather hose
- ⑪ Coolant reservoir breather hose

- ⑫ Fuel tank overflow hose and fuel tank breather hose
- ⑬ Drive chain sprocket cover
- ⑭ Coolant hose
- ⑮ EXUP servomotor

**A** Route the air filter case breather hose and air induction system hose to the inside of the wire harness.

**B** Through the air cleaner drain hose, coolant reservoir tank breather, fuel tank breather hose, fuel tank over flow hose, air induction system hose and air induction system vacuum hose outside of the AC magneto lead. Then, clamp all of them at just behind of the air induction system protector and air induction system vacuum hose protector, moreover at under the three sides pipe.

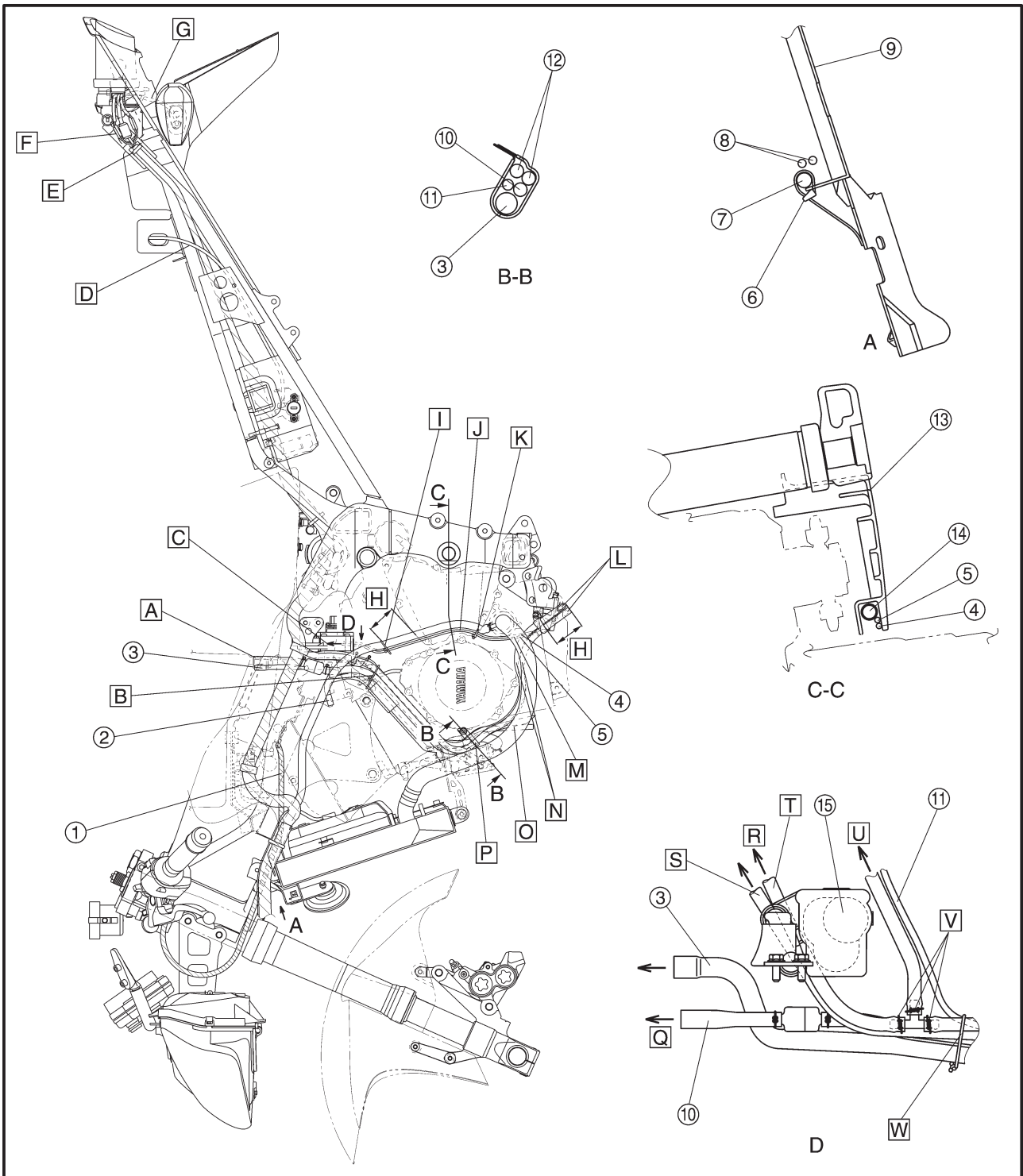


# CABLE ROUTING

**SPEC**



- C** To the connector cover.
- D** Route the seat lock cable over the wire harness.
- E** Fasten the wire harness with a plastic clamp.
- F** Make sure the rear flasher light lead coupler and tail light lead coupler in the rubber cover.
- G** Route the rear 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** Route the sidestand switch lead and oil level switch lead to the inside of the drive sprocket cover.
- K** Do not crush the water pump breather hose and plastic clip.
- L** Pass the fuel tank breather hose and the air filter drain hose through the steel clamps and then after routing the hoses to the exterior of the under cowl- ing, align the leading ends of the hoses.
- M** Route the engine oil level switch lead and side- stand switch lead inside the coolant hose.



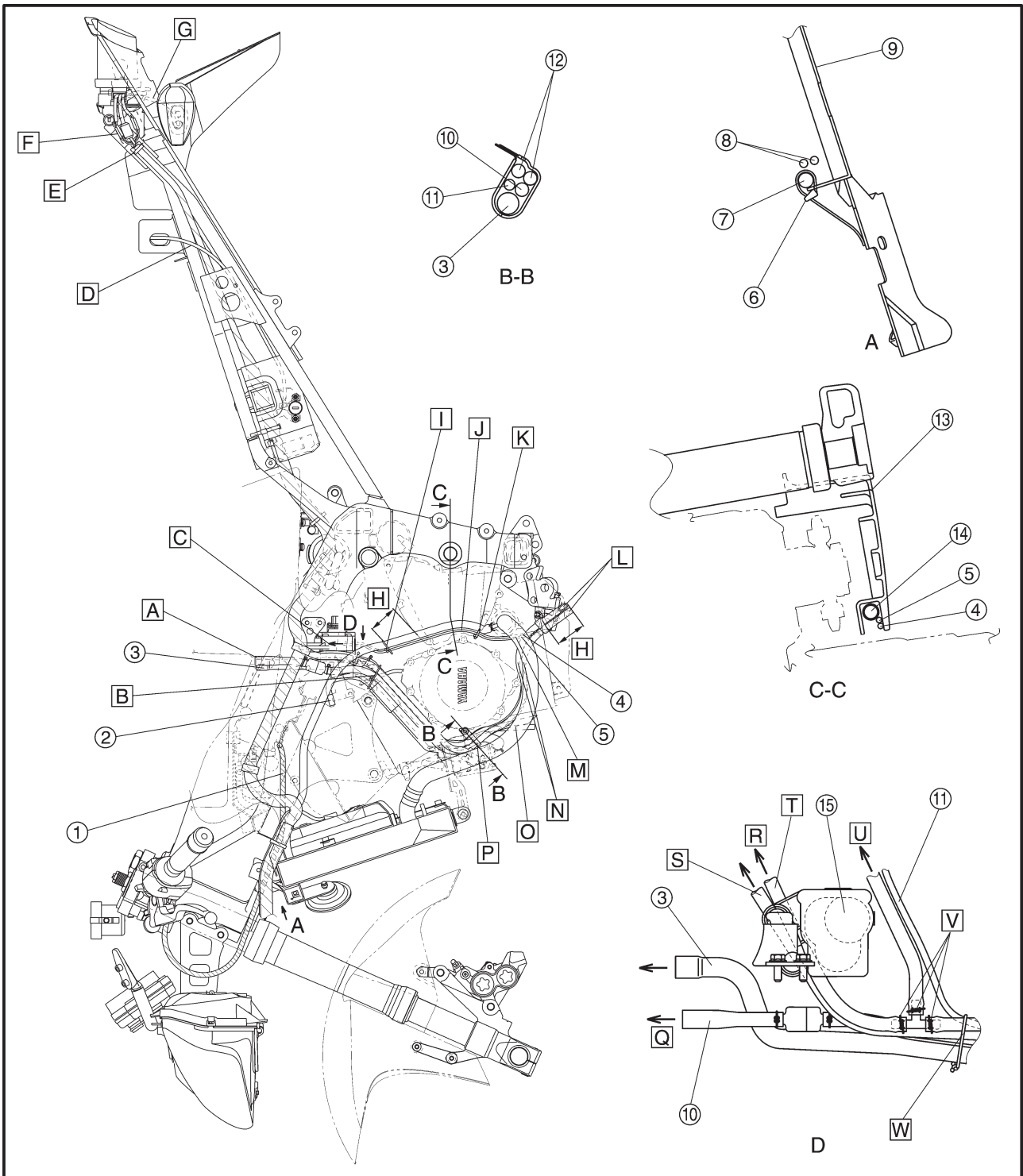


# CABLE ROUTING

SPEC



- N** Pass the fuel tank breather hose and the air filter drain hose through the inside of the coolant hose. No hose must be inserted into the under cowling.
- O** Pass the air filter drain hose and the coolant reservoir hose through the inside of the coolant hose and route the leading ends to the bottom of the coolant hose. The leading ends must not protrude from the under cowling.
- P** Fasten the air filter drain hose, coolant hose, coolant reservoir tank breather hose, fuel tank breather hose, fuel tank drain hose and air induction system hose at the steel clamp.
- Q** To the air filter.
- R** To the fuel tank.
- S** Insert the fuel tank breather hose into a back side nipple of fuel tank. The fuel tank nipple and the fuel tank breather hose have each white mark.
- T** Insert the fuel tank over flow hose into a front side nipple of fuel tank.
- U** To the air vent surge tank.
- V** Adjust the all clip's direction to back side of the body.
- W** Clamp under a three sides pipe.

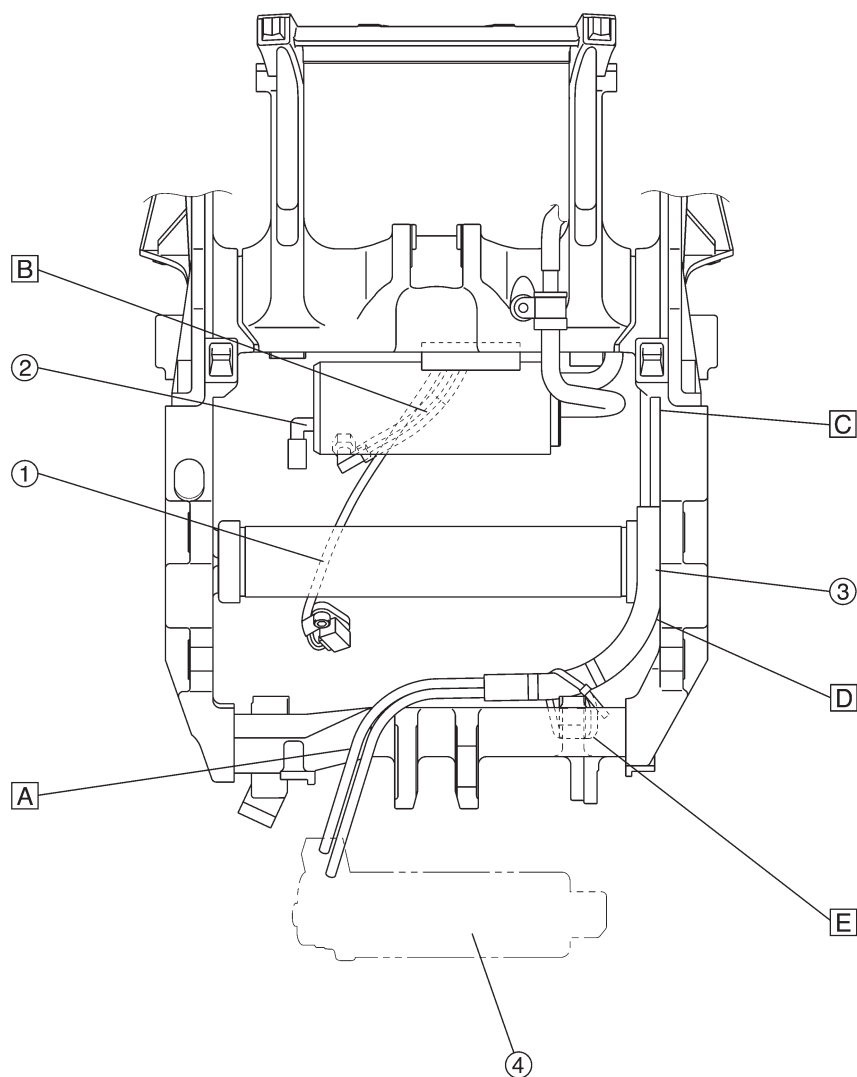


## CABLE ROUTING

SPEC



- ① Speed sensor lead
- ② Charcoal canister (California only)
- ③ EXUP cables
- ④ EXUP
- A Route the EXUP cables behind the cross tube.
- B Route the neutral switch lead direct to upper right side.
- C Route the EXUP cables on the outside of the engine mount.
- D Route the EXUP cables behind the swing arm head pipe.
- E Fasten the EXUP cables and engine mount with a plastic locking tie.

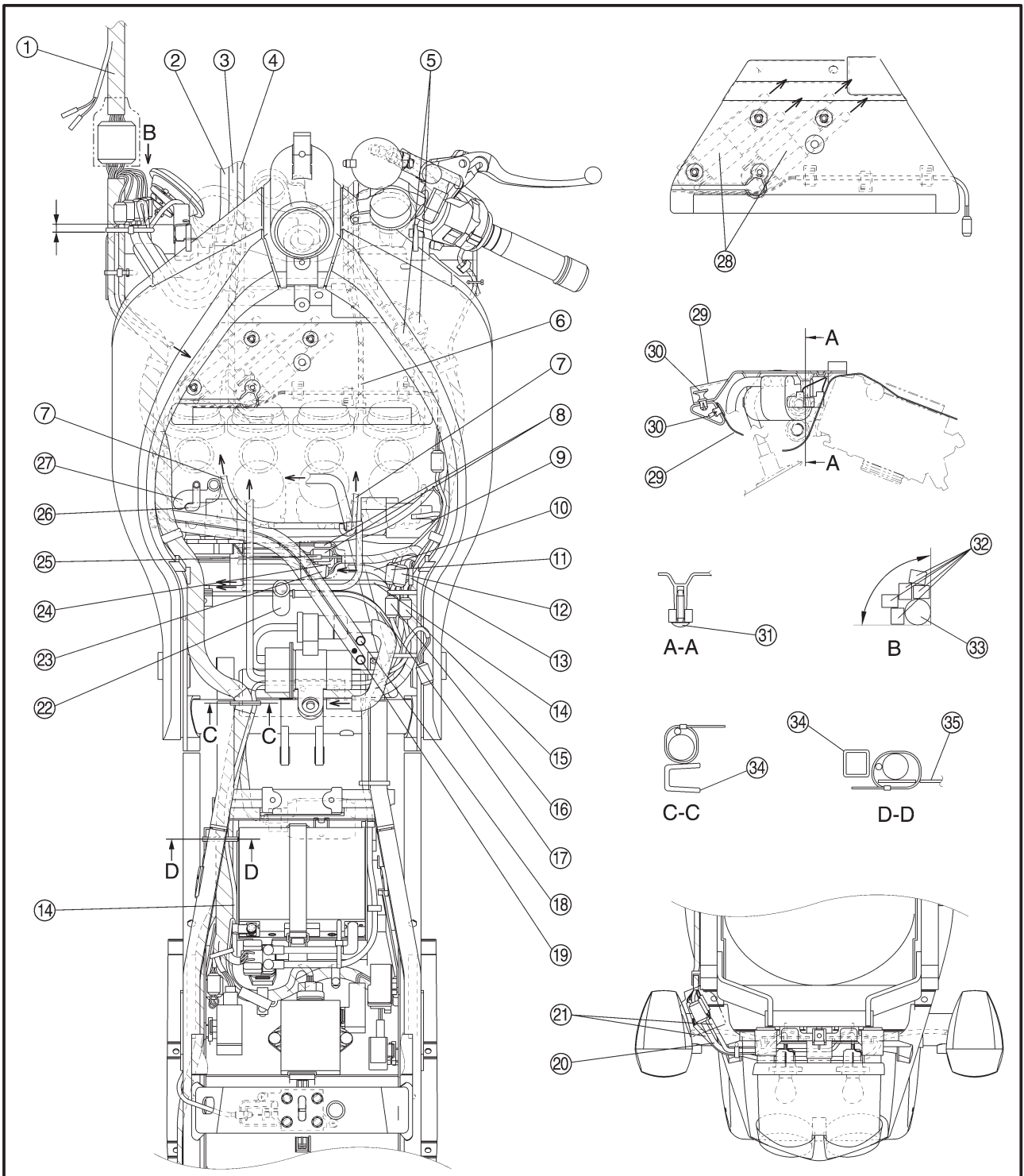


# CABLE ROUTING

SPEC

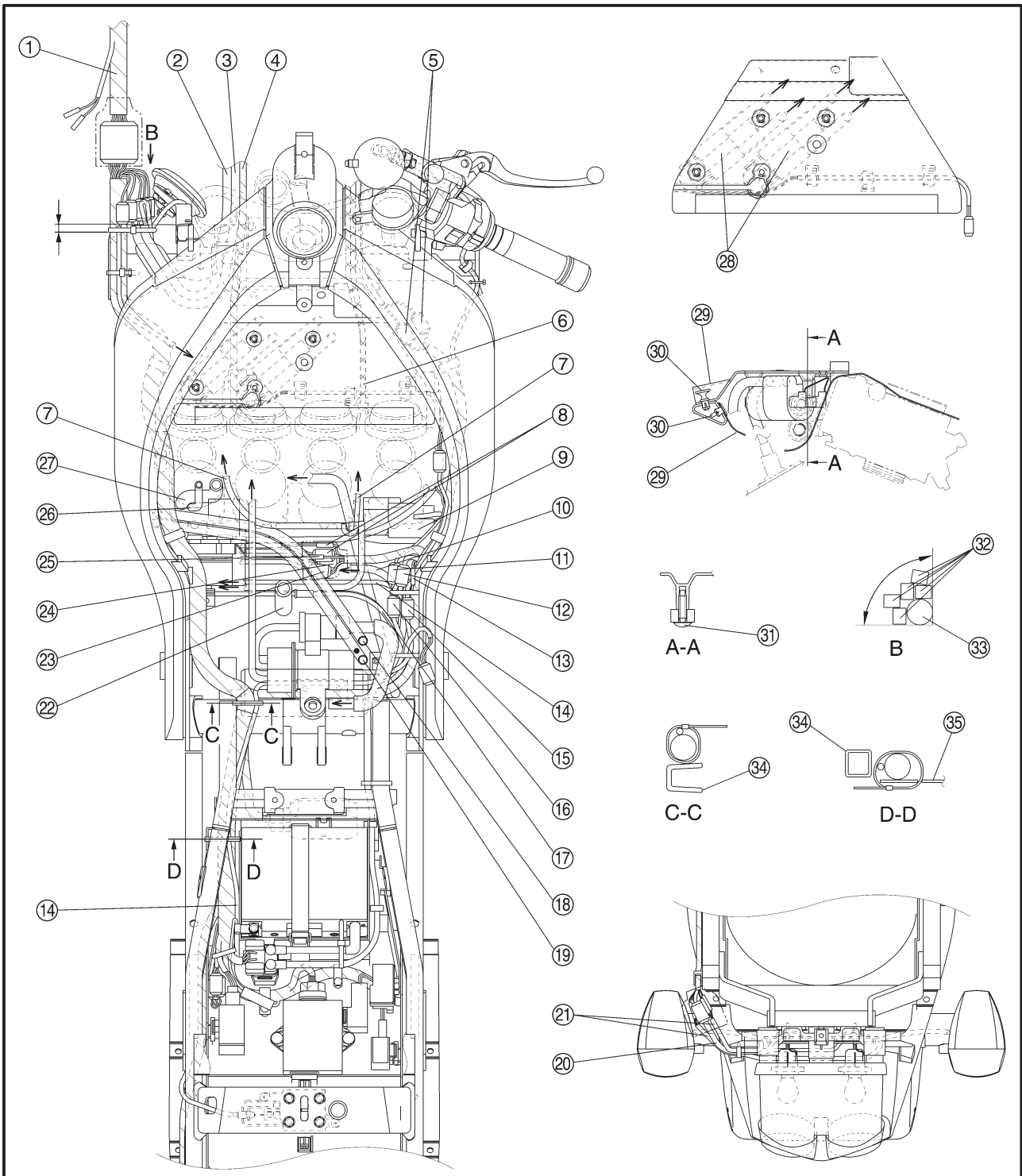


- ① Headlight sub-wire harness
- ② Left handlebar switch lead
- ③ Main switch lead
- ④ Starter cable
- ⑤ Right handlebar switch coupler
- ⑥ Throttle cables
- ⑦ Engine air vent hose
- ⑧ EXUP servomotor coupler
- ⑨ Air vent surge tank
- ⑩ Starter motor lead
- ⑪ Pickup coil coupler
- ⑫ Fuel pump coupler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





- ②⑤ Engine oil level switch lead
- ②⑥ Air filter case drain hose
- ②⑦ Air induction system hose
- ②⑧ Ignition coil
- ②⑨ Cover
- ③⑩ Rivet
- ③⑪ Screw
- ③⑫ Coupler
- ③⑬ Main harness
- ③⑭ Frame
- ③⑮ Rear fender

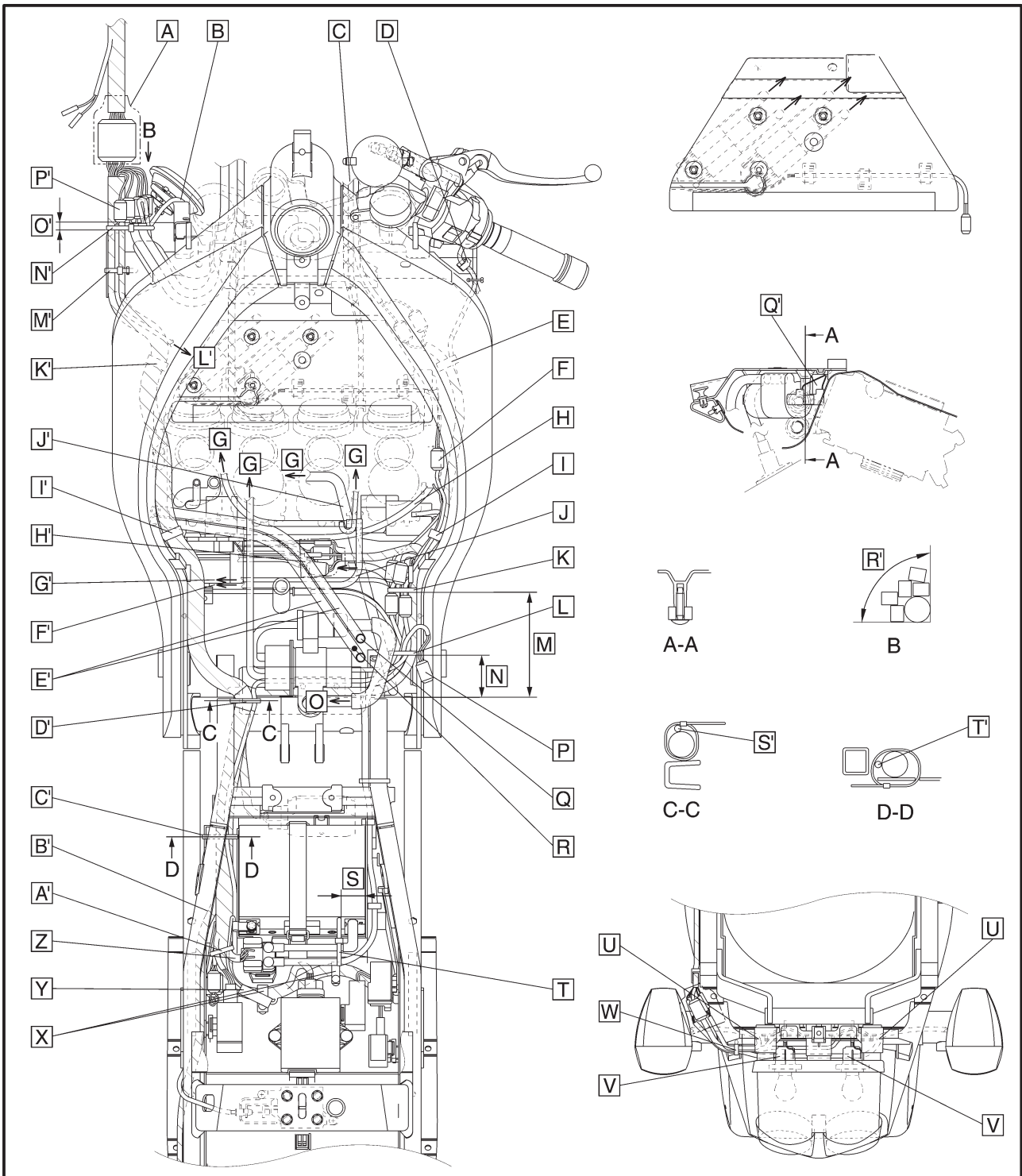


# CABLE ROUTING

SPEC



- A** Make sure the headlight lead in the rubber cover.
- B** Route the horn lead over the horn bracket and make sure that the lead has no slack.
- C** Do not cross the throttle cables and right handlebar switch lead.
- D** Route the thermo switch lead through the steel band on the radiator.
- E** Fasten the main harness and thermo switch lead with a plastic clamp. Insert the plastic clamp into the hole on the frame.
- F** Route the ignition coil sub-wire harness under the throttle position sensor.
- G** To the carburetor.
- H** Route the coolant reservoir tank breather hose upper the air vent surge tank.
- I** Fasten the wire harness and ignition coil subwire harness with a plastic clamp.
- J** Route the idle adjust cable upper the ground lead.
- K** Fasten the fuel pump lead, speed sensor lead, neutral switch lead, rear brake light lead, fuel sender lead, starter motor lead and EXUP cable with a plastic clamp.



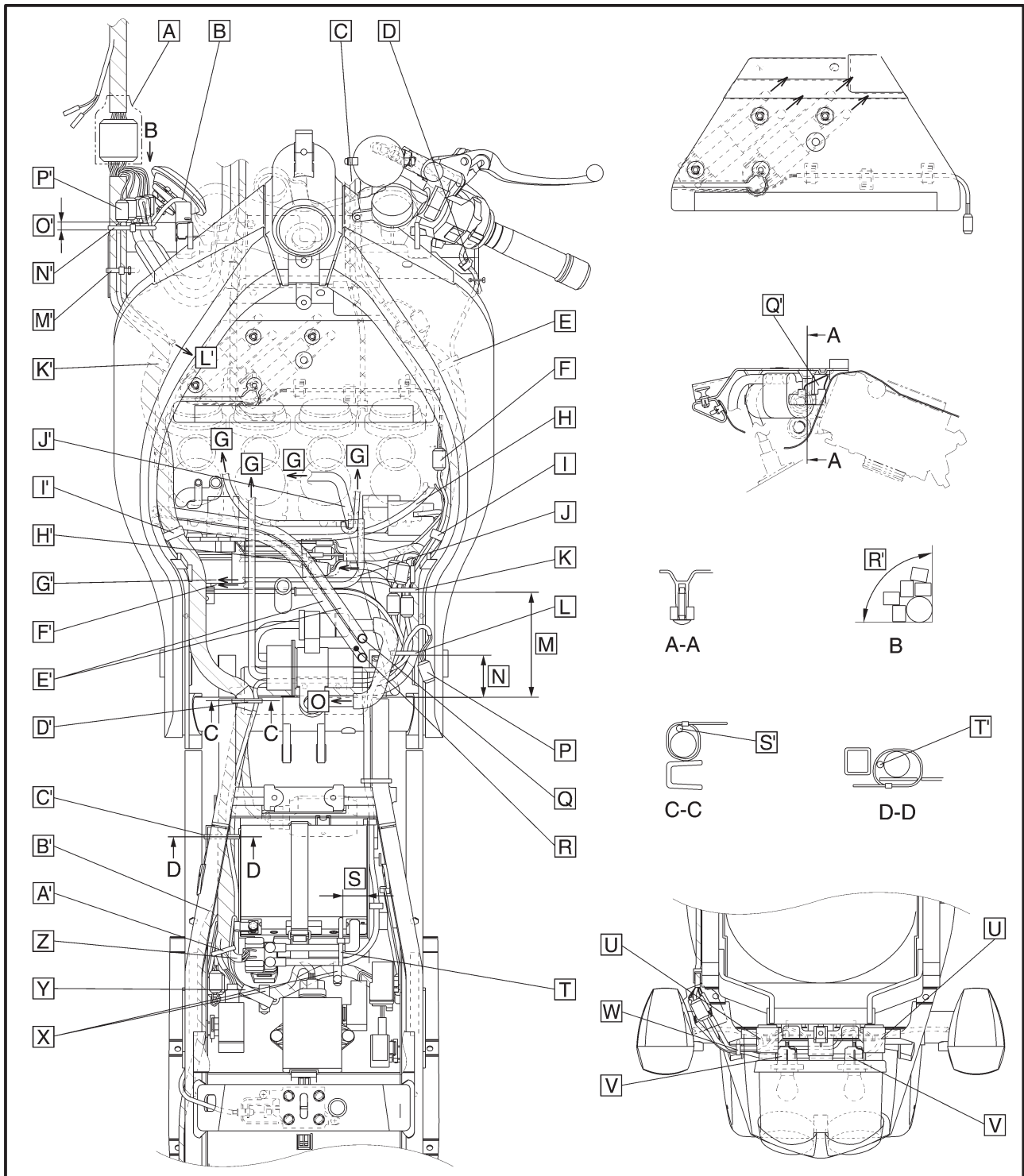
# CABLE ROUTING

SPEC



- L** Fasten the fuel pump lead, speed sensor lead, neutral switch lead, rear brake light lead, fuel sender lead, starter motor lead and EXUP cable with a plastic clamp.
- M** 125 mm (4.88 in)
- N** 50 mm (1.95 in)
- O** To the fuel cock.
- P** To the fuel sender.
- Q** Insert the fuel tank over flow hose into a front side nipple of fuel tank.
- R** Insert the fuel tank breather hose into a back side nipple of fuel tank. The fuel tank nipple and the fuel

- tank breather hose have each white mark.
- S** 30 mm (1.17 in)
- T** Fasten the battery positive lead and starter motor lead with a plastic locking tie.
- U** Route the rear flasher light lead in the hole on the rear fender.
- V** Insert the tail/brake light lead and turn signal leads under the tail/brake light.
- W** Fasten the rear flasher light lead and taillight lead with a plastic clamp. Route the rear flasher light lead and taillight lead in the hole on the taillight bracket.

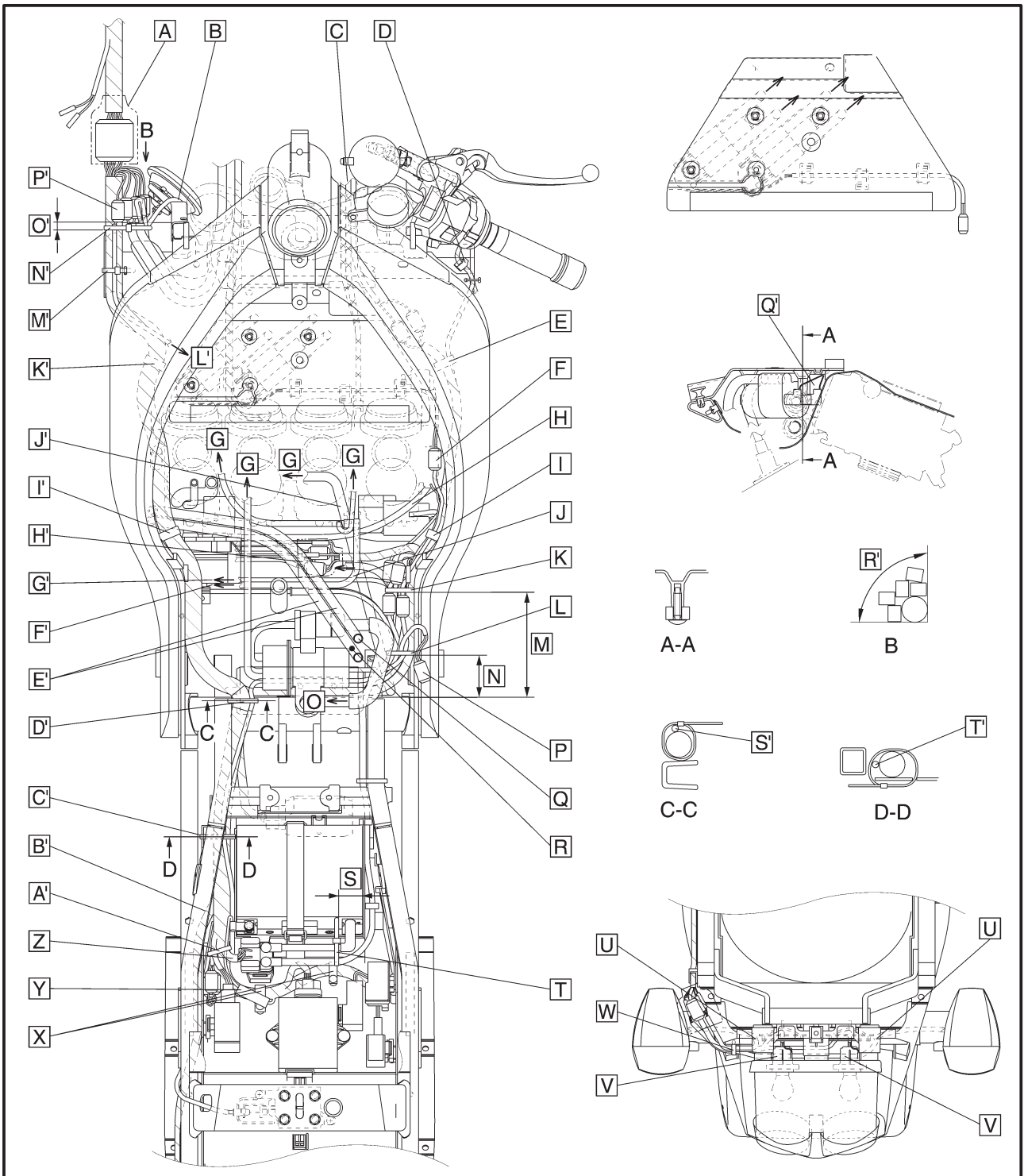


# CABLE ROUTING

SPEC



- X** Fasten the main harness with a plastic band on the rear fender.
- Y** Position the ground coupler over the main harness.
- Z** Route the ground lead under the starter relay lead.
- A'** Fasten the starter relay lead, ground lead, starting circuit cutoff relay lead, alarm lead and main harness with a plastic clamp. Route the clamp end to outside, and insert it between wire harness and fender.
- B'** Route the taillight leads through the rear fender.
- C** Fasten the main harness, battery negative lead and rear fender with a plastic clamp. Clamp the battery negative lead with a white tape mark.
- D'** At the back side of turning point, battery negative lead is fixed to wire harness.
- E'** Route the fuel tank overflow hose and fuel tank breather hose in front of the crank case breather hose and under the fuel hose and front of the EXUP servomotor bracket and upper the EXUP servomotor.
- F'** To the idle adjust screw.
- G'** To the engine backward.
- H'** Make sure the sidestand switch coupler, engine oil level sensor coupler, EXUP servo motor coupler and acmagneto coupler in the rubber cover.

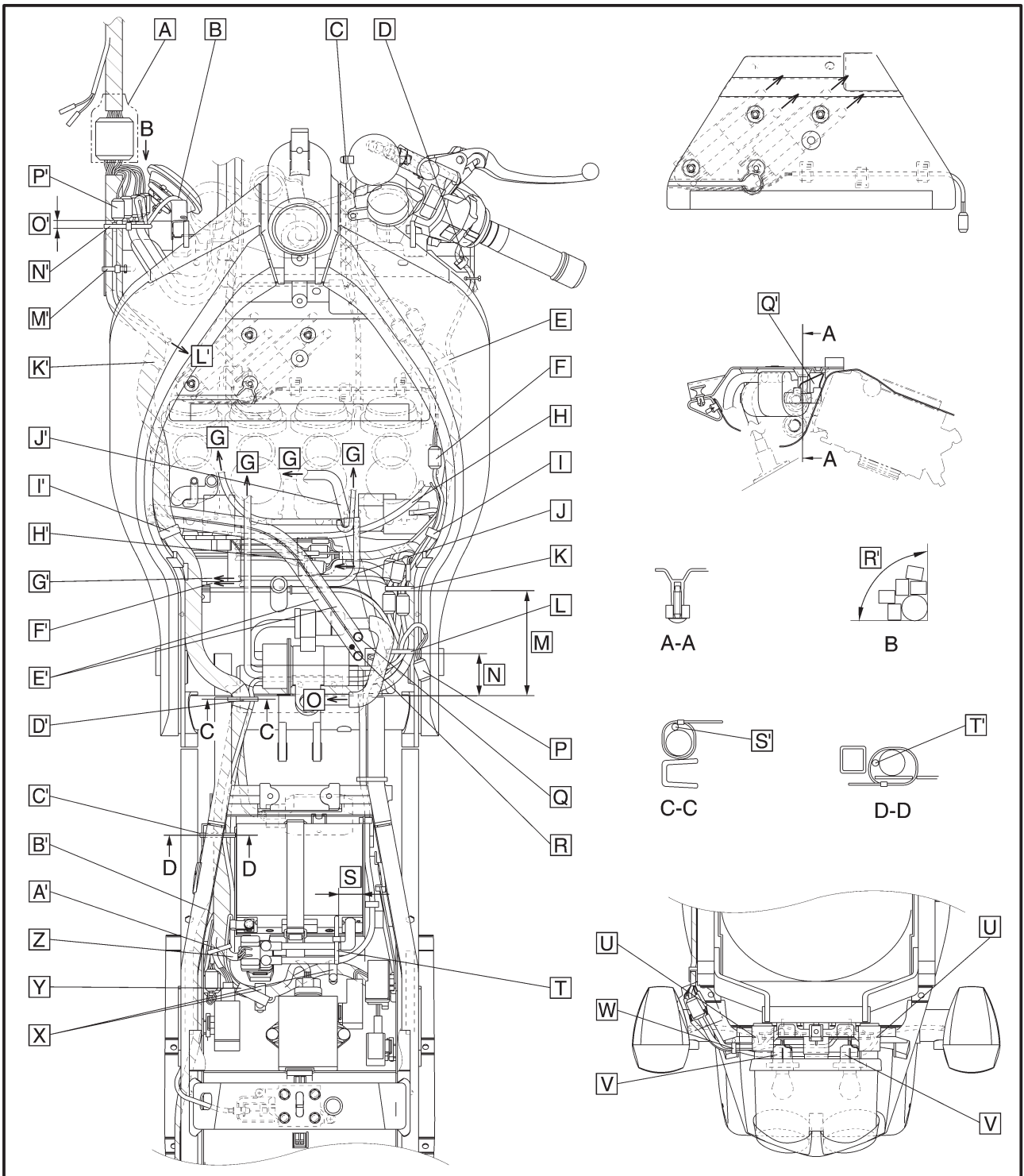


# CABLE ROUTING

SPEC



- [I] Fasten the main harness with a plastic clamp. Insert the plastic clamp into the hole on the frame.
- [J] Route the charcoal canister hose under the engine air vent hose, coolant reservoir tank breather hose and all of leads. (California only)
- [K] Fasten the wire harness with a plastic clamp and then insert the clamp into the frame.
- [L] To the radiator fan motor.
- [M] Route the main harness and fan motor lead into the hole on the air intake guide. Fasten the main harness and fan motor lead with a plastic clamp.
- [N] Route the band end to inside. The clamp position should be not exceed just behind 30 mm of all coupler.
- [O] 0 ~ 30 mm
- [P] Although the main switch lead couplers and the handlebar switch lead couplers are the same in shape, they differ in color (the former is white, and the latter, blue). Connect the couplers of the same color.
- [Q] Direct the ignition coil leads upward and insert them into position at the rubber damper.
- [R] 90°
- [S] Route the battery negative lead inside the main harness.
- [T] Route the battery positive lead upper the main harness.







EB300000

## PERIODIC CHECKS AND ADJUSTMENTS

### INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. 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.

EB301000

### PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

No.	ITEM	CHECKS AND MAINTENANCE JOBS	After the first	Every	Every	Annual check
			1,000 km	10,000 km	20,000 km	
1	* Fuel line	<ul style="list-style-type: none"> <li>• Check fuel hoses and vacuum hose for cracks or damage.</li> <li>• Replace if necessary.</li> </ul>		√		√
2	* Fuel filter	<ul style="list-style-type: none"> <li>• Check condition.</li> <li>• Replace if necessary.</li> </ul>			√	
3	Spark plugs	<ul style="list-style-type: none"> <li>• Check condition.</li> <li>• Clean, regap or replace if necessary.</li> </ul>		√		
4	* Valves	<ul style="list-style-type: none"> <li>• Check valve clearance.</li> <li>• Adjust if necessary.</li> </ul>	<b>Every 40,000 km</b>			
5	Air filter	<ul style="list-style-type: none"> <li>• Clean or replace if necessary.</li> </ul>		√		
6	Clutch	<ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Adjust or replace cable.</li> </ul>	√	√		
7	* Front brake	<ul style="list-style-type: none"> <li>• Check operation, fluid level and vehicle for fluid leakage.</li> <li>• Correct accordingly.</li> <li>• Replace brake pads if necessary.</li> </ul>	√	√		√
8	* Rear brake	<ul style="list-style-type: none"> <li>• Check operation, fluid level and vehicle for fluid leakage.</li> <li>• Correct accordingly.</li> <li>• Replace brake pads if necessary.</li> </ul>	√	√		√
9	* Brake hose	<ul style="list-style-type: none"> <li>• Check for cracks or damage.</li> <li>• Replace if necessary.</li> </ul>		√		√
10	* Wheels	<ul style="list-style-type: none"> <li>• Check balance, runout and for damage.</li> <li>• Rebalance or replace if necessary.</li> </ul>		√		
11	* Tires	<ul style="list-style-type: none"> <li>• Check tread depth and for damage.</li> <li>• Replace if necessary.</li> <li>• Check air pressure.</li> <li>• Correct if necessary.</li> </ul>		√		
12	* Wheel bearings	<ul style="list-style-type: none"> <li>• Check bearing for looseness or damage.</li> <li>• Replace if necessary.</li> </ul>		√		
13	* Swingarm	<ul style="list-style-type: none"> <li>• Check swingarm pivoting point for play.</li> <li>• Correct if necessary.</li> <li>• Lubricate with lithium soap base grease.</li> </ul>		√		
14	Drive chain	<ul style="list-style-type: none"> <li>• Check chain slack.</li> <li>• Adjust if necessary. Make sure that the rear wheel is properly aligned.</li> <li>• Clean and lubricate.</li> </ul>	<b>Every 1,000 km and after washing the motorcycle or riding in the rain</b>			
15	* Steering bearings	<ul style="list-style-type: none"> <li>• Check bearing play and Steering for roughness.</li> <li>• Correct accordingly.</li> </ul>	√	√		
		<ul style="list-style-type: none"> <li>• Lubricate with lithium soap base grease.</li> </ul>	<b>Every 24,000 km</b>			

## PERIODIC MAINTENANCE AND LUBRICATION INTERVALS

**CHK  
ADJ**



No.	ITEM	CHECKS AND MAINTENANCE JOBS	After the first 1,000 km	Every	Every	Annual check
				10,000 km	20,000 km	
16	* Chassis fasteners	<ul style="list-style-type: none"> <li>• Make sure that all nuts, bolts and screws are properly tightened.</li> <li>• Tighten if necessary.</li> </ul>		√		√
17	Sidestand	<ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Lubricate and repair if necessary.</li> </ul>		√		√
18	* Sidestand switch	<ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Replace if necessary.</li> </ul>	√	√		√
19	* Front fork	<ul style="list-style-type: none"> <li>• Check operation and for oil leakage.</li> <li>• Correct accordingly.</li> </ul>		√		
20	* Rear shock absorber assembly	<ul style="list-style-type: none"> <li>• Check operation and shock absorber for oil leakage.</li> <li>• Replace shock absorber assembly if necessary.</li> </ul>		√		
21	* Rear suspension relay arm and connecting arm pivoting points	<ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Correct if necessary.</li> </ul>		√		
22	* Carburetors	<ul style="list-style-type: none"> <li>• Check engine idling speed, synchronization and starter operation.</li> <li>• Adjust if necessary.</li> </ul>	√	√		√
23	Engine oil	<ul style="list-style-type: none"> <li>• Check oil level and vehicle for oil leakage.</li> <li>• Correct if necessary.</li> <li>• Change. (Warm engine before draining.)</li> </ul>	√	√		√
24	Engine oil filter cartridge	<ul style="list-style-type: none"> <li>• Replace.</li> </ul>	√		√	
25	* Cooling system Cooling system	<ul style="list-style-type: none"> <li>• Check coolant level and vehicle for coolant leakage.</li> <li>• Correct if necessary.</li> </ul>		√		√
		<ul style="list-style-type: none"> <li>• Change coolant.</li> </ul>			√	
26	* Front and rear brake switches	<ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Correct accordingly.</li> </ul>	√	√		√
27	Moving parts and cables	<ul style="list-style-type: none"> <li>• Lubricate if necessary.</li> </ul>		√		√
28	* Air induction system	<ul style="list-style-type: none"> <li>• Check the air cut valve and reed valve for damage.</li> <li>• Replace the entire air induction system if necessary.</li> </ul>		√		
29	* Exhaust system	<ul style="list-style-type: none"> <li>• Check the screw clamp for looseness.</li> <li>• Tighten if necessary.</li> </ul>	√	√		
30	* Lights, signals and switches	<ul style="list-style-type: none"> <li>• Check operation.</li> <li>• Correct if necessary.</li> <li>• Adjust headlight beam if necessary.</li> </ul>	√	√		√

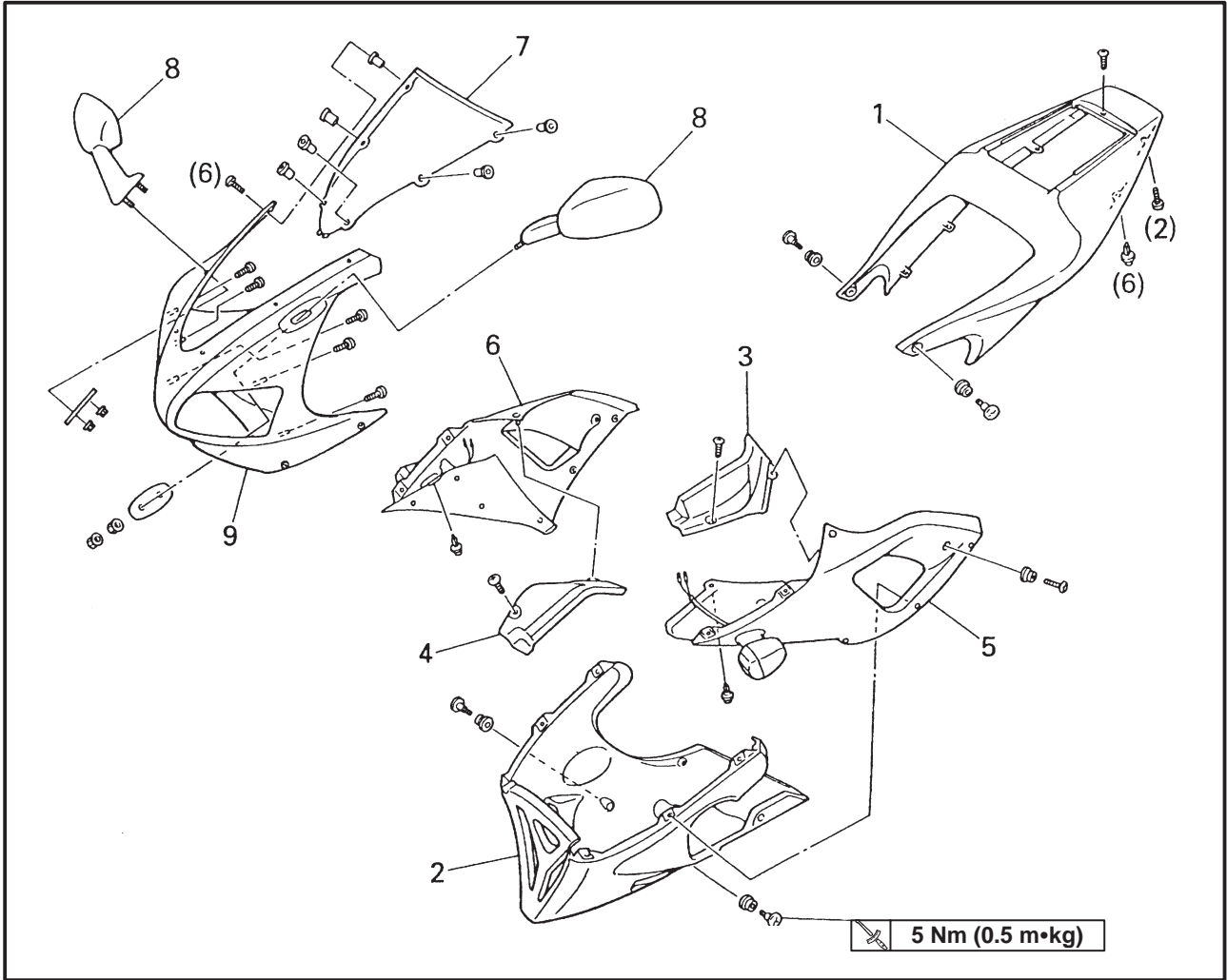
\* Since these items require special tools, data and technical skills, have a Yamaha dealer perform the service.

**NOTE:** \_\_\_\_\_

- The annual checks must be performed once a year unless a 10,000 km or 20,000 km maintenance was performed in the same year.
- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake service
  - Regularly check and, if necessary, correct the brake fluid level.
  - Every two years replace the internal components of the brake master cylinder and caliper, and change the brake fluid.
  - Replace the brake hoses every four years and if cracked or damaged.

EB302020

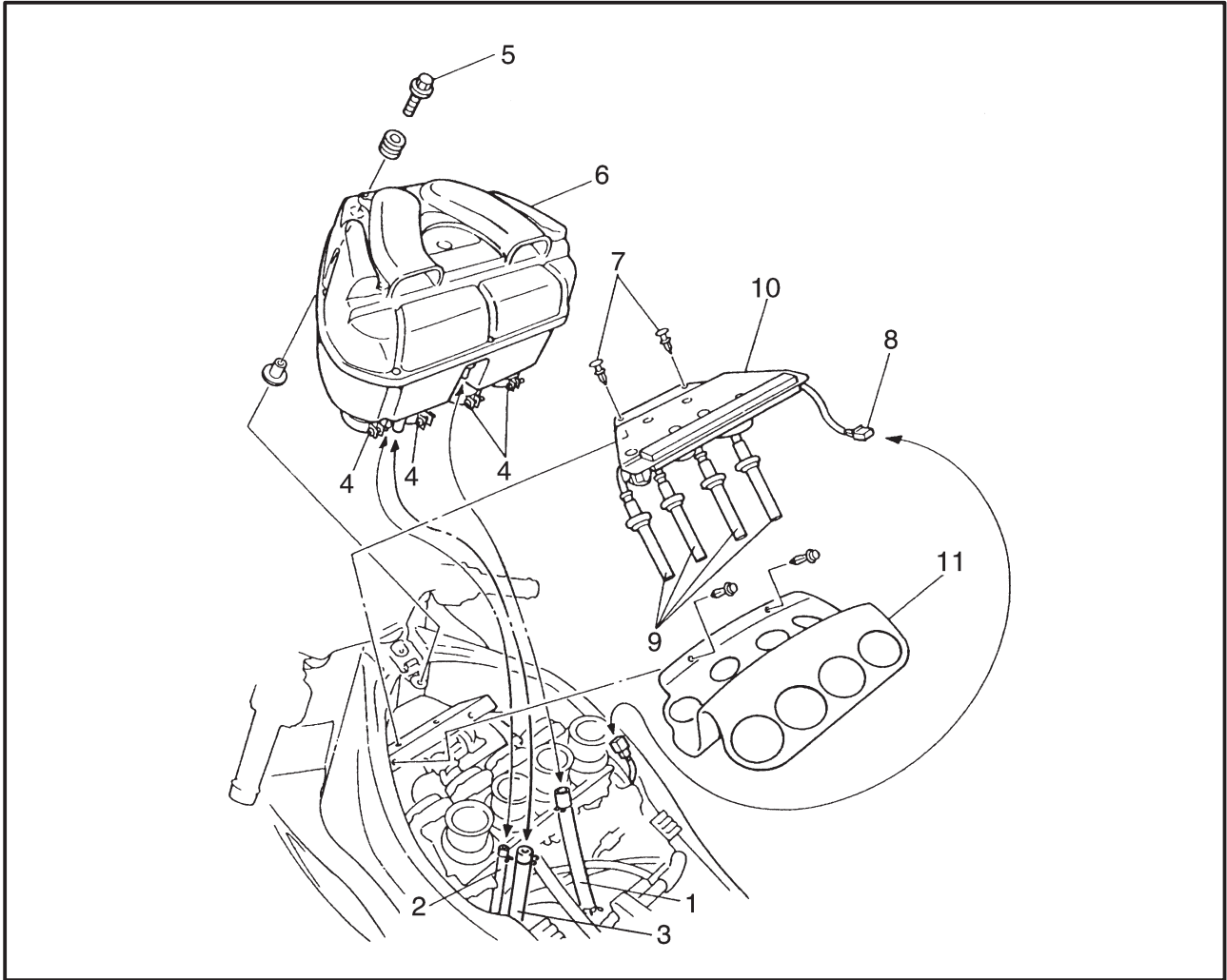
COWLINGS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the cowlings</b>		Remove the parts in the order listed. Refer to "SEATS".
1	Rider and passenger seats	1	
2	Rear cowling	1	
3	Bottom cowling	1	
4	Front cowling inner panel (left)	1	
5	Front cowling inner panel (right)	1	
6	Left side cowling	1	
7	Right side cowling	1	
8	Windshield	1	
9	Rear view mirror	2	
	Front cowling	1	Front installation, reverse the removal procedure.

EB302040

## AIR FILTER CASE AND IGNITION COIL PLATE

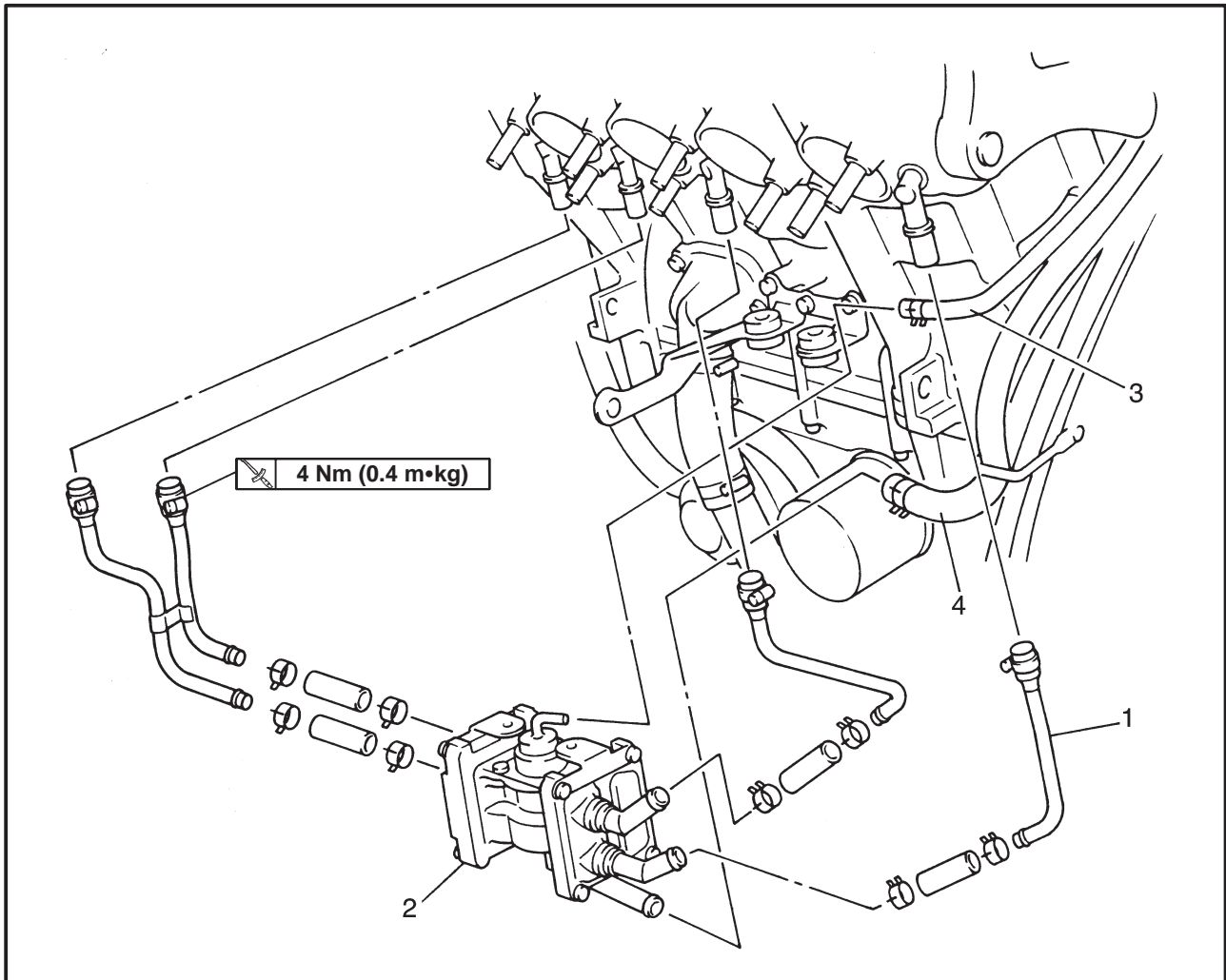


Order	Job/Part	Q'ty	Remarks
	<b>Removing the air filter case and ignition coil plate</b>		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK".
1	Crankcase breather hose	1	
2	Air filter case breather hose	1	
3	Air induction system hose	1	
4	Clamp screw	4	Loosen.
5	Bolt	1	
6	Air filter case	1	
7	Quick fastener	2	
8	Ignition coil coupler	1	Disconnect.
9	Spark plug cap	4	
10	Ignition coil plate/ignition coil	1/2	
11	Rubber baffle	1	
			For installation, reverse the removal procedure.



## OVERHAULING THE ENGINE

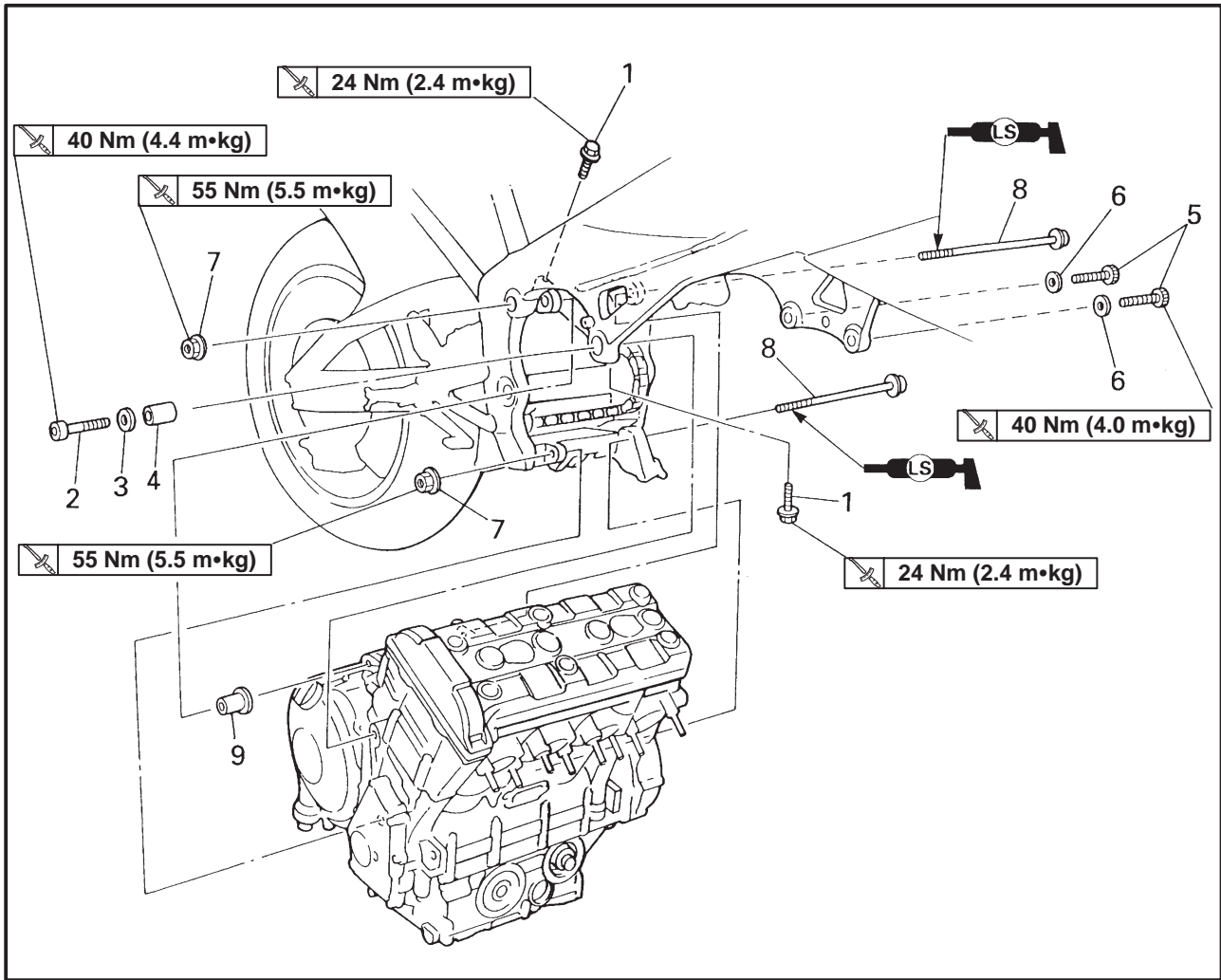
### AIR INDUCTION SYSTEM



Order	Job/Part	Q'ty	Remarks
	<b>Removing the air induction system</b>		Remove the parts in the order listed.
1	Air induction pipe	4	
2	Air cutoff valve	1	
3	Carburetor joint hose	1	
4	Air intake hose	1	
			For installation, reverse the removal procedure.



ENGINE

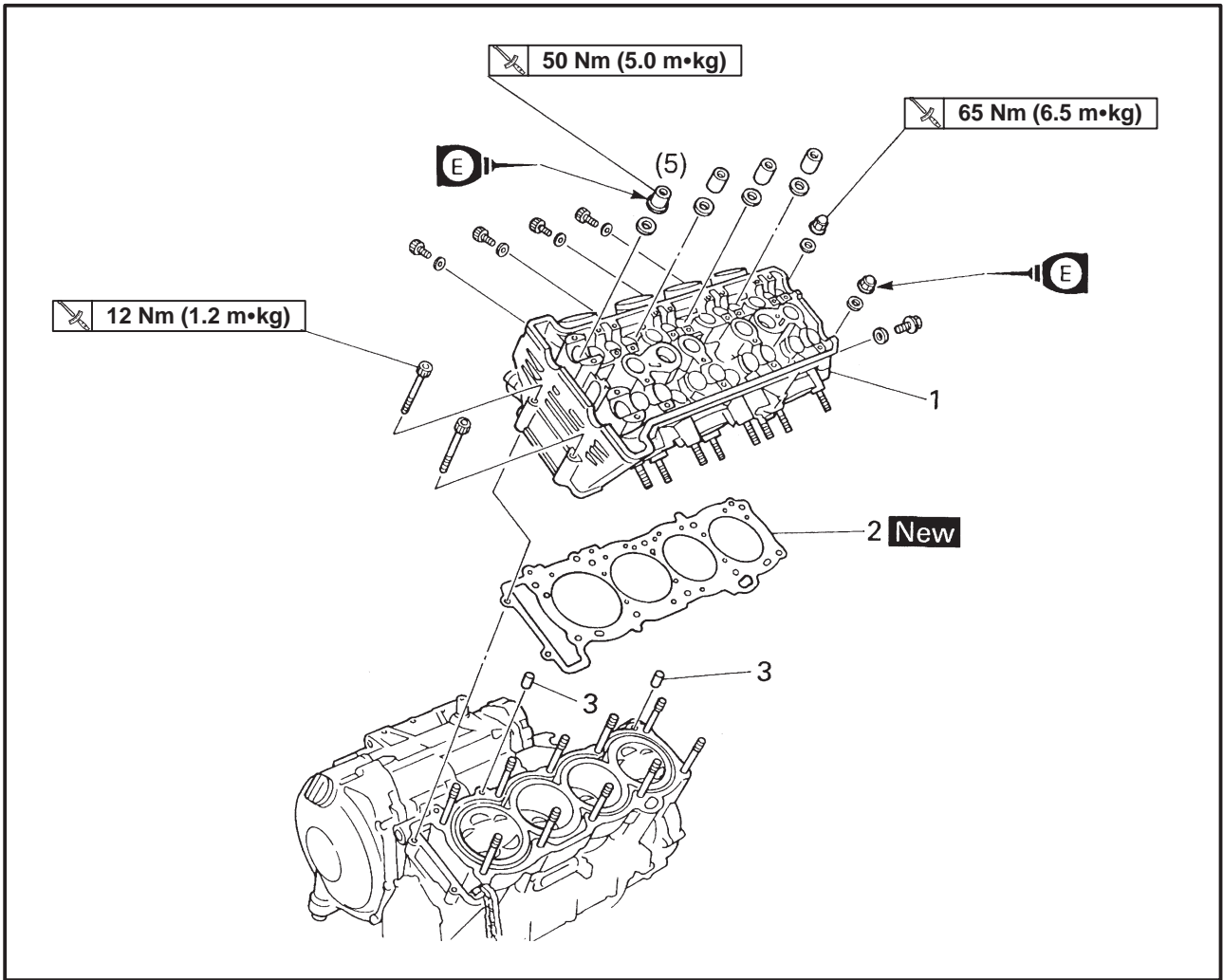


Order	Job/Part	Q'ty	Remarks
	<b>Removing the engine</b>		Remove the parts in the order listed. <b>NOTE:</b> _____ Place a suitable stand under the frame and engine.
1	Pinch bolt	2	Loosen.
2	Right front mounting bolt	1	
3	Washer	1	
4	Spacer	1	
5	Left front mounting bolt	2	
6	Washer	2	
7	Self-locking nut	2	
8	Rear mounting bolt	2	
9	Spacer	1	
			For installation, reverse the removal procedure.



EB402000

CYLINDER HEAD

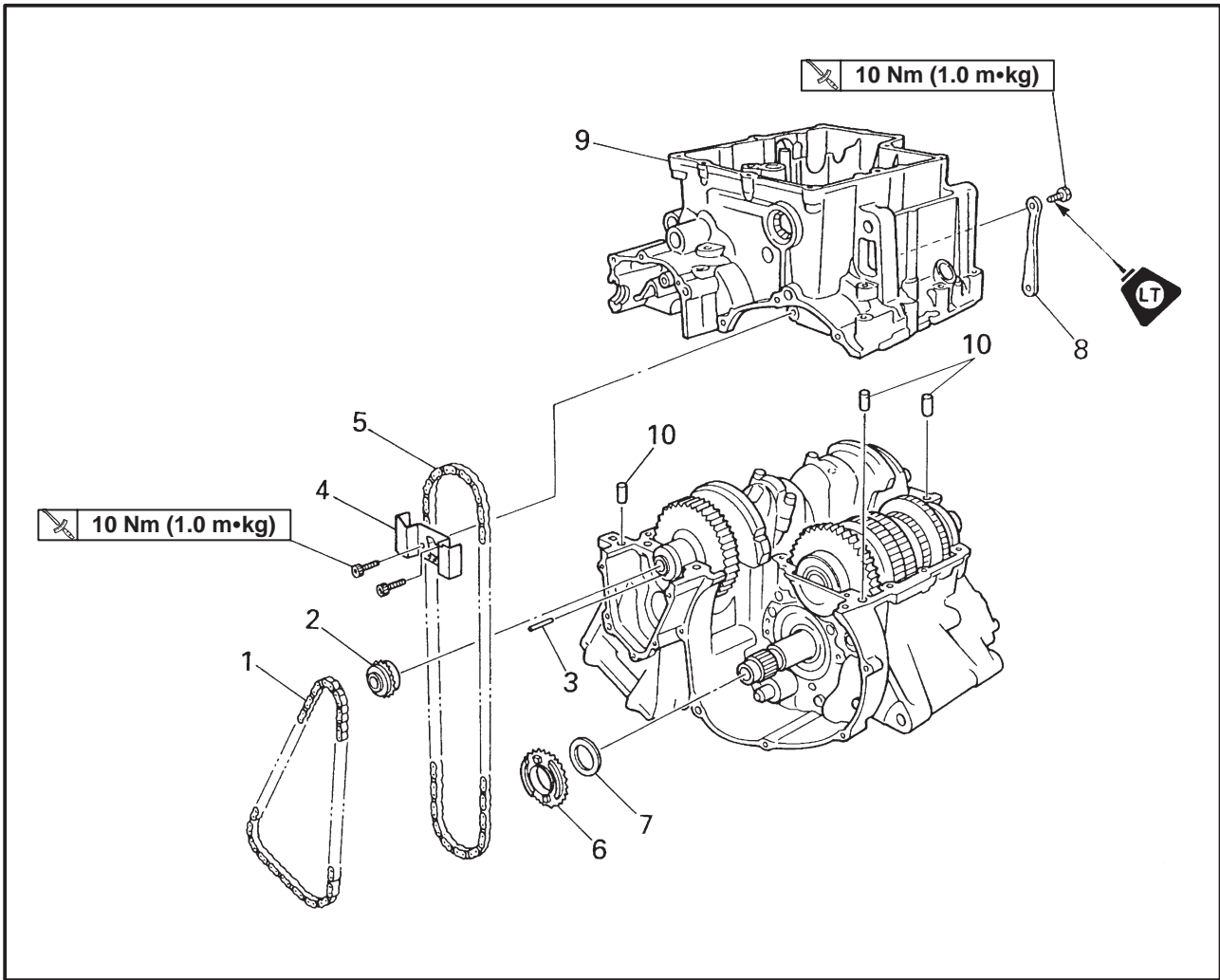


Order	Job/Part	Q'ty	Remarks
	<b>Removing the cylinder head</b>		
	Engine		Remove the parts in the order listed.
	Intake and exhaust camshafts		Refer to "ENGINE".
			Refer to "CAMSHAFTS".
1	Cylinder head	1	
2	Cylinder head gasket	1	
3	Dowel pin	2	
			For installation, reverse the removal procedure.

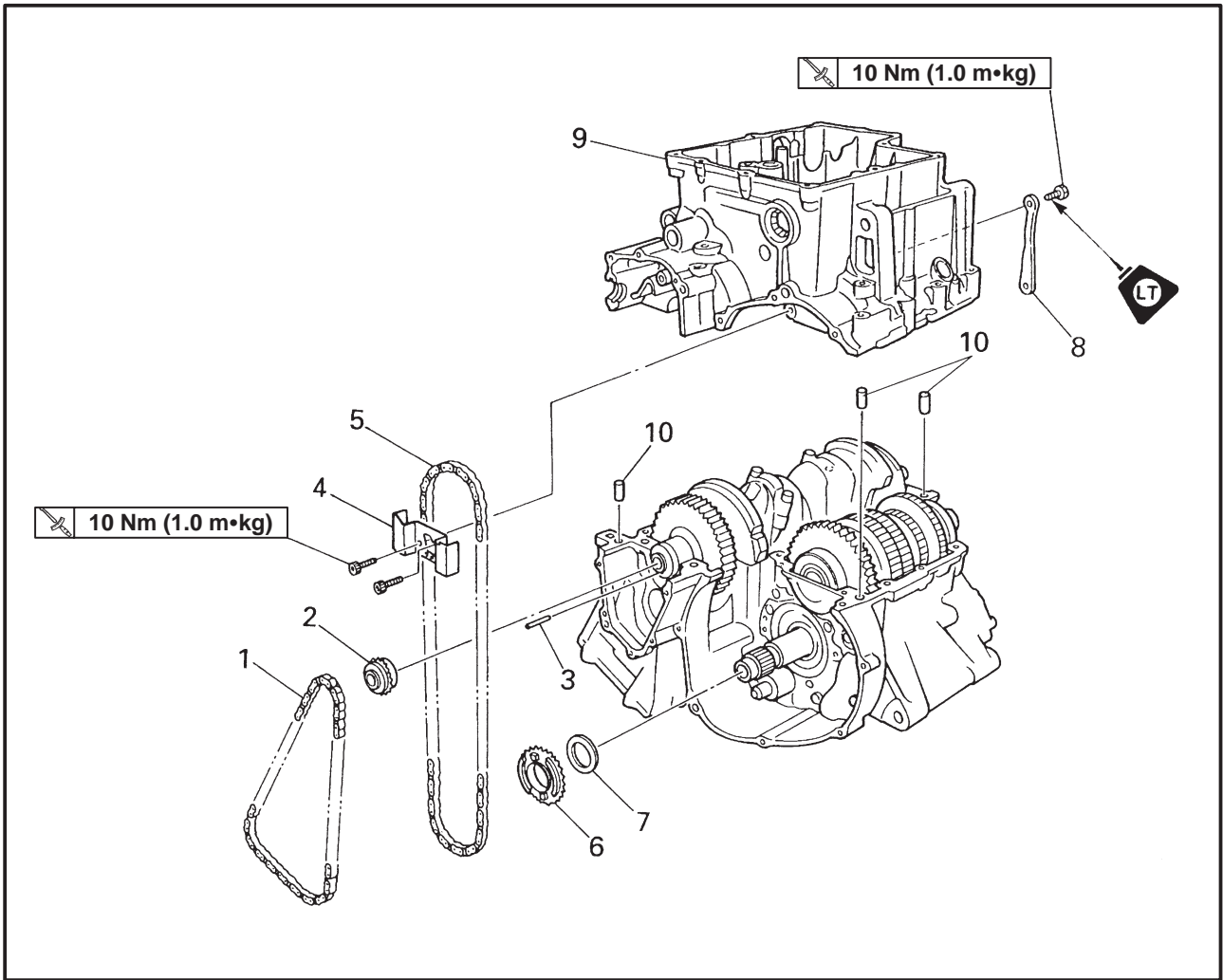




CRANKCASE



Order	Job/Part	Q'ty	Remarks
	<b>Separating the crankcase</b>		Remove the parts in the order listed.
	Engine		Refer to "ENGINE".
	Cylinder head		Refer to "CYLINDER HEAD".
	Pickup coil and pickup coil rotor		Refer to "PICKUP COIL".
	Stator coil assembly		Refer to "GENERATOR".
	Clutch housing and starter clutch idle gear		Refer to "CLUTCH".
	Oil/water pump assembly		Refer to "OIL PAN AND OIL PUMP".
1	Timing chain	1	
2	Crankshaft sprocket	1	
3	Pin	1	
4	Oil/water pump assembly drive chain guide	1	
5	Oil/water pump assembly drive chain	1	



Order	Job/Part	Q'ty	Remarks
6	Oil/water pump assembly drive sprocket	1	For installation, reverse the removal procedure.
7	Washer	1	
8	Plate	1	
9	Lower crankcase	1	
10	Dowel pin	3	



EB412743

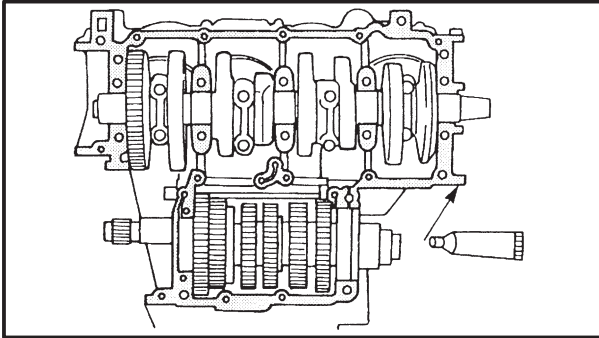
## ASSEMBLING THE CRANKCASE

### 1. Lubricate:

- crankshaft journal bearings  
(with the recommended lubricant)



**Recommended lubricant**  
**Engine oil**

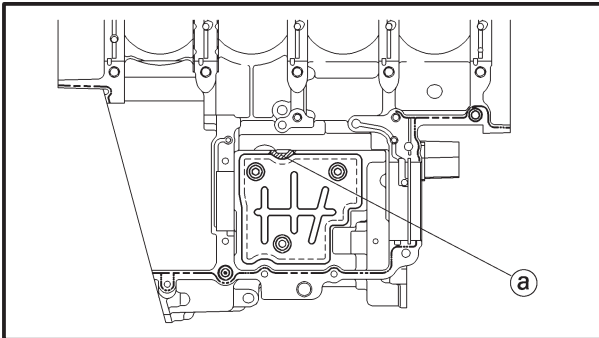


### 2. Apply:

- sealant  
(onto the crankcase mating surfaces and the groove (a) of the oil baffle plate)



**Yamaha bond No. 1215**  
**90890-85505**

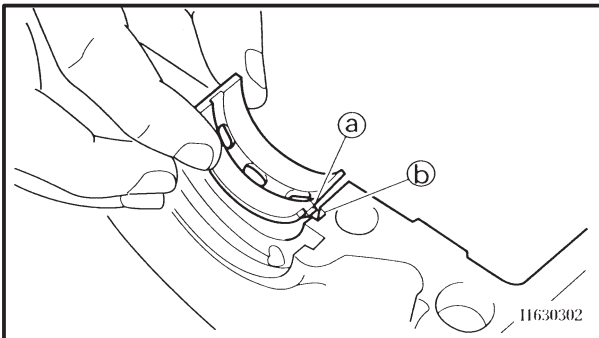


### NOTE:

Do not allow any sealant to come into contact with the oil gallery or crankshaft journal bearings. Do not apply sealant to within 2 ~ 3 mm of the crankshaft journal bearings.

### 3. Install:

- dowel pin



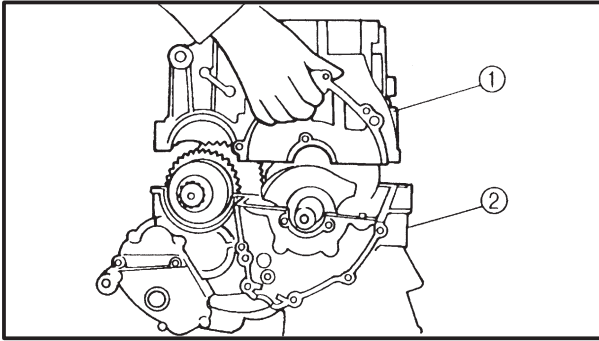
### 4. Install:

- crankshaft journal lower bearings  
(into the lower crankcase)

### NOTE:

- Align the projections (a) on the crankshaft journal lower bearings with the notches (b) in the lower crankcase.
- Install each crankshaft journal lower bearing in its original place.

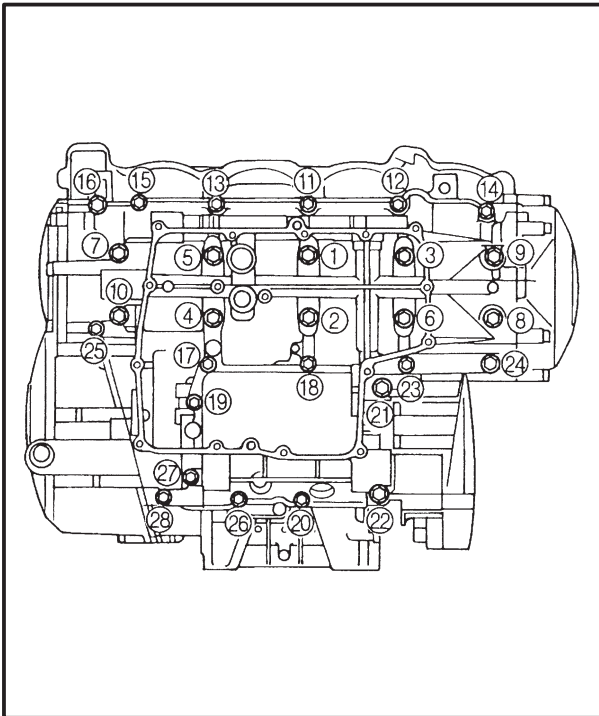
5. Set the shift drum assembly and transmission gears in the neutral position.



6. Install:
- lower crankcase (1)  
(onto the upper crankcase (2))

### CAUTION:

Before tightening the crankcase bolts, make sure that the transmission gears shift correctly when the shift drum assembly is turned by hand.



7. Install:
- crankcase bolts

### NOTE:

- Lubricate the bolt threads with engine oil.
- Install a washer on bolts (1) ~ (10).
- Tighten each bolt at 15 Nm in the tightening sequence cast on the crankcase.
- Loosen each bolt one time and tighten 15 Nm in the same sequence.
- Tighten bolts (1) to (10) 45° ~ 50° more.
- Tighten bolts (11) to (28) as shown below.

- M9 × 115 mm bolts: (1) ~ (10)  
 M8 × 60 mm bolt: (21)  
 M8 × 50 mm bolt: (22)  
 M6 × 70 mm bolts: (17), (19), (25)  
 M6 × 65 mm bolt: (27)  
 M6 × 64 mm bolts: (16), (24)  
 M6 × 60 mm bolt: (23)  
 M6 × 55 mm bolts: (11) ~ (15)  
 M6 × 50 mm bolt: (18)  
 M6 × 45 mm bolts: (20), (26), (28)



**Bolt (1) ~ (10)**

**15 Nm (1.5 m•kg) + 45° ~ 50°**

**Bolt (11) ~ (15), (17) ~ (20), (23), (25) ~ (28)**

**12 Nm (1.2 m•kg)**

**Bolt (16), (24)**

**14 Nm (1.4 m•kg)**

**Bolt (21), (22)**

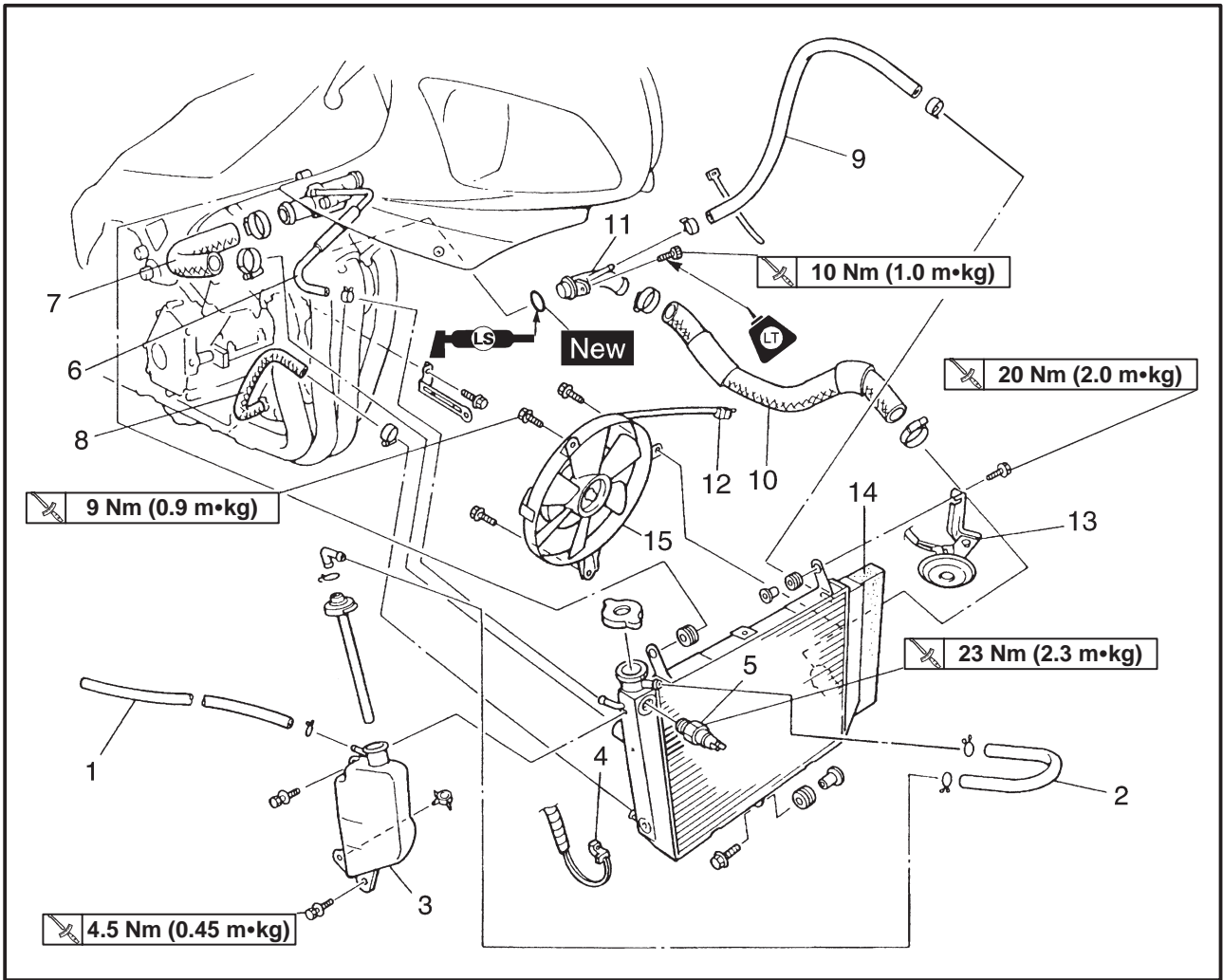
**24 Nm (2.4 m•kg)**



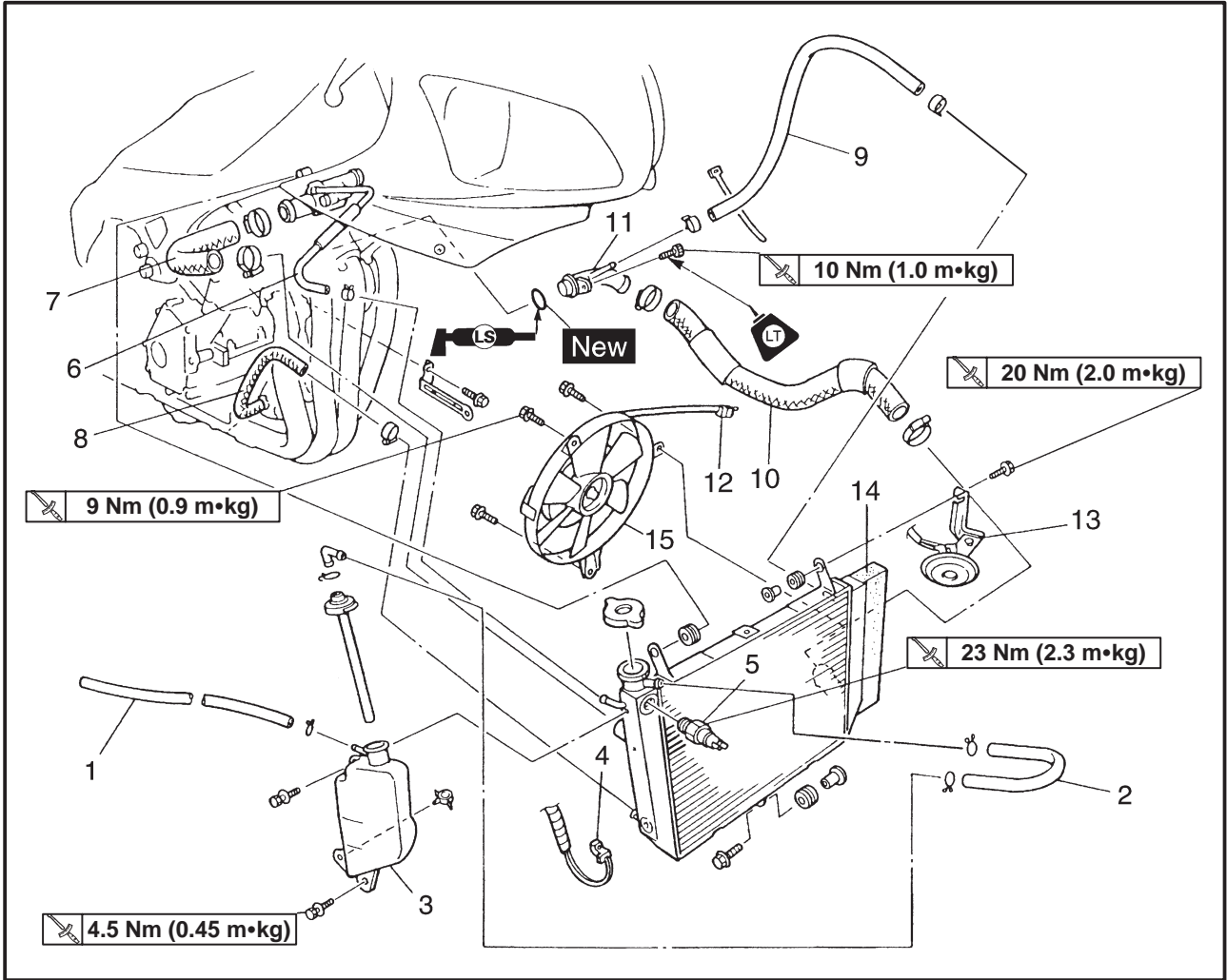
EB500000

COOLING SYSTEM

RADIATOR



Order	Job/Part	Q'ty	Remarks
	<b>Removing the radiator</b>		Remove the parts in the order listed.
	Rider seat and fuel tank		Refer to "SEATS" and "FUEL TANK" in chapter 3.
	Air filter case and rubber cover		Refer to "AIR FILTER CASE AND IGNITION COIL PLATE" in chapter 3.
	Bottom cowling and side cowlings		Refer to "COWLINGS" in chapter 3.
	Drive sprocket cover		Refer to "ENGINE" in chapter 4.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" in chapter 3.
1	Coolant reservoir breather hose	1	
2	Coolant reservoir hose	1	
3	Coolant reservoir	1	
4	Thermo unit coupler	1	Disconnect.



Order	Job/Part	Q'ty	Remarks
5	Thermo unit	1	
6	Thermostat assembly breather hose	1	Disconnect.
7	Radiator inlet hose	1	
8	Oil cooler outlet hose	1	Disconnect.
9	Water pump breather hose	1	
10	Radiator outlet hose	1	
11	Water pump inlet pipe	1	
12	Radiator fan motor coupler	1	Disconnect.
13	Horn bracket	1	
14	Radiator	1	
15	Radiator fan	1	
			For installation, reverse the removal procedure.



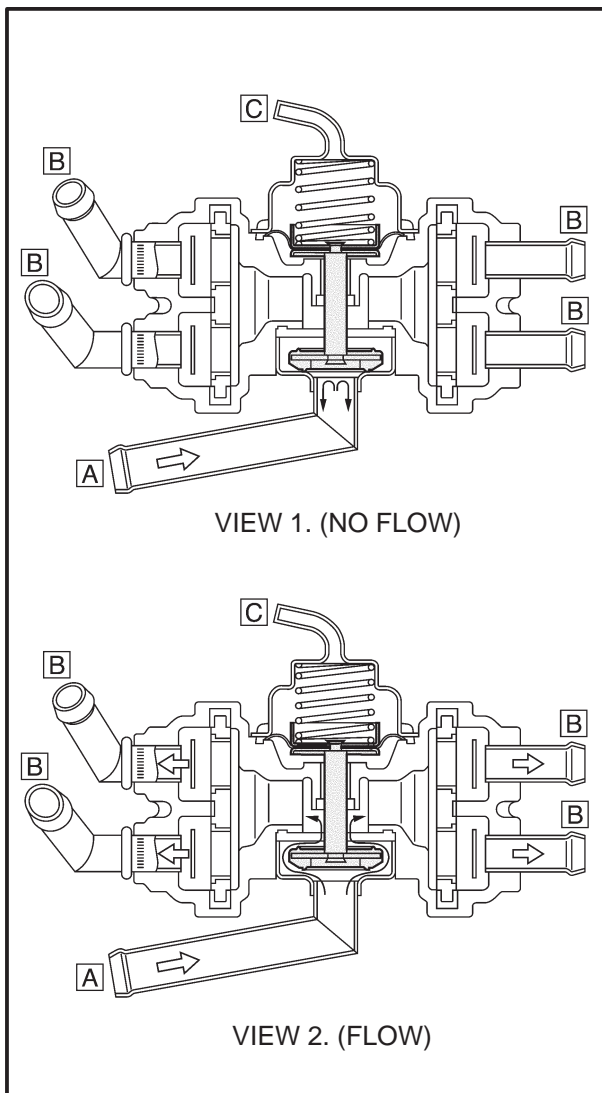
EAS00507

## CARBURETORS

### AIR INDUCTION SYSTEM AIR INJECTION

The air induction system burns unburned exhaust gases by injecting fresh air (secondary air) into the exhaust port, reducing the emission of hydrocarbons.

When there is negative pressure at the exhaust port, the reed valve opens, allowing secondary air to flow into the exhaust port. The required temperature for burning the unburned exhaust gases is approximately 600 to 700°C.



EAS00508

### AIR CUTOFF VALVE

The air cutoff valve is operated by the intake gas pressure through the piston valve diaphragm. Normally, the air cutoff valve is open to allow fresh air to flow into the exhaust port. During sudden deceleration (the throttle valve suddenly closes), negative pressure is generated and the air cutoff valve is closed in order to prevent after-burning.

Additionally, at high engine speeds and when the pressure decreases, the air cutoff valve automatically closes to guard against a loss of performance due to self-EGR.

(This "low-boost close" function is the same as on the FZR600 (3HW).)

#### VIEW 1. (NO FLOW)

When decelerating (the throttle closes), the valve will close.

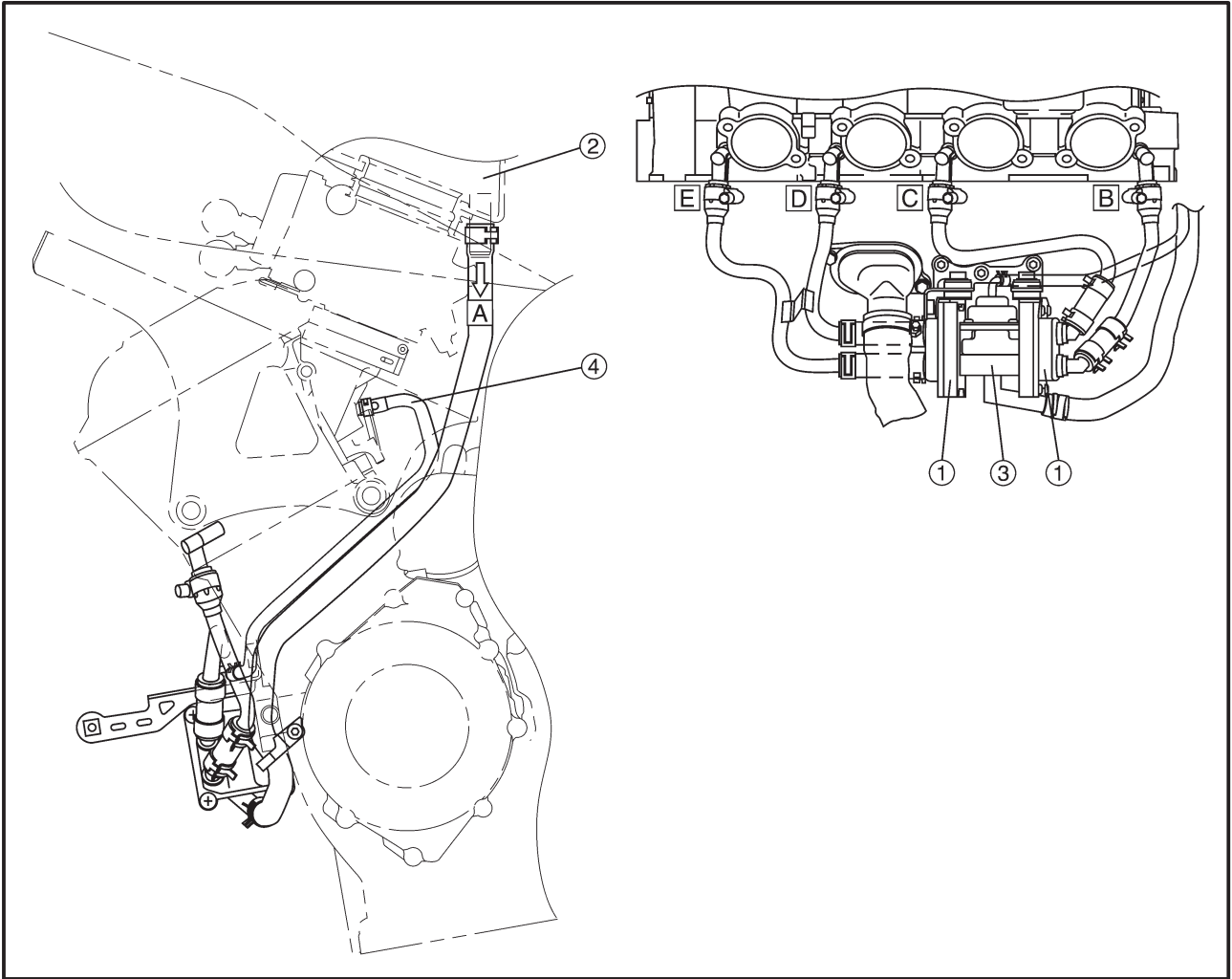
#### VIEW 2. (FLOW)

During normal operation the valve is open.

- A** From the air filter
- B** To the reed valve
- C** To the carburetor joint

EAS00509

AIR INDUCTION SYSTEM DIAGRAMS



- ① Reed valve
- ② Air cleaner
- ③ Air cutoff valve
- ④ Carburetor joint (cylinder #1)

- Ⓐ To the air cutoff valve
- Ⓑ To cylinder #1
- Ⓒ To cylinder #2
- Ⓓ To cylinder #3
- Ⓔ To cylinder #4



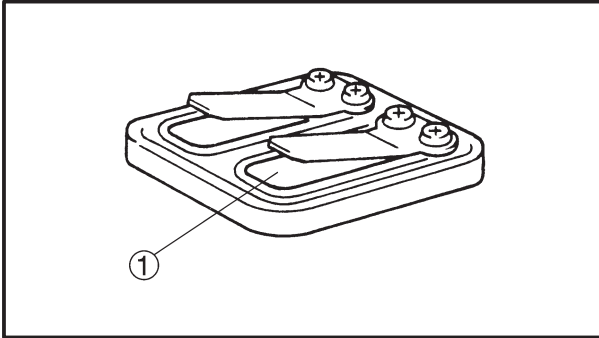


EAS00510

## CHECKING THE AIR INDUCTION SYSTEM

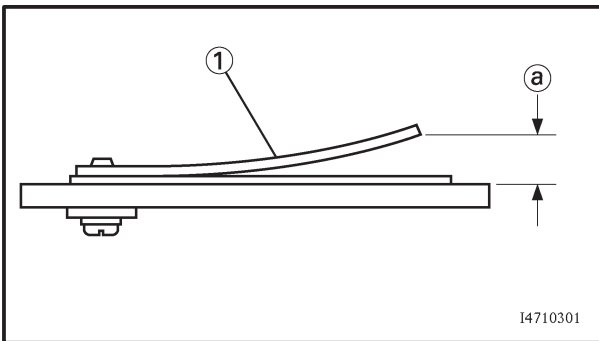
### 1. Check:

- hoses  
Loose connection → Connect properly.  
Cracks/damage → Replace.
- pipes  
Cracks/damage → Replace.



### 2. Check:

- fibre reed ①
- fibre reed stopper
- reed valve seat
- Cracks/damage → Replace.



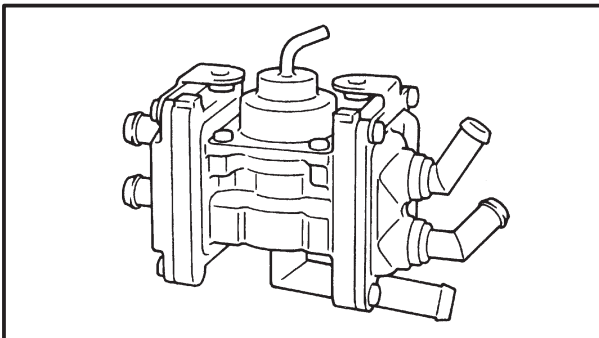
### 3. Measure:

- fibre reed bending limit ②
- Out of specification → Replace the reed valve.



**Fibre reed bending limit**  
**0.4 mm**

① Surface plate



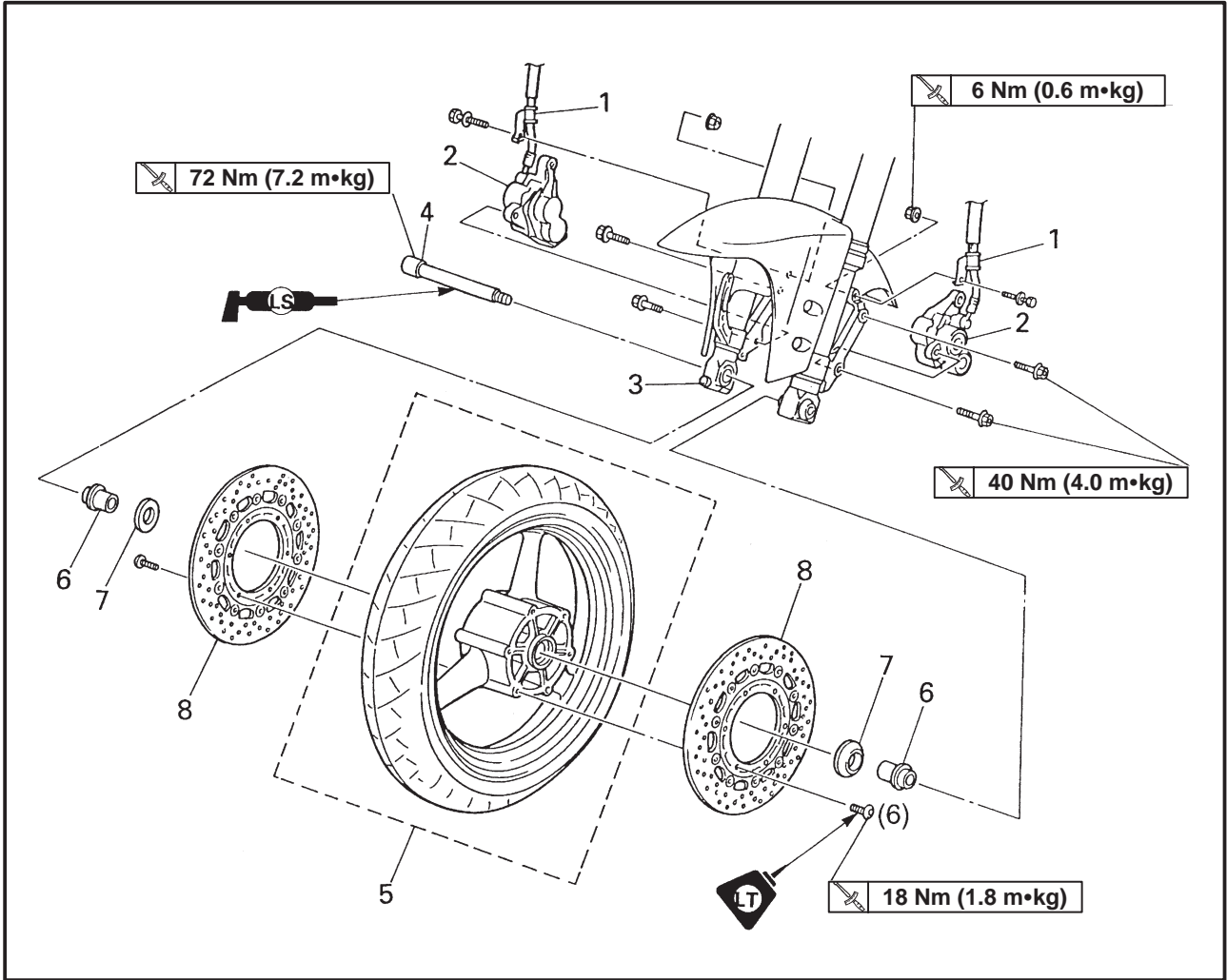
### 4. Check:

- air cutoff valve  
Cracks/damage → Replace.

EB700002

CHASSIS

FRONT WHEEL AND BRAKE DISCS



Order	Job/Part	Q'ty	Remarks
	<b>Removing the front wheel and brake discs</b>		Remove the parts in the order listed. <b>NOTE:</b> _____ Place the motorcycle on a suitable stand so that the front wheel is elevated.
1	Brake hose holder (left and right)	2	Loosen. Refer to "INSTALLING THE FRONT WHEEL".  For installation, reverse the removal procedure.
2	Brake caliper (left and right)	2	
3	Wheel axle pinch bolt	1	
4	Front wheel axle	1	
5	Front wheel	1	
6	Collar (left and right)	2	
7	Oil seal cover (left and right)	2	
8	Brake disc (left and right)	2	

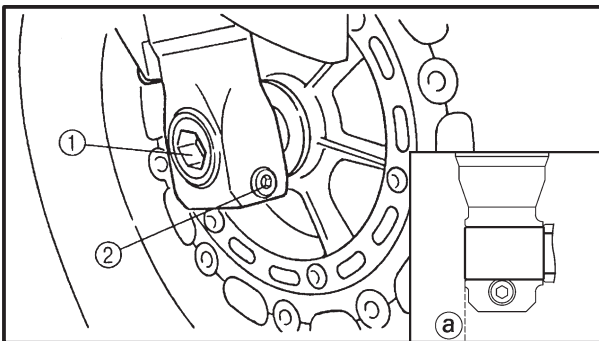
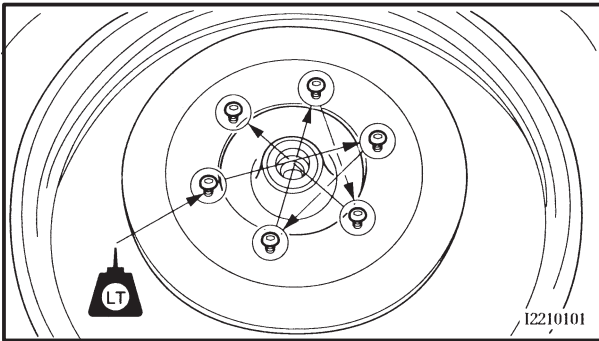
EB700725

## INSTALLING THE FRONT WHEEL

### 1. Lubricate:


- wheel axle
- oil seal lips

	<b>Recommended lubricant</b> Lithium soap base grease
---	--



### 2. Install:

- brake discs ①


 **18 Nm (1.8 m•kg)**


### NOTE:

- Apply LOCTITE® 648 to the threads of the brake disc bolts.
- Tighten the brake disc bolts in stages and in a crisscross pattern.

### 3. Tighten:

- wheel axle ①
- wheel axle pinch bolt ①

 **72 Nm (7.2 m•kg)**

 **23 Nm (2.3 m•kg)**

### NOTE:


When front wheel is installed to front fork, make sure that wheel axle ① top end side and front fork end side are align ② together. Then, tighten wheel axle pinch bolt ②.

### CAUTION:

Before tightening the wheel axle nut, push down hard on the handlebars several times and check if the front fork rebounds smoothly.

### 4. Install:

- brake calipers

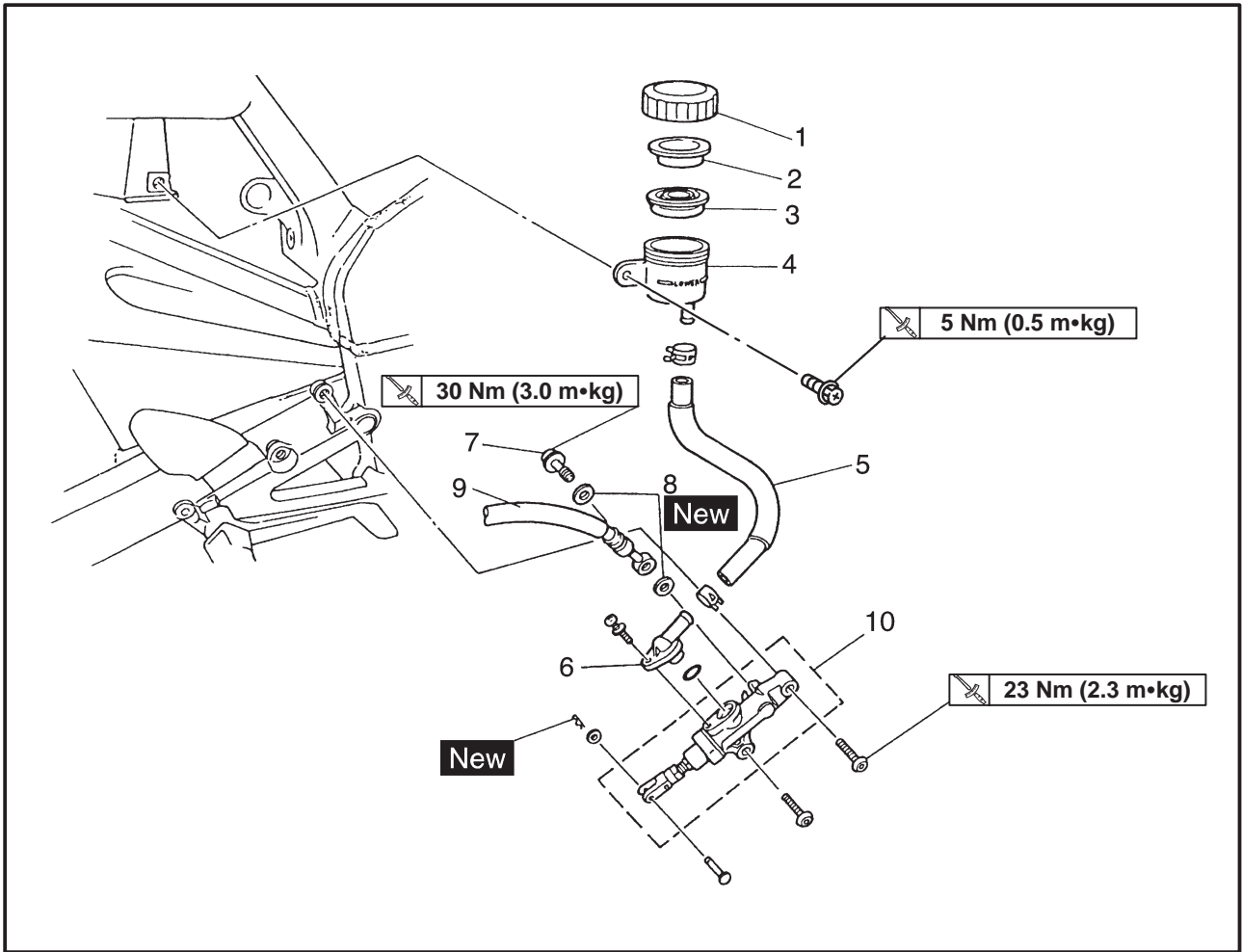
 **40 Nm (4.0 m•kg)**

### **WARNING**

Make sure that the brake hose is routed properly.

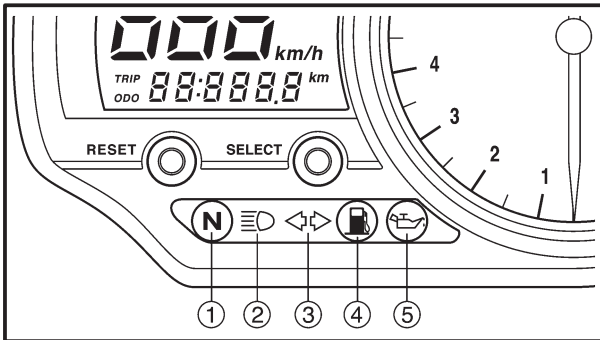
EB702202

**FRONT AND REAR BRAKES**  
**REAR BRAKE MASTER CYLINDER AND BRAKE FLUID RESERVOIR**



Order	Job/Part	Q'ty	Remarks
	<b>Removing the rear brake master cylinder and brake fluid reservoir</b>		Remove the parts in the order listed.
	Brake fluid		Drain.
1	Brake fluid reservoir cap	1	
2	Brake fluid reservoir diaphragm holder	1	
3	Brake fluid reservoir diaphragm	1	
4	Brake fluid reservoir	1	
5	Brake fluid reservoir hose	1	
6	Hose joint	1	
7	Union bolt	1	
8	Copper washer	2	
9	Brake hose	1	
10	Brake master cylinder	1	
			For installation, reverse the removal procedure.

**ELECTRICAL**  
**INSTRUMENT FUNCTIONS**  
**INDICATOR LIGHTS**



- ① Neutral indicator light “N”
- ② High beam indicator light “≡”
- ③ Turn signal indicator light “↔”
- ④ Fuel level warning light “⛽”
- ⑤ Oil level warning light “🛢️”

**Neutral indicator light “N”**

This indicator light comes on when the transmission is in the neutral position.

**High beam indicator light “≡”**

This indicator comes on when the headlight high beam is used.

**Turn signal indicator light “↔”**

This indicator light flashes when the turn signal switch is pushed to the left or right.

**Fuel level warning light “⛽”**

This warning light comes on when the fuel level drops below approximately 3.8 L. When this occurs, refuel as soon as possible.

The electrical circuit of the warning light can be checked according to the following procedure.

1. Set the engine stop switch to “⊗” and turn the key to “ON”.
2. Shift the transmission into the neutral position or pull the clutch lever.
3. Push the start switch. If the warning light does not come on while pushing the start switch, have a Yamaha dealer check the electrical circuit.

**NOTE:**

This model is equipped with a selfdiagnosis device for the fuel level warning light circuit. Refer to “SELF-DIAGNOSIS”.

**Oil level warning light “🛢️”**

This warning light comes on when the engine oil level is low.

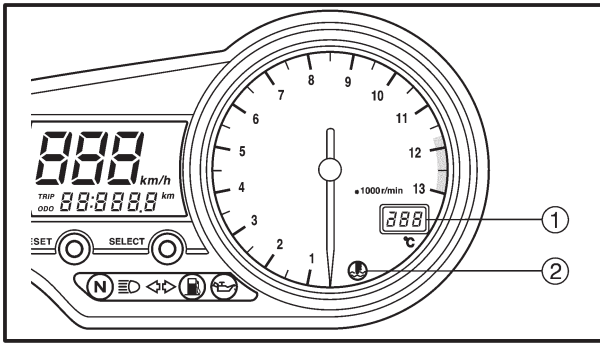
The electrical circuit of the warning light can be checked according to the following procedure.


1. Set the engine stop switch to “⊗” and turn the key to “ON”.
2. Shift the transmission into the neutral position or pull the clutch lever.
3. Push the start switch. If the warning light does not come on while pushing the start switch, have a Yamaha dealer check the electrical circuit.

**NOTE:**

Even if the oil level is sufficient, the warning light may flicker when riding on a slope or during sudden acceleration or deceleration, but this is not a malfunction.

**COOLANT TEMPERATURE WARNING LIGHT**




- ① Coolant temperature gauge
- ② Coolant temperature warning light “”

**Coolant temperature warning light “”**

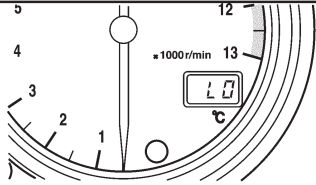
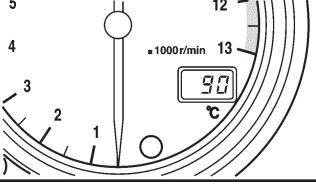
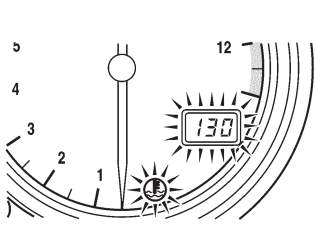
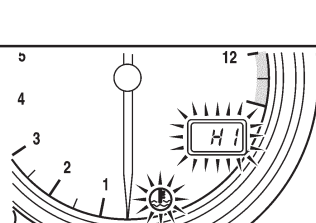
This warning light comes on when the engine overheats. When this occurs, stop the engine immediately and allow the engine to cool.

The electrical circuit of the warning light can be checked according to the following procedure.

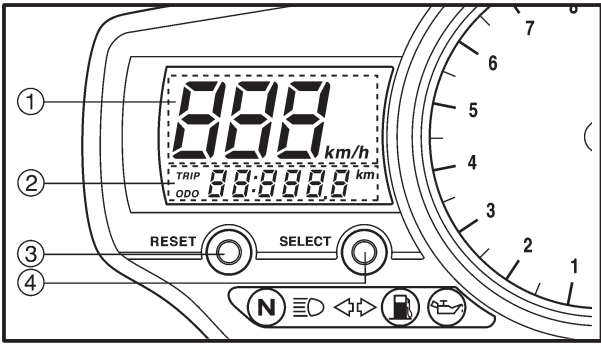
1. Set the engine stop switch to “” and turn the key to “ON”.
2. Shift the transmission into the neutral position or pull the clutch lever.
3. Push the start switch. If the warning light does not come on while pushing the start switch, have a Yamaha dealer check the electrical circuit.

**CAUTION:** \_\_\_\_\_

**Do not operate the engine if it is overheated.**

Coolant temperature	Display	Conditions	What to do
0 – 39°C		Message “LO” is displayed.	OK. Go ahead with riding.
40 – 116°C		Temperature is displayed.	OK. Go ahead with riding.
117 – 139°C		Temperature flashes. Warning light comes on.	Stop the motorcycle and allow it to idle until the coolant temperature goes down. If the temperature does not go down, stop the engine. Refer to “OVER HEATING” in chapter 9.
Above 140°C		Message “HI” flashes. Warning light comes on.	Stop the engine and allow it to cool. Refer to “OVER HEATING” in chapter 9.

**SPEEDOMETER UNIT**



- ① Speedometer
- ② Odometer/tripmeter/fuel reserve tripmeter/  
clock
- ③ “RESET” button
- ④ “SELECT” button

The speedometer unit is equipped with the following:

- a digital speedometer (which shows riding speed)
- an odometer (which shows the total distance traveled)
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled on the fuel reserve)
- a clock

**Odometer and tripmeter modes**

Pushing the “SELECT” button switches the display between the odometer mode “ODO” and the tripmeter modes “TRIP 1” and “TRIP 2” in the following order:

ODO → TRIP 1 → TRIP 2 → ODO

If the fuel level warning light comes on (see page 3-2), the odometer display will automatically change to the fuel reserve tripmeter mode “TRIP F” and start counting the distance traveled from that point. In that case, pushing the “SELECT” button switches the display between the various tripmeter and odometer modes in the following order:

TRIP F → TRIP 1 → TRIP 2 → ODO → TRIP F

To reset a tripmeter, select it by pushing the “SELECT” button, and then push the “RESET” button. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to “TRIP 1” after refueling and traveling 5 km.

**NOTE:** \_\_\_\_\_

After resetting the fuel reserve tripmeter, the display will return to “TRIP 1”, unless a different mode had been previously selected; in that case, the display automatically returns to the prior mode.

**Clock mode**

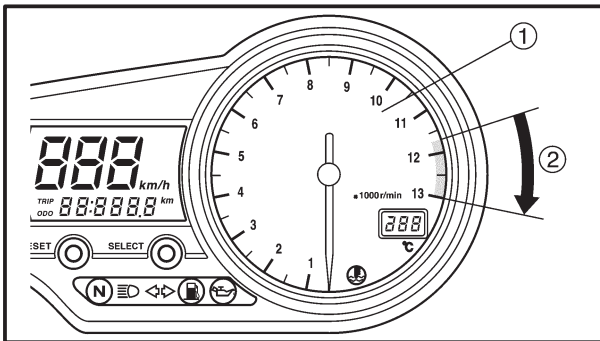
To change the display to the clock mode, push the “SELECT” button for at least one second.

To change the display back to the odometer modes, push the “SELECT” button.

To set the clock:

1. Push the “SELECT” button and “RESET” button together for at least two seconds.
2. When the hour digits start flashing, push the “RESET” button to set the hours.
3. Push the “SELECT” button, and the minute digits will start flashing.
4. Push the “RESET” button to set the minutes.
5. Push the “SELECT” button and then release it to start the clock.

**Tachometer**



The electric tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.

**CAUTION:**

**Do not operate the engine in the tachometer red zone.**

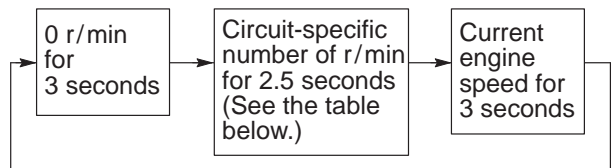
**Red zone: 11,750 r/min and above**

**Self-diagnosis devices**

This model is equipped with a self-diagnosis device for the following electrical circuits:

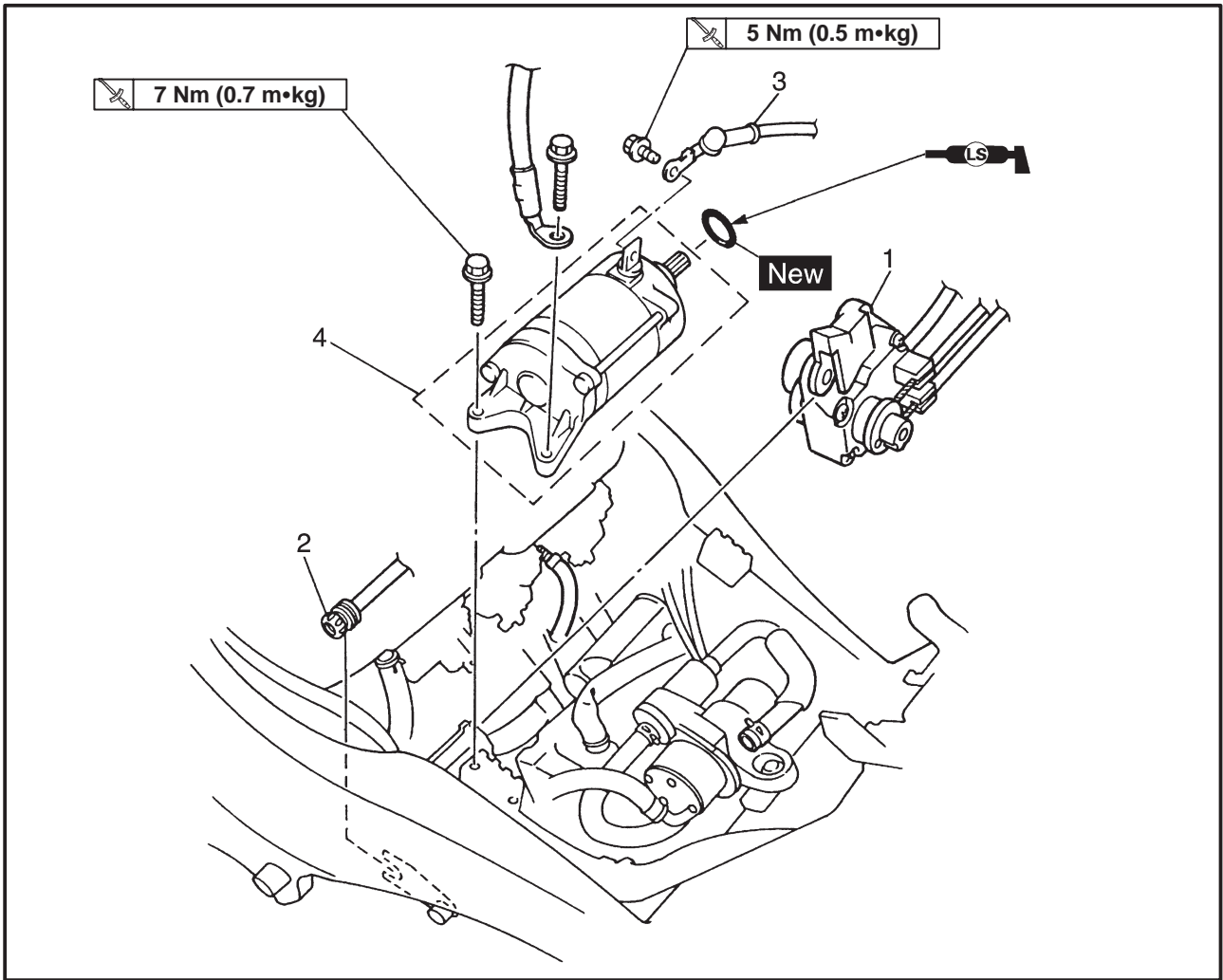
- Throttle position sensor
- Speed sensor
- EXUP system

If any of those circuits are defective, the tachometer will repeatedly display the following error code:



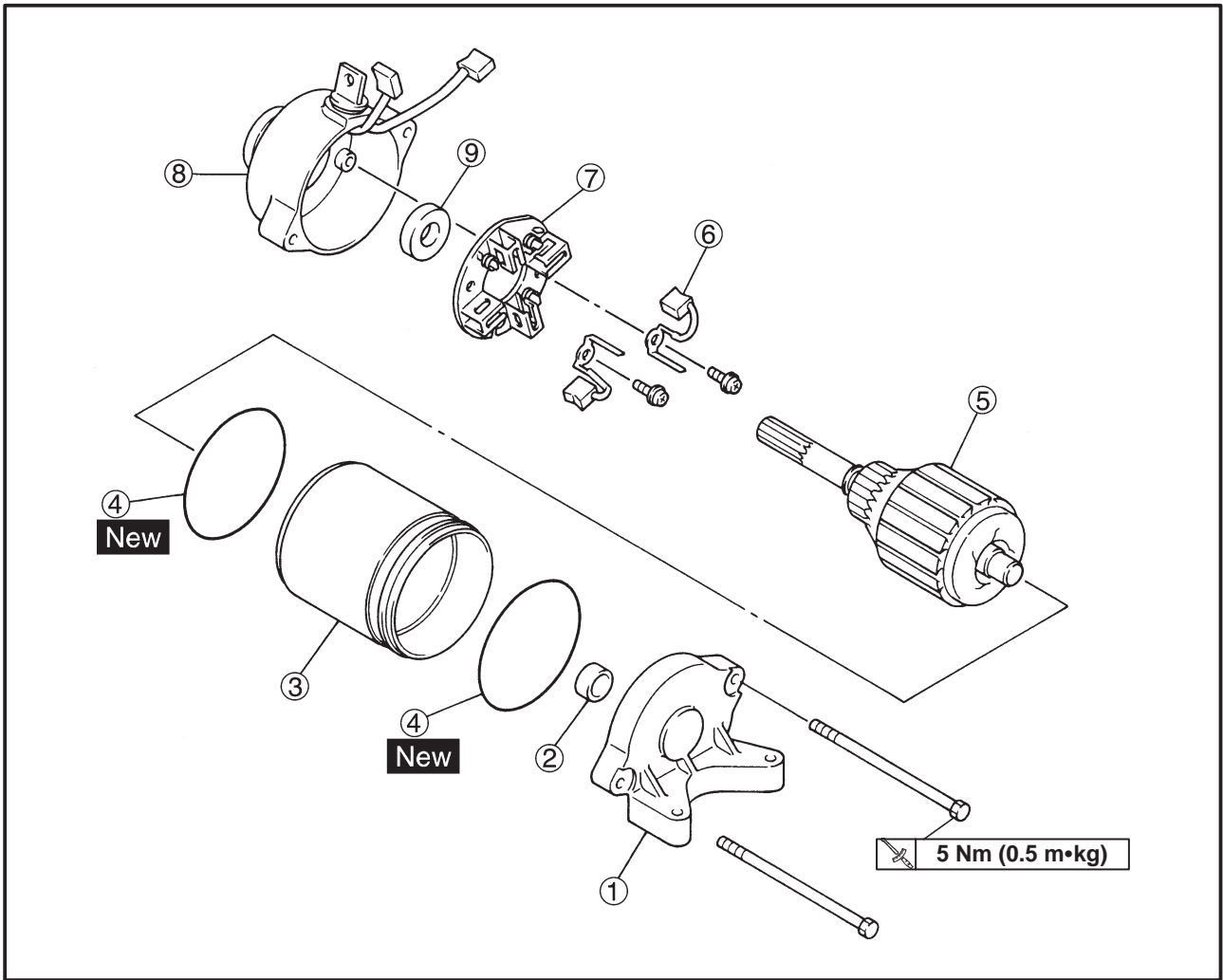


**ELECTRIC STARTING SYSTEM**  
**STARTER MOTOR**



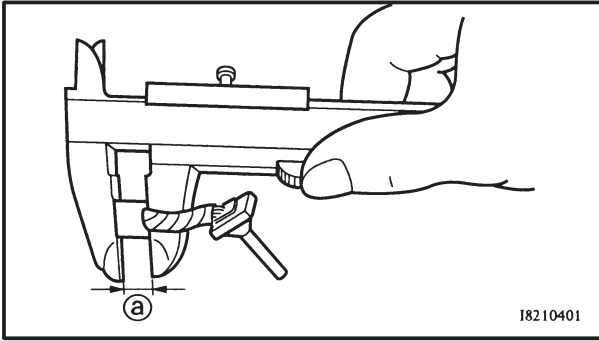
Order	Job/Part	Q'ty	Remarks
	<b>Removing the starter motor</b>		
	Rider seat		Remove the parts in the order listed.
	Fuel tank		Refer to "SEATS" in chapter 3.
	Left side cowling		Refer to "FUEL TANK" in chapter 3.
			Refer to "COWLINGS" in chapter 3.
1	EXUP servomotor	1	
2	Throttle stop screw	1	
3	Starter motor lead	1	
4	Starter motor assembly	1	
			For installation, reverse the removal procedure.

EB803501



Order	Job/Part	Q'ty	Remarks
	<b>Disassembling the starter motor</b>		Disassembly the parts in the order listed.
①	Starter motor rear cover	1	
②	Bearing	1	
③	Starter motor yoke	1	
④	O-ring	2	
⑤	Armature assembly	1	
⑥	Brush	2	
⑦	Brush holder	1	
⑧	Starter motor front cover	1	
⑨	Bearing	1	
			For assembly, reverse the disassembly procedure

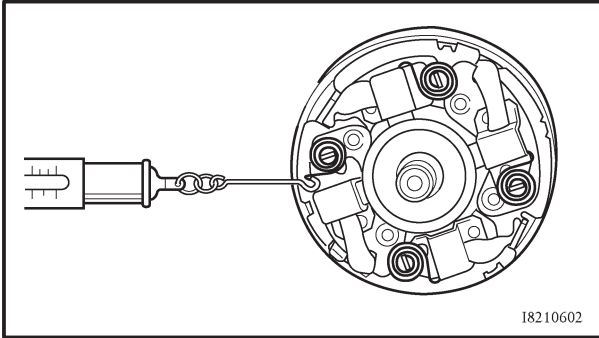




5. Measure:
- brush length ①
- Out of specification → Replace the brushes as a set.



**Min. brush length**  
**3.65 mm**

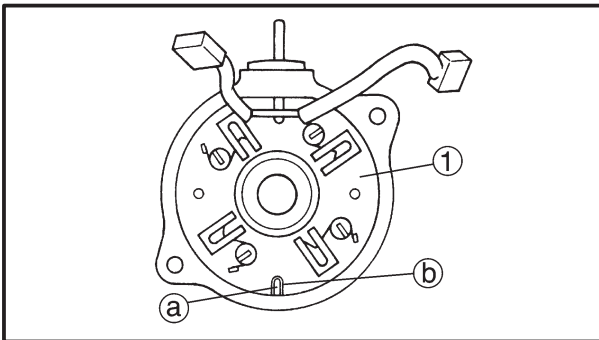


6. Measure:
- brush spring force
- Out of specification → Replace the brush springs as a set.



**Brush spring force**  
**5.28 ~ 7.92 N**

7. Check:
- gear teeth
- Damage/wear → Replace the gear.
8. Check:
- bearing
  - oil seal
- Damage/wear → Replace the defective part(-s).



EB803701

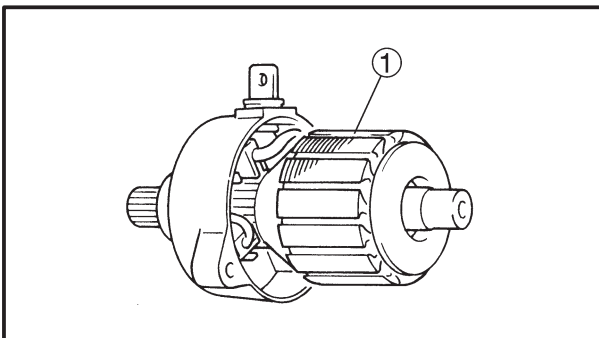
### Assembling The Starter Motor

1. Install:
- brush seat ①

**NOTE:** \_\_\_\_\_

Align the tab ① on the brush seat with the slot ② in the starter motor front cover.

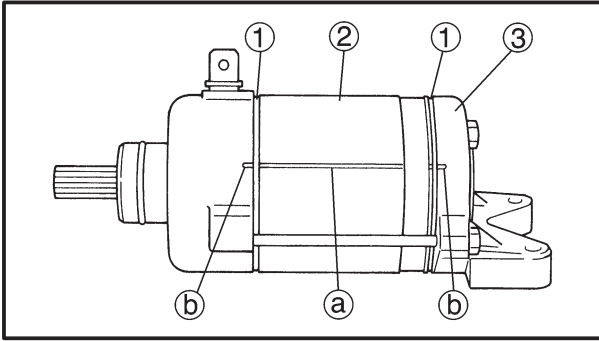
\_\_\_\_\_



2. Install:
- armature ①


## ELECTRIC STARTING SYSTEM

ELEC



### 3. Install:

- starter motor yoke ②
- O-rings ① **New**
- starter motor rear cover ③
- bolts

 **5 Nm (0.5 m•kg)**

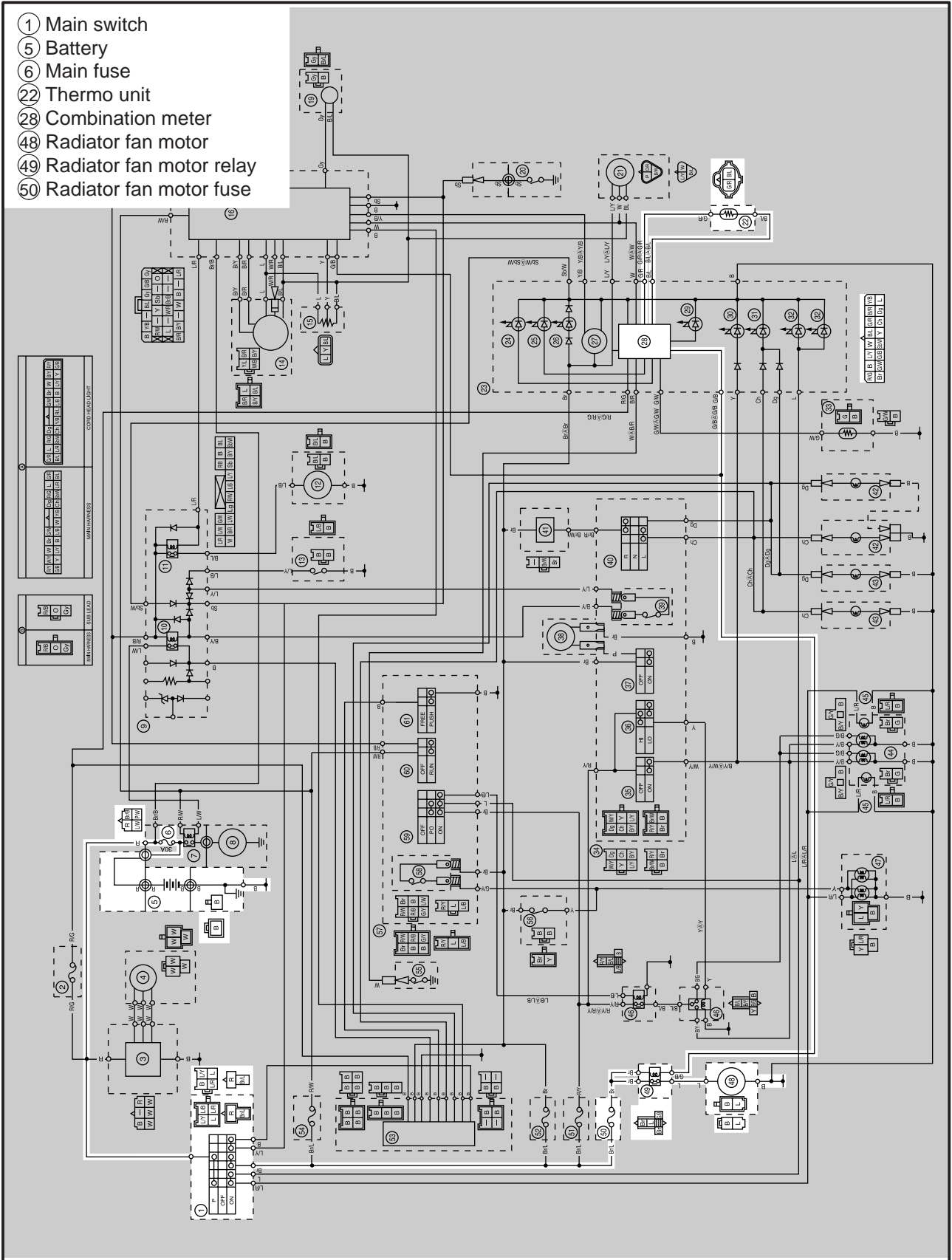
### NOTE:

Align the match marks (a) on the starter motor yoke with the match marks (b) on the front and rear covers.

EB807000

COOLING SYSTEM  
CIRCUIT DIAGRAM

- ① Main switch
- ⑤ Battery
- ⑥ Main fuse
- ②② Thermo unit
- ②⑧ Combination meter
- ④⑧ Radiator fan motor
- ④⑨ Radiator fan motor relay
- ⑤⑩ Radiator fan motor fuse





EB807010

### TROUBLESHOOTING

- The radiator fan motor fails to turn.
- The coolant temperature meter needle fails to move when the engine is warm.

#### CAUTION:

- If the engine is kept running at over 1,500 rpm for at least one minute with the switch remaining placed in neutral position and the throttle valve fully open, even when the coolant temperature is low enough, the radiator fan motor will start rotating. This, however, is not trouble.
- Keep hands and other body regions away to avoid injury.

Check:

1. main, signal system, and radiator fan motor fuses
2. battery
3. main switch
4. radiator fan motor
5. Fan motor relay
6. Speedometer
7. Thermo unit
8. Wiring  
(the entire cooling system)

#### NOTE:

- Before troubleshooting, remove the following part(-s).
  - 1) rider seat
  - 2) bottom cowling
  - 3) front cowling inner panels
  - 4) left side cowling
  - 5) windshield
- Troubleshooting with the following special tool(-s).



**Pocket tester**  
90890-03112

EB802400

1. Main, signal system and radiator fan motor fuses

- Check the main, signal system, and radiator fan motor fuses for continuity. Refer to "CHECKING THE FUSES" in chapter 3.
- Are the main, signal system, and radiator fan motor fuses OK?

↓ YES

↓ NO

Replace the fuse(-s).

EB802401

2. Battery

- Check the condition of the battery. Refer to "CHECKING AND CHARGING THE BATTERY" in chapter 3.



**Open-circuit voltage**  
12.8 V or more at 20°C

- Is the battery OK?

↓ YES

↓ NO

- Clean the battery terminals.
- Recharge or replace the battery.

EB802411

3. Main switch

- Check the main switch for continuity. Refer to "CHECKING THE SWITCHES".
- Is the main switch OK?

↓ YES

↓ NO

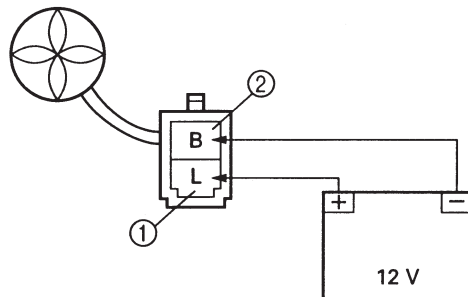
Replace the main switch.

EB807400

4. Radiator fan motor

- Disconnect the radiator fan motor coupler from the wire harness.
- Connect the battery (12 V) as shown.

**Battery positive lead** → blue ①  
**Battery negative lead** → black ②



- Does the radiator fan motor turn?

↓ YES

↓ NO

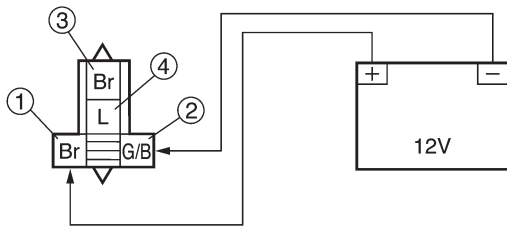
The radiator fan motor is faulty and must be replaced.

EB807400

5. Fan motor relay

- Disconnect the fan motor relay coupler.
- Connect the pocket tester ( $\Omega \times 1$ ) and battery (12V) to the fan motor relay coupler as shown.

**Battery positive lead** → brown ①  
**Battery negative lead** → green/black ②  
**Tester positive probe** → brown ③  
**Tester negative probe** → blue ④



- Does the radiator fan motor relay have continuity between brown and blue?

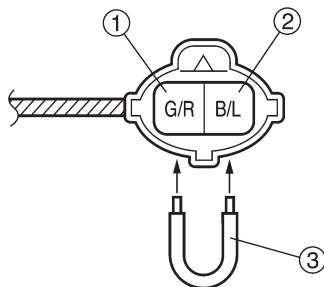
↓ YES                      ↓ NO

Replace the fan motor relay.

EB807400

6. Speedometer

- Disconnect the thermo unit coupler.
- Set the main switch to "ON".
- Connect the green/red ① and black/blue ② terminals with a jumper lead ③ as shown.



- Does the coolant temperature display "HI" and warning light comes on?

↓ YES                      ↓ NO

The speedometer is faulty and must be repaired.

EB807402

7. Thermo unit

- Remove the thermo unit from the radiator.
- Connect the pocket tester ( $\Omega \times 1$ ) to the thermo unit ① as shown.
- Immerse the thermo unit in a container filled with coolant ②.

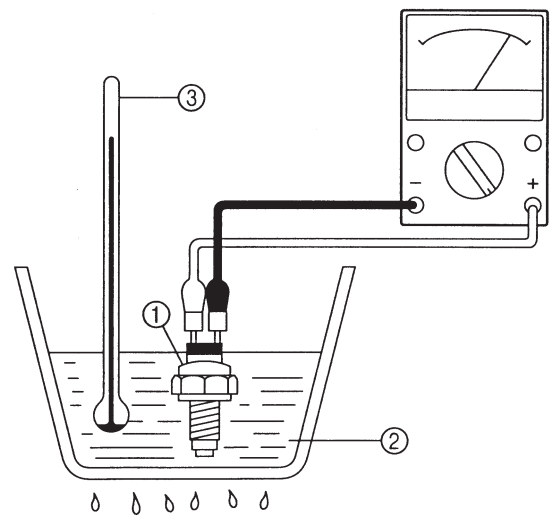
**NOTE:** \_\_\_\_\_  
 Make sure that the thermo unit terminals do not get wet.

- Place a thermometer ③ in the coolant.
- Slowly heat the coolant, then let it cool to the specified temperature as indicated in the table.
- Check the thermo unit for continuity at the temperatures indicated in the table.



Thermo unit

9.7 ~ 11.4 k $\Omega$ at 50 °C
3.4 ~ 4.0 k $\Omega$ at 80 °C
1.6 ~ 1.9 k $\Omega$ at 105 °C
1.1 ~ 1.2 k $\Omega$ at 120 °C



**⚠ WARNING**

- Handle the thermo unit with special care.
- Never subject the thermo unit to strong shocks. If the thermo unit is dropped, replace it.



Thermo unit

23 Nm (2.3 m•kg)  
 Three bond sealock® 10



• Does the thermo unit operate properly as described above?

↓ YES

↓ NO

Replace the thermo unit.

EB807403

8. Wiring

- Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM".
- Is the cooling system's wiring properly connected and without defects?

↓ YES

↓ NO

This circuit is OK.

Properly connect or repair the cooling system's wiring.



EB812000

## SELF-DIAGNOSIS

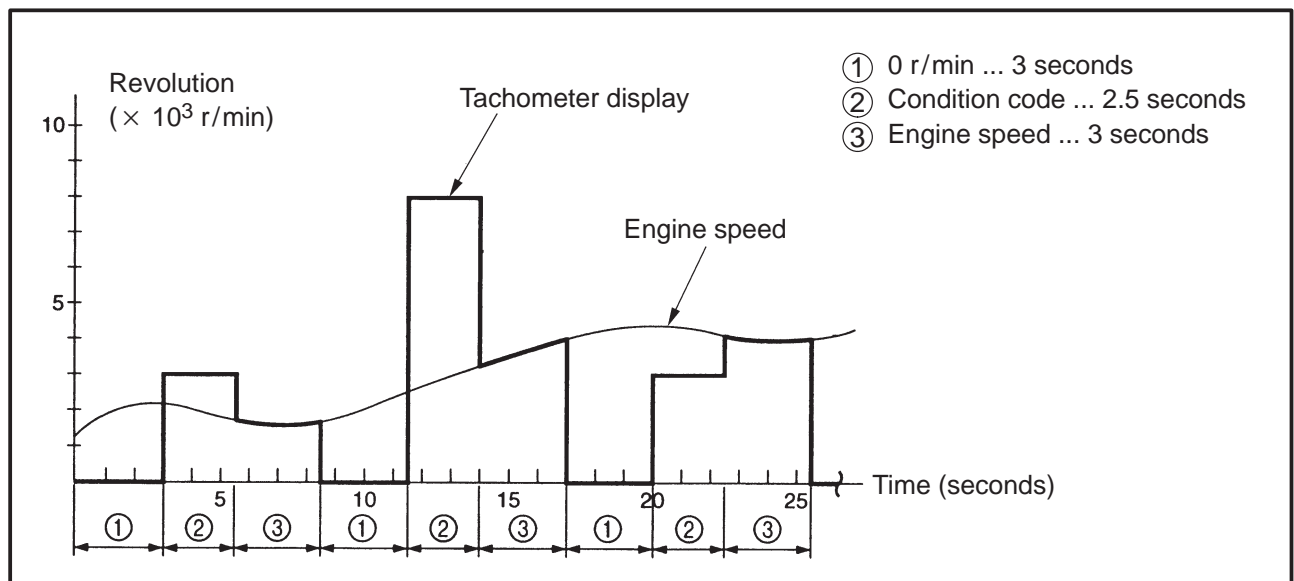
The YZF-R1 features a self-diagnosing system for the following circuit(-s):

- throttle position sensor
- EXUP
- speed sensor
- fuel level warning light

If any of these circuits are defective, their respective condition codes will be displayed on the tachometer when the main switch is set to "ON" (irrespective of whether the engine is running or not)

Circuit	Defect(-s)	System response	Condition code
Throttle position sensor	<ul style="list-style-type: none"> <li>• Disconnected</li> <li>• Short-circuit</li> <li>• Locked</li> </ul>	<ul style="list-style-type: none"> <li>• The ignitor unit stays set to the wide-open throttle ignition timing. The motorcycle can be ridden.</li> <li>• The tachometer displays the condition code.</li> </ul>	3,000 r/min
EXUP	<ul style="list-style-type: none"> <li>• Improper connection</li> <li>• Short-circuit</li> </ul>	<ul style="list-style-type: none"> <li>• The EXUP valve stays in the open position for three seconds and then the servomotor shuts off. The motorcycle can be ridden.</li> <li>• The tachometer displays the condition code.</li> </ul>	7,000 r/min
	<ul style="list-style-type: none"> <li>• Servomotor is locked.</li> </ul>	<ul style="list-style-type: none"> <li>• The servomotor's power supply is constantly interrupted so that it will not burn out. The motorcycle can be ridden.</li> <li>• The tachometer displays the condition code.</li> </ul>	
Speed sensor	<ul style="list-style-type: none"> <li>• Disconnected</li> <li>• Short-circuit</li> </ul>	<ul style="list-style-type: none"> <li>• The tachometer displays the condition code.</li> </ul>	4000 r/min
Fuel level warning light	<ul style="list-style-type: none"> <li>• Improper connection</li> <li>• Short-circuit</li> </ul>	<ul style="list-style-type: none"> <li>• Display the condition code on the fuel level warning light.</li> </ul>	The warning light will flash eight times, then go off for three seconds.

### Tachometer display sequence



When more than one item is being monitored, the tachometer needle displays the condition codes in ascending order, cycling through the sequence repeatedly.

If the engine is stopped, the engine speed ③ is 0 r/min.

EB812010

**TROUBLESHOOTING**

**The tachometer starts to display the self-diagnosis sequence.**

Check:

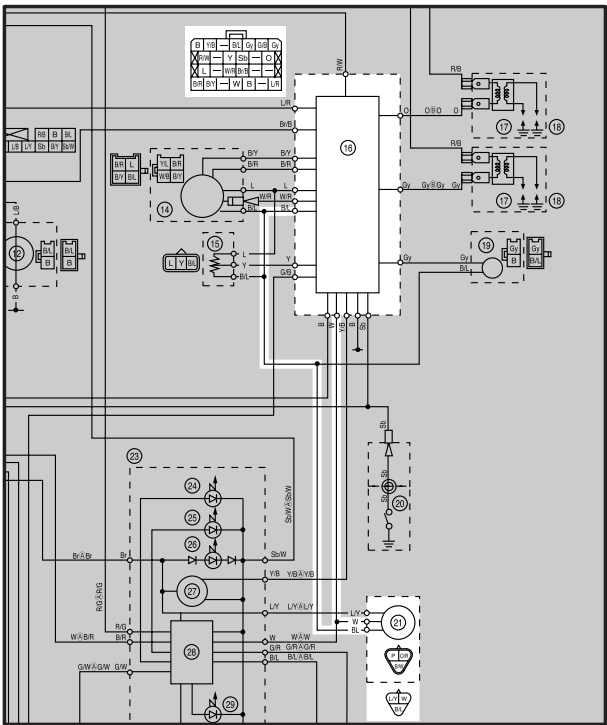
1. speed sensor
2. fuel level warning light

**NOTE:**

- Troubleshoot with the following special tool(-s).

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

**1. Speed sensor**  
**CIRCUIT DIAGRAM**



- ① Ignitor unit
- ② Speed sensor

**1. Wire harness**

- Check the wire harness for continuity. Refer to "CIRCUIT DIAGRAM".
- Is the wire harness OK?

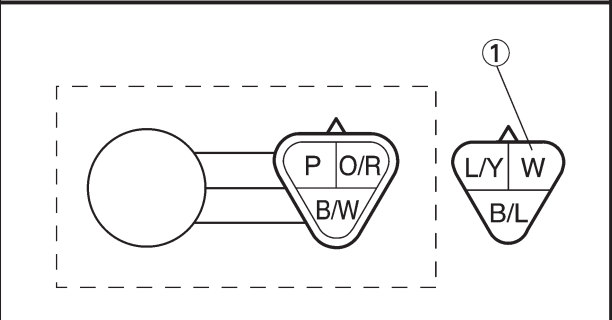
↓ YES                      ↓ NO

Repair or replace the wire harness.

**2. Speed sensor**

- Place the motorcycle on a suitable stand so that the rear wheel is elevated.
- Connect the pocket tester (DC 20V) to the speed sensor connector.

**Tester (+) lead → White ① terminal**  
**Tester (-) lead → Body earth**



- Set the main switch to "ON".
- Turn the rear wheel slowly.
- Check the tester voltage (0V - 5V - 0V).
- Is the speed sensor OK?

↓ YES                      ↓ NO

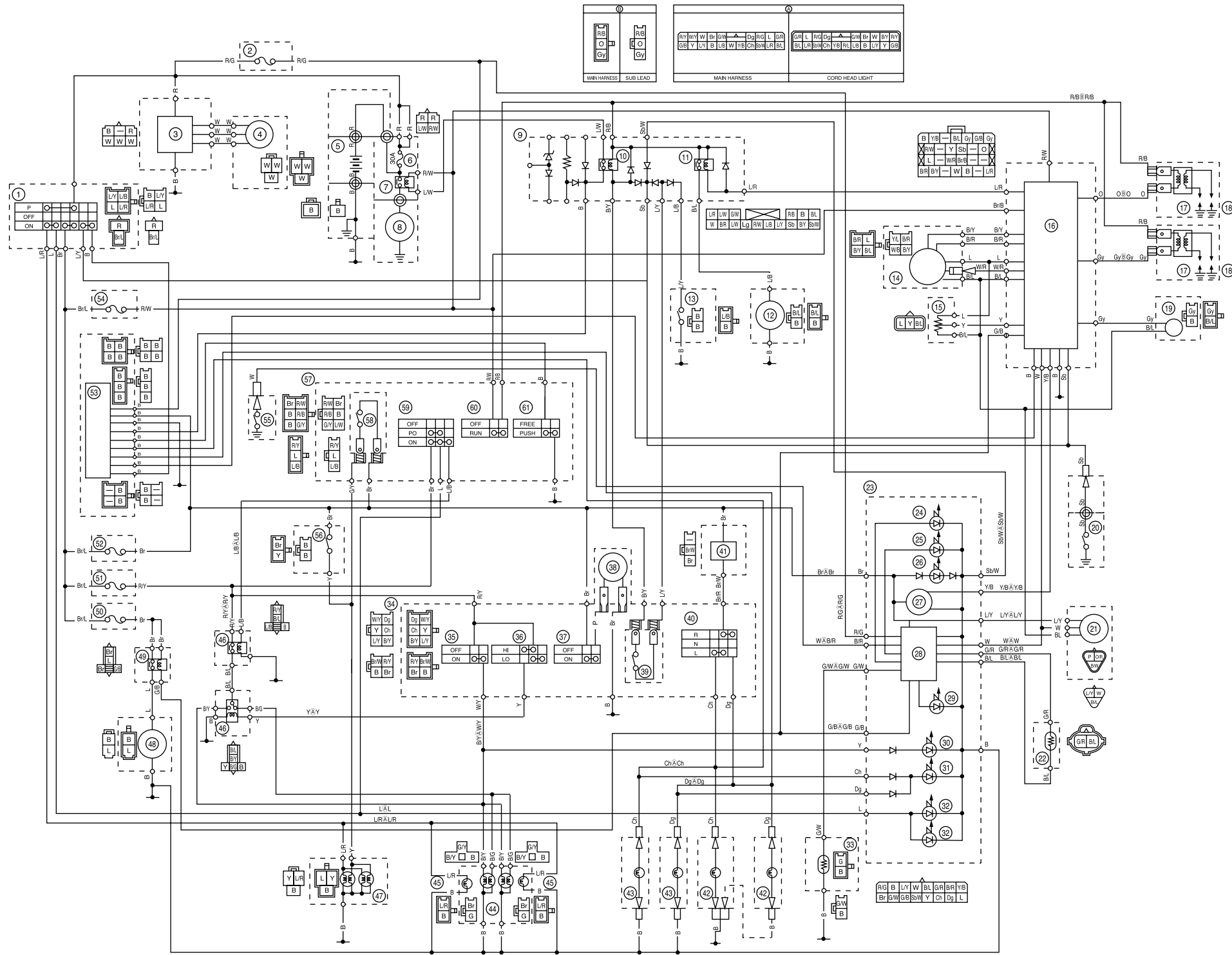
Replace the ignitor unit.

Replace the speed sensor.

**2. Fuel level warning light**  
(Refer to signal system)



# YZF-R1 WIRING DIAGRAM (For EUR)

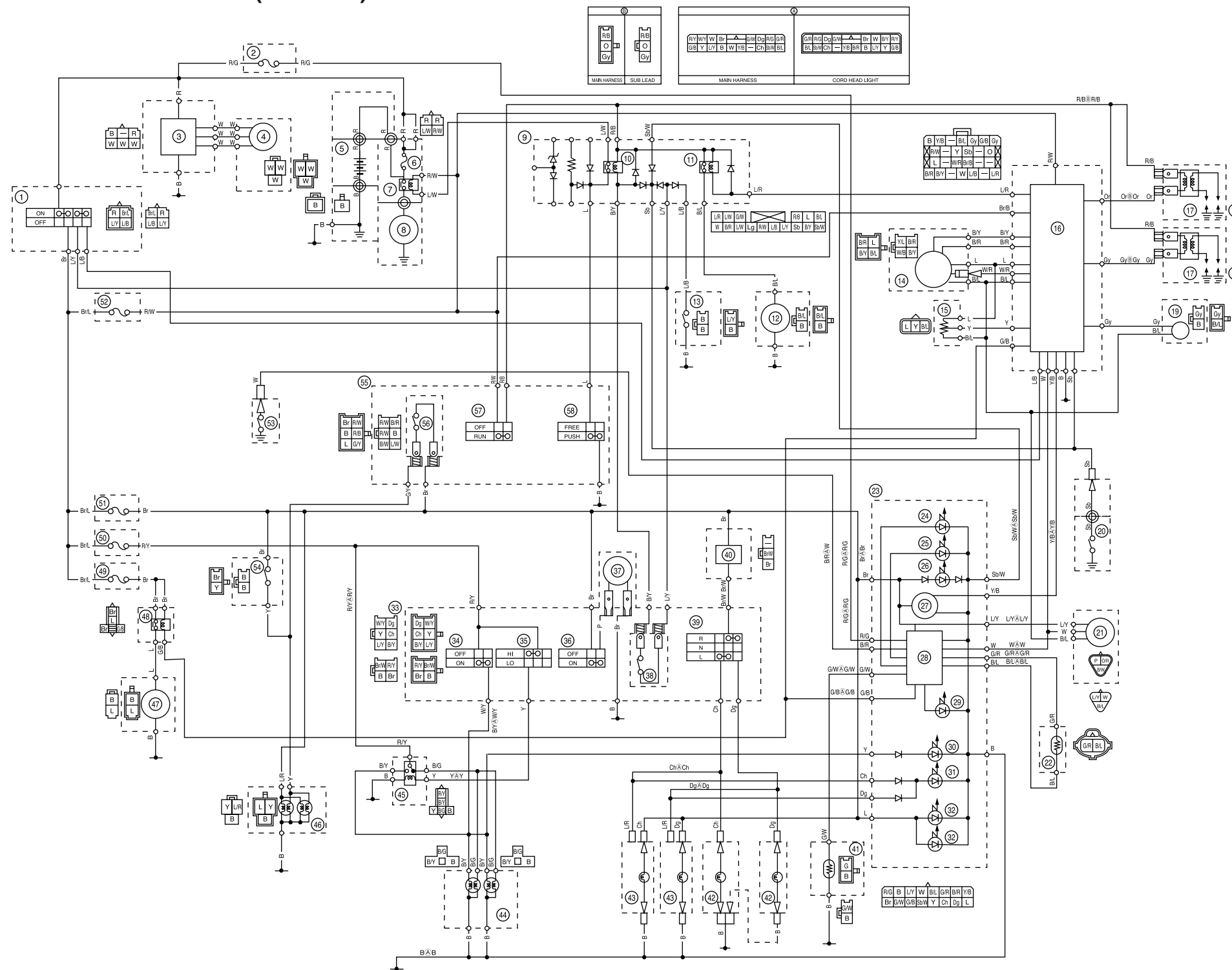


- ① Main switch
- ② Backup fuse (odometer)
- ③ Rectifier/regulator
- ④ Generator
- ⑤ Battery
- ⑥ Main fuse
- ⑦ Starter relay
- ⑧ Starter motor
- ⑨ Relay unit
- ⑩ Starting circuit cutoff relay
- ⑪ Fuel pump relay
- ⑫ Fuel pump
- ⑬ Sidestand switch
- ⑭ EXUP servomotor
- ⑮ Throttle position sensor
- ⑯ Ignition unit
- ⑰ Ignition coil
- ⑱ Spark plug
- ⑲ Pickup coil
- ⑳ Neutral switch
- ㉑ Speed sensor
- ㉒ Thermo unit
- ㉓ Meter assembly
- ㉔ Fuel level indicator light
- ㉕ Oil level warning light
- ㉖ Neutral indicator light
- ㉗ Tachometer
- ㉘ Combination meter
- ㉙ Coolant temperature meter
- ㉚ High beam indicator light
- ㉛ Turn signal indicator light
- ㉜ Meter light
- ㉝ Fuel sender
- ㉞ Left handlebar switch
- ㉟ Pass switch
- ㊱ Dimmer switch
- ㊲ Horn switch
- ㊳ Horn
- ㊴ Clutch switch
- ㊵ Turn signal switch
- ㊶ Turn signal relay
- ㊷ Rear turn signal light
- ㊸ Front turn signal light
- ㊹ Headlight
- ㊺ Auxiliary light
- ㊻ Headlight relay
- ㊼ Tail/brake light
- ㊽ Radiator fan motor
- ㊾ Radiator fan motor relay
- ㊿ Radiator fan fuse
- 1 Headlight fuse
- 2 Signaling system fuse
- 3 CYCLELOCK (option)
- 4 Ignition fuse
- 5 Engine oil level switch
- 6 Rear brake light switch
- 7 Right handlebar switch
- 8 Front brake light switch
- 9 Lights switch
- 10 Engine stop switch
- 11 Start switch

## COLOR CODE

B . . . . . black	Sb . . . . . sky blue	G/R . . . green/red	R/L . . . red/blue
Br . . . . . brown	W . . . . . white	G/W . . . green/white	R/W . . . red/white
Ch . . . . . chocolate	Y . . . . . yellow	G/Y . . . green/yellow	R/Y . . . red/yellow
Dg . . . . . dark green	B/L . . . black/blue	L/B . . . blue/black	W/B . . . white/black
G . . . . . green	B/R . . . black/red	L/R . . . blue/red	W/G . . . white/green
Gy . . . . . gray	B/W . . . black/white	L/W . . . blue/white	W/Y . . . white/yellow
L . . . . . blue	B/Y . . . black/yellow	L/Y . . . blue/yellow	Y/B . . . yellow/black
O . . . . . orange	Br/L . . brown/blue	O/R . . orange/red	Y/L . . yellow/blue
P . . . . . pink	Br/R . . brown/red	R/B . . red/black	
R . . . . . red	Br/W . . brown/white	R/G . . red/green	

# YZF-R1 WIRING DIAGRAM (For OCE)



- ① Main switch
- ② Backup fuse (odometer)
- ③ Rectifier/regulator
- ④ Generator
- ⑤ Battery
- ⑥ Main fuse
- ⑦ Starter relay
- ⑧ Starter motor
- ⑨ Relay unit
- ⑩ Starting circuit cutoff relay
- ⑪ Fuel pump relay
- ⑫ Fuel pump
- ⑬ Sidestand switch
- ⑭ EXUP servomotor
- ⑮ Throttle position sensor
- ⑯ Ignition unit
- ⑰ Ignition coil
- ⑱ Spark plug
- ⑲ Pickup coil
- ⑳ Neutral switch
- ㉑ Speed sensor
- ㉒ Thermo unit
- ㉓ Meter assembly
- ㉔ Fuel level indicator light
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- ㊲ Horn
- ㊳ Clutch switch
- ㊴ Turn signal switch
- ㊵ Turn signal relay
- ㊶ Fuel sender
- ㊷ Rear turn signal light
- ㊸ Front turn signal light
- ㊹ Headlight
- ㊺ Headlight relay
- ㊻ Tail/brake light
- ㊼ Radiator fan motor
- ㊽ Radiator fan motor relay
- ㊾ Radiator fan motor fuse
- ㊿ Headlight fuse
- 1 Signaling system fuse
- 2 Ignition fuse
- 3 Engine oil level switch
- 4 Rear brake light switch
- 5 Right handlebar switch
- 6 Front brake light switch
- 7 Engine stop switch
- 8 Start switch

## COLOR CODE

B . . . . . black	Sb . . . . . sky blue	G/R . . . green/red	R/L . . . red/blue
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Ch . . . . . chocolate	Y . . . . . yellow	G/Y . . . green/yellow	R/Y . . . red/yellow
Dg . . . . . dark green	B/L . . . black/blue	L/B . . . blue/black	W/B . . . white/black
G . . . . . green	B/R . . . black/red	L/R . . . blue/red	W/G . . . white/green
Gy . . . . . gray	B/W . . . black/white	L/W . . . blue/white	W/Y . . . white/yellow
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P . . . . . pink	Br/R . . brown/red	R/B . . . red/black	
R . . . . . red	Br/W . . brown/white	R/G . . . red/green	